Brazil Workflow Data Fabric

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Company Headquarters
2225 Lawson Lane
Santa Clara, CA 95054
United States
(408) 501-8550

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Workflow Data Fabric

Increase the impact of your cross-enterprise workflows by connecting any application or data. Connect people, processes, and apps to enhance the value of your ServiceNow investment.

Workflow Data Fabric brings automation, low-code, and AI efficiency to your workflows, all on the same platform. Workflow Data Fabric runs on the ServiceNow AI Platform®, a single system of action for the enterprise.

Automate and connect anything to ServiceNow. Unify your approach to automation with a complete set of capabilities that include insights and oversight, all on a single platform.

Integration Hub



Automate integration tasks and develop custom integrations.

Workflow Data Fabric Home



Unify and simplify data from different systems into one consistent, discoverable experience.

Robotic Process Automation (RPA) Hub



Emulate user actions and eliminate mundane and repetitive human activities.

External Content Connectors



Search content and metadata from supported external data repositories.

Zero Copy Connectors



Fetch real-time data from an external data source without copying it to your instance.

Stream Connect



Connect your Apache Kafka environment to your ServiceNow instance.

Workflow Data Fabric products and features

The following table lists the products and features that are available in Workflow Data Fabric.

Workflow Data Fabric products and features

Product name	Description
Automation Center	Automation Center application governs your end-to-end multi-vendor automation life cycles from one place. By using real-time dashboards, you can manage and measure the health of the automation and prevent automation failures across multiple vendors.

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Workflow Data Fabric products and features (continued)

Product name	Description
Boomi	Boomi supports full lifecycle API management, including governance, analytics, and API security. ServiceNow has partnered with Boomi to deliver Boomi API Management, a cloud-based platform that enables customers to discover, manage, secure, and monetize their APIs. Boomi provides documentation though their own portal, and customers requesting support with Boomi API Management will contact the Boomi support through their standard channels. To get started, see the Boomi API Management listing on the ServiceNow Store, which includes information about entitlements and required plugins, as well as a link to the Boomi API Management documentation.
Conversational Spokes	Now Assist in Conversational Spokes application to utilize the conversational ability of Integration Hub Spoke actions. Perform business actions through conversational interface like Now Assist and unlock the interactive conversational experience to automate your business workflows.
Workflow Data Fabric Home	Unify data from different systems into one consistent, governed layer. Package trusted, business-ready Data Products with built-in context and meaning. Simplify how teams discover, understand, and reuse data through the catalog.
Data Catalog	The Data Catalog is a centralized and searchable inventory of all data assets across an organization. It's enriched with metadata, context, lineage, and governance policies to make data more discoverable, understandable, and usable by both technical and business users.
Integration Hub	Automate integration tasks using ServiceNow components for ServiceNow® Workflow Studio, or develop custom integrations. A separate subscription is required.
Integration Hub Remote Process Sync	Integration Hub Remote Process Sync enables you to set up one-way or bidirectional integrations among multiple ServiceNow instances, so that your process flows stay in sync.
External Content Connectors	The External Content Connectors ServiceNow® Store application enables AI Search applications to search content and metadata from supported external data repositories, such as Atlassian Confluence Cloud and Microsoft SharePoint Online.
RPA Hub	Robotic Process Automation (RPA) Hub enables end-to-end automation for your organization. With a combination of UI interactions and element-based automations that interact between the various business applications, you can emulate user actions and eliminate mundane and repetitive human activities.
Stream Connect	Connect your Apache Kafka environment to your ServiceNow instance with Stream Connect for Apache Kafka.
Zero Copy Connectors	Securely connect to an external data source and access external data directly from your instance with zero copy connectors. Create zero copy connections and data fabric tables in Workflow Data Fabric Hub after requesting the Zero Copy Connectors app through the Now Support Service Catalog. If it isn't already installed, the app installs Workflow Data Fabric Hub.

Related ServiceNow applications and features

Instance Data Replication

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ServiceNow® Instance Data Replication (IDR) copies data updates from one instance, called the producer instance, to one or more other instances called the consumer instances. IDR enables you to maintain consistent data across different instances. For example, you can synchronize data between different organizations in your company or even between different companies with separate instances.

Inbound email actions

Define an inbound email action to script how the system responds to an inbound email.

Workflow Studio

Integrate workflow authoring, configuring, and monitoring into a single page experience. Consolidate playbooks, flows, actions, decision tables, and integrations into one design environment.

Building actions

Actions automate a repeatable task or operation within a flow. Flows run actions by passing them data as inputs. Actions run a sequence of steps to complete the task, and pass data to the flow as outputs.

Exports

Exports enable you to push data from an instance to an external file. To dynamically export data from a script or web service, export data from the URL.

Imports

Imports enable administrators to import data from various data sources, and then map that data into ServiceNow tables. You can automate data import tasks from a new design environment using Integration Hub.

Classic Orchestration

ServiceNow® Orchestration extends the workflow engine to manage processes and to automate things outside of a ServiceNow instance. See Classic Orchestration for more information.

Workflow Data Fabric Home

Unify data from different systems into one consistent, governed layer. Package trusted, business-ready Data Products with built-in context and meaning. Simplify how teams discover, understand, and reuse data through the catalog.

Get started

Explore	Configure	Ask ServiceNow Otto
Learn about Workflow Data Fabric concepts and features	Learn how to set up Workflow Data Fabric	Learn how to use ServiceNow Otto for WDF

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Connect to external systems



Discover, build, configure, and manage the complete life-cycle of your integrations

Reference



Get details about Workflow Data Fabric key terms and background information

Exploring Workflow Data Fabric Home

Workflow Data Fabric Home is ServiceNow's unified data foundation that connects enterprise data where it lives, governs it through stable contracts, and makes it ready for workflows, analytics, and AI.

Workflow Data Fabric Home overview

Workflow Data Fabric addresses a common enterprise challenge: Data is scattered across dozens of systems, integrations are rebuilt team by team, and AI agents lack the governed context they need to act reliably. Workflow Data Fabric Home addresses this challenge so that once data is connected and governed, any team can discover and reuse it without rebuilding pipelines or compromising data integrity.

ServiceNow Otto for Workflow Data Fabric (WDF)

The AI-guided entry point and parent interface for Workflow Data Fabric, powered by ServiceNow Otto for WDF. Describe what you need and ServiceNow Otto for WDF recommends whether to reuse existing data or connect a new source, and then routes you to the right place.

Connect Hub

Where Connection Admins create and manage connections to external systems. From Connect Hub, admins configure credentials and authentication, set up metadata collectors, and grant Data Stewards access to work with connected data.

For more information, see Workflow Data Fabric Home navigation.

Workflow Data Fabric Home users

Users

User	Description
Connection Admin	Creates and manages connections, configures credentials, sets up metadata collectors, and grants Data Stewards access to connections.
Data Steward	Creates and owns all Data products and Data interfaces. Responsibilities include schema design, governance,

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Users (continued)

User	Description
	metadata management, backward compatibility enforcement, and lifecycle management of all data contracts.
WDF Builder	Creates connectors, spokes, and MCP servers to extend the connectivity layer without owning or modifying data contracts.
WDF Operator	Builds deterministic and agentic workflows that consume governed data through Data Interfaces. WDF Operators are consumers of contracts, not owners or modifiers.
WDF Consumer	Explores the Data Catalog to discover data products, evaluates them for use, requests access, and uses governed data through workflows, analytics, AI agents, or APIs.

For more information, see Workflow Data Fabric Home roles.

What to explore next

To learn more about configuring and using Workflow Data Fabric Home, see:

- Configuring Workflow Data Fabric Home
- ServiceNow Otto for Workflow Data Fabric (WDF)
- Connect to external systems
- Workflow Data Fabric Home Reference

Workflow Data Fabric Home navigation

Workflow Data Fabric Home provides a unified, guided experience for connecting, understanding, and using enterprise data to power workflows, analytics, and AI. Access the tools needed to build trusted data assets, govern them, and make them available for consumption.

ServiceNow Otto for Workflow Data Fabric (WDF)

You return to the home page by selecting the Home icon .

From the Workflow Data Fabric Home landing page, use the Now Assist search field with the icon for guidance on setting up integrations. Navigate straight to selected capabilities using the **Quick links**. For more information, see ServiceNow Otto for Workflow Data Fabric (WDF).

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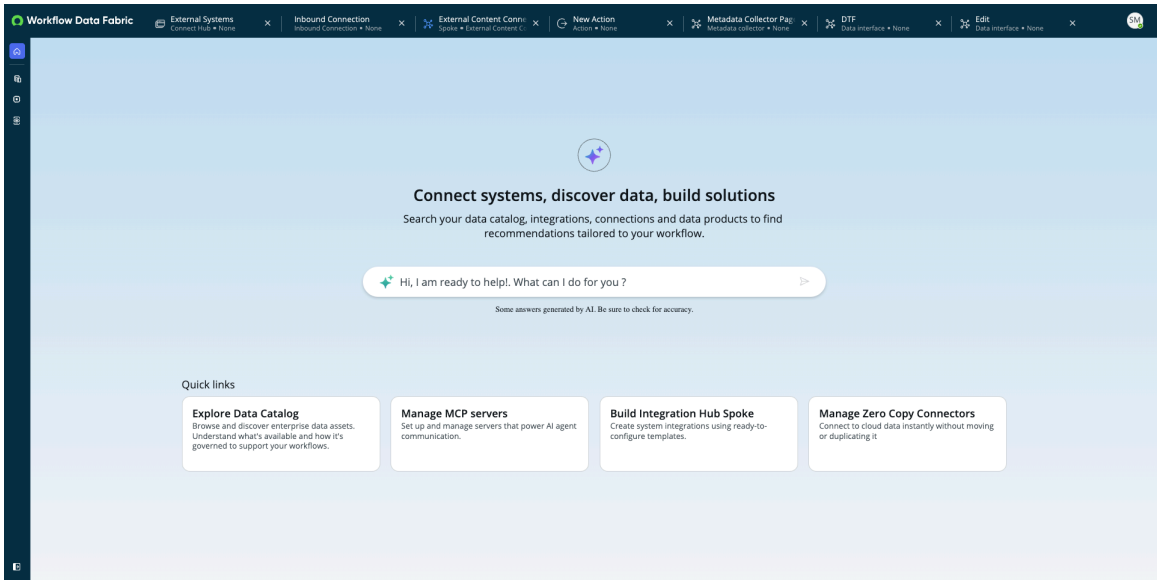
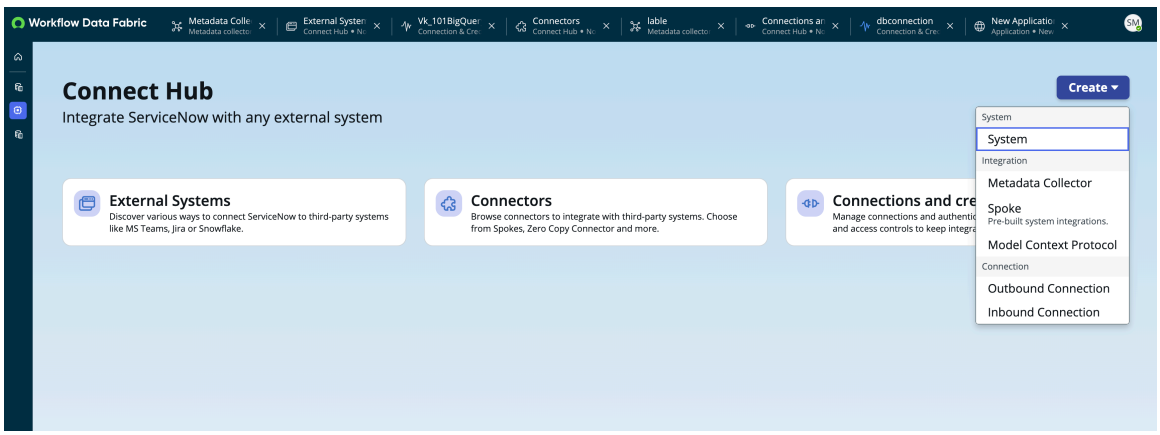


Connect Hub

You access Connect Hub by selecting the Connect Hub icon .

Discover, manage, and connect ServiceNow to external systems using Connect Hub. The unified interface eliminates the need to switch between multiple tools and interfaces, reducing knowledge silos and improving collaboration across teams working with different integrations types. Connect Hub provides consistent access to integration capabilities and shared resources. For more information, see Connect to external systems.



Configuring Workflow Data Fabric Home

Install Workflow Data Fabric Home and supporting applications to integrate data from multiple sources, unify it into a consistent structure, and make it available across UI, workflows, GenAI, agents, and processes.

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Configuration overview

1. Install other required Workflow Data Fabric applications if they aren't already installed.

   Other Workflow Data Fabric store applications

Application	App ID	Link
Zero Copy Connectors	(sn_data_fabric_zcc) and (sn_data_fabric)	Configuring Zero Copy Connectors
Workflow Data Fabric Credits	(sn_wdf_token)	Workflow Data Fabric Credits

2. Install the Connect Hub (sn_wdf_connect_hub) store application. WDF Unified Hub (sn_wdf_unified_hub) and ServiceNow Otto for Workflow Data Fabric (WDF) (sn_nowassist_wdf) are automatically installed with Connect Hub (sn_wdf_connect_hub).

   For more information, see Install Workflow Data Fabric Home store applications.

3. Configure the ServiceNow Otto for Workflow Data Fabric (WDF) (sn_nowassist_wdf) plugin. Create a ServiceNow Product Documentation connector, and activate the flow generation skill to enable full AI agent capabilities

   For more information, see Configure ServiceNow Otto for Workflow Data Fabric (WDF).

4. Assign Workflow Data Fabric roles to control access to features, capabilities, and data in Workflow Data Fabric Home.

   For more information, see Assign roles to Workflow Data Fabric Home users.

Install Workflow Data Fabric Home store applications

You can install Workflow Data Fabric store applications if you have the admin role.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the Workflow Data Fabric Home application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin

About this task

Roles are installed with the Workflow Data Fabric Home store applications. For more information, see Workflow Data Fabric Home roles.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Connect Hub (sn_wdf_connect_hub) Home store applications using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

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Workflow Data Fabric Home store applications installed with Connect Hub

Name	App ID
WDF Unified Hub	sn_wdf_unified_hub
ServiceNow Otto for Workflow Data Fabric (WDF)	sn_nowassist_wdf

A list of the versions available to you are displayed.

3. Select a version from the list and select **Install**.

   In the Review Installation Details dialog box, any dependencies installed with your application are listed.

4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
6. Select **Install**.

Assign roles to Workflow Data Fabric Home users

Assign roles to control access to features, capabilities, and data in Workflow Data Fabric Home.

Before you begin

Set the application scope using the application picker.

Role required: admin

About this task

For detailed information about roles that are installed with Workflow Data Fabric Home, see Workflow Data Fabric Home roles.

Procedure

Assign roles to users and groups using the ServiceNow AI Platform user administration feature.

- Assign a role to a user
- Assign a role to a group

ServiceNow Otto for Workflow Data Fabric (WDF)

Use ServiceNow Otto for Workflow Data Fabric (WDF) to describe what you want to achieve and get AI-driven recommendations on the right Workflow Data Fabric tools, data assets, and next steps.

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Get started

Explore



Learn more about ServiceNow Otto for WDF

Configure



Configure ServiceNow Otto for WDF to get started

Ask Now Assist



Learn how to get guidance from ServiceNow Otto for WDF

Reference



Get details about ServiceNow Otto for WDF background information

Important:

- Not all model providers are available for customers with in-country SKUs, and some AI products/features are currently unavailable for in-country customers. For more information, see the KB1584492 article in the Now Support Knowledge Base. Be sure to check for model provider availability updates in future releases.
- Some AI products/features are currently unavailable for customers in the FedRAMP, NSC DOD IL5, or Australia IRAP-Protected data centers, self-hosted customers, or in other restricted environments. For more information, see the KB0743854 article in the Now Support Knowledge Base. Be sure to check for availability updates in future releases.
- Some AI products/features are currently available only for customers in some regions. Be sure to check for availability updates in future releases.
- Some AI products and skills are not available in Regulated Markets. For more information, see KB2593939: Regulated Markets AI Products/Skills Not Available. Be sure to check for availability updates in future releases.

Troubleshoot and get help

- ServiceNow Community on AI and Intelligence
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Furthermore, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-

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making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. In addition, this application will collect information about applications (and associated application files) in which app generation was utilized. Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

Exploring ServiceNow Otto for Workflow Data Fabric (WDF)

With the ServiceNow Otto for Workflow Data Fabric (WDF) application, you can obtain information about setting up integrations.

ServiceNow Otto for WDF overview

Use ServiceNow Otto for WDF to discover data fabric tables, connectors, and collectors, and request guidance on how to set up integrations.

ServiceNow Otto for WDF includes the oneExtend LLM skill that enables you to find information about collectors, connectors, data fabric tables, data products, and more.

ServiceNow Otto for WDF users

Users

User	Description
All Workflow Data Fabric user roles	• Connection Admin • Data Steward • WDF Builder • WDF Operator • WDF Consumer

What to explore next

To learn more about configuring and using Now Assist for WDF, see:

- Configure ServiceNow Otto for Workflow Data Fabric (WDF)
- Ask ServiceNow Otto for Workflow Data Fabric (WDF) for recommendations
- ServiceNow Otto for Workflow Data Fabric (WDF) Reference

oneExtend LLM skill

ServiceNow Otto for Workflow Data Fabric (WDF) includes the oneExtend LLM skill that guides you through integration setup.

Important: Some generative AI skills, AI agents, and agentic workflows are turned on by default. For more information, see AI agents, skills, and agentic workflows on by default.

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The oneExtend LLM skill is included with the ServiceNow Otto for WDF experience. Follow the instructions in Configure ServiceNow Otto for Workflow Data Fabric (WDF) to install the plugin.

By default, all skills exist in the global domain. When you use AI in a domain-separated environment, users are only able to access data in their domain. For example, if a user uses the summarization skill, AI only uses material that exists in the user's domain when generating that summary. Additionally, there is no co-mingling of data for domain-separated instances when using generative AI skills. The data resides only on the instance, and the shared services used for generative AI do not persist any requests (prompts) and responses. For more information, see Domain separation in the AI Admin Hub console. (Note that global domain is not the same as global scope. For more information, see Exploring Next Experience pickers.)

Related topics

Ask ServiceNow Otto for Workflow Data Fabric (WDF) for recommendations

Configure ServiceNow Otto for Workflow Data Fabric (WDF)

If you have the admin role, you can configure the ServiceNow Otto for Workflow Data Fabric (WDF) application to enable AI capabilities across the Workflow Data Fabric platform.

Before you begin

To install any Now Assist plugin, you must have Now Assist capabilities activated. For more information, see AI Admin Hub.

Role required: admin

About this task

Use the AI Admin Hub console to configure Now Assist for WDF. For additional information, see Overview tab in AI Admin Hub.

The oneExtend LLM skill is included in Now Assist for WDF.

Procedure

1. Navigate to **All** > **System Definition** > **Plugins**.
2. Find the ServiceNow Otto for WDF plugin (sn_nowassist_wdf) using the filter criteria and search bar and install the ServiceNow Otto for WDF plugin (sn_nowassist_wdf).

   For information about the installation process, see Install plugins for ServiceNow Otto.
3. Select the Now Assist for WDF plugin tile, select **Install**, and confirm.
4. **Optional:** Navigate to **All** > **External Content Connectors** > **External Content Admin Home** and create the **ServiceNow Product Documentation** connector to index and enhance AI search with content from the ServiceNow product documentation site.
   Core functionality isn't affected if skipped, but some AI agent capabilities may be limited. For more information, see https://www.servicenow.com/docs/r/platform-administration/ai-search/servicenow-product-documentation-external-content-connector.html.

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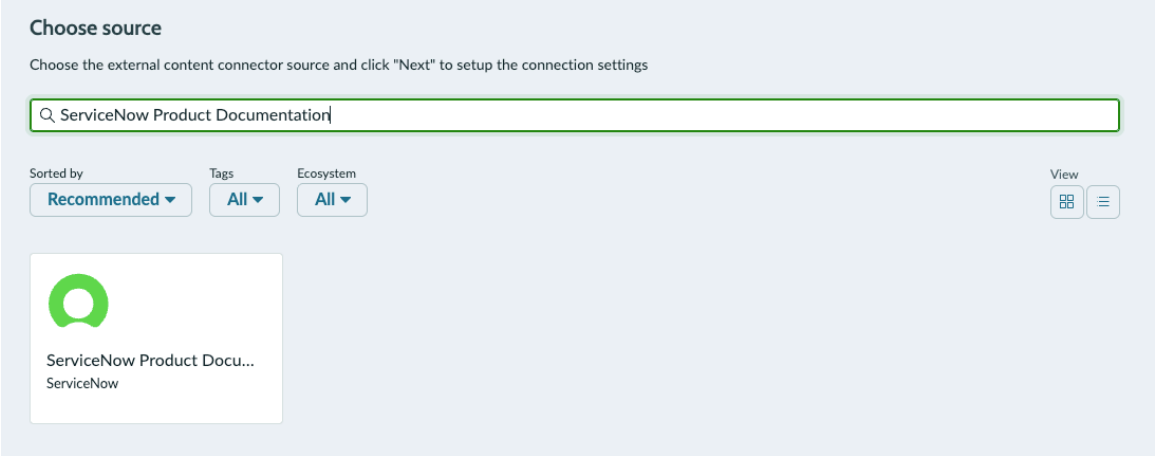
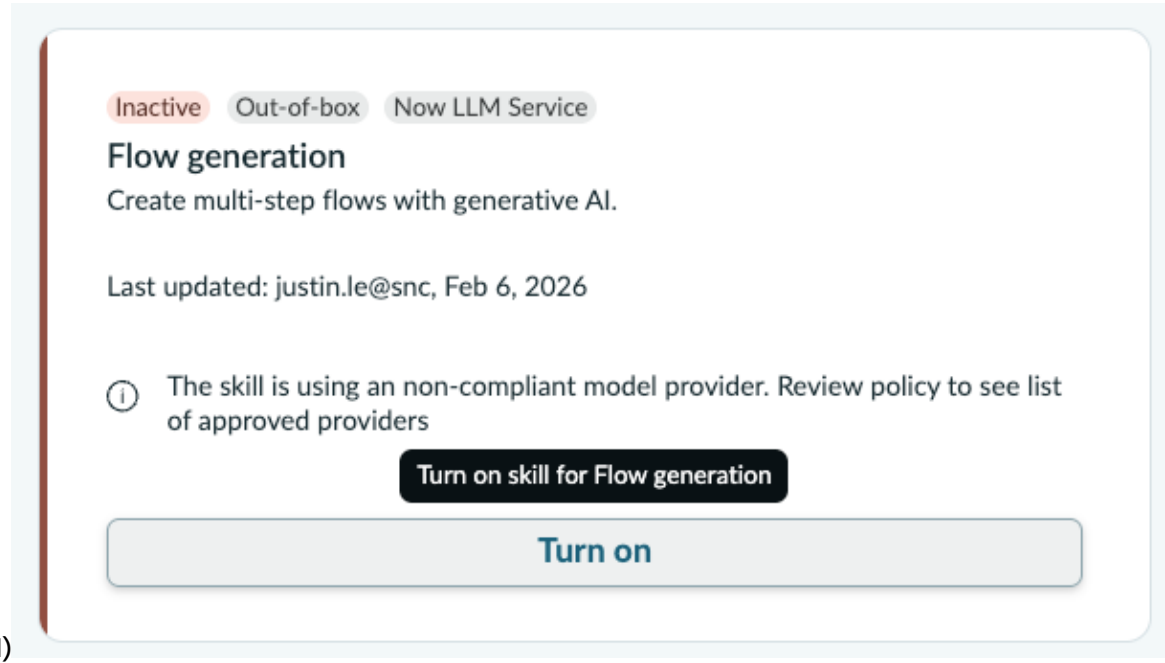


5. **Optional:** Activate the flow generation skill.

   (Optional) Core functionality isn't affected if skipped, but some AI agent capabilities may be limited.

   a. Navigate to **All** > **Now Assist Admin** > **Skills**.

   (Optional)



   b. On the **Flow generation** tile, select **Turn on** and confirm to activate the skill.

   (Optional) You're asked to specify any ACLs permitted to access the flow generation skill and configure role restrictions. You can leave these fields empty. For more information, see https://www.servicenow.com/docs/r/build-workflows/now-assist-for-creator/turn-on-the-flow-generation-skill.html.

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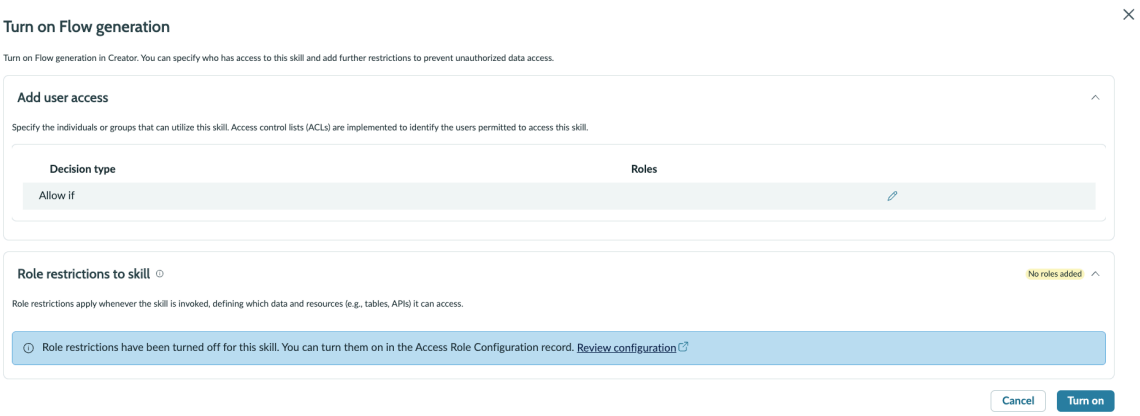


c. Delete a skill by selecting **Deactivate skill** on the skill's tile, and confirm.

Related topics

Overview tab in AI Admin Hub

Configuring Now Assist Admin features

Ask ServiceNow Otto for Workflow Data Fabric (WDF) for recommendations

Find guidance on setting up integrations, understand the advantages of different integration tools, and get links to sources of information.

Before you begin

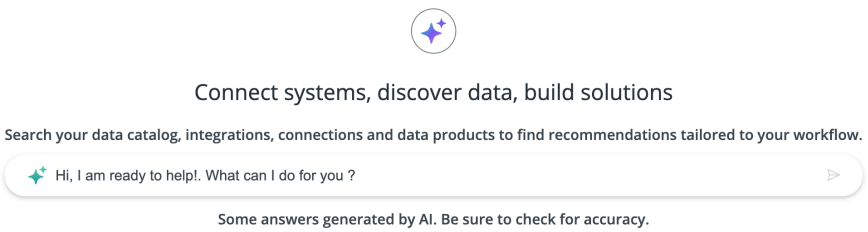
Role required: df_data_steward, connection_admin, wdf_operator, wdf_builder, wdf_consumer

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. On the landing page, enter your question in the Now Assist search field .

   Ask for information in plain language. For example, `How can I connect to Jira`.

   If specific applications have data available that you want to use, enter the application name and get relevant links. For example, `MySQL`.



3. **Optional:** Select source links to see more information about a topic.

Note: You can access support information and toggle audio notifications from the Support and setting icon .

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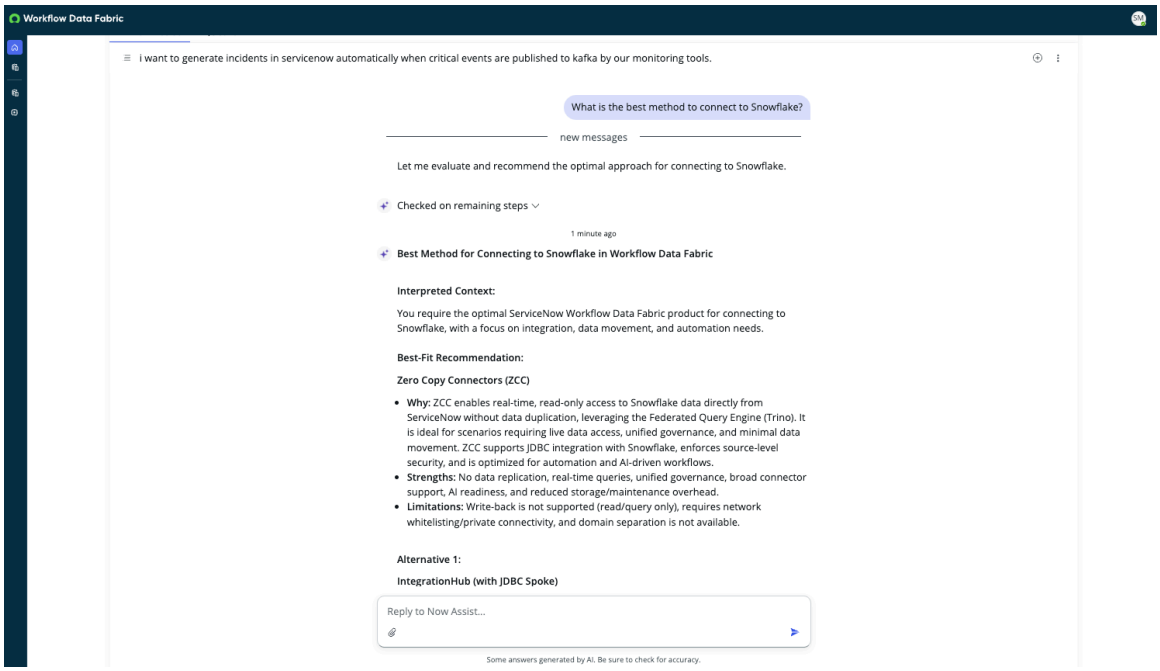
Result
ServiceNow Otto for Workflow Data Fabric (WDF) provides the information that you requested, including alternatives, sources, and a summary.



Example: Search documents across cloud drives
Employees collaborate in Google Drive and Microsoft OneDrive. We need near real-time indexing so the latest documents are searchable in ServiceNow immediately.

Example: Build dashboards with external data
We want to build executive dashboards using finance data stored in BigQuery/Redshift, but we don't want to copy or synchronize that data into ServiceNow or another system.

Example: Automate incident creation
I want to generate incidents in ServiceNow automatically when critical events are published to Apache Kafka by our monitoring tools.

Example: Unify customer data
Customer data exists across Salesforce SAP, and internal databases. We need a unified view for support and operations without syncing everything into a single system.

Example: Search the data catalog
The support team is investigating customer churn. It wants to find data assets in the Data Catalog that hold subscription and cancellation records, along with the related glossary terms.

Example: Classify ServiceNow assets
The data privacy team wants data class recommendations for the ServiceNow columns in the Data Catalog. Select the promoted Classifying ServiceNow assets with Vault agents agentic workflow, if available on this panel, or ask Otto to classify the ServiceNow assets.

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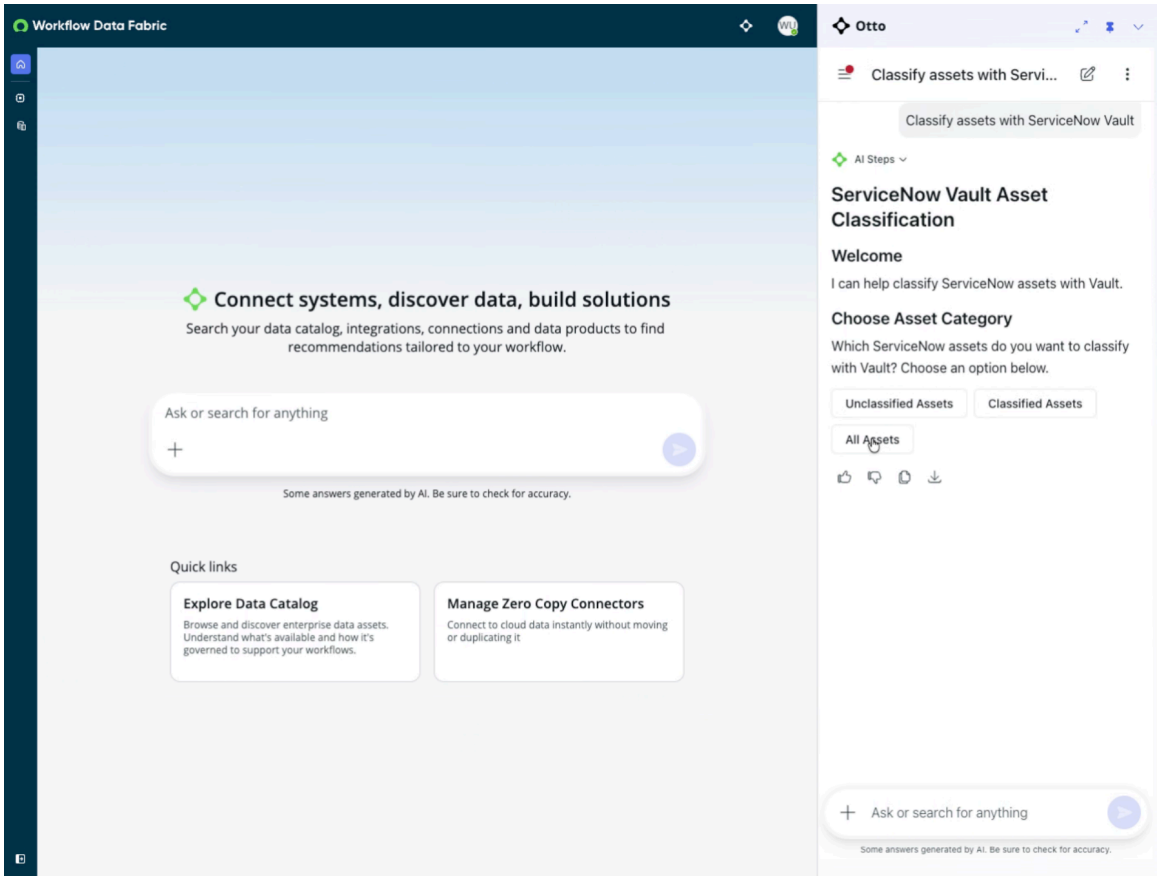
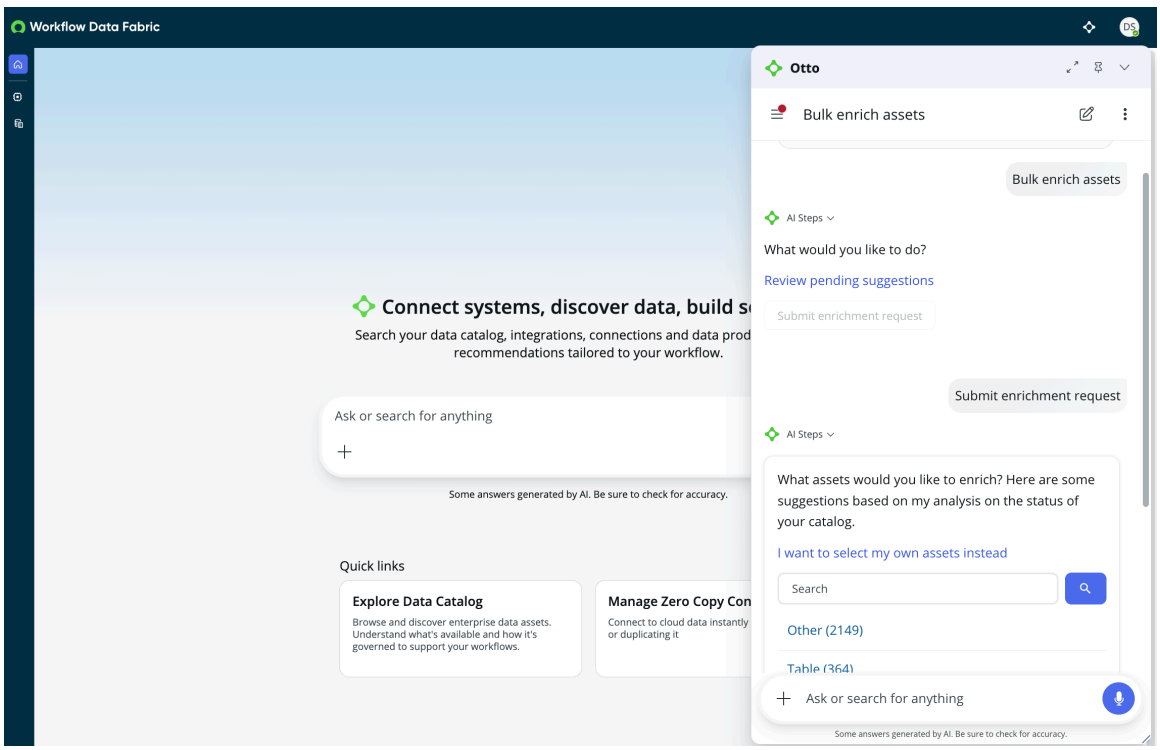


Example: Enrich metadata for data assets

A recent metadata collector run onboarded new assets to the Data Catalog, but their metadata is still incomplete. Select the promoted Bulk-enrich assets action, if available on this panel, or ask Otto to bulk enrich the assets.



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Related topics

oneExtend LLM skill

ServiceNow Otto for Workflow Data Fabric (WDF) Reference

Find reference information for ServiceNow Otto for Workflow Data Fabric (WDF), including table and field details.

Installed with ServiceNow Otto for Workflow Data Fabric (WDF)

Several tables are installed with activation of the ServiceNow Otto for Workflow Data Fabric (WDF) plugin.

Tables installed

Table	Description
Quicklink [sn_wdf_quicklink]	Contains quick link parameters for ServiceNow Otto for WDF.
Search Result Route Config [sn_wdf_search_results_route_config]	Contains routing configurations for search results for ServiceNow Otto for WDF.

Connect to external systems

Connect Hub is a unified workspace for discovering, building, and managing integrations between ServiceNow and external systems. It consolidates discovery, configuration, and management into a single interface.

Key capabilities of Connect Hub

Connect Hub provides a consolidated interface to accomplish key integration tasks :

Discover external systems and integration opportunities

Explore available external systems and identify connection methods for over 200 third-party systems like MS Teams, Jira, and Snowflake.

Build and manage connectors

Access prebuilt integration components including Spokes, Zero Copy Connectors, and custom connector types. Browse the connector library to select appropriate tools for your integration scenarios or integrate Model Context Protocol clients.

Configure connections and credentials

Set up and manage secure authentication details, endpoint URLs, and access controls for your integrations between ServiceNow and external systems.

Access specialized integration tools

Use Connect Hub as the entry point for building Spokes and setting up Model Context Protocol clients.

Understanding connectors and connections

Connect Hub distinguishes between two fundamental integration concepts: connectors and connections. Understanding this relationship is essential for effective integration development.

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Connectors

Prebuilt integration components that define communication with specific external applications. A connector acts as a translator between ServiceNow and the target system, providing actions, triggers, and data-mapping capabilities. For example, a Jira connector contains all the logic needed to interact with Jira's API, including available operations like creating issues or updating workflows. Connectors are reusable tools that you configure once and use across multiple connection instances.

Connections

Specific configuration instances that contain the credentials and endpoint details needed to establish communication with a particular external system. A connection holds authentication information such as API keys, OAuth tokens, or user name and password combinations, along with the target system's URL. You create a connection by selecting a connector and providing the specific credentials for your environment. For example, you might use the Jira connector to create separate connections for your development, staging, and production Jira instances.

The relationship between connectors and connections follows a one-to-many pattern. A single connector supports multiple connection instances, enabling you to reuse integration logic across different environments or system instances while maintaining separate credentials and configurations for each. For example, you can have one Jira spoke connector but have three different connections: one each for development, staging, and production respectively.

Request apps on Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store.

Application version

Connect Hub v2.4.0 is the latest version.

Create external systems

Create a custom external system to organize integrations beyond the default systems.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Click the **External Systems** card.
3. Click **Create** > **External System**.
4. In the **System** field, enter a descriptive name for your system.
5. **Optional:** Click the image area and upload an icon or logo.
6. Click **Add**.

Result

Your new system appears in the **Custom systems** section on the **External Systems** page.

Modify an external system

Change the name of an external system or the image depicting the system.

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Before you begin
Role required: admin

Procedure

1. Click the **External Systems** card.
2. In the **Custom systems** pane, click **Edit** next to the system name.
3. Change the system name or icon.
4. Click **Update**.

Explore external systems

Find and explore external systems through search and filtering.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Select the **External Systems** card.
   The **External Systems** tab displays the list of external systems (custom and default systems) currently available in Connect Hub.
3. Search for a system to narrow the list of systems.
4. Select a system to view the connectors and connections that are part of the external system.

Build integrations with connectors

Browse connector types to communicate with the external systems. Connectors move data, trigger actions, and automate tasks between platforms based on your workflow needs.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Select the **Connect Hub** icon from the left navigation.
3. Find the connector type you need:
   - **Spoke** - See Building spokes using Spoke Generator for full build and configuration details.
   - **Model Context Protocol (MCP)** - See MCP Integration Documentation for full configuration details.
4. Find your connector in the list.
5. Click the connector to configure it.

Map connector to system

After creating a connector, configure connectors with an external system.

About this task
Connectors must be mapped to an external system before they can be used. If you want to link a unmapped connector (spoke or MCP) to an external system, you must map it to an external system.

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Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Click **Connectors**.
3. Click **Map System** in the System Name column.
4. Choose an existing system to map the connector to.

   To create an new external system, click  to add a new external system to map an existing connector.
5. Choose the connector type.
6. Click **Save** to complete the mapping.

View Connectors

View the list of connectors for an external system.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Select the **External Systems** card.
   The **External Systems** tab displays the list of external systems (custom and default systems) currently available in Connect Hub.
3. Select an external system and select **Connectors**.
   The list of connectors available for the external system are displayed as cards.
4. Click a connector card to display the connection settings in a new **Connector** tab.

Model Context Protocol connectors

Model Context Protocol (MCP) connectors in Connect Hub enable AI agents to access tools and data from external systems using a standardized communication protocol.

MCP is an open protocol that defines how AI agents communicate with external systems to discover and invoke tools, retrieve resources, and share context. By standardizing this communication layer, MCP allows AI agents to interact with a wide range of third-party applications without requiring custom integration logic for each one.

In Connect Hub, an MCP connector represents a configured connection between ServiceNow and an external system that exposes an MCP-compatible server. Once an MCP connector is set up, AI agents can use it to access the tools and capabilities that the external system provides, enabling coordinated, context-aware workflows across models and systems.

MCP Registry

ServiceNow MCP Registry is a private registry where large language models (LLMs), AI agents, and teams discover and connect to approved MCP servers, finding the best tool for every business problem, governed at every step. The Registry enables AI models and humans query available MCP servers and select the ones best suited to solve a business problem. Every server exposed to an LLM can obtain approval from AICT, helping to ensure autonomous decisions

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never bypass enterprise governance. It works with AI Agent Studio, Claude, and so on. For more information, see ServiceNow MCP Registry.

MCP connector registration methods for OAuth 2.1

Connect Hub supports two OAuth client registration methods for connecting to external systems: manual client registration and dynamic client registration. When the MCP registry does not include a connector for the system you need, you can define a custom connector. Connectors that are tested and approved by ServiceNow display a **Certified by ServiceNow** label in the registry.

Dynamic client registration automates the OAuth application setup between Connect Hub and the third-party provider. Instead of requiring you to create an OAuth application manually, the provider and Connect Hub negotiate the client credentials automatically as part of the connection flow. When a connector may probably require manual setup, the registry entry displays the label **Manual setup may be required** next to the connector name.

Dynamic client registration offers the following advantages over manual registration:

- Credentials are managed by the provider and rotated automatically, reducing the risk of credential exposure.
- The connection workflow is completed in fewer steps.

Manual client registration requires you to create and configure an OAuth application in the third-party system's developer settings before connecting the MCP connector. During this process, the third-party system issues Client ID and a Client secret, which you provide to Connect Hub to authorize the connection.

The MCP registry in Connect Hub includes connectors for a curated set of third-party systems. If the registry does not contain a connector for the system you need, you can define a custom connector by providing your own MCP endpoint URL and authentication configuration.

Authentication methods for custom connectors

When creating a custom MCP connector, you select an authentication method that matches the security requirements of your external MCP server. The following authentication methods are supported:

- **OAuth 2.1**: The recommended method for MCP connectors. Supports both Dynamic Client Registration, where the server auto-populates client details, and Manual Client Registration, where you supply the client credentials directly.
- **API key**: Uses a static key issued by the third-party application to authenticate requests to the MCP server.
- **Basic Authentication**: Authenticates using a username and password associated with the MCP server.

Dynamic client registration

Connect an MCP connector in Connect Hub to enable AI agents in Workflow Data Fabric to interact with an external system using automatic OAuth authorization.

Before you begin

- An account with the third-party system you want to connect to. Ensure that your account has the permissions required to authorize OAuth applications.
- Role required: wdf_builder or admin.

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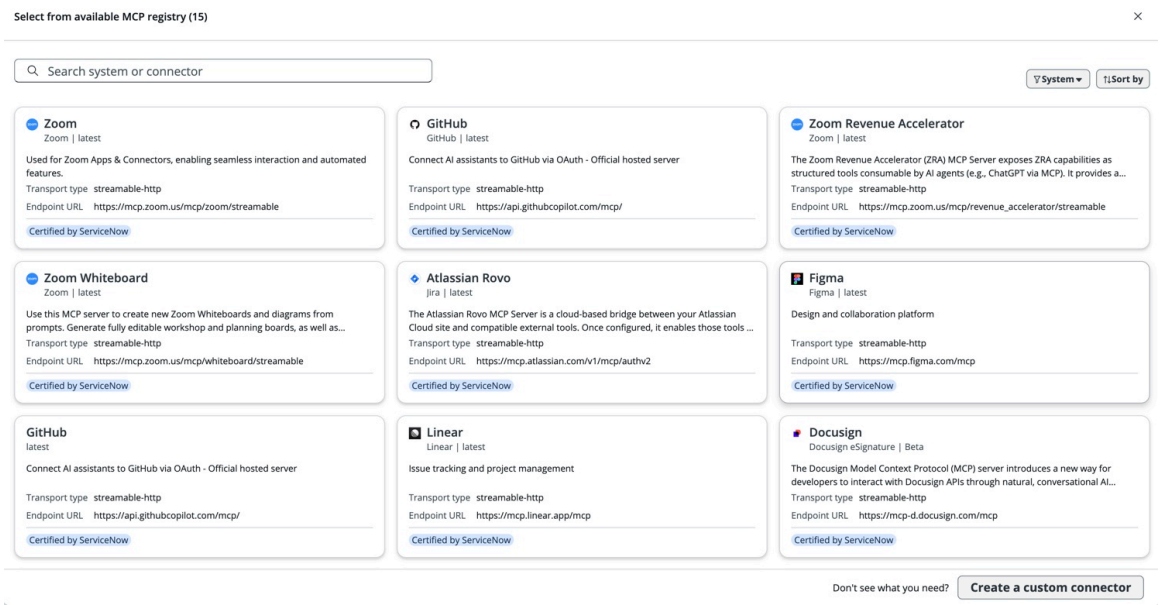
About this task

Dynamic client registration enables you to connect an MCP connector that supports automatic OAuth authorization, such as Linear. In this, Connect Hub redirects you to the third-party provider's authorization page, where you approve the connection. No Client ID or Client secret is required. If the connector you want to use requires manual setup with a Client ID and Client secret, see Manual client registration.

For the list of available MCP connectors, see Available Enterprise MCP Registries.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Click **Create** and select **Model Context Protocol**.
   The list of all available MCP connectors is displayed.



3. Locate the connector you want to use.
   - To search for a connector by name, enter the connector or system name in the **Search system or connector** field.
   - To filter by system, select **System**, select one or more systems from the list, and then select **Apply**.
   - To change the sort order, select **Sort by** and choose the preferred option.
4. Select the connector card.
   A details panel opens on the right, displaying the connector's description, system, type, endpoint URL, and certification status. If multiple connectors are available for the same system, they are listed under **Other connectors** in the panel.

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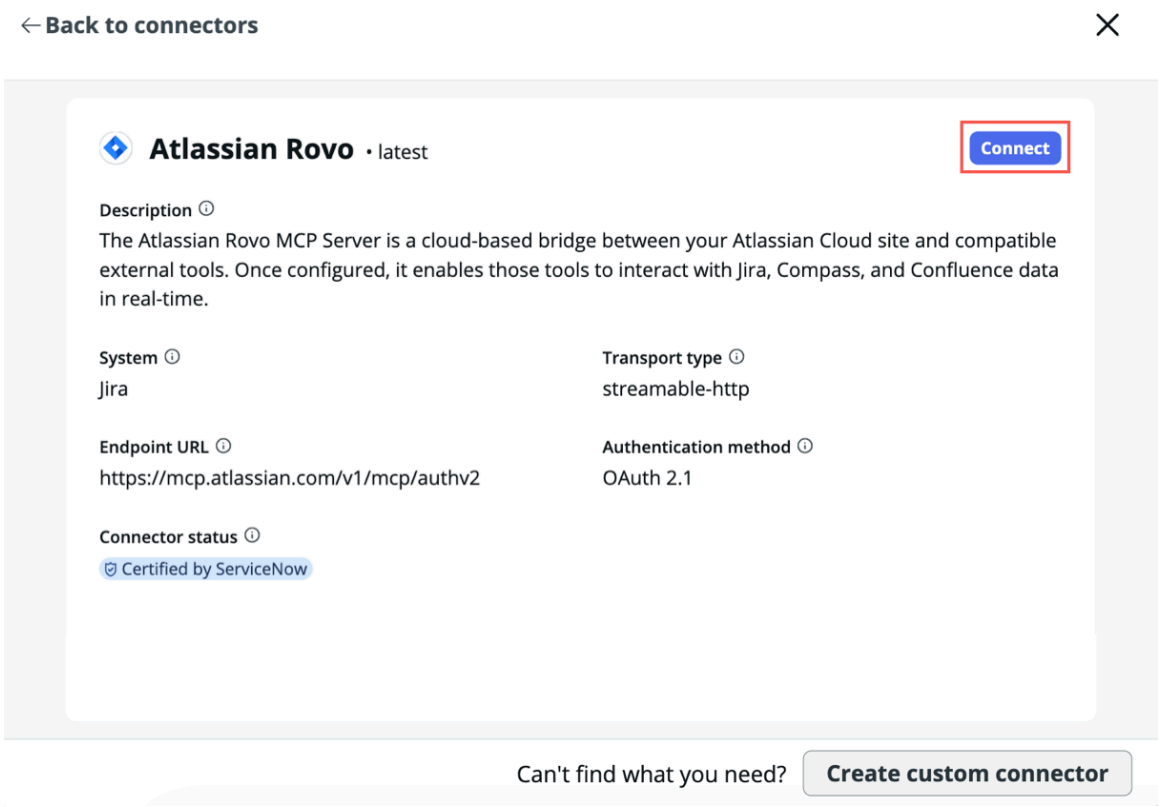

5. Select **Connect**.
   Connect Hub initiates the OAuth authorization flow and redirects you to the third-party provider's authorization page in a new browser window or tab. The dialog in Connect Hub shows the status message.
6. In the third-party provider's authorization page, review the requested permissions and select **Approve**.

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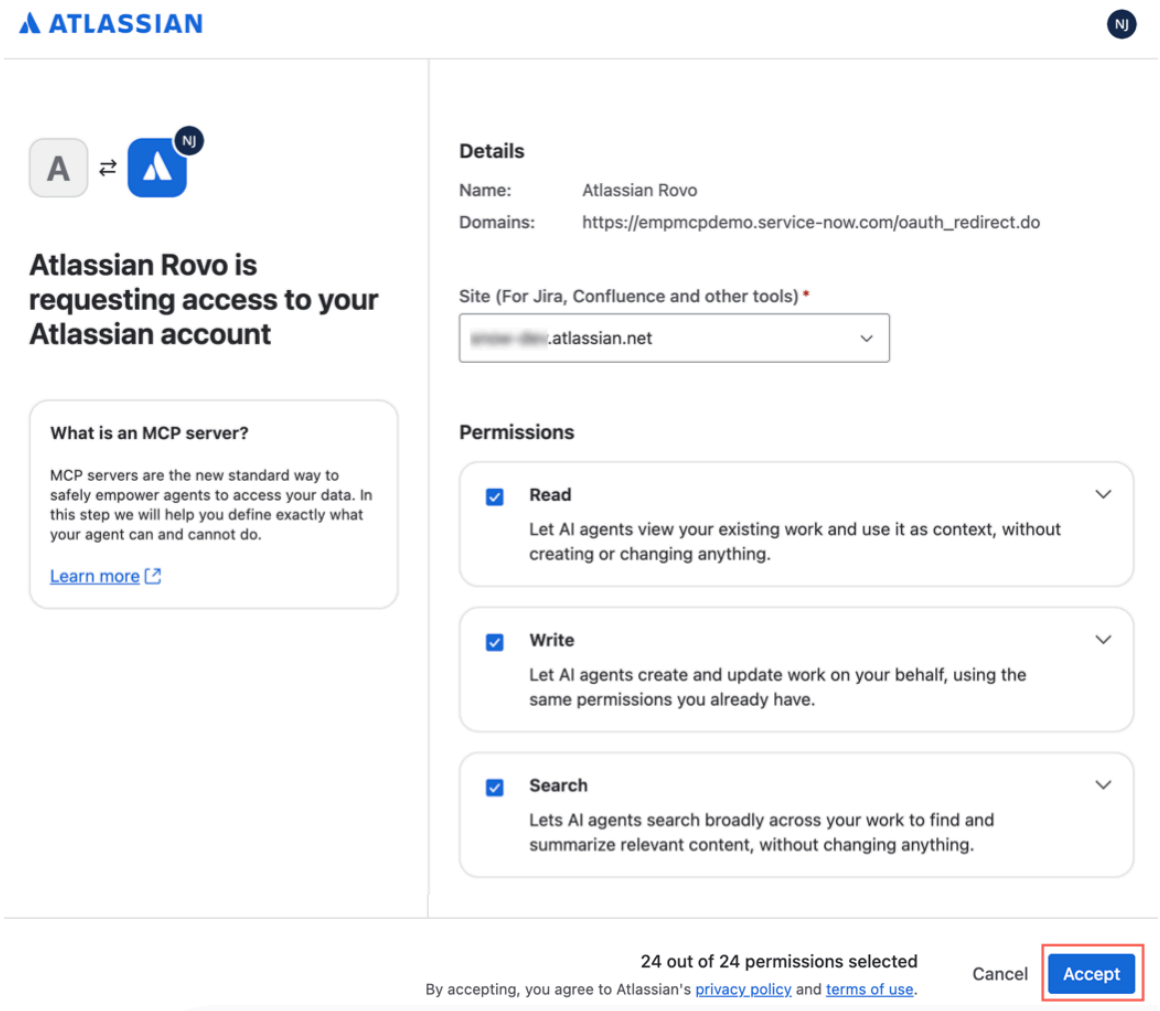

7. Provide the credentials when prompted.
   After authorization completes, the Edit MCP Connector page is displayed with the connection record details. A **Connected** label is displayed next to the connection name when the connector is ready for use.

Result
The MCP connector is connected to Connect Hub and available for use in AI agent configurations and automation flows.

Dynamic client registration use case: Jira

This use case illustrates manual client registration for Jira.

Before you begin
Role required: admin

Procedure
1. Log in to your Atlassian Administration account.
2. Navigate to **Settings** > **Billing**.
3. Navigate to **Rovo** > **Rovo MCP server**.
4. Click **Add domain**.

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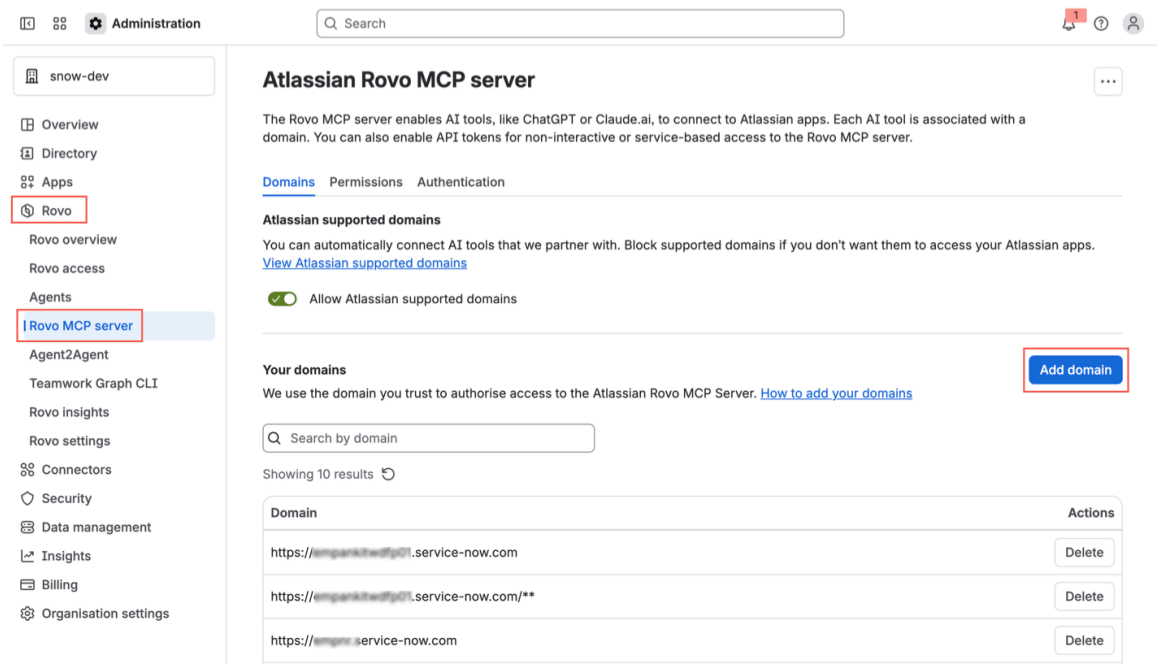
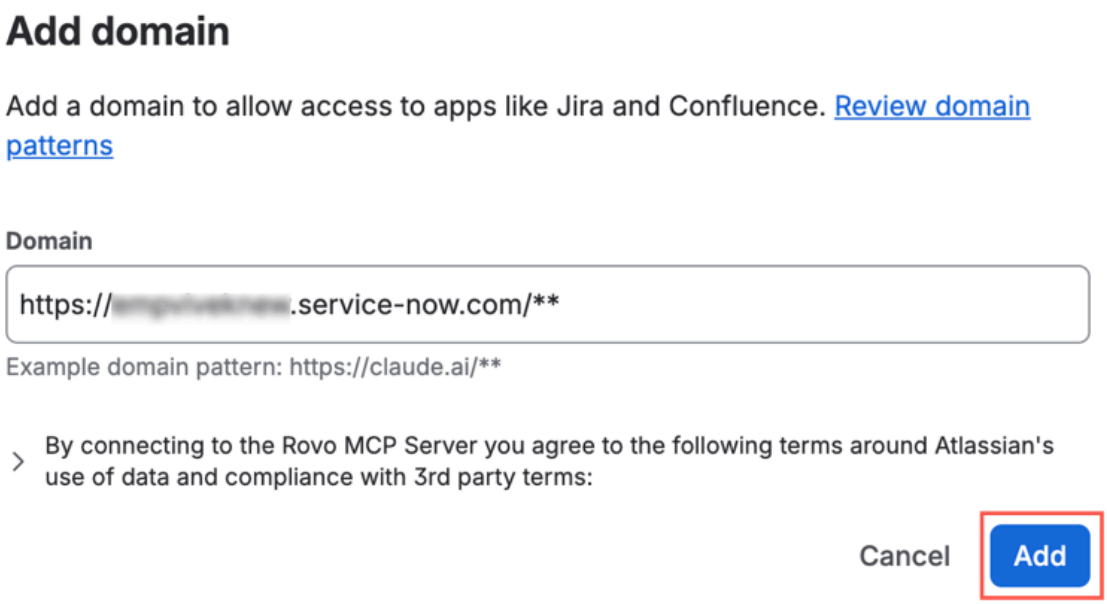


5. In **Domain**, provide the ServiceNow instance URL in this format: `https://<ServiceNow-Instance-Name>.service-now.com/**`.



6. Click **Add**.

What to do next

Navigate to **All** > **Workflow Data Fabric** > **Connect Hub** to dynamically register the client in your ServiceNow instance. For instructions, see Dynamic client registration.

Manual client registration

Connect to an MCP connector in Connect Hub by providing OAuth 2.1 credentials from the third-party provider, for connectors such as GitHub and Figma that require a registered OAuth application.

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Before you begin

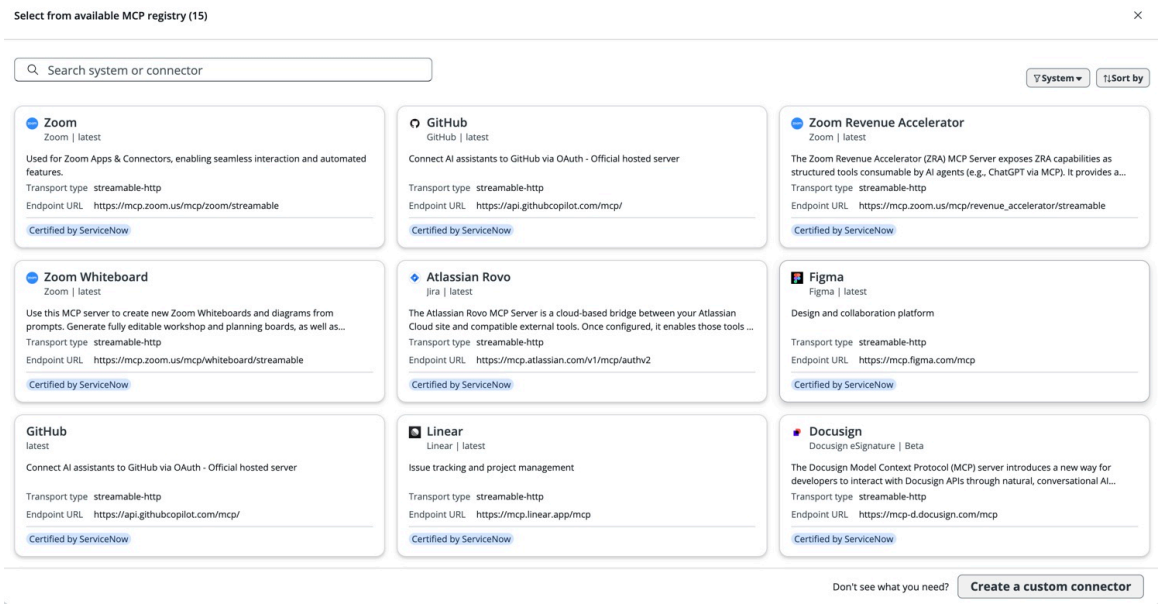
- Note the **Client ID** and **Client secret** generated for your OAuth application. You must provide these values during the connection setup.
- Some connectors may require additional configurations. See Additional connector configurations for the list of supported connectors that require additional configurations. If your connector is listed, perform the required configurations before registering the client manually.
- Role required: wdf_builder or admin.

About this task

Some MCP connectors require you to manually supply OAuth 2.1 credentials instead of using an automatic authorization redirect. Connect Hub displays the label **Manual setup may be required** next to connectors that use this method.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Click **Create** and select **Model Context Protocol**.
   The list of all available MCP connectors is displayed.



3. Locate the connector you want to use.
   - To search for a connector by name, enter the connector or system name in the **Search system or connector** field.
   - To filter by system, select **System**, select one or more systems from the list, and then select **Apply**.
   - To change the sort order, select **Sort by** and choose the preferred option.
4. Select the connector card for the system you want to connect.
   A details panel opens showing the connector description, system, type, endpoint URL, and the label **Manual setup may be required**.

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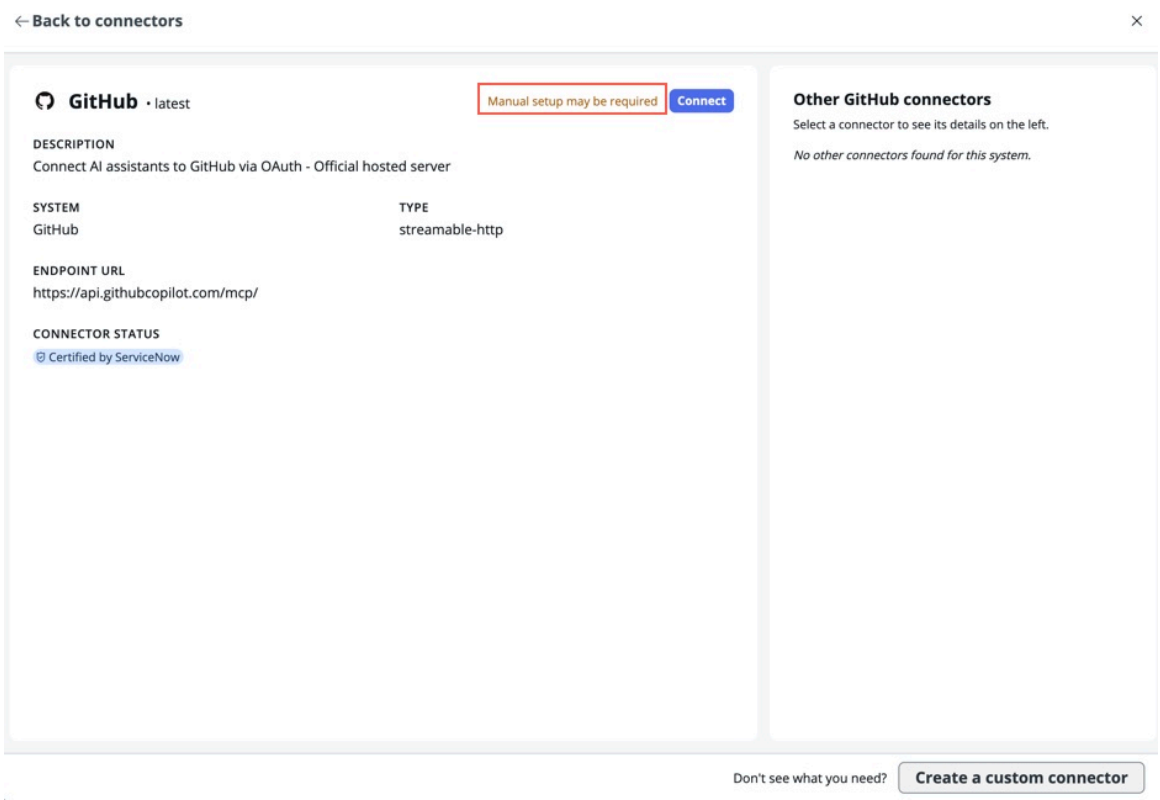

5. Select **Connect**.
   The Authentication dialog opens for the selected connector. The dialog shows the authentication method as **OAuth 2.1** and includes fields for authentication..
6. On the form, fill these values.

Field	Description
Client ID	Client ID from your OAuth application in the third-party system.
Client secret	Client secret from your OAuth application in the third-party system.
Authorization scopes	Optional OAuth scopes as a comma-separated list.

> **Note:** Refer to the third-party system's OAuth documentation for the list of supported scopes. For example, the Figma connector uses the scope `mcp:connect`. If no scopes are required, leave the field empty.

7. Select **Connect**.

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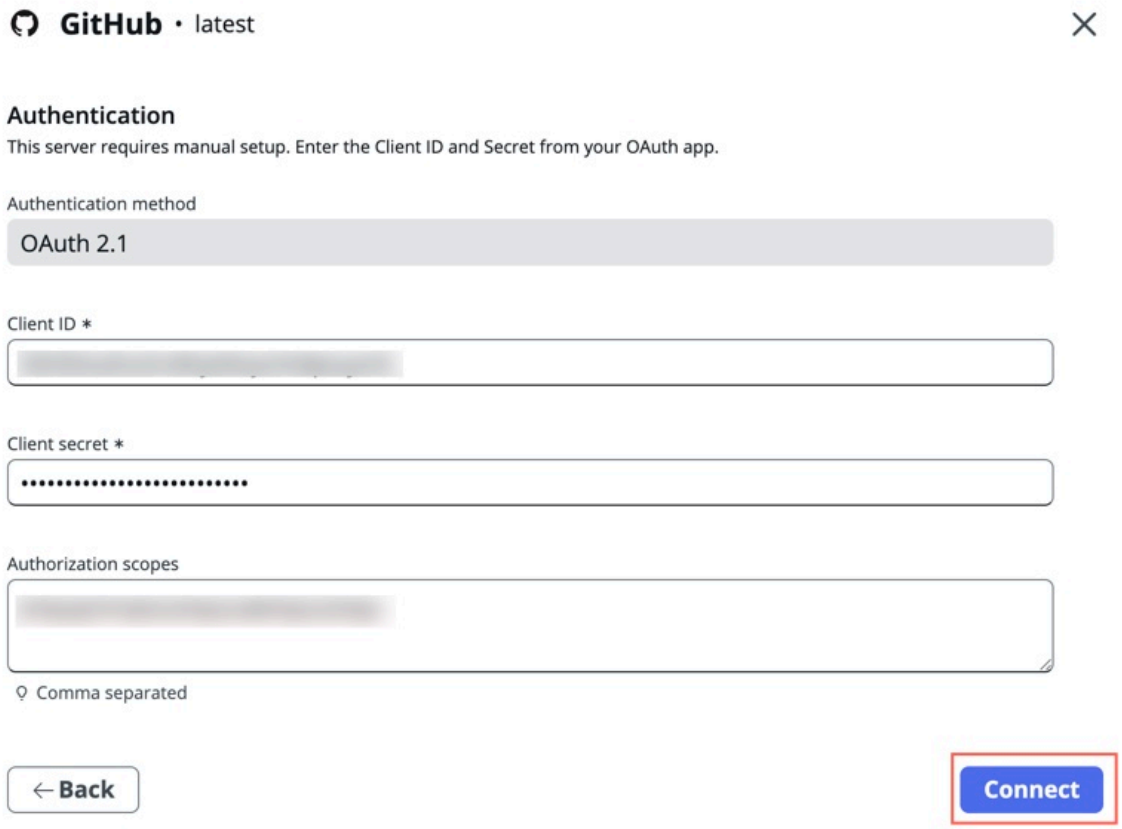


Connect Hub processes the OAuth credentials and creates the connection record. The Edit MCP Connector page is displayed with the connection record details. A **Connected** label is displayed next to the connection name when the connector is ready for use.

Result

The MCP connector is connected to Connect Hub using the OAuth 2.1 credentials you provided. The connector is available for use in AI agent configurations and automation flows.

Manual client registration use case: GitHub

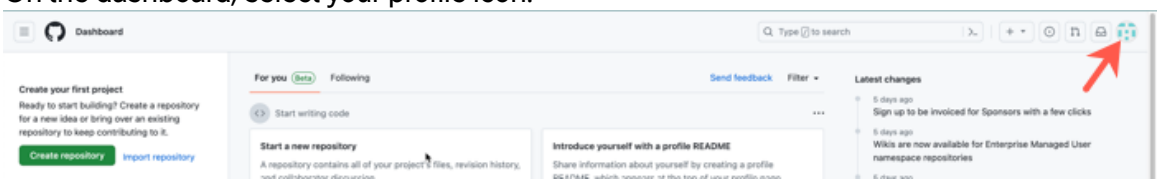
This use case illustrates manual client registration for GitHub. For this, the **Client ID** and **Client secret** must be generated for your OAuth application in GitHub account.

Before you begin

Role required: admin

Procedure

1. Log in to https://github.com/.
2. On the dashboard, select your profile icon.



3. Select **Settings**.
4. In the Settings page, on the left panel, select **Developer settings**.
5. Click **OAuth Apps** and click **New OAuth app**.

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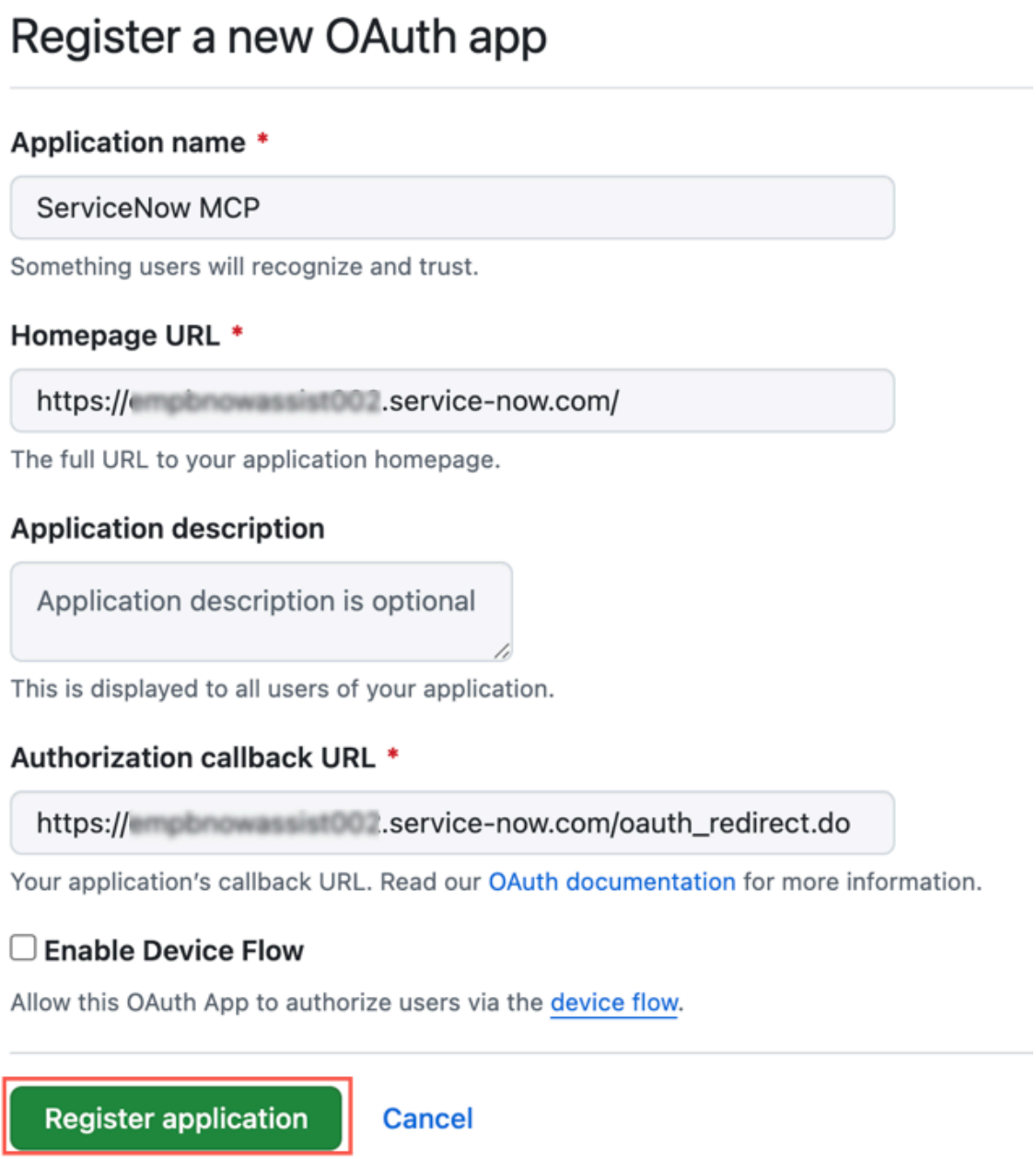
6. On the firm, fill these fields.

Field	Description
Application name	Name to identify the application.
Homepage URL	URL of your ServiceNow instance.
Authorization callback URL	Callback URL of your ServiceNow instance in this format: `https://<ServiceNow-Instance-Name>.service-now.com/oauth_redirect.do`.

7. Click **Register Application**.



The developer settings for the application are displayed.

8. Click **Generate a new client secret**.

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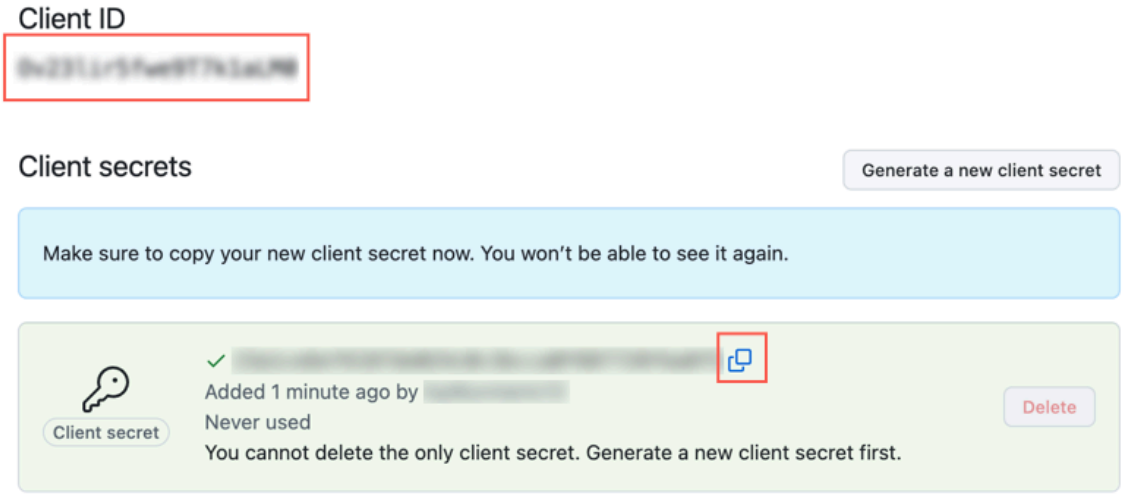
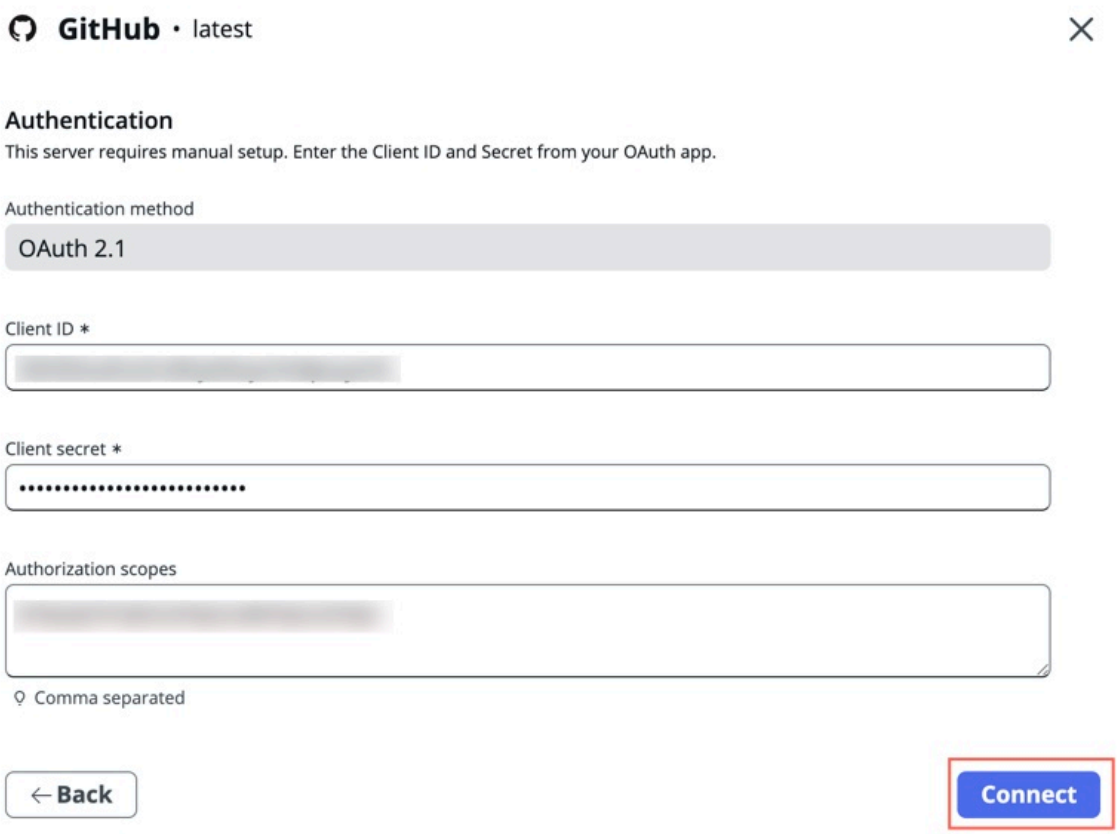
Values of **Client ID** and **Client secret** are displayed.



9. Copy and record the values of **Client ID** and **Client secret** for later use.

What to do next

Navigate to **All** > **Workflow Data Fabric** > **Connect Hub** to manually register the client in your ServiceNow instance. During the client registration, provide the values of **Client ID** and **Client secret**. For instructions, see Manual client registration.



Client registration using custom connector

Define a custom connector by providing your own MCP endpoint URL and authentication configuration if the registry does not contain a connector for the system you need.

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Before you begin
Role required: wdf_builder or admin.

About this task
Use a custom connector in the following situations:

- The third-party system exposes an MCP-compatible endpoint, but no certified or community connector exists in the registry for it.
- You are connecting to an internal or proprietary system within your organization that is not listed in the registry.
- You need to override the endpoint URL or authentication settings of an existing registry connector for a specific environment or configuration.

Custom connectors support both manual and dynamic client registration, depending on the capabilities of the target system. Custom connectors are scoped to the instance and are not added to the shared MCP registry.

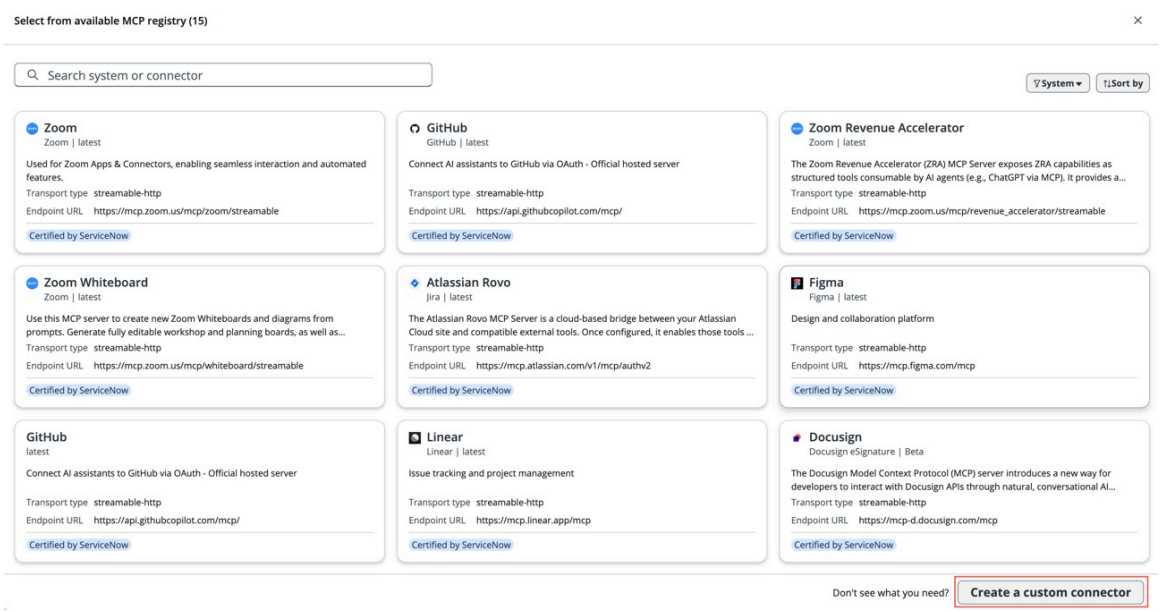
Create an MCP Connector with OAuth 2.1

Create an MCP Connector with OAuth 2.1 for connecting to external systems or applications that support MCP.

Before you begin
Role required: sn_mcp_client.admin

About this task
OAuth 2.1 provides the most secure and flexible authentication for MCP connectors. If your MCP server supports it, select OAuth 2.1 as the authentication method. You can choose between Dynamic Client Registration, where the server auto-populates client details, or Manual Client Registration, where you provide the client details yourself.

Procedure
1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Click **Create** and select **Model Context Protocol**.
   The list of all available MCP connectors is displayed.



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3. Click **Create a custom connector**.
4. On the form, fill in the fields.

System Details

Field	Description
Server name	Name of the MCP server. For example, Linear MCP server.
System	Search for the external system you want to integrate.
Add system (Optional)	Click the + icon to add an external system. For more information, see Create external systems. **Note:** If you already have an existing system, you can use that system for the MCP connector.
Connection name	Select **New connection** and enter a name to uniquely identify the connection. For example, Linear Connection.

Connection Configuration

Field	Description
Endpoint name	This field is auto-populated with the Connection name.
Endpoint URL	Connection URL for the MCP server.
Authentication Method	Select **OAuth 2.1**.

Select the registration type based on your MCP server's capabilities.

Manual Client Registration

Field	Description
Authorization method	Select the grant type to be used for requesting tokens from the authorization server. ○ **Authorization Code**: A system-generated code used for granting access to an application or resource. ○ **Client Credentials**: Access token provided by the administrator to access the application directly.
Client ID	Client ID of the OAuth provider.
Client Secret	Client secret of the OAuth provider.

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Field	Description
Client Authentication	Specifies how the client credentials are sent to the OAuth token endpoint when requesting an access token. ○ **Client Secret Post**: Sends the client ID and client secret in the request body as form-encoded parameters when calling the token endpoint. ○ **Client Secret Basic**: Sends the client ID and client secret in the HTTP Authorization header using Basic authentication when calling the token endpoint.
Access permissions	Select the required scopes. These scopes determine the permissions of this OAuth client.
OAuth Auth URL	URL of the OAuth authorization server.
OAuth Token URL	OAuth server endpoint used to obtain access tokens.
Token revocation URL	OAuth server endpoint used to revoke previously issued tokens.

Dynamic Client Registration

Field	Description
Authorization method	Select the grant type to be used for requesting tokens from the authorization server. ○ **Authorization Code**: A system-generated code used for granting access to an application or resource. ○ **Client Credentials**: Access token provided by the administrator to access the application directly.
Client Authentication	Select how the client credentials are sent when requesting tokens from the authorization server. ○ **Basic Authorization Header** ○ **Request Body Parameter** ○ **Private Key Jwt**
Access permissions	Select the required scopes. These scopes determine the permissions of this OAuth client.
Authorization URL	URL of the OAuth authorization server.
Token URL	OAuth server endpoint used to obtain access tokens.

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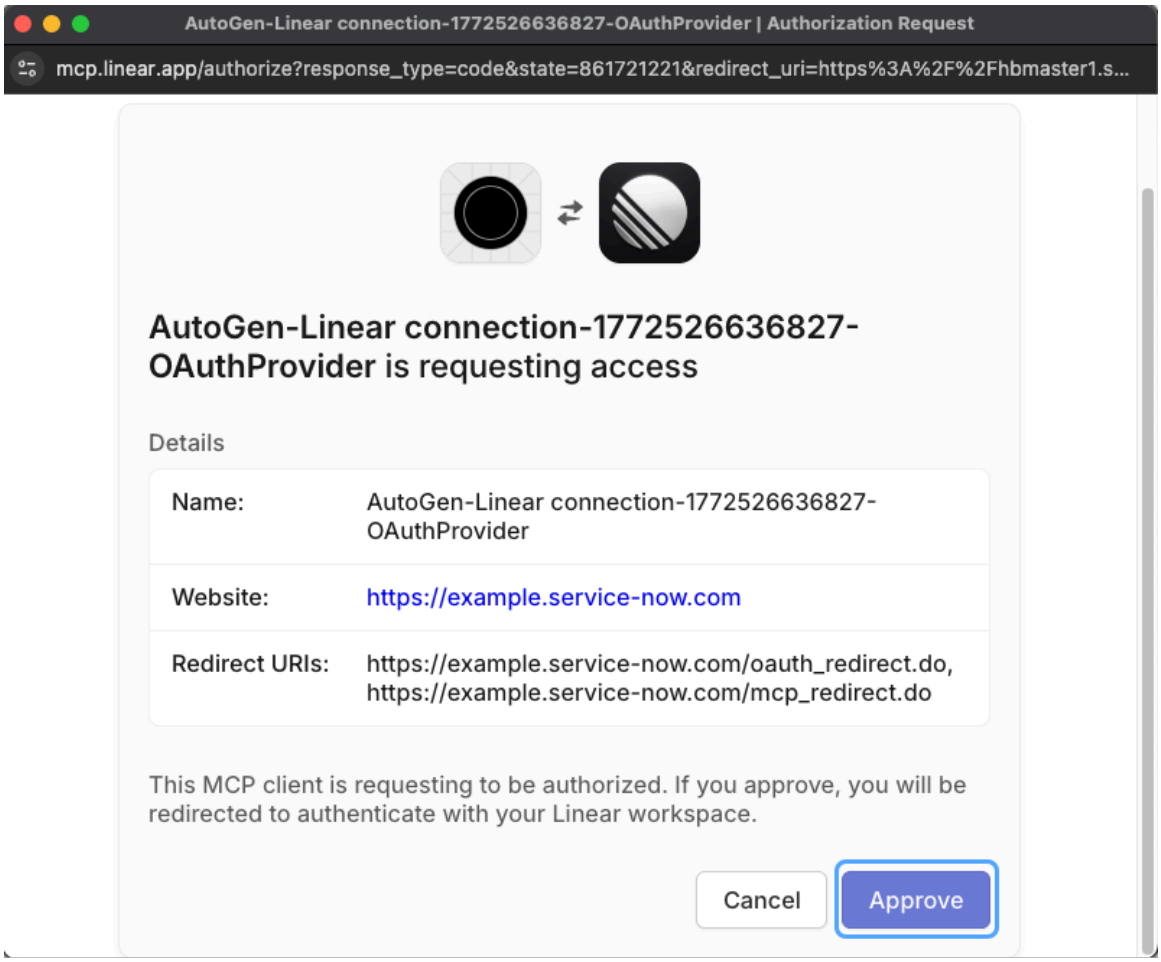
Field	Description
Token revocation URL	OAuth server endpoint used to revoke previously issued tokens.
Client registration token	Token used to authenticate requests to the OAuth client registration endpoint.
Value	Token for dynamic client registration. Leave this value blank if the server supports unauthenticated registration.

5. Click **Save**.

   For example:



   You are redirected to the third-party page requesting authorization for the MCP client.

6. Click **Approve**.
   The MCP client for your application is created and appears in the **Model Context Protocol** list.

Create an MCP Connector with API Key

Create an MCP Connector with API key for connecting to external systems or applications that support MCP.

Before you begin
Role required: sn_mcp_client.admin

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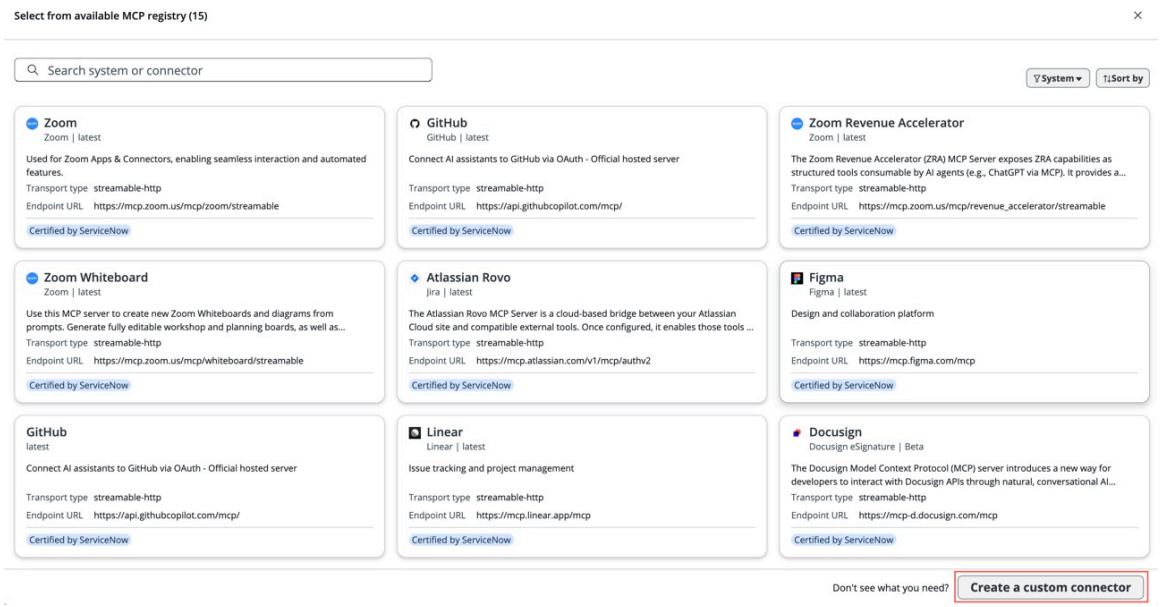
About this task

Use API key authentication when your MCP server requires a static key for authorization. Obtain the API key from your third-party application before configuring the connector.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Click **Create** and select **Model Context Protocol**.
   The list of all available MCP connectors is displayed.



3. Click **Create a custom connector**.
4. On the form, fill in the fields.

System Details

Field	Description
Server name	Name of the MCP server. For example, Figma MCP server.
System	Search for the external system you want to integrate.
Add system (Optional)	Click the + icon to add an external system. For more information, see Create external systems. **Note:** If you already have an existing system, you can use that system for the MCP connector.
Connection name	Select **New connection** and enter a name to uniquely identify the connection. For example, Figma Connection.

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Connection Configuration

Field	Description
Endpoint name	This field is auto-populated with the Connection name.
Endpoint URL	Connection URL for the MCP server.
Authentication Method	Select **API key**.
API key	Enter the API key of the third-party application.

5. Click **Save**.
   You are redirected to the third-party page requesting authorization for the MCP client.
6. Click **Approve**.
   The MCP client for your application is created and appears in the **Model Context Protocol** list.

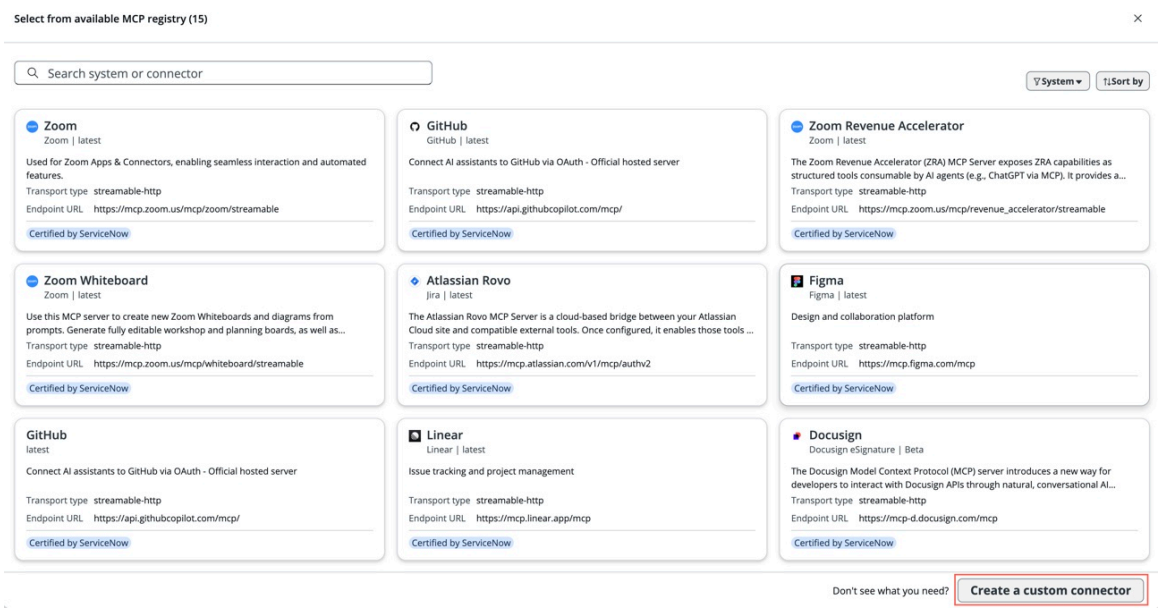
Create an MCP Connector with Basic Authentication

Create an MCP Connector with Basic Authentication for connecting to external systems or applications that support MCP.

Before you begin
Role required: sn_mcp_client.admin

About this task
Use Basic Authentication when your MCP server requires a username and password for access. Ensure that valid server credentials are available before configuring the connector.

Procedure
1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Click **Create** and select **Model Context Protocol**.
   The list of all available MCP connectors is displayed.



3. Click **Create a custom connector**.

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4. On the form, fill in the fields.

System Details

Field	Description
Server name	Name of the MCP server. For example, Figma MCP server.
System	Search for the external system you want to integrate.
Add system (Optional)	Click the + icon to add an external system. For more information, see Create external systems. **Note:** If you already have an existing system, you can use that system for the MCP connector.
Connection name	Select **New connection** and enter a name to uniquely identify the connection. For example, Figma Connection.

Connection Configuration

Field	Description
Endpoint name	This field is auto-populated with the Connection name.
Endpoint URL	Connection URL for the MCP server.
Authentication Method	Select **Basic Authentication**.
User name	User name of the MCP server.
Password	Password of the MCP server.

5. Click **Save**.
   You are redirected to the third-party page requesting authorization for the MCP client.
6. Click **Approve**.
   The MCP client for your application is created and appears in the **Model Context Protocol** list.

Additional connector configurations

Some connectors may require additional configurations while registering client manually. These connectors and their required configurations are listed here.

Zoom connector

User must create one app in Zoom account for each MCP server. For example, two separate apps must be created in Zoom account for Zoom Revenue Accelerator and Zoom Whiteboard. One Zoom app cannot be used for more than one MCP server.

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Figma connector

Ensure that you whitelist your account and then obtain the values of **Client ID** and **Client secret**. For the list of whitelisted MCP clients, see Figma MCP Catalog.

Miro connector

Obtain the values of **Client ID** and **Client secret**, and add the **Redirect URL** in Miro account. If you are unable to perform the required steps, run this curl command from your terminal. Replace `<ServiceNow-Instance-Name>` in *`client_uri`* and *`redirect_uris`* with your ServiceNow instance name:

```
curl --location 'https://mcp.miro.com/register' \
--header 'Content-Type: application/json' \
--data '{
    "client_uri":
 "https://<ServiceNow-Instance-Name>.service-now.com",
    "grant_types": [
        "authorization_code",
        "refresh_token"
    ],
    "redirect_uris": [

 "https://<ServiceNow-Instance-Name>.service-now.com/oauth_redir
ect.do",

 "https://<ServiceNow-Instance-Name>.service-now.com/mcp_redirec
t.do"
    ],
    "client_name": "AutoGen-1775150937195-OAuthProvider",
    "response_types": [
        "code"
    ]
}'
```

View Connections

View the inbound and outbound connections for an external system.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Select the **External Systems** card.
   The **External Systems** tab displays the list of external systems (custom and default systems) currently available in Connect Hub.
3. Select an external system and select **Connections**.
   The list of outbound connections available for the external system is displayed.

   Note:

   To view the inbound connections, click the **Inbound** tab,

4. Click a connection to display the connection settings in a new **Connection** tab.

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Search and filter connections

Find and explore connections available in external systems through search and filtering.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Select the **External Systems** card.
   The **External Systems** tab displays the list of external systems (custom and default systems) currently available in Connect Hub.
3. Select an external system and select **Connections**.
   The list of outbound connections available for the external system is displayed.

   Note:

   To view the inbound connections, click the **Inbound** tab,

4. Use the search field to search for a connection.
5. Use the **Connectors** filter to filter the connections by connector type or use the **Status** filter to filter by status.

Connections and Credentials

The **Connections and Credentials** page is where you create, configure, and manage all connections between ServiceNow and external systems. This is where you store authentication credentials and establish the actual communication links.

Outbound connections

Outbound connections are integrations where ServiceNow initiates communication to an external system. ServiceNow calls the external system to read data, write data, or trigger actions.

When you create an outbound connection, you:

- Select the external system
- Choose a connector type
- Configure authentication credentials
- Set up endpoints for different environments
- Save the connection for use in workflows

See Set up outbound connections for detailed steps.

Inbound connections

Inbound connections are integrations where an external system initiates communication to ServiceNow. The external system sends data, events, or triggers actions in ServiceNow.

When you create an inbound connection, you:

- Select the external system
- Choose a spoke to handle the incoming data

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- Configure authentication credentials
- Activate the connection to generate an endpoint URL
- Share the endpoint URL with the external system

See Set up inbound connections for detailed steps.

Credentials and security

All credentials stored in Connections and Credentials are encrypted and securely managed by ServiceNow. Credentials include:

- Usernames and passwords
- API keys and tokens
- OAuth credentials

You can update credentials anytime without affecting the connection configuration. Changes apply immediately to new requests.

Connection status

Each connection displays a status indicating its health and readiness. Status values include:

- **Configured** - Connection is configured
- **Connected** - Connection is working and ready to use
- **Expired** - Authentication credentials have expired
- **Not Configured** - Connection is not configured yet
- **Deactivated** - Connection exists but is not active

Managing multiple connections

You can create multiple connections to the same external system for different environments or purposes. Each connection is independent with its own credentials and configuration.

For example, you might have:

- Jira Production connection
- Jira Staging connection
- Jira Development connection

Each connection can use different credentials and settings while using the same connector type.

Set up inbound connections

Inbound connections allow external systems to send data, events, or trigger actions in ServiceNow.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Click the **Connections and Credentials** tab.

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3. Click **Create** and select **Inbound Connection**.
4. In the **System** field, select the external system that will send data.
5. In the **Connector Type** field, select the type of connector that this incoming connection will use.
6. In the **Spoke** field, select the spoke that will process the incoming data.
7. In the **Endpoint Name** field, enter a name for the endpoint.
8. In the **Authentication Method** field, select an authentication method and enter the authentication details for your chosen method.
9. Click **Save**.

Set up outbound connections

Outbound connections enable ServiceNow to send data to, read data from, or trigger actions in external systems.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Connect Hub**.
2. Click the **Connections and Credentials** tab.
3. **Optional:** You can create a new external system.
4. Click **Create** and select **Outbound Connection**.
5. In the **System** field, select the external system.
6. In the **Connector Type** field, select the type of connector that this incoming connection will use.
7. On the form, fill in the fields.

System Details

Field	Description
Connection name	Name of the external system that you want to create an outbound connection to. For example, Jira.
Description	A description for the connection to the external system.
Protocol	The connection protocol to connect to the external system.
Retry Policy	Retry policy for the connection. For more information, see Retry policy.

8. Choose between using a configuration template or custom credentials for adding an endpoint.
9. **Optional:** Enable the **Configuration Template** option to choose a preexisting configuration.
10. Configure the **Endpoint 1** connection settings:

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System Details

Field	Description
Endpoint name	Name of the endpoint.
Endpoint URL	Connection URL for the server.
Authentication Method	Select an authentication method and provide the details for your chosen method.

11. **Optional:** Enable the MID server option and configure the server information. For more information, see Configure a MID Server cluster.
12. **Optional:** Click **Add Endpoint** to add additional endpoints for different environments.
13. Click **Save**.

ServiceNow MCP Registry

Model Context Protocol (MCP) enables AI agents to connect to external systems and perform the required actions without any human intervention. ServiceNow MCP Registry is a private registry where large language models (LLMs), AI agents, and teams discover and connect to approved MCP servers, finding the best tool for every business problem, governed at every step. With these configurations, you can use any generative AI assistant to perform the required actions in ServiceNow.

AI-native discovery

The Registry enables AI models and humans query available MCP servers and select the ones best suited to solve a business problem. Every server exposed to an LLM is pre-approved in AICT, helping to ensure autonomous decisions never bypass enterprise governance. It works with AI Agent Studio, Claude, and so on.

Governed server catalog

The Registry unifies three server types into a single trusted catalog:

- MCP servers built by business units or the WDF abstraction layer.
- Customer servers published through the MCP Server Console or discovered through the CMDB.
- Third-party certified servers for seamless business unit agentic workflow execution.

Agentic workflow support

Business unit agentic workflows need their MCP servers trusted and available before execution begins. Pre-requesting approvals for all servers through AICT and centralizing them in the registry eliminates per-run approval overhead and helps ensure every workflow runs without connectivity surprises.

Request apps on Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store.

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Application version

ServiceNow MCP Registry v1.1.0 is the latest application version.

Supported APIs

APIs supported in this version of the ServiceNow MCP Registry application are listed here.

Get MCP Servers

Retrieves a paginated list of registered MCP servers.

The ServiceNow MCP Registry provides HTTP API endpoints for discovering and retrieving MCP server metadata. The list servers endpoint is the primary discovery interface for browsing the registry catalog.

Endpoint

HTTP Method: `GET`

Route: `/api/sn_mcp_registry/v1/servicenow_mcp_registry/servers`

Sample response


```
{
  "result": {
    "metadata": {
      "count": 8,
      "nextCursor": null
    },
    "servers": [
      {
        "_meta": {
          "io.modelcontextprotocol.registry/official": {
            "isLatest": true,
            "active": "active",
            "type": "servicenow",
            "updatedAt": "2026-02-15 18:10:04",
            "publishedAt": "2026-02-15 18:08:28"
          }
        },
        "server": {
          "title": "Figma",
          "description": "Design and collaboration platform",
          "name": "com.figma.mcp@mcp-server-remote",
          "version": "latest",
          "repository": {
            "url": "https://github.com/figma/mcp-server-guide",
            "source": "github"
          },
          "remotes": [
            {
              "type": "streamable-http",
              "url": "https://mcp.figma.com/mcp"
            }
          ]
        }
      },
```


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```
      {
        "_meta": {
          "io.modelcontextprotocol.registry/official": {
            "isLatest": true,
            "active": "active",
            "type": "servicenow",
            "updatedAt": "2026-02-15 18:06:59",
            "publishedAt": "2026-02-15 18:06:59"
          }
        },
        "server": {
          "title": "Linear",
          "description": "Issue tracking and project
 management",
          "name": "com.linear.app@mcp-server-remote",
          "version": "latest",
          "repository": {
            "url":
 "https://github.com/jerhadf/linear-mcp-server",
            "source": "github"
          },
          "packages": [
            {
              "registryType": "npm",
              "identifier": "linear-mcp-server",
              "transport": {
                "type": "stdio"
              },
              "environmentVariables": [
                {
                  "name": "LINEAR_API_KEY",
                  "description": "Linear Personal API key from
 Settings > Account > Security & Access",
                  "isRequired": true,
                  "isSecret": true
                }
              ]
            }
          ],
          "remotes": [
            {
              "type": "sse",
              "url": "https://mcp.linear.app/sse"
            },
            {
              "type": "streamable-http",
              "url": "https://mcp.linear.app/mcp"
            }
          ]
        }
      }
    ]
  }
}
```


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Get all versions of an MCP server

Retrieve all available versions for a specific MCP server.

The list server versions endpoint retrieves all available versions for a specific MCP server.

Endpoint

HTTP Method: GET

Route: `/api/sn_mcp_registry/v1/servicenow_mcp_registry/servers/{mcp_server_name}/versions`

Path parameters

Parameter	Type	Required	Description
mcp_server_name	String	Yes	url encoded name of the mcp server. For example, `com.figma.mcp@mcp-server-remote`.

Sample response


```
{
  "result": {
    "serverName": "com.linear.app@mcp-server-remote",
    "totalVersions": 1,
    "versions": [
      {
        "version": "latest",
        "isLatest": true,
        "active": "1",
        "type": "servicenow",
        "description": "Issue tracking and project management",
        "publishedAt": "2026-02-15 18:06:59",
        "updatedAt": "2026-02-15 18:06:59",
        "websiteUrl": "",
        "sysId": "7df5ef86ffcb3210a476fffffffff45",
        "repository": {
          "url": "https://github.com/jerhadf/linear-mcp-server",
          "source": "github"
        },
        "package": [
          {
            "registryType": "npm",
            "identifier": "linear-mcp-server",
            "transport": {
              "type": "stdio"
            },
            "environmentVariables": [
              {
                "name": "LINEAR_API_KEY",
                "description": "Linear Personal API key from
 Settings > Account > Security & Access",
                "isRequired": true,
                "isSecret": true
```


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```
                }
              ]
            }
          ]
        }
      ]
    }
}
```

Get specific MCP server version

Retrieve detailed configuration for a specific MCP server version, including complete package definitions, transport configurations, and metadata.

The endpoint retrieves detailed configuration for a specific MCP server version. This endpoint returns complete server metadata including package definitions, transport configurations, authentication requirements, and registry-managed metadata. Use the special version `latest` to get the latest version.

Endpoint

HTTP Method: GET

Route: `/api/sn_mcp_registry/v1/servicenow_mcp_registry/servers/{serverName}/versions/{version}`

Path parameters

Parameter	Type	Required	Description
serverName	String	Yes	URL-encoded server name. For example, `com.figma.mcp@mcp-server-remote`.
version	String	Yes	URL-encoded version string. For example, `1.0.0`. Use `latest` to retrieve the latest version.

Sample response

```
{
  "result": {
    "server": {
      "name": "com.linear.app@mcp-server-remote",
      "title": "Linear",
      "description": "Issue tracking and project management",
      "version": "latest",
      "remotes": [
        {
          "type": "sse",
          "url": "https://mcp.linear.app/sse"
        },
        {
          "type": "streamable-http",
          "url": "https://mcp.linear.app/mcp"
        }
```

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```
      ],
      "packages": [
        {
          "registryType": "npm",
          "identifier": "linear-mcp-server",
          "transport": {
            "type": "stdio"
          },
          "environmentVariables": [
            {
              "name": "LINEAR_API_KEY",
              "description": "Linear Personal API key from
 Settings > Account > Security & Access",
              "isRequired": true,
              "isSecret": true
            }
          ]
        }
      ],
      "icons": null,
      "repository": {
        "url": "https://github.com/jerhadf/linear-mcp-server",
        "source": "github"
      }
    },
    "_meta": {
      "active": "1",
      "publishedAt": "2026-02-15 18:06:59",
      "updatedAt": "2026-02-15 18:06:59",
      "isLatest": false
    }
  }
}
```


Available Enterprise MCP Registries

Pre-configured connection information for a set of high-value MCP Servers are available as part of the Enterprise MCP Registry.

The available MCP Servers are:

Enterprise MCP servers

Server	URL/Endpoint	Services	Authentication	Notes
Zoom	`https://mcp.zoom.us/mcp/zoom/streamable`	• Meetings • Team Chat • Zoom Docs (search and retrieval)	• OAuth 2.0 registered via Zoom App Marketplace.	Enables natural-language retrieval of meeting assets including AI summaries, docs, recordings, and whiteboards.

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Enterprise MCP servers (continued)

Server	URL/Endpoint	Services	Authentication	Notes
		• AI summaries • Recordings and transcripts	• Server-to-Server OAuth supported for headless use.	
Zoom Revenue Accelerator	`https://mcp.zoom.us/mcp/revenue_accelerator/streamable`	• Conversation intelligence • Deal insights • Sales activity • CRM data • Coaching signals	OAuth 2.0 registered via Zoom App Marketplace.	• Focused MCP surface for sales insights and deal intelligence. • Supports reviewing customer interactions and preparing follow-up notes. • Requires a Zoom Revenue Accelerator license.
Zoom Whiteboard	`https://mcp.zoom.us/mcp/whiteboard/streamable`	• Whiteboard creation and management • Diagram generation	OAuth 2.0 registered via Zoom App Marketplace.	• Provides MCP tools for creating editable whiteboards and diagrams from prompts and locating existing boards. • Intended for workshop planning, visual collaboration, and diagram-generation use cases. • Exposes only boards the authenticated user can access.
Zoom Docs	`https://mcp.zoom.us/mcp/docs/streamable`	• Document creation • Document retrieval • Notes in Markdown	OAuth 2.0 registered via Zoom App Marketplace.	• Supports creating new Zoom Docs from Markdown content and retrieving existing Zoom Docs or notes. • Designed for structured document

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Enterprise MCP servers (continued)

Server	URL/Endpoint	Services	Authentication	Notes
				generation and read-back flows. • Does not expose update or delete operations.
Zoom Chat	`https://mcp.zoom.us/mcp/team_chat/streamable`	• Team chat channels • Messages • Contacts • Collaboration context	OAuth 2.0 registered via Zoom App Marketplace.	• Focused MCP surface for chat channels, messages, contacts, and collaboration context. • Supports locating chat history, preparing summaries, and generating follow-ups. • Separate from the Zoom Workspace server; exposes write and update tools for messages and channels.
Atlassian Rovo	`https://mcp.atlassian.com/v1/mcp` Legacy SSE endpoint (`/v1/sse`) deprecated after June 30, 2026.	• Jira • Confluence • Compass	• OAuth 2.1. • API token supported for headless or machine-to-machine use if enabled by org admin.	• Cloud-based bridge between an Atlassian Cloud site and compatible external tools. • All actions respect existing user permissions. Exposes 46+ tools across product areas.
DocuSign	`https://mcp.docusign.com/mcp`	• e-Signature • Envelope management • Agreement workflows • Maestro • Navigator	OAuth 2.0 access token is required per interaction.	• Enables natural-language interaction with DocuSign APIs, including authentication, API testing, and envelope creation. • Production connectors support seven API

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Enterprise MCP servers (continued)

Server	URL/Endpoint	Services	Authentication	Notes
				groups; additional endpoints accessible in developer mode.
Miro	`https://mcp.miro.com/`	• Whiteboard and board content • Sticky notes, shapes, frames • Diagram generation • Comments	OAuth 2.1 with dynamic client registration	• Supports content summarization, board creation, diagram generation, and comment resolution. • Users must supply a board URL in prompts; agents cannot discover or access boards not explicitly referenced.
Figma	• Remote: `https://mcp.figma.com/mcp` • Desktop/local: `http://127.0.0.1:3845/sse`	• Design files and nodes • Components and variables • Styles • Code Connect • FigJam • Code-to-canvas capture	OAuth 2.0 (browser-based; `mcp:connect` scope required; access limited to clients in the Figma MCP Catalog)	Enables design context extraction, native Figma content creation, and live UI capture as design layers.
Linear	• Streamable HTTP (recommended): `https://mcp.linear.app/mcp` • SSE (deprecated): `https://mcp.linear.app/sse`	• Issues • Projects • Cycles • Comments • Teams and labels	OAuth 2.1 with dynamic client registration (no API key required; browser OAuth flow)	Provides 25+ tools covering the full project management workflow.

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Enterprise MCP servers (continued)

Server	URL/Endpoint	Services	Authentication	Notes
Prisma	• Remote: `https://mcp.prisma.io/mcp` • Local: `npx prisma mcp` (CLI)	• Prisma Postgres database provisioning • Schema migrations • Backups • Connection strings • SQL query execution • Database recovery	OAuth (browser-based authentication via Prisma Console on first use)	Dual-mode architecture: local server handles development workflows (migrations, schema, queries); remote server manages Prisma Postgres infrastructure.
Box	`https://mcp.box.com`	• File management and operations • Folder operations and navigation • Content search and retrieval • Metadata extraction • Sharing and permissions • Collaboration context • Comments and workflows	OAuth 2.1	Cloud-based bridge for Box file content access. All actions respect existing user permissions. Supports natural-language file discovery, content summarization, and document retrieval. Users must have appropriate Box folder/file permissions.

Note: Some connectors may require additional configurations. See Additional connector configurations for the list of supported connectors that require additional configurations. If your connector is listed, perform the required configurations before registering the client manually.

Workflow Data Fabric Home Reference

Reference topics provide additional information about the terms, forms, and concepts that you use for Workflow Data Fabric Home.

Workflow Data Fabric key terms

Key terms used in Workflow Data Fabric.

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Workflow Data Fabric key terms

Term	Description
Workflow Data Fabric	Workflow Data Fabric is a unified data foundation that connects to enterprise data across systems, contextualizes it with metadata and stable contracts, making it available to workflows, analytics, and AI agents.
Workflow Data Fabric Home	The AI-guided entry point and parent interface for Workflow Data Fabric, powered by ServiceNow Otto for WDF. It provides natural language search across the catalog, recommendations on reuse versus building new, and navigation to specific tasks like Connect Hub.
Data fabric table	A ServiceNow projection of an external data object that makes external data accessible as if it were a local ServiceNow table, without physically copying the data.
Connectors	Prebuilt integration components that define communication with specific external applications. A connector acts as a translator between ServiceNow and the target system, providing actions, triggers, and data-mapping capabilities.
Connection	A secure, governed access path between ServiceNow and an external data source, such as a database, SaaS application, REST API, event stream, or another ServiceNow instance.
Spoke	A packaged, reusable integration available from the ServiceNow Store that provides prebuilt actions for common third-party systems (such as Azure DevOps, Salesforce, or Jira), enabling quick connectivity without custom development.
Connect Hub	The interface in Workflow Data Fabric Home where Connection Admins create and manage connections to external systems. From Connect Hub, admins configure credentials and authentication, set up metadata collectors, and grant Data Stewards access to work with connected data.
Zero Copy Connector (ZCC)	An integration mechanism that provides real-time query access to external data without moving or copying it into ServiceNow. Zero Copy Connectors are best suited for large data volumes and analytics use cases where data freshness matters.

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Workflow Data Fabric Home roles

Several user roles are installed with activation of the ServiceNow WDF Unified Hub plugin.

Roles installed

Role title [name]	Description	Contains roles
Connection Admin [connection_admin]	Create and manage connections, configure credentials, set up metadata collectors, and grant Data Stewards access to connections.	• [df_data_steward] • [external_app_install_admin] • [agent_admin] • [credential_admin] • [web_service_admin] • [sn_nowassist_wdf.creator_admin]
Data Steward [df_data_steward]	Create and own all Data products and Data interfaces. Responsibilities include schema design, governance, metadata management, backward compatibility enforcement, and lifecycle management of all data contracts.	• [sn_nowassist_wdf.creator_admin] • [wdf_consumer]
WDF Builder [wdf_builder]	Create connectors, spokes, and MCP servers to extend the connectivity layer without owning or modifying data contracts.	• [wdf_consumer] • [sn_nowassist_wdf.creator_admin] • [connection_admin] • [template_editor_global] • [action_designer] • [sn_appclient.app_client_user] • [sn_g_app_creator.app_creator]
WDF Operator [wdf_operator]	Build deterministic and agentic workflows that consume governed data through Data Interfaces. WDF Operators are consumers of contracts, not owners or modifiers.	• [fd_read] • [now.assist.creator] • [flow_designer] • [sn_nowassist_wdf.creator_admin] • [sn_mcp_client.viewer] • [wdf_consumer]
WDF Consumer [wdf_consumer]	Explore the Data Catalog to discover data products, evaluate them for use, request access, and use governed data through	[sn_nowassist_wdf.creator_admin]

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Role title [name]	Description	Contains roles
	workflows, analytics, AI agents, or APIs.	

Workflow Data Fabric Credits

Workflow Data Fabric Credits let you monitor and track Workflow Data Fabric product usage through a dashboard showing credit usage, usage measurements, and thresholds that trigger alerts.

For more information about Workflow Data Fabric benefits, the workflow for the solution, and requirements for integrating the solution, see .

Exploring Workflow Data Fabric Credits

Workflow Data Fabric lets organizations connect, manage, and automate their data workflows across different systems, through various product solutions.

Workflow Data Fabric Credits measure the usage of Workflow Data Fabric subscriptions. Each credit represents a unit of consumption under a unified meter. For example, depending on the underlying product a credit can represent a record, an API call, a megabyte of data throughput, or a minute of runtime.

For more information about Workflow Data Fabric products, meters, and reproducibility, see the Fabric Credits - WDF Products and Meter Sources to trace and reproduce [KB2276348] article in the Now Support Knowledge Base.

For more information about Workflow Data Fabric Credits, see the Count of Workflow Data Fabric Credits consumed in the last 367 Days [KB2239792] article in the Now Support Knowledge Base.

Configure Workflow Data Fabric Credits

You must have Workflow Data Fabric license to use Workflow Data Fabric Credits.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the WDF Tokenization application (sn_wdf_token) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you can’t find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Review Installation Details dialog box, any dependencies installed with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.

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5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
6. Select **Install**.

Measuring usage

Credit usage is measured for each account. The number of credits you use for a feature is determined by the terms of the Workflow Data Fabric license.

Credit measurements

Measurement category	Description
Transactions	Measured in API calls, assets, records, or transactions.
Data volume	Measured in MB/GB.
Usage	Measured in runtime.

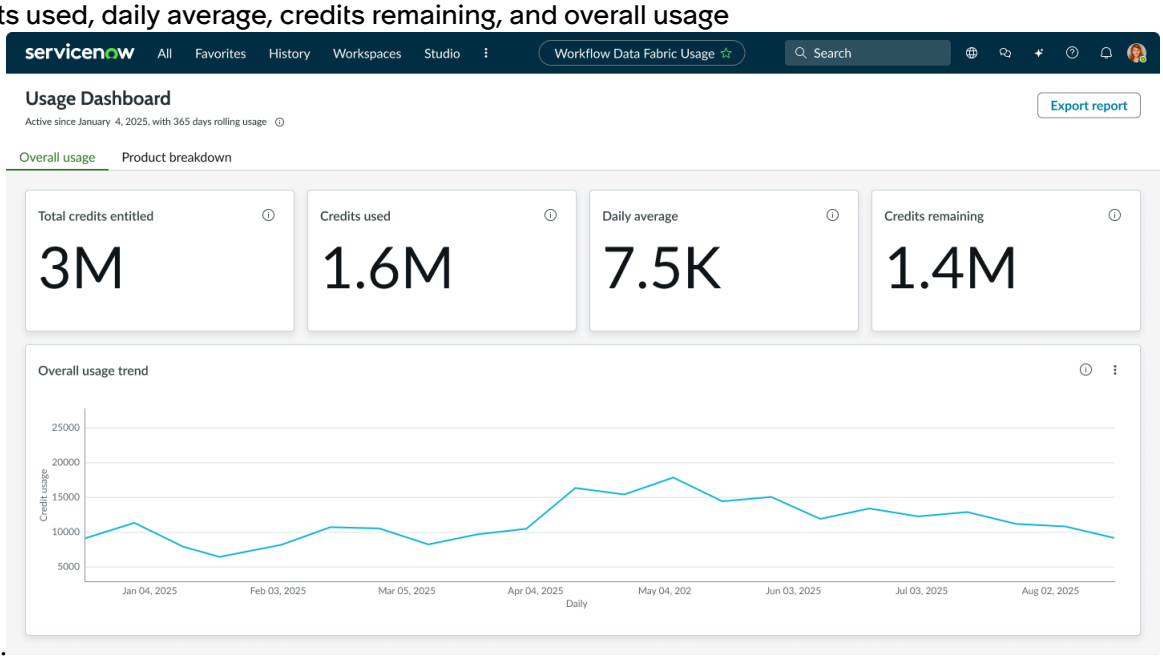
Usage Dashboard

The Usage Dashboard shows credit usage, usage measurements, and thresholds that trigger alerts.

Access the Usage Dashboard by navigating to **All** > *Workflow Data Fabric* **Usage** > **Usage Dashboard**. The Credit Dashboard has two tabs: **Overall usage** and **Product breakdown**.

Overall usage tab

Provides a detailed analysis of credit usage with specific KPIs and a usage trend chart. View data by total credits entitled, credits used, daily average, credits remaining, and overall usage trend.



Product breakdown tab

Provides an overview of credit usage by product. You can filter the data that is displayed by date range and selected

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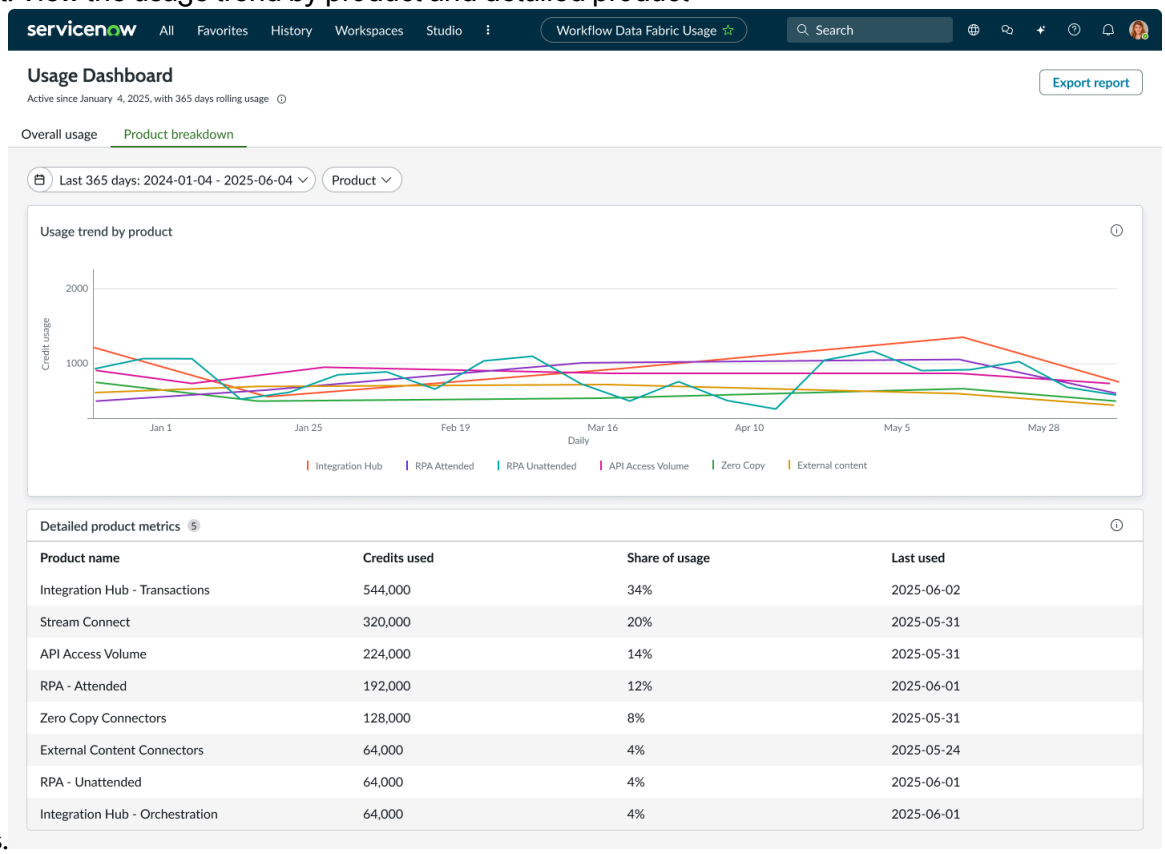
product. View the usage trend by product and detailed product



Product name	Credits used	Share of usage	Last used
Integration Hub - Transactions	544,000	34%	2025-06-02
Stream Connect	320,000	20%	2025-05-31
API Access Volume	224,000	14%	2025-05-31
RPA - Attended	192,000	12%	2025-06-01
Zero Copy Connectors	128,000	8%	2025-05-31
External Content Connectors	64,000	4%	2025-05-24
RPA - Unattended	64,000	4%	2025-06-01
Integration Hub - Orchestration	64,000	4%	2025-06-01

metrics.

Data Catalog

The Data Catalog module within the Workflow Data Fabric application helps you discover, understand, and manage your organization's data assets. Use the Data Catalog to search for data across multiple systems, view comprehensive metadata and relationships, track data lineage, and connect to data sources for analysis.

Get started

Explore	Configure	**Configure metadata collectors**
Learn about the data catalog	Plan and configure your implementation	Create and run metadata collectors

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Find and access data assets	Reference	
Learn about data assets	Get details about data catalog key terms and roles.	

Explore Data Catalog

The Data Catalog is the self-service discovery layer for finding, evaluating, and accessing governed data assets.

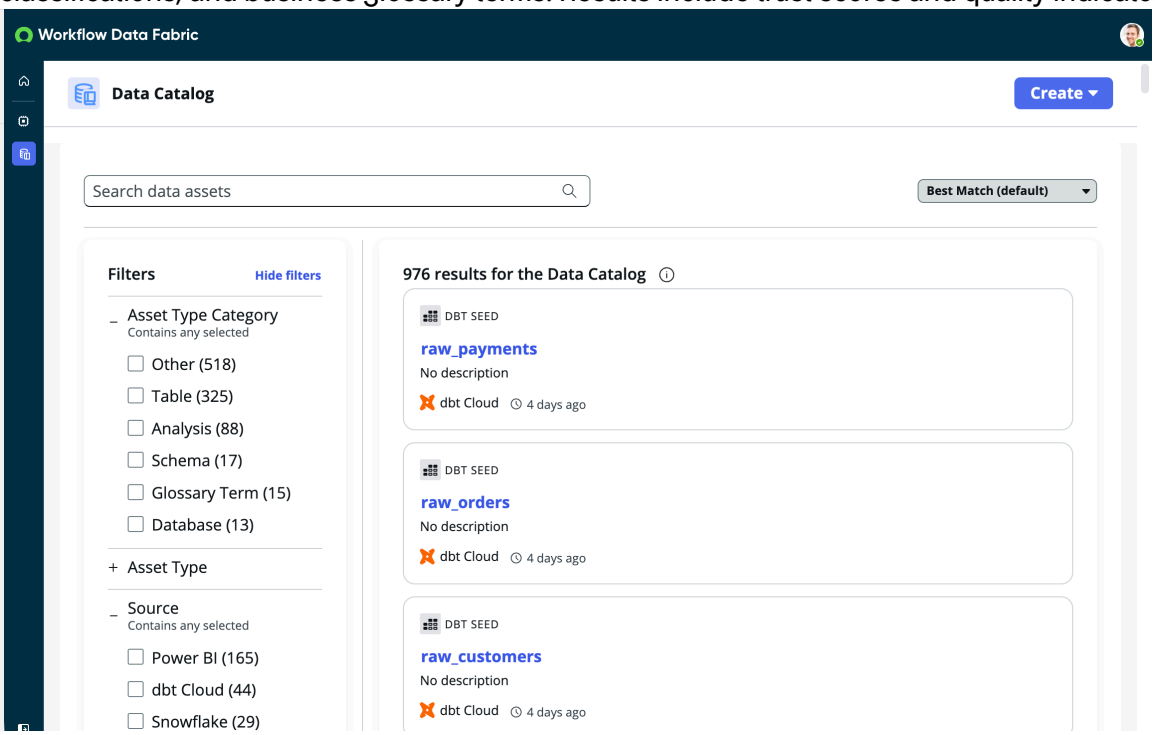
The Data Catalog provides a centralized discovery and governance layer where users search for data assets, understand their lineage and quality, and request access to governed data across the enterprise.

Data Catalog overview

The Data Catalog addresses a common enterprise challenge. Data exists across dozens of systems, but finding trustworthy, well-documented assets requires manual coordination across teams. The Data Catalog solves this by providing a unified discovery layer. Metadata collectors automatically harvest technical metadata, Data Stewards add business context, and consumers evaluate trust scores and lineage before requesting access.

Search and discovery:

Find data assets through keyword search, faceted filtering, and browsing by source system, domain, or collection. Search looks across asset names, descriptions, tags, classifications, and business glossary terms. Results include trust scores and quality indicators.



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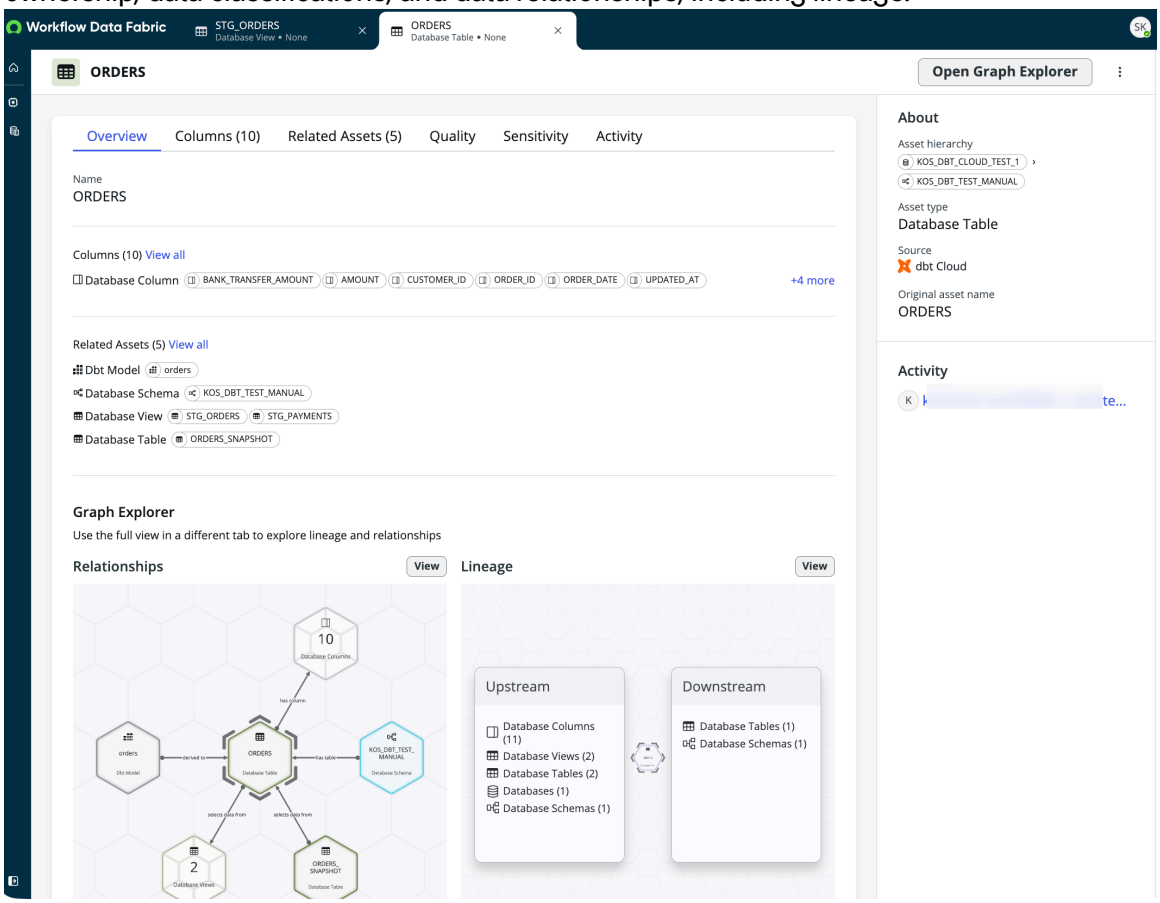
Asset details and relationships:

View comprehensive details for each data asset including schema, field descriptions, ownership, data classifications, and data relationships, including lineage.



Business glossary:

Create and maintain business glossary terms that define enterprise data vocabulary. Link glossary terms to catalog assets to provide business context.

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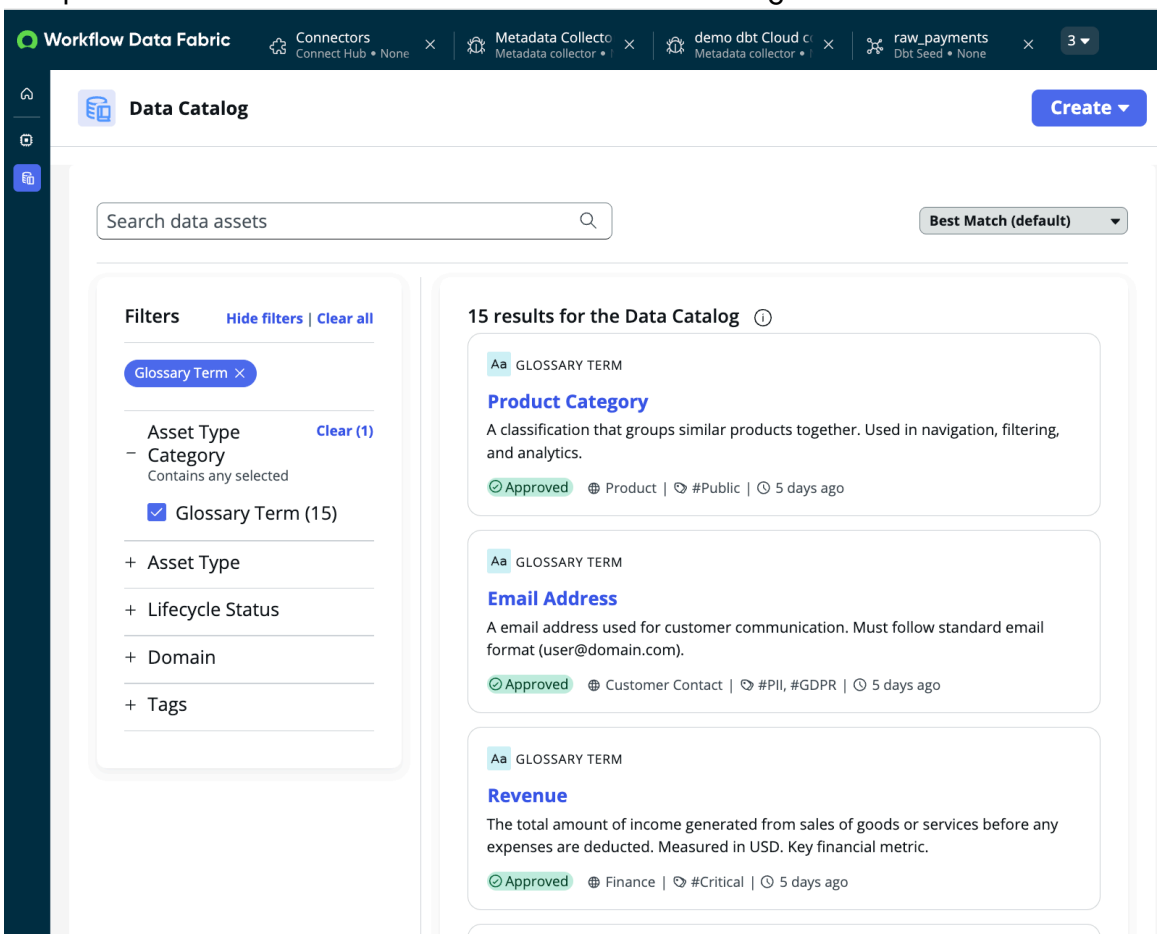
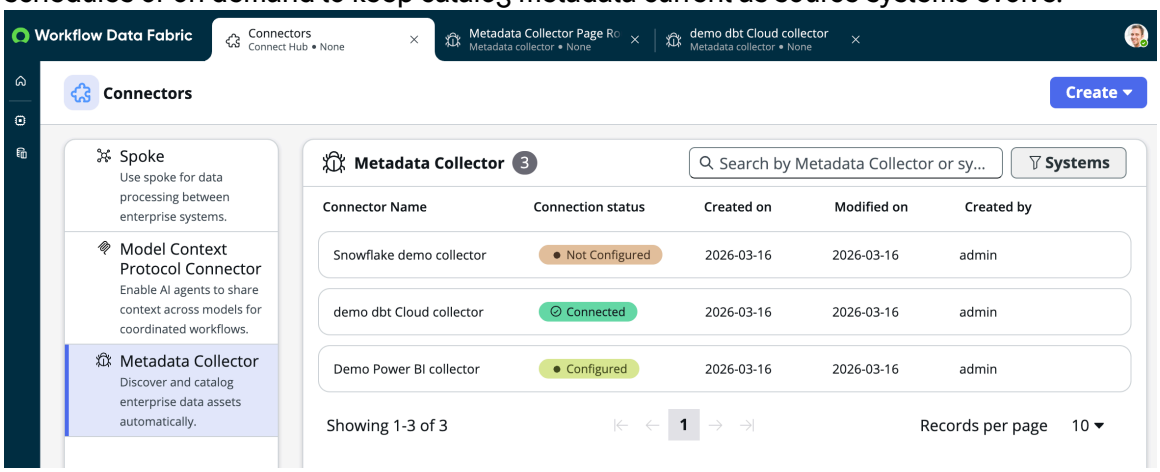
This promotes consistent use of data definitions across the organization.



Metadata collectors:

Automated scanners that connect to source systems, discover schemas, and build lineage relationships. They populate the Data Catalog with technical metadata. Collectors run on schedules or on demand to keep catalog metadata current as source systems evolve.



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Data Catalog users

Users

User	Description
Connection admin	Creates and manages connections to external systems and configures metadata collectors. Schedules collector runs and monitors collection execution and logs.
Data Steward	Enriches catalog assets with business context and creates and maintains business glossary terms. Links terms to assets, assigns ownership, manages tags and classifications, organizes assets into domains and collections, and tracks asset lifecycle status.
Catalog Viewer	Searches and browses the Data Catalog to discover data assets. Views asset details and lineage, evaluates trust scores and quality indicators, previews sample data, and identifies assets for use in analytics, workflows, or AI applications.

Data Catalog workflow

This lifecycle shows the distinct phases of discovery, governance, and consumption in the Data Catalog:

1. Connect: Connection Admins create connections to external data sources and configure metadata collectors. These harvest technical metadata including schemas, tables, columns, relationships, and lineage.
2. Harvest: Metadata collectors run on schedules or on demand to discover assets and build lineage relationships. They populate the catalog with up-to-date technical metadata from connected source systems.
3. Enrich: Data Stewards add business context by creating glossary terms, linking terms to assets, adding descriptions, assigning ownership, applying classifications, and organizing assets into domains and collections
4. Discover: Catalog Viewers search and browse to find relevant data assets. They review metadata and lineage, evaluate trust scores, preview sample data, and identify assets that meet their requirements.
5. Access: Users request access to discovered assets through governance workflows. After approval, they consume governed data through Data Fabric tables, APIs, analytics dashboards, or AI agents.

Data Catalog benefits

Data Catalog benefits

Benefit	Feature	Users
Find data assets across enterprise systems without manual coordination	Search, browse, faceted filtering	All users
Understand data quality and	Trust scores, quality indicators, sample data preview	Catalog Viewer

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Data Catalog benefits (continued)

Benefit	Feature	Users
trustworthiness before requesting access		
Automatically discover and catalog metadata as source systems evolve	Metadata collectors, scheduled harvesting	Connection admin
Provide business context and shared vocabulary for enterprise data	Business glossary terms, asset descriptions	Data Steward
Organize and classify assets for improved discoverability and governance	Domains, collections, tags, classifications	Data Steward
Establish accountability through ownership and stewardship assignments	Owner and steward assignment, lifecycle management	Data Steward

What to explore next

To learn more about using the Data Catalog, see:

- Configuring metadata collectors
- Finding and accessing data assets
- Governing the Data Catalog

Data catalog navigation

Access Connect Hub to manage metadata collectors and the Data Catalog to discover and govern data assets.

Both areas are accessed from the same starting point: navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**, then select the relevant icon in the sidebar. Connection Admins work in Connect Hub to bring data into the catalog. Data Stewards and Catalog Viewers work in the Data Catalog to manage and discover it.

Connect Hub

Connect Hub is accessed from **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home** by selecting the Connect Hub icon in the sidebar. Connection Admins create and manage metadata collectors in Connect Hub. These automated scanners connect to external data sources, harvest table schemas, column definitions, lineage, and other metadata, and publish them to the Data Catalog. Collectors can be run on demand or scheduled to keep catalog content current as source systems evolve. Runtime logs for

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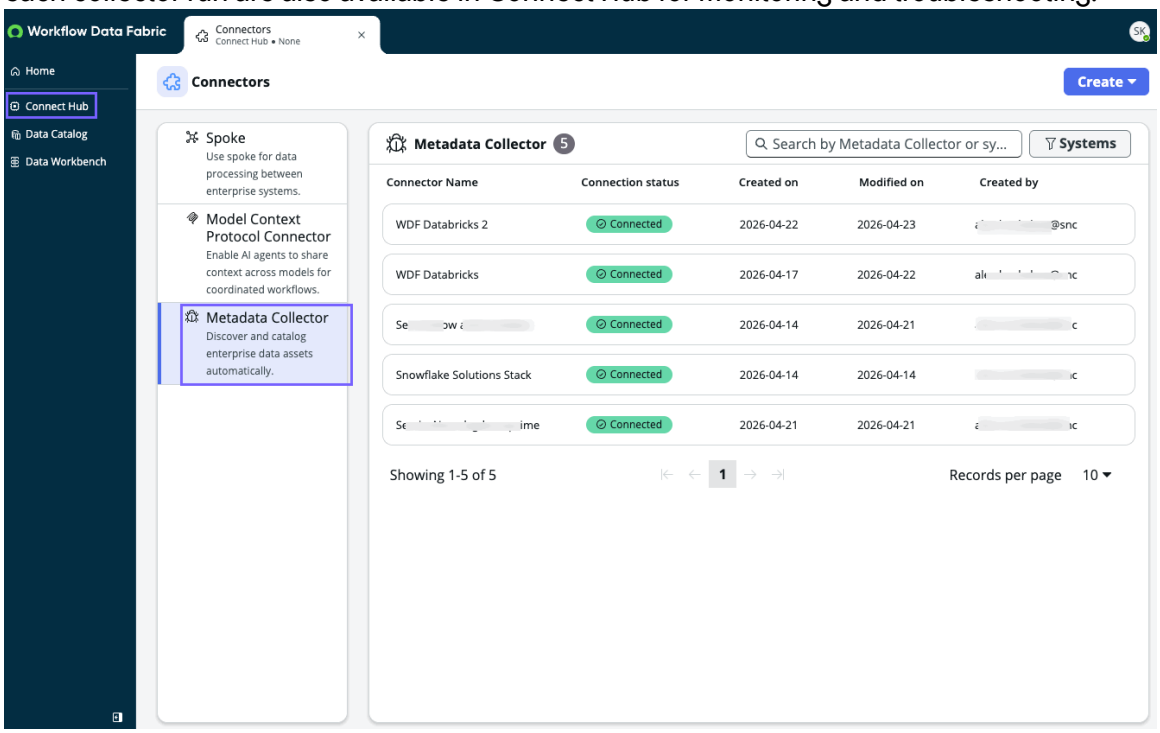
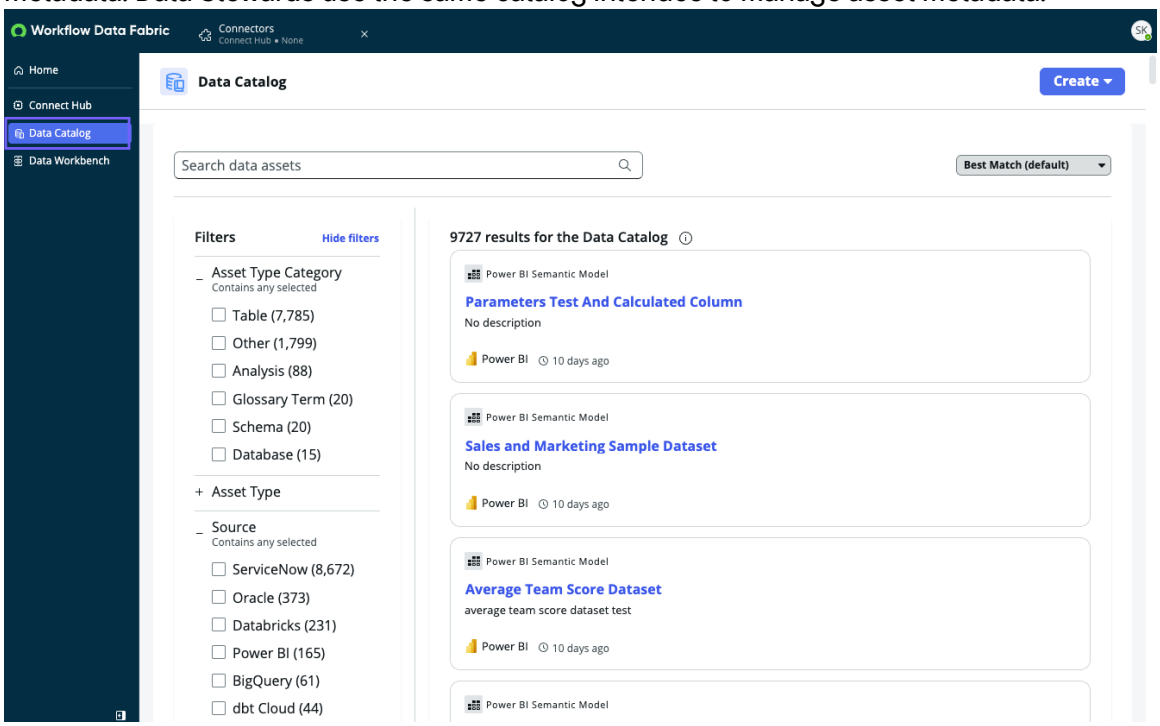
each collector run are also available in Connect Hub for monitoring and troubleshooting.



Data Catalog

The Data Catalog is accessed from **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home** by selecting the Data Catalog icon in the sidebar. This is the primary workspace for both Data Stewards and Catalog Viewers. Catalog Viewers search and browse published data assets and open asset detail pages to review schemas, lineage, and governance metadata. Data Stewards use the same catalog interface to manage asset metadata.



Configure data catalog

You can plan and configure a Data Catalog implementation in your organization.

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Install Data Catalog store applications

You can install the Data Catalog application (sn_dcg_app) if you have the admin role. The application installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application .
- Review the Data Catalog application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.
- Ensure that the AI Search application is enabled on your instance by navigating to **All** > **AI Search** > **AI Search Status**. If AI search is not enabled, select **Request AI Search**.

Role required: admin

About this task

The following items are installed with Data Catalog:

- Plugins
- Store applications
- Roles
- Scheduled jobs
- Tables

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the ServiceNow Data Catalog (sn_dcg_app) store application using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   A list of the versions available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Review Installation Details dialog box, any dependencies installed with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. Select **Install**.

Assign roles to Data Catalog users

Assign roles to control access to features, capabilities, and data in Data Catalog .

Before you begin

Role required: admin

About this task

For detailed information about roles that are installed with Data Catalog, see Data catalog roles.

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Procedure

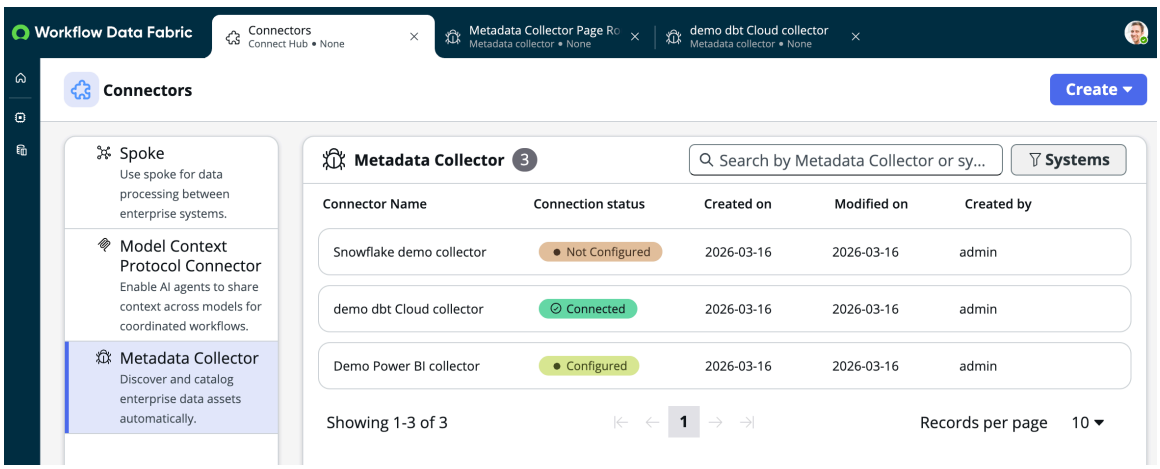
Assign roles to users and groups using the Data Catalog feature.

- Assign a role to a user
- Assign a role to a group

Configuring metadata collectors

Metadata collectors automatically import data asset information from external systems into Data Catalog.

Metadata collectors provide read-only access to external data systems and harvest information about data assets, making them searchable and discoverable in the catalog. Each collector type is designed for a specific platform and processes that platform's metadata structure. Configuration involves setting up source-system prerequisites and creating a collector record for each platform.



Connection states

Metadata collectors progress through the following states as you configure and validate them:

Not configured

The collector has been created but required fields are incomplete. Complete all mandatory fields including system details, connection credentials, and at least one endpoint configuration to move to the next state.

Configured

All required information has been provided, but credentials have not yet been validated. The collector moves to Connected status after credentials are successfully verified when the collector runs successfully.

Connected

Credentials have been validated and the connection is working. The collector is ready to harvest metadata from the source system.

Expired

The connection is broken due to expired authentication details. It is only applicable for authentication methods where this information can be retrieved.

Metadata collector deployment models

Choose how to deploy metadata collectors based on your network accessibility and security needs. Deploy on a MID Server you host, or use ServiceNow-managed cloud infrastructure.

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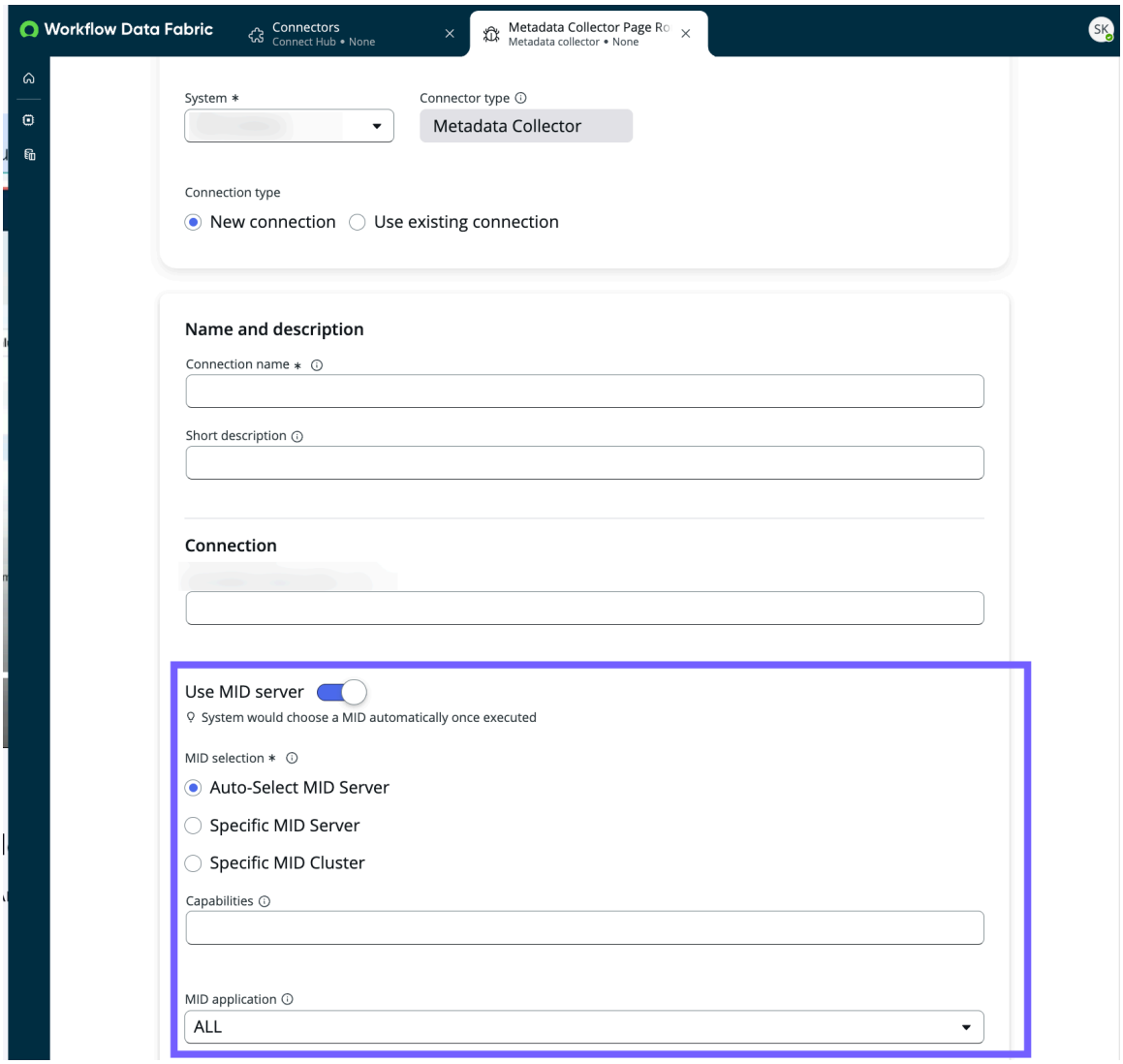
Metadata collectors harvest metadata — schemas, tables, columns, and lineage — from your data sources and upload it to your ServiceNow instance for cataloging and governance. You can deploy collectors in two ways: on a MID Server within your network, or in ServiceNow-managed cloud infrastructure. The choice depends on your source's network accessibility and whether you want to manage your own infrastructure.

Deployment model selection

Select a deployment model using the **Use MID server** toggle on the metadata collector configuration form.



When a collector is configured to run on a MID Server, three routing models control how the system assigns a MID Server to the collection job. For details on each routing model, see MID Server for metadata collectors.

MID Server collectors (on-premises)

The collector runs as a job on a MID Server you host, inside your network. The MID Server reaches the source directly, then pushes the harvested metadata back to your ServiceNow instance over the existing MID Server connection.

For system requirements and configuration guidelines, see MID Server for metadata collectors.

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ServiceNow-hosted collectors (cloud)

The collector runs in ServiceNow-managed infrastructure. There is no host to provision or patch on your side. You register the connection and credentials, and ServiceNow runs the collector job.

Use this option if you do not want to provision or maintain a MID Server just for cataloging.

Requirements:

- Source system reachable from ServiceNow's cloud through direct internet access.
- Service account credentials with read access to the source's metadata APIs or system catalogs
- No local infrastructure to size or maintain

Deployment model comparison

MID Server versus ServiceNow-hosted collectors

Consideration	MID Server (on-premises)	ServiceNow-hosted (cloud)
Who runs the process	You, on your infrastructure	ServiceNow
Network exposure needed	None inbound; MID Server reaches out	Source must be reachable from ServiceNow's cloud
Best for	Sources behind a firewall or VPN, strict data residency requirements	Internet-reachable or cloud-native sources, no appetite for hosting infrastructure
Ongoing maintenance	You patch and size the MID Server	None

What gets harvested

The deployment model doesn't change what's cataloged. Either way, the collector harvests schemas, tables, columns, and lineage from the source, then uploads them to the ServiceNow instance for cataloging, governance, and AI-ready workflows.

MID Server for metadata collectors

When your source is behind a firewall or requires on-premises handling, deploy metadata collectors on a MID Server you host to harvest metadata from on-premises and privately networked data sources.

To harvest metadata from on-premises and privately networked data sources, you deploy metadata collectors on a MID Server within your network. This is one of two deployment models available for metadata collectors.

The Management, Instrumentation, and Discovery (MID) Server facilitates secure communication and data movement between your ServiceNow instance and external data sources. A configured and validated MID Server is required to connect to the data source. For more information, see the MID Server documentation.

System requirements

The host running the MID Server must meet the following minimum hardware requirements:

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Item	Requirement
RAM	8 GB
CPU	4 GHz processor

MID Server configuration guidelines

The following guidelines apply when sizing and configuring the MID Server for metadata collectors:

- Dedicated MID Server: Use a dedicated MID Server for metadata collectors that connect to external data sources to avoid resource contention with other applications.
- Minimum memory guidance: Start with a minimum of 8 GB JVM memory. Actual requirements vary based on data volume and complexity.
- Size-based planning: Estimate data volume in advance and size MID Server resources accordingly.

Consider your data volume and processing requirements when configuring your MID Server. Depending on your environment, you can adjust memory allocation to support your workload.

Note: If you experience out-of-memory errors or performance issues, refer to the MID Server system requirements documentation for guidance on adjusting your configuration.

MID Server routing models

When a metadata collector is deployed on a MID Server, a routing model determines which MID Server or cluster executes each collection job. The routing model applies to all runs and can be changed by an administrator at any time.

Auto-select

The system selects any available MID Server at job execution time. This is the default routing model. Auto-select supports two optional constraints: selection can be restricted to MID Servers that advertise specific capabilities, or narrowed to MID Servers running a particular application.

Designated MID Server

The collection job always runs on a single, named MID Server. If that MID Server is unavailable at job execution time, the job fails with an error identifying it by name. This model is suited for sources that require a specific network path, credential set, or capability that only one MID Server in the environment provides.

Designated MID cluster

The collection job runs on any available MID Server within a named cluster. This model supports load distribution and failover across MID Servers that share access to the source.

Enable Vault classification for a metadata collector

Enable a metadata collector to classify harvested columns using ServiceNow Vault.

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Before you begin

- The metadata collector is created and saved. This option is available only from the connection details of a saved collector.
- An active entitlement to ServiceNow Vault is required. If the entitlement isn't present, the **Enable vault classification** toggle is disabled.

Role required: connection-admin

About this task

The following metadata collector types support Vault classification: Snowflake, Amazon Redshift, Databricks, Oracle, PostgreSQL, Teradata, MySQL, Microsoft SQL Server, and SAP HANA.

ServiceNow Vault uses Data Classification to organize data into data classes, such as Personally Identifiable Information (PII), so it can be governed at the class level. Enabling this option extends Data Classification to the columns that a collector harvests from an external database. For more information, see Data Classification.

To identify the type of data in a column, the metadata collector reads a small sample of values from each harvested column in the source database. The collector sends the sample over an encrypted (HTTPS) connection to the Vault Discovery service on your ServiceNow instance. Vault scans the sample for sensitive data patterns, such as email addresses or Social Security numbers, and returns the classification result. Sample values aren't stored. Neither the Data Catalog nor Vault persists them. Only the resulting classification labels are saved and displayed in the Data Catalog.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Connectors**.
4. Select **Metadata collector**.
5. Select a saved collector to open its connection details.
6. Select the **Classification** tab.
7. Enable the **Enable vault classification** toggle and complete the form.

   Note: An active entitlement to ServiceNow Vault is required. If the entitlement isn't present, the Enable vault classification toggle is disabled.

Classification tab fields

Field	Description
Username	Username for the ServiceNow instance.
Password	Password for the user.

8. Select **Save**.

Result

Vault classification is applied to columns the collector harvests. When the **Enable vault classification** toggle is cleared, columns aren't classified.

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Amazon Redshift metadata collector

Amazon Redshift metadata collector provides read-only access to metadata from an Amazon Redshift database.

The Amazon Redshift collector harvests metadata for Redshift tables and columns.

Metadata cataloged

The Amazon Redshift collector catalogs the following information.

Note: All versions of overloaded functions and stored procedures are cataloged. Each version has its own title in the catalog but a distinct identifier.

Metadata harvested

Object	Information cataloged
Columns	Name, Description, JDBC type, Column Type, Is Nullable, Default Value, Key type (Primary, foreign), column size, column index
Table	Name, description, primary key, schema
Views	Name, description, SQL definition
Schema	Identifier, Name
Database	Type, name, identifier, server, port, environment, JDBC URL
Function	Name, Description, Function Type
Stored Procedure	Name, Description, Stored Procedure Type

Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between harvested data assets

Data asset page	Relationship
Table	Columns
Columns	Table
Schema	Database that contains Schema, Table that is part of Schema
Database	Schema contained in Database

Lineage for Redshift

The following lineage information is collected by the Redshift collector:

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Lineage availability by object

Object	Lineage available
View (column-level)	The collector traces data flow from view columns to source table columns across SQL expressions and sub queries. View → Table column relationships The collector captures lineage when views: • Sort rows (ORDER BY) • Filter rows (WHERE, HAVING) • Aggregate rows (GROUP BY)

Stored Procedure	The collector identifies:
	• The associated column in an upstream view or table:
	  ○ Where the data is sourced from
	  ○ That sort the rows via ORDER BY
	  ○ That filter the rows via WHERE/HAVING
	  ○ That aggregates the rows via GROUP BY
	• The downstream table that has its tables updated.
	
	The following stored procedures aren't supported:
	• Stored procedures with multitable inserts. However, multiple separate insert statements that insert into one table are supported.
	• Stored procedure with multiple SELECT and INSERT statements not separated by a semicolon delimiter

Authentication supported

The collector supports username and password authentication to Redshift.

Prepare to run the Amazon Redshift collector

Create a Redshift user and configure permissions before running the collector.

Before you begin
Role required: admin

About this task
Run the following SQL statements to set up a new user with appropriate permissions to harvest from Redshift. For information about Redshift permissions, see the Redshift GRANT documentation.

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Procedure

1. Create a user.

```
CREATE USER ddw_user PASSWORD '<password>';
```

   Replace `<password>` with a secure password.

2. Grant permissions to the user.

   Run these commands for each schema you want to collect. Replace `<schemaName>` with your schema name.

```
-- Grant USAGE access to the target schema
             GRANT USAGE ON SCHEMA <schemaName> TO ddw_user;
          -- Grant USAGE access to pg_catalog schema for stored
 procedures and extended metadata
             GRANT USAGE ON SCHEMA pg_catalog TO ddw_user;
          -- Grant SELECT access on all tables in the target
 schema
             GRANT SELECT ON ALL TABLES IN SCHEMA <schemaName>
 TO ddw_user;
          -- Grant SELECT access on all tables in pg_catalog
 schema for stored procedures and extended metadata
             GRANT SELECT ON ALL TABLES IN SCHEMA pg_catalog
 TO ddw_user;
```

Create an Amazon Redshift metadata collector

Create a collector to import metadata from Amazon Redshift.

Before you begin

Before you begin, verify the following:

- All prerequisite tasks are completed. For more information, see Prepare to run the Amazon Redshift collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Redshift**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

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6. Complete the form.

Redshift metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Server	Hostname of the database server to connect to.
Server port	Port of the database server (if not the default).
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication options

Field	Description
Username	Username to use to connect to the database.

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Field	Description
Password	Password of the databsase user.

9. Configure the databases information.

Databases information

Field	Description
Database	Name of the database to connect to. Specify multiple databases by adding one value per line.
Excluded database	Name or regular expression indicating databases not to catalog when the Database field is empty. **Note:** This parameter is ignored if the Database field is specified.

10. From the schema collection options, select one of the following: **Collect all schemas** or **Specify which schema to collect**.

Schema collection options

Field	Description
Collect all schemas	
Collect all schemas	Catalog all schemas to which the user has access.
Exclude Schema	Name or regular expression of the database schema to be excluded.
Include Information Schema	Include the database's Information Schema in catalog collection.
Specify which schema to collect	
Specify which schema to collect	Catalog only the specified schemas.
Schema	Name of the database schema to catalog.

11. Configure the harvesting scope and limits options.

Harvesting scope and limits options

Field	Description
Enable column statistics collection	Enable harvesting of column statistics (that is, data profiling). **Note:** Enabling profiling can increase the collector's runtime, as the collector must read table data to generate profiling metadata.

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Field	Description
Target sample size for column statistics	Number of rows sampled for computation of column statistics and string-value histograms. For example, to sample 1000 rows, set the parameter as: 1000. Default: 100000
Disable Lineage collection	Skip harvesting of intra-database lineage metadata.
Disable Extended Metadata collection	Skip harvesting of extended metadata for data asset types such as database, schema, table, columns functions, stored procedures, user-defined types, synonyms. Basic metadata for these data asset types is still harvested.
Enable Sample String Values collection	Enable harvesting of sample values and histograms for columns containing string data.
Exclude system functions	Exclude system functions from metadata collection.

12. Configure the connection and reliability options.

Connection and reliability options

Field	Description
Server environment	Friendly name for the environment in which your database server runs when the server name is localhost. Used to differentiate it from other environments.
Database ID	Unique identifier for this database. Used to generate the database ID when the database name is not sufficiently unique.
JDBC properties	JDBC driver properties to pass through to driver connection.
SQL parsing timeout	Timeout in seconds for SQL parsing during lineage collection. Default: 60

13. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a **Configured** status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

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- Enable vault classification for columns harvested by the collector. This option is available only from the connection details of a saved collector. See Enable Vault classification for a metadata collector.
- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Amazon S3 metadata collector

The Amazon S3 metadata collector harvests read-only metadata from an AWS S3 account.

The collector harvests metadata from AWS S3, including buckets, objects, and their associated metadata.

Authentication supported

The collector supports the following authentication methods. For details, see Credentials and authentication in the AWS documentation.

- Authentication details supplied through an AWS credentials file
- Access Key ID and AWS Secret Access Key

Metadata cataloged

Amazon S3 metadata cataloged by object type

Object	Information cataloged
Bucket	• ARN (Amazon Resource Name) • Region • Name • Version state • Creation date • ACL (access control list) owner ID • ACL grantee ID • ACL grant permission
Object	• Key • ARN (Amazon Resource Name) • Region • Size • Last modified date

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Amazon S3 metadata cataloged by object type (continued)

Object	Information cataloged
	• ACL (access control list) owner ID • ACL grantee ID • ACL grant permission • Metadata

Relationships between objects

By default, the harvested metadata includes catalog pages for the following resource types. Each catalog page has a relationship to the other related resource types. If the metadata presentation for this data source has been customized, you might see other resource pages and relationships.

Amazon S3 resource page relationships

Resource page	Relationship
S3 Bucket	S3 Object
S3 Object	S3 Bucket

Limits for S3 buckets

The collector has a default limit of 10,000 objects per bucket. If a bucket exceeds this limit, the collector skips the bucket, harvests no metadata for it, and logs a warning message.

To increase the limit beyond the default, set the `--max-resources` parameter in your collector command. The maximum value for this parameter is 10,000,000 (ten million). If the total contents across all buckets and objects exceed this limit, the collector stops cataloging additional buckets and logs a warning message.

Prepare to run the Amazon S3 collector

Create an AWS IAM user with the permissions required for the metadata collector to harvest metadata from Amazon S3 buckets and objects.

Before you begin

Role required: admin

About this task

The collector authenticates to Amazon S3 using either an AWS credentials file or an access key ID and secret access key. Complete the following steps to create a dedicated IAM user, assign the required permissions, obtain an access key, and set up a credentials file.

Procedure

1. Create an IAM user for running the collector.
   a. Log in to the AWS portal and navigate to the IAM service.
   b. Under **Users**, select **Add users**.
   c. Enter a name for the user and complete the user creation workflow.
2. Assign the following permissions to the user.

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Required IAM permissions for the Amazon S3 collector

Permission	AWS API	Object cataloged using the permission
`s3:ListAllMyBuckets`	`ListBuckets`	List of all buckets owned by the user
`s3:GetBucketLocation`	`GetBucketLocation`	The region the bucket resides in
`s3:ListBucket`	`ListObjectsV2Paginator`	The list of objects within included buckets
`s3:GetBucketVersioning`	`GetBucketVersioning`	The versioning state of the bucket
`s3:GetBucketAcl`	`GetBucketAcl`	The ACL (access control list) of the bucket
`s3:GetObjectAcl`	`GetObjectAcl`	The ACL (access control list) of the object
`s3:GetObject`	`HeadObject`	The metadata of an object

3. Obtain an access key for the user.

   If you already have an access key for the user, skip this step. Detailed AWS documentation on this topic is available in the AWS Tools for PowerShell documentation.

   a. In the IAM service, under **Users**, select the user.

   b. On the **Security credentials** tab, select **Create access key**.

   c. Select **Application running outside AWS**, then select **Next**.

   d. Enter an optional description tag, then select **Create access key**.

   e. Copy the **Access key ID** and **Secret access key** values. You need these values when configuring the collector.

4. Set up an AWS credentials file.

   If you already have the AWS CLI installed and a credentials profile file configured, skip this step.

   a. Install the AWS CLI. For details, see the AWS CLI installation documentation.

   b. From the command line, run `aws configure`.

      This command stores the credentials in `~/.aws/credentials`.

Result

The IAM user has the permissions required to run the Amazon S3 metadata collector.

What to do next

Use these credentials when configuring the collector. See Create an Amazon S3 metadata collector.

Create an Amazon S3 metadata collector

Use a metadata collector to import Amazon S3 bucket and object metadata into the data catalog.

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Before you begin

- All prerequisite tasks must be complete. For more information, see Prepare to run the Amazon S3 collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.

Role required: connection-admin.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Amazon S3**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

Amazon S3 metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected.

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Field	Description
	○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.
AWS Region	The AWS region used to start the S3 client.

8. Configure the authentication options.

Authentication options

Field	Description
Authenticate using AWS Key/Secret	Specify the **AWS Access Key ID** and **AWS Secret Access Key**.
Authenticate using IAM role	Specify the **AWS IAM role ARN** and **AWS Role External ID**.

9. Configure the bucket and objects options.

Configuration options

Field	Description
Excluded bucket	Specify the buckets to exclude. You can provide the bucket name or a regular expression to match. Use the parameter multiple times for multiple specific buckets. If multiple regular expressions are specified, the collector excludes buckets that match any of them. If both **Include bucket** and **Excluded bucket** are specified, **Include bucket** takes precedence.

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Field	Description
	Note: If the bucket name includes special characters [. , + , * , ? , ^ , $, (,) , [,] , { , } ,	, \], use a backslash (\) before the special character to escape it. For example, \[
Included bucket	Specify the buckets to collect. You can provide the bucket name or a regular expression to match. Use the parameter multiple times for multiple specific buckets. If multiple regular expressions are specified, the collector harvests buckets that match any of them. **Note:** If the bucket name includes special characters [. , + , * , ? , ^ , $, (,) , [,] , { , } ,	, \], use a backslash (\) before the special character to escape it. For example, \[
Include object prefix	Specify the object prefix to harvest objects that begin with the specified prefix.
Included object	Specify the objects to collect, using either an object name or a regular expression to match. Use the parameter multiple times for multiple specific objects. If multiple regular expressions are specified, the collector harvests objects that match any of them. If both **Included object** and **Excluded object** are specified, **Included object** takes precedence. **Note:** If the object name includes special characters [. , + , * , ? , ^ , $, (,) , [,] , { , } ,	, \], use a backslash (\) before the special character to escape it. For example, \[
Excluded object	Specify the objects not to collect, using either an object name or a regular expression to match. Use the parameter multiple times for multiple specific objects. If multiple regular expressions are specified, the collector excludes objects that match any of them. If both **Included object** and **Excluded object** are specified, **Included object** takes precedence.

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Field	Description
	Note: If the object name includes special characters [. , + , * , ? , ^ , $, (,) , [,] , { , } , | , \], use a backslash (\) before the special character to escape it. For example, \[

10. Configure the advanced options.

Advanced options

Field	Description
Max objects per run	Maximum resources the collector will harvest, up to 10 million. If not specified, by default the collector will harvest a maximum of 10,000 resource.

11. Select **Save**.

Result

The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next

After creating the collector, you can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Azure Data Factory metadata collector

The Azure Data Factory metadata collector provides read-only access to metadata from an external Azure Data Factory account.

Use this collector to harvest metadata from ADF, including pipelines, datasets, dataflows, linked services, triggers, integration runtimes, and global parameters. It gathers lineage information between ADF datasets and between ADF and external sources such as Snowflake.

Metadata cataloged

The Azure Data Factory collector catalogs the following information.

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Metadata harvested

Object	Information cataloged
Factory	ID, Name, ETag, Location, Create Time, Provisioning State, Version, Public Network Access, Factory Tags, Repository configuration (Account name, Collaboration Branch, Repository Name, Disable Publish, Root Folder, Host Name, Client ID, Project Name, Last Commit ID, Tenant ID, Repo Configuration Type).
Pipeline	ID, Name, Description, Etag, Concurrency, Folder, Parameters, Metric Policy Duration, Variables
Pipeline Activity	Name, Description, Type, Inactivity Status, State, User Properties, Activity Policy (Retry, Timeout, Retry Interval In Secs, Secure Input, Secure Output)
Linked Service	ID, Name, Description, Type, Etag, Connection String, Domain, Parameters **Note:** Harvesting of Connection String for SFTP Linked Services is not supported.
Dataset	ID, Name, Etag, Type, Database, Schema, Table, Folder, Container, File Name, Parameters
Dataflow	ID, Name, Etag, Type, Description, Folder
Trigger	ID, Name, Etag, Type, State, Description, Frequency, Interval, Start time, End time
Integration Runtime	ID, Etag, Name, Type, Description, State Compute Properties (Node Size, Number of Nodes, Max Parallel Execution Per Node, Core Count, Compute Type, Clean up, Number of External Nodes, Number of Pipeline Nodes), SSIS properties (Catalog Server Endpoint, Catalog Admin Username, Catalog Pricing Tier, License Type, Dual Standby PairName, Edition)
Global Parameter	ID, Name, Value, Type
ADF Table	ID, Name
ADF Column	ID, Name, Type, Precision, Scale
Pipeline Activity	Query

Relationships between objects

Catalog pages show relationships between the following data asset types:

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Relationships between harvested data asset pages

Data asset page	Relationship
Factory	Contains Global Parameter, Contains Pipeline, Contains Dataset, Contains Dataflow, Contains Trigger, Contains Integration Runtime
Pipeline	Has Tag (also known as Annotation), Contains Activity
Activity	Belongs to Pipeline, Contains Activity, Depends on Activity, uses Linked Service, uses Integration Runtime, uses Dataset
Linked Service	Uses Integration Runtime, Has Tag (also known as Annotation), Connects to database
Dataset	Uses Linked Service, Has Tabular Datasource, Has Tag (also known as Annotation)
Dataflow	Uses Dataflow, Imports Data From Linked Service, Exports Data From Linked Service, Imports Data From Dataset, Exports Data From Dataset, has Tag (also known as Annotation)
Integration Runtime	Uses Integration Runtime, Uses Linked Service
Trigger	Triggers Pipeline, Has Tag (also known as Annotation)

Lineage for Azure Data Factory

Collected lineage information:

Lineage availability by object

Object	Lineage available
Dataset	The collector identifies the source or sink of the dataset: • when the source/sink is Snowflake, Databricks, PostgreSQL, MySQL, Oracle, Teradata, DB2, and SQLServer. • when there is a Copy Activity Run copying data between two datasets.
ADF table	The collector identifies the associated table in an upstream table where the data is sourced from/sinked to.
ADF column	The collector identifies the associated table in an upstream column where the data is sourced from/sinked to.

Supported data sources for cross-system lineage:

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- Snowflake
- Databricks

Authentication types supported

The Azure Data Factory collector authenticates using Azure Service Principal.

Prepare to run the Azure Data Factory collector

Set up Azure data assets, authentication, and permissions before running the collector.

Before you begin
Role required: admin

About this task
The collector uses Azure Service Principal for authentication. You must register an application, obtain Azure IDs, and grant subscription-level access. You can also prepare datasets for lineage harvesting.

Procedure

1. Register an application in Azure Active Directory and create credentials.

   See Register application and create client secret.

2. Obtain required Azure IDs.

   See Obtain subscription and tenant IDs.

3. Grant Service Principal access to Data Factory data assets.

   See Grant Service Principal access to Data Factory.

4. **Optional:** Prepare datasets for lineage harvesting.

   (Optional) See Prepare to harvest lineage.

Register application and create client secret

Register an Azure application and create a client secret for Service Principal authentication.

Before you begin
Role required: admin

About this task
Register an application in Azure Active Directory and create credentials for the collector.

Procedure

1. Register a new application.

   a. Navigate to **Azure Portal** > **Azure Active Directory**.

   b. Select **App Registrations**.

   c. Select **New Registration**.

   d. Enter the application name.

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Example: DataDotWorldADFApplication.

e. For **Supported account types**, select **Accounts in this organizational directory only**.

f. Select **Register**.

2. Create a client secret.
   a. On the application page, select **Certificates and Secrets** > **Client secrets**.
   b. Select **New client secret**.
   c. Add a description and set the expiration date.
   d. Select **Add**.
   e. Copy and save the secret value.
3. Obtain the Client ID.
   a. Select the **Overview** tab.
   b. Copy the Application (Client) ID from the Essentials section.

Obtain subscription and tenant IDs

Obtain Azure subscription and tenant IDs for collector configuration.

Before you begin
Role required: admin

About this task
You will use these IDs when configuring the collector.

Procedure
1. Obtain the Tenant ID.

   a. Navigate to the application page that you created.

   b. Copy and save the Directory (tenant) ID.

      You will use this value for the Tenant ID field in the collector configuration.

2. Obtain the Subscription ID.

   a. Navigate to a storage account that you want to harvest from.

   b. On the Overview page, copy the Subscription ID.

      You will use this value for the Subscription ID field in the collector configuration.

Grant Service Principal access to Data Factory

Grant Reader role to the Service Principal for Azure Data Factory access.

Before you begin
Role required: admin

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About this task
The Service Principal does not require explicit permission for each Data Factory. If the Data Factories you want to catalog were created within a specific subscription, add the Service Principal to that subscription with the Reader role.

Procedure
1. Navigate to the Subscriptions page in Azure Portal.
2. Select the subscription containing your Data Factories.
3. Select the **Access Control (IAM)** tab.
4. Select **Add** > **Add Role Assignment**.
5. Under **Job Function Roles**, search for and select **Reader**.
6. Select the **Members** tab.
7. Select **Select Members**.
8. Search for and select `DataDotWorldADFApplication`.
9. Select **Review + assign**.

Prepare to harvest lineage

Import dataset schemas to enable column and lineage harvesting.

Before you begin
Role required: admin

About this task
Complete this task if you want to harvest columns and the associated lineage.

Procedure
1. Navigate to the dataset you want to harvest columns and lineage from.
2. Select the **Schema** tab.
3. Select **Import Schema**.
4. Publish the dataset.

Create an Azure Data Factory metadata collector

Create a collector to import metadata from Azure Data Factory.

Before you begin
Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the Azure Data Factory collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure
1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.

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3. Select **Create** > **Metadata collector**.
4. From the System list, select **Azure Data Factory**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. On the form, fill in the fields.

Azure Data Factory metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.

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Field	Description
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Enter the Azure Data Factory authentication details.

Azure Data Factory authentication details

Field	Description
Microsoft Entra client ID	Azure Active Directory application client ID for the Azure Data Factory app.
Microsoft Entra client secret	Azure Active Directory application client secret for the Azure Data Factory app.
Azure subscription ID	The subscription ID in which the data factories are available.
Microsoft Entra Tenant ID	Azure Active Directory application tenant ID for the Azure Data Factory app.

9. Enter the Azure Data Factory configuration details.

Azure Data Factory configuration details

Field	Description
Include Data Factory name(s)	Names of data factories to catalog. Enter either the exact name or a regular expression to match. List one data factory name per line.
Exclude Data Factory name(s)	Names of data factories to exclude from cataloging. Enter either the exact name or a regular expression to match. List one data factory name per line.

10. Configure the advanced options.

Advanced options

Field	Description
Max retries	The number of times the system retries a failed API call. Default: 5
Retry delay	The number of seconds to wait between retry attempts for a failed API call. Default: 2 seconds

11. Select **Save**.

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Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

BigQuery metadata collector

The BigQuery metadata collector provides read-only access to metadata from an external BigQuery account.

The collector harvests metadata for BigQuery datasets, projects, tables, and columns in a BigQuery instance and make it searchable and discoverable in the data catalog. The collector also harvests column-level lineage relationships between tables and views.

Metadata cataloged

The BigQuery collector catalogs the following information.

Metadata harvested

Object	Information cataloged
Datasets	ID, name, description, labels (note these are key/value pairs), created date, last modified date, default table expiry, default partition expiry, data location
Projects	Name
Tables	Name, Description, Created date, Last modified date, Default table expiration, Data location, Labels, Type (Standard, External, Snapshot, Model), Partitioned on field, Clustered by columns for standard and snapshot tables, Partition type (range or time) requires partition filter - Range (Start, end, interval) Time (Partition type (hour, day, month, year), expiration)
Columns	Name, Description, Data Type, Is Nullable, Column size
View	Name, description, created date, default table expiration, last modified date, data location, default collation, labels, view SQL, clustered by columns for materialized

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Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between harvested data assets

Data asset page	Relationships
Datasets	Tables, Views
Projects	Dataset
Tables	Column, Labels
Columns	Table, View
Views	Column
Label Value	Table, View, Project, Dataset

Lineage for BigQuery

The following lineage information is collected by the BigQuery collector.

Object lineage availability

Object	Lineage available
View Column	The collector identifies the associated column in an upstream view or table: • Where the data is sourced from • That sort the rows via ORDER BY • That filter the rows via WHERE/HAVING • That aggregate the rows via GROUP BY

Prepare to run the BigQuery collector

Create a service account and configure authentication before running the collector.

Before you begin
Role required: admin

About this task
The collector connects to BigQuery using a service account associated with your project.

Procedure

1. Create a service account.

   Assign the following roles to the service account:

   - BigQuery Data Viewer
   - BigQuery User
2. Create a key for the service account and download the JSON key file.

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See the Creating and managing service account keys documentation for details.

3. Place the key file on the machine where you plan to run the collector.

   You need this file when configuring the collector.

What to do next

See the Google Cloud Platform predefined roles and permissions documentation for additional information.

Create a BigQuery metadata collector

Create a collector to import metadata from BigQuery.

Before you begin

Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the BigQuery collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **BigQuery**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

BigQuery metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

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Connection options

Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Enter the BigQuery authentication details.

BigQuery authentication details

Field	Description
BigQuery Credential File Path	Upload the credentials file you generated for authentication.

9. Enter the BigQuery configuration details.

BigQuery configuration details

Field	Description
BigQuery Project	BigQuery project that contains the datasets to catalog.
BigQuery Datasets to Catalog	BigQuery datasets to catalog in the project. By default, all datasets in a project are cataloged. When multiple projects are

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Field	Description
	specified, the dataset filter applies to all projects.

10. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Databricks metadata collector

The Databricks metadata collector provides read-only access to metadata from an external Databricks account.

The collector harvests metadata from data assets in Databricks Hive Metadata, Unity Catalog (including Delta Lake), Workflows, and Notebooks.

Metadata cataloged

The Databricks collector catalogs the following information.

Metadata harvested

Object	Information cataloged
Columns	Name, Description, JDBC type, Column Type, Is Nullable, Default Value, Column size, Column index Extended metadata: Tags **Note:** Deprecated columns and any lineage related to these deprecated columns are not cataloged.
Table	Name, Description, Schema, Primary key, Foreign key Extended metadata: Tags, Owner, Type, Creation date, Last Modified, Location,

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Metadata harvested (continued)

Object	Information cataloged
	Provider, Version, Size, File Count, Partition Columns, Properties
Model	Name, Owner, Description, Created By, Created At, Last Modified By, Last Modified At, Securable Kind, Securable Type
Views	Name, Description, SQL definition, Tags
Schema	Name Extended metadata: Tags
Database	Type, Name, Server, Port, Environment, JDBC URL Extended metadata: Tags
Notebook	Notebook ID, Path, Language Type (SQL, Python, Scala, R)
Function	Name, Description, Function Type
Job	Title, Description, Creator, Created At, Job run as, Format, Max Concurrent Runs, Notification On Start, Timeouts (sec), Notification On Success, Schedule, Git Source, Notification on Failure, Tags, List of tasks, List of clusters
Cluster	Name, Description, Node Type ID, Driver Node Type ID, Spark Version, Number of Workers, Autoscale Max Workers, Autoscale Min Workers, AWS Attributes, Tags
Task	Task Key, Type of Task (Notebook, dbt, Spark jar, Python script, Python wheel, Pipeline task, SQL), Task timeout, Retry interval, Cluster used by the task, Max retries, Depends on, Libraries, Notifications (On start, On success, On failure), Notebook File Path, Notebook Source, Notebook Parameters, Spark Jar Main Class Name, Spark Jar Parameters, Python Script File path, Python Script Parameters, Spark Submit Parameters, Pipeline ID, Pipeline Full Refresh, Python Wheel Package Name, Python Wheel Entry Point, Python Wheel

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Metadata harvested (continued)

Object	Information cataloged
	Parameters, SQL Warehouse, SQL Query ID, SQL Dashboard ID, SQL Alert ID, Dbt Project Directory, Dbt Profiles Directory, Dbt warehouse, Dbt catalog, Dbt schema, Dbt commands
External Location	Name, External URL, Description, Data Source Type, Created Date, Created By, Owner
Storage Credential	Name, Description, Credential, Created Date, Created By, Owner
Volume	Name, Description, Type, Owner, Created By, Created At, Last Modified By, Last Modified At, Metastore ID
Materialized View	Name, SQL Definition, Created, Last Modified
Metric View	Name, Description, YAML Definition, Source Table, Source Table Type, Filter, Created, Last Modified

Following additional information is cataloged when you run the collector with the **Enable Governance Metadata Collection** option.

Cataloging Databricks Governance Policies

Object	Information Cataloged
Row Filter Access Control	Name
Column Mask Access Control	Name
Attribute Based Access Control	Name, Description, Created by, Created at, Modified by, Modified at, On securable type, For securable type, To principals, Except principals
Workspace bindings	Workspace ID, Binding type
Privileges	Granted to, Granted by, Privilege type, Granted on object, Inherited from

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Relationships between objects

The harvested metadata includes catalog pages for the following data asset types. Each catalog page has a relationship to the other related data asset types.

Relationships between harvested data asset pages

Data asset page	Relationships
Table	• Columns contained in Table • Table Indexes • Has privileges Columns contained in Table
Schema	• Database that contains Schema • Table that is part of Schema • Has privileges
Database	Schema contained in Database
Columns	• Table Indexes • Table containing Column
Table Indexes	Columns
Job	• Clusters used by tasks in Job • Tasks contained within Job
Cluster	• Cluster contained in job • Task using Cluster
Task	• Job containing Task • Cluster used by Task • Tasks depending on Task
Notebook	• Folder containing Notebook • Task sourcing data from Notebook
Folder	• Folders contained in Folder • Notebooks contained in Folder

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Relationships between harvested data asset pages (continued)

Data asset page	Relationships
External Location	• Uses storage credential • Connects to datasource (S3 bucket, S3 Object, Azure container or Azure blob) • Has workspace bindings
Storage Credential	• Has workspace bindings • Used by External Location
Model	• Registered in schema • Stored in data assets (S3 Bucket, S3 Object)
Volume	• Contained within schema • Stored in data assets (S3 Bucket, S3 Object)
Materialized View	• Schema that contains Materialized Views • Columns that are part of Materialized Views
Metric View	• Schema that contains Metric Views • Columns that are part of Metric Views
Pipeline	• Copies data to Databricks Table/Database Schema • Ingests data from Database Table/Database Schema
Unity Catalog Metastore	Databases contained in metastore
Row Filter Access Control	• Applies to table • Uses function • Using column • Contained within schema
Column Mask Access Control	• Applies to column • Uses function • Contained within schema

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Relationships between harvested data asset pages (continued)

Data asset page	Relationships
Attribute Based Access Control	• Applies to catalog, schema and table • Defined on catalog, schema and table • Uses function
Catalog	• Has workspace bindings • Has privileges

Lineage for Databricks

The following lineage information is collected by the Databricks collector.

Note: The collector does not support lineage for SQL statements defined via variable statements.

Object Lineage Availability

Object	Lineage available
Column in view	The collector identifies the associated column in an upstream view or table for both Hive metastore and Unity Catalog: • Where the data is sourced from • That sort the rows via ORDER BY • That filter the rows via WHERE/HAVING • That aggregate the rows via GROUP BY **Note:** Deprecated columns and any lineage related to these deprecated columns are not cataloged.
Notebook	Tasks that reference Notebook. (Only if Databricks Unity Catalog is enabled).
Table	• The collector identifies the upstream and downstream tables and their external locations (S3 and ADLS Gen2 data assets) along with the intermediate Job. • The collector harvests the Databricks table lineage to S3 object.

Authentication supported

The Databricks collector supports Personal access token authentication and Oauth service principal authentication.

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Prepare to run the Databricks collector

Complete authentication and permission configuration tasks before running the Databricks metadata collector.

Before you begin

Role required: admin

Procedure

1. Generate Databricks credentials.

   For detailed instructions, see Generate credentials.

2. Configure permissions.

   For detailed instructions, see Configure permissions.

Generate credentials

Generate a personal access token or service principal secret to authenticate the Databricks connection.

Before you begin

Role required: account admin

Important: You must be an Account Admin in Databricks to create and manage service principals.

About this task

Configure these credentials to enable authentication for the Databricks collector. You can use either a Personal Access Token (PAT) or an OAuth service principal.

Procedure

Generate the required credentials based on your authentication method.

- To generate a Personal Access Token (PAT):

  a. In the Databricks workspace, select your username in the top bar and select **Settings**.

  b. Select **Developer**.

  c. Next to **Access tokens**, select **Manage**.

  d. Select **Generate New Token**.

  e. Enter a comment to identify the token.

  f. Change the **Lifetime (days)** setting if required.

  Note: To create a token with the maximum lifetime of 730 days, leave the lifetime field empty.

  g. Select **Generate**.

  h. Copy the displayed token and select **Done**. Save this token securely for future use.

  i. Alternatively, use the token API to generate a PAT.

- To generate a Service Principal secret:

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a. In the Databricks workspace, select your username in the top bar and select **Settings**.

b. Navigate to the **Identity and access** tab.

c. Next to **Service principals**, select **Manage**.

d. Select **Add service principal**.

e. Select **Add new**, provide a name for the service principal, and select **Add**.

f. Select the newly created service principal and navigate to the **Secrets** tab.

g. Select **Generate secret**.

h. Enter the lifetime for the secret and select **Generate**.

i. Copy the **Client ID** and **Client secret** from the dialog box.

Configure permissions

Grant necessary permissions for Unity Catalog, Jobs, and system tables.

Before you begin

Role required: admin

About this task

In Unity Catalog, data is secure by default. Grant permissions to the user running the collector to harvest resources. Securable objects in Unity Catalog are hierarchical, and privileges are inherited downward.

Procedure

1. Grant Unity Catalog permissions.
   The user requires **USE CATALOG**, **USE SCHEMA**, and **SELECT** permissions on the catalog to access data.

   Note: A user with **USE CATALOG** and **BROWSE** permissions can access data but can't retrieve column statistics, system functions, or certain additional table metadata. See the Databricks documentation for details about these permissions.

   a. Select the catalog to which you want to grant access.

   b. Select the **Permissions** tab and select **Grant**.

   c. Select the user and the appropriate permissions, then select **Grant**.

2. Grant compute resource permissions.
   The user must have **Can Use** permission on the existing cluster or SQL warehouse, or can create their own compute resources.

   a. Select the **More options** icon on the resource and select **Permissions**.

   b. Add the user and select the **Can Use** permission.

3. Grant permissions for Jobs.
   To harvest Jobs, the user running the collector must have **Can View** permissions on the target Jobs. For details about setting Job permissions, see the Databricks documentation.

4. Enable lineage harvesting from system tables.
   Work with your Databricks admin to enable the `system.access` schema.

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a. Make a PUT request to the API to enable the schema.

```
curl -X PUT -H "Authorization: Bearer <PAT_Token>"
 https://<databricks-host>/api/2.1/unity-catalog/metastores/<
metastore_id>/systemschemas/access
```

To find the `metastore_id`, navigate to **Catalog** > **Settings** and view the Metastore info section.

b. Grant the following permissions to the user running the collector.

- **USE SCHEMA** on `system.access`
- **SELECT** on `system.access.table_lineage`
- **SELECT** on `system.access.column_lineage`

Example SQL commands:

```
GRANT USE SCHEMA ON SCHEMA system.access to `<userid>`;
          GRANT SELECT on TABLE system.access.table_lineage
 to `<userid>`;
          GRANT SELECT on TABLE system.access.column_lineage
 to `<userid>`;
```

Create a Databricks metadata collector

Create a collector to import metadata from Databricks.

Before you begin

Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the Databricks collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Databricks**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. On the form, fill in the fields.

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Databricks metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Enter the Databricks connection details.

Connection details

Field	Description
Server	Hostname of the database server to connect to.
Server port	Port of the database server (if not the default).
Databricks HTTP Path	Databricks compute resources URL. See Databricks documentation for details.
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.

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Field	Description
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication details

Field	Description
Authenticate using personal access token	Option to authenticate using the Databricks personal access token. For details, see Databricks documentation.
Authenticate using Databricks Service Principal	Option to authenticate using the Databricks service principal client ID and Databricks Service Principal Client Secret.

9. Configure the databases information.

Databases information

Field	Description
Include databases	Name of the database to connect to. Specify multiple databases by adding one value per line.
Excluded databases	Name or regular expression indicating databases not to catalog when the Database field is empty. **Note:** This parameter is ignored if the Database field is specified.

10. Choose between **Collect all schemas** and **Specify which schema to collect** to configure the schema collection options.

Schema collection options

Field	Description
Collect all schemas	
Collect all schemas	Catalog all schemas to which the user has access.
Exclude Schema	Name or regular expression of the database schema to be excluded.

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Field	Description
Include Information Schema	Include the database's Information Schema in catalog collection.
Specify which schema to collect	
Specify which schema to collect	Catalog only the specified schemas.
Schema	Name of the database schema to catalog.

11. Configure the statistics and sampling options.

Statistics and sampling options

Field	Description
Enable column statistics collection	Enable harvesting of column statistics (data profiling). **Note:** Enabling profiling can increase the collector's runtime because the collector must read table data to generate profiling metadata.
Target sample size for column statistics	Number of rows sampled for computation of column statistics and string-value histograms. For example, to sample 1000 rows, set the parameter to 1000. Default: 100000
Disable Lineage collection	Skip harvesting of intra-database lineage metadata.
Disable Extended Metadata collection	Skip harvesting of extended metadata for data asset types such as database, schema, table, columns functions, stored procedures, user defined types, and synonyms. Basic metadata for these data asset types will still be harvested.

12. Configure the harvesting scope and limits options.

Harvesting scope and limits options

Field	Description
Disable Harvesting Workflows	Skip harvesting of Databricks workflows and their lineage metadata.
Harvest Lineage from Other Schemas	Harvest lineage from other schemas.
Enable Sample String Values collection	Enable sampling and storage of sample values for string-valued columns.
Exclude system functions	Exclude harvesting of built-in Databricks system functions.
Disable Harvesting Notebook Content	Skip harvesting notebook content.

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Field	Description
Page Size for Harvesting Queries	Specify the page size for harvesting queries. Default: 1000
Page Size for Databricks API Responses	Specify the page size for Databricks API response. Default: 100
Enable Metric Views Harvesting	Enable harvesting of metric views. Metric view information is extracted from a table's extended metadata and is available only when extended metadata harvesting is enabled.

13. Configure the connection and reliability options.

Connection and reliability options

Field	Description
Server environment	Friendly name for the environment where your database server runs when the server name is localhost. Helps differentiate it from other environments.
Database ID	Unique identifier for this database. Used to generate the database ID when the database name isn't sufficiently unique.
JDBC properties	JDBC driver properties to pass through to driver connection.
Max retries	The number of times the system retries a failed API call. Default: 5
Retry delay	The number of seconds to wait between retry attempts for a failed API call. Default: 2 seconds
Disable model collection	Skip harvesting machine learning models.
Databricks account ID	The Databricks account ID for Unity Catalog access.
External workspace URL	The external workspace URL for cross-workspace access.
Enable governance metadata collection	Enable harvesting of governance metadata including privileges, workspace bindings, ABAC policies, row filters, and column masking policies
Workspace ID to URL Mapping	Specify workspace ID to workspace URL mapping. Provide the option multiple times for multiple mappings.

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Field	Description
SQL parsing timeout	Timeout in seconds for SQL parsing during lineage collection. Default: 60

14. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Enable vault classification for columns harvested by the collector. This option is available only from the connection details of a saved collector. See Enable Vault classification for a metadata collector.
- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

dbt Cloud metadata collector

The dbt Cloud metadata collector provides read-only access to metadata from an external dbt Cloud account.

The dbt cloud collector connects to the dbt cloud project and harvests dbt assets and column-level lineage relationships from database views associated with dbt assets.

Metadata cataloged

The dbt Cloud collector catalogs the following information.

Metadata harvested

Object	Information cataloged
Analysis	Name, Description, Path, Root path, Package name, Unique ID, Alias, Meta, Raw SQL, Compiled SQL/Compiled Code, Enabled, Materialized, Resource type
Model	Name, Description, Path, Root path, Package name, Unique ID, Alias, Meta, Raw SQL, Compiled SQL/Compiled Code, Enabled, Materialized, Resource type
Model column	Column name

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Metadata harvested (continued)

Object	Information cataloged
Project	Name, Project version
Snapshot	Name, Description, Path, Root path, Package name, Unique ID, Alias, Meta, Raw SQL/ Raw Code, Compiled SQL/Compiled Code, Enabled, Materialized, Resource type
Seed	Name, Description, Path, Root path, Package name, Unique ID, Alias, Meta, Raw SQL/ Raw Code, Compiled SQL/Compiled Code, Enabled, Materialized, Resource type
Source	Name, Description, Path, Root path, Package name, Unique ID, Alias, Meta, Raw SQL/ Raw Code, Compiled SQL/Compiled Code, Enabled, Source name, Resource type
Test	Name, Description, Path, Root path, Package name, Unique ID, Alias, Meta, Raw SQL/ Raw Code, Compiled SQL/Compiled Code, Enabled, Materialized, Resource type
Test result	Time the test was executed, Status, Count of failures (if any), Message emitted by the test (if any)
Semantic Models	Name, Description, Path, Package name, Unique ID, Enabled, Resource Type, Semantic Model Components, Primary Entity
Entities	Title, SQL Expression, Entity Type
Dimensions	Title, Dimension Type
Measures	Title, Description, Has Measure Aggregation
Metrics	Title, Description, Path, Package Name, Unique ID, Metric Type

Relationship between objects

Catalog pages show relationships between the following data asset types:

Relationships between harvested data asset pages

Data asset page	Relationship
Model	Project containing dbt model, Tests testing the integrity of model, dbt data assets (test, seed, model, snapshot, source) that are upstream of model, dbt data assets (Test, Seed, Model, Snapshot, Source) that are downstream of model
Semantic Model	Project containing the semantic model, dbt model related to the semantic model, dbt semantic model components (dimensions,

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Relationships between harvested data asset pages (continued)

Data asset page	Relationship
	entities, measures), Metric that the semantic model provides context for
Model column	The database column in the manifested table or view
Project	dbt data assets (Test, Seed, Model, Snapshot, Source) contained within project
Snapshot	Project containing dbt project, dbt data assets (Test, Seed, Model, Source) that are upstream of snapshot, dbt data assets (Test, Seed, Model, Source) that are downstream of snapshot
Seed	Project containing dbt project, dbt data assets (Test, Seed, Model, Snapshot, Source) that are upstream of seed, dbt data assets (Test, Seed, Model, Snapshot, Source) that are downstream of seed
Source	Project containing dbt project, dbt data assets (Test, Seed, Model, Snapshot) that are downstream of seed, Database schema that the source represents
Test	Project containing dbt project, dbt model that has its integrity tested by this test
Test result	The dbt test that was executed to produce the result

Lineage for dbt

The following lineage information is collected by the dbt Cloud collector.

Object Lineage Availability

Object	Lineage available
dbt model materialized as view	Referenced database tables and columns in dbt model materialized as view
dbt resource	dbt data assets that are upstream and downstream (for example, seeds that are upstream of models, and tests that are downstream of models) of dbt data asset.

Snowflake is the currently supported data source for cross-system lineage.

Prepare to run the dbt Cloud collector

Configure dbt Cloud and create authentication tokens before running the collector.

Before you begin
Role required: none

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About this task
Complete these preparation tasks before running the dbt Cloud collector.

Procedure
1. Obtain the required IDs from dbt Cloud.

   See Obtain account, project, job, and run IDs.

2. Create an API token based on your dbt Cloud plan.
   - Enterprise plan: See Create a service token
   - Team plan: See Create a user token
3. Enable documentation generation in job settings.

   See Update job execution settings.

Obtain account, project, job, and run IDs
Obtain required IDs from dbt Cloud URLs for collector configuration.

Before you begin
Role required: none

About this task
You'll use this information when configuring the collector for metadata harvesting.

Procedure
1. Obtain the Account ID and Project ID.

   a. Navigate to **Deploy** > **Jobs**.

   b. Copy the Account ID and Project ID from the URL.

   URL format:

   ```
   https://cloud.getdbt.com/deploy/<accountID>/projects/<project ID>/jobs
   ```

2. Obtain the Environment ID and Environment Name.

   a. Navigate to **Deploy** > **Environments**.

   b. Select the environment that you want to run the collector against.

   c. Copy the Environment ID from the URL or note the Environment Name from the page title.

   URL format:

   ```
   https://cloud.getdbt.com/deploy/<accountID>/projects/<project ID>/environments/<environmentID>
   ```

3. Obtain the Job ID.

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a. From the Jobs section, select the job associated with your environment.

b. Copy the Job ID from the URL or note the Job name from the page title.

URL format:

```
https://cloud.getdbt.com/deploy/<accountID>/projects/<project ID>/jobs/<jobID>
```

4. **Optional:** : Obtain a specific Job Run ID.

(Optional) By default, the collector harvests from the most recent successful job run. To harvest from a specific run, complete these steps.

a. From the Job page, select a specific job run.

b. Copy the Job Run ID from the URL.

(Optional) URL format:

```
https://cloud.getdbt.com/deploy/<accountID>/projects/<project ID>/runs/<jobRunID>
```

Create a user token

Create a personal access token for metadata harvesting.

Before you begin

Role required: admin

Plan required: Team.

About this task

The Team plan doesn't support service account tokens. You must create a personal access token using a dedicated user account.

Procedure

1. Create a dedicated user account for the collector.
2. Assign the Admin role to the user account.
3. Log in as the dedicated user.
4. Navigate to **Profile** > **Access Tokens**.
5. Generate a Personal Access Token.
6. Copy the token value.

You'll use this token value for the dbt Cloud API key when configuring the collector.

What to do next

See the dbt Cloud user tokens documentation for additional information.

Create a service token

Create a service account token with the required permissions for metadata harvesting.

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Before you begin
Role required: admin

Plan required: Enterprise.

About this task
For Enterprise accounts, service account tokens are commonly used for production systems.

Procedure
1. Create a service account token.

   Follow the steps in the dbt Cloud service tokens documentation.
2. Assign roles to the service account token.
   - Account Viewer: Assigned at the account level
   - Job Viewer: Assigned at the project level for each project to collect metadata from
3. Copy the token value.

   You'll use this token value for the dbt Cloud API key when configuring the collector.

Update job execution settings

Enable documentation generation in dbt Cloud job settings. This setting must be enabled to successfully harvest dbt resources.

Before you begin
Role required: admin

This setting must be enabled to successfully harvest dbt resources.

Procedure
1. Navigate to **Deploy** > **Jobs**.
2. From the **Environment** list, select the environment you want to run the collector against.
3. Select the job associated with your environment.
4. Select **Settings**.
5. Under **Execution Settings**, select **Generate docs on run**.

Create a dbt Cloud metadata collector

Create a collector to import metadata from dbt Cloud.

Before you begin
Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the dbt Cloud collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

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Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **dbt Cloud**.
5. From the Connection type list, select one of the following:
   a. Select **New connection** to configure a new connection.
   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.
6. On the form, fill in the fields.

dbt Cloud metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
dbt Cloud host	The host for your organization's account on dbt cloud. If left unspecified, the default host is assumed as cloud.getdbt.com.
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.

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Field	Description
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Enter the dbt Cloud configuration details.

Configuration details

Field	Description
dbt Cloud API key	A dbt cloud-issued API key with permissions to access the specified account.
dbt cloud account	The dbt cloud account that owns the project from which to harvest dbt metadata artifacts.
dbt Cloud project	The name or numeric identifier of the project from which to harvest dbt metadata artifacts.
dbt cloud run ID	The numeric identifier of the run that produced the artifacts to be harvested. If not specified, the most recent successful run that produced artifacts within the project is harvested.
dbt Cloud environment	The dbt Cloud environment (ID or name) used to filter the job runs from which to harvest dbt metadata artifacts.
dbt Cloud job	The dbt Cloud job (ID or name) used to filter the job runs from which to harvest dbt metadata artifacts.

9. Enter the target database details.

Note: You must set the **Target database** to **Snowflake overrides** to harvest Snowflake lineage relationships between columns specified through views.

Target database details

Field	Description
Target database	Option to override the database connection information configured on the Project in dbt cloud

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Field	Description
	○ **No Target database overrides**: Enables the collector to skip connecting to a data warehouse and only harvest dbt assets. No lineage is available for views ○ **Snowflake overrides**: Select to harvest Snowflake lineage relationships between columns specified through views
Authentication (Snowflake overrides)	
Authentication	Authentication method to use if **Snowflake overrides** is selected ○ **No Snowflake authentication overrides** ○ **Snowflake username and password overrides** ○ **Snowflake private key file overrides** **Note:** If you select Snowflake overrides and don't provide any authentication details, the collector obtains connection information (Snowflake account, role, and warehouse) from the identified dbt Cloud run.
Snowflake username and password overrides	
Database username	User credential to use in connecting to the target database
Database password	Password credential to use in connecting to the target database
Snowflake private key file overrides	
Database username	Username to use in connecting to the target database
Snowflake key file path	Private key file to use for authentication with Snowflake (for example rsa_key.p8). Use this option to override the dbt profile
Snowflake key file password	Password for the private key file if the key is encrypted and a password was set. Use this option to override the dbt profile or cloud configuration
Other optional settings	
Snowflake application	Application connection parameter to use in connecting to the target Snowflake database. Use this option to override the dbt profile or cloud configuration Default: datadotworld
Snowflake account	Snowflake account or tenant

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Field	Description
Snowflake role	Role to use in connecting to the target Snowflake database. Use this option to override the dbt profile or cloud configuration. This field is case-insensitive
Snowflake warehouse	Warehouse to use in connecting to the target Snowflake database. Use this option to override the dbt profile or cloud configuration. This field is case-insensitive

10. Enter the advanced options.

Advanced options

Field	Description
Max retries	The number of times the system retries a failed API call. Default: 5
Retry delay	The number of seconds to wait between retry attempts for a failed API call. Default: 2 seconds
API HTTP headers	Name-value pairs included as HTTP headers in API calls made by the collector. Add one value per line to specify multiple headers.
JDBC driver properties	JDBC driver properties to pass through to driver connection. Specify multiple JDBC driver properties by adding one value per line. If you are using the NTLM authentication, you must set two JDBC properties as: ○ integratedSecurity=true ○ authenticationScheme=NTLM

11. Select **Save**.

Result

The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next

After creating the collector, you can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.

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- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Fivetran metadata collector

Provides read-only access to metadata from a Fivetran account.

The collector harvests metadata from Fivetran assets, including connectors, jobs, groups, sources, and destinations. Supports impact analysis to understand how changes to upstream Fivetran connectors affect downstream systems.

Metadata cataloged

The Fivetran collector catalogs the following information.

Metadata harvested

Object	Information cataloged
Groups	Name, Identifier, Creation date
Connectors	Identifier, Succeeded at datetime, Failed at datetime, Created at datetime, Sync frequency, Name, Version, Daily sync time, Schedule type, Setup state, Update state, Pause state, Sync state, Connector type, Connected by user identifier
Connector Jobs	Run state (Failed time, Success time)
Destination	Name, Setup status, Destination type, Identifier, Region
Data source	Data source configuration properties, as configuration key and value pairs.
Database tabular source	Database name, Server, Port, JDBC URL
Non-database tabular source	Datasource ID, Name
Database schema	Name
Destination database	Database name, Server, Port, JDBC URL
Columns	Name

Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between cataloged objects

Data asset page	Relationship
Group	Destinations within group, Connectors within group

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Relationships between cataloged objects (continued)

Data asset page	Relationship
Connector	Source associated to connector, group that contains this connector, connector job which was initiated by this connector.
Connector Job	Connector
Fivetran Data Source	Tables that this Fivetran Data Source connects to via Source (file or database), Connector that connects to this Fivetran Data Source
Data Source	Tables within data source. For non-database sources, tabular sources connected via data source
Destination	Tables within destination, group that contains this destination
Table	Column within the table
Column	Table containing the column

Lineage for Fivetran

The collector identifies source columns from which destination columns derive their data through copy or load operations. Catalogs all database sources and destinations.

Supported data sources and connectors for cross-system lineage:

- PostgreSQL
- Salesforce
- SQL Server

Supported database destinations for cross-system lineage:

- Snowflake
- SQL Server

Lineage availability by object

Object	Lineage available
Source database columns and tables	Downstream destinations that source data from these columns and tables

Authentication supported

The collector authenticates using a Fivetran API key. The API key owner must have read access to destinations and connectors.

See the Fivetran role-based access control documentation for details on API keys and permissions.

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Prepare to run the Fivetran collector

Create a Fivetran API key before running the collector.

Before you begin
Role required: admin

About this task
The collector authenticates using a Fivetran API key. The API key owner must have read access to destinations and connectors.

Procedure

1. Create a Fivetran API key with read access to destinations and connectors.

   See the Fivetran role-based access control documentation for details on creating API keys and assigning permissions.

2. Save the **API Key** and **API Secret**.

   You need these credentials when configuring the collector.

Create a Fivetran metadata collector

Create a collector to import metadata from Fivetran.

Before you begin
Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the Fivetran collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Fivetran**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. On the form, fill in the fields.

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Metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Enter the authentication details.

Authentication details

Field	Description
Fivetran API key	The Fivetran API key used to authenticate to the REST API.
Fivetran API secret	The Fivetran secret used to authenticate to the REST API.

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9. Enter the Fivetran configuration details.

Fivetran configuration details

Field	Description
Exclude groups	Exclude the specified Fivetran group's contents from the catalog.
Include groups	Include only the specified Fivetran group's contents in the catalog.

10. Configure the advanced options.

Advanced options

Field	Description
Max retries	The number of times the system retries a failed API call. Default: 5
Retry delay	The number of seconds to wait between retry attempts for a failed API call. Default: 2 seconds

11. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Microsoft Fabric metadata collector

Provides read-only access to metadata from a Microsoft Fabric account.

The collector harvests metadata from Microsoft Fabric workspaces and their child resources, including items commonly found in Power BI.

Metadata cataloged

The collector catalogs the following information.

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Microsoft Fabric metadata catalog

Object	Information cataloged
Workspaces	ID, Name, Description
Warehouses	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, Collation Type, Connection String, JDBC URL, Endorsement (Certified By, Endorsement Badge)
Lakehouses	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, OneLake Tables Path, OneLake Files Path, Connection String, JDBC URL, Endorsement (Certified By, Endorsement Badge)
Fabric Data Pipelines	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, Parameters, Variables, Endorsement (Certified By, Endorsement Badge), Refresh Schedule
Eventhouses	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, Endorsement (Certified By, Endorsement Badge), Ingestion Service URI, Query Service URI, State
Dataflows	ID, Name, Description, Last Modified Date, Refresh Schedule, Created By, Last Modified By, Endorsement (Certified By, Endorsement Badge)
Dataflow Gen2	ID, Name, Description, Created By, Last Modified Date, Last Modified By, Endorsement (Certified By, Endorsement Badge), Refresh Schedule
Dataflow Gen2 CI/CD	ID, Name, Description, Created Date, Created By, Last Modified Date, Last Modified By, Endorsement (Certified By, Endorsement Badge), Refresh Schedule, State
Mirrored Databases	OneLake Tables Path, Mirroring Status
Fabric Mirrored Database Table	Name, Description, Table Mirroring Status Extended Metadata: Created Date, Modified Date
Fabric Delta Lakehouse Table	Name, Description, Created Date, Last Modified Date, ABFS File Path
Fabric Lakehouse Column	Name, Description, Column Type, Is Nullable, Column Size, Column Index, Decimal Digits, Partition Index
Notebooks	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, Definition, Endorsement (Certified By, Endorsement Badge), Refresh Schedule
Spark Job Definitions	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, Endorsement (Certified By, Endorsement Badge), Refresh Schedule
SQL Analytics Endpoints	ID, Name, Description, Last Modified Date, Created By, Modified By, Provisioning Status, Connection String, Endorsement (Certified By, Endorsement Badge)
Lakehouse Folders	ID, Name, Description, Created Date, Last Modified Date, ABFS File Path

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Microsoft Fabric metadata catalog (continued)

Object	Information cataloged
Lakehouse Files	ID, Name, Description, Created Date, Last Modified Date, ABFS File Path
Schemas	Name Extended Metadata: Created Date, Modified Date
Fabric Database Tables	Name, Description, Primary Key, ABFS File Path Extended metadata: Created date, Modified date
Database Columns	Name, Description, JDBC Type, Column Type, Is Nullable, Default Value, Key Type (Primary, Foreign), Column Size, Column Index, Decimal Digits
Views	Name, Description, SQL Definition
Reports	ID, Name, Description, Type, Preview Image (supported for paginated reports), Created Date, Last Modified Date, Created by, Modified by, External URL, Embed URL, Endorsement (Certified By, Endorsement Badge)
Report Pages	Name, Is Hidden
Dashboards	ID, Name, External URL, Embed URL
Dashboard Tiles	Name, Embed URL
Semantic Models	ID, Title, Description, Created Date, Created By, External URL, Refresh Schedule
Data Sources	Name, Type, Connection Details
Fabric Logical Tables	Name, Description, Is Hidden, Is Entered Data, Expression
Fabric Calculated Tables	Name, Description, Is Hidden, Is Entered Data, Expression
Fabric Logical Columns	Name, Description, Data Type, Column Type, Is Hidden, Expression
Measures	Name, Description, Is Hidden, Expression
Data Pipeline Activity	Name, Description, Type, Inactivity Status, Activity Policy (Retry, Timeout, Retry Interval In Secs, Secure Input, Secure Output)
Data Pipeline Run	Start Time, End Time, Invoke Type, Run Status
Activity Run	Start Time, End Time, Run Status, Output Message, Error Message
Job Run	ID, Job Type, Start Time, End Time, Run Status, Invocation Type, Failure Reason
KQL Database	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, State, Endorsement (Certified By, Endorsement Badge)
App	ID, Name, Description

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Microsoft Fabric metadata catalog (continued)

Object	Information cataloged
Org App	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, Endorsement (Certified By, Endorsement Badge)
GraphQL API	ID, Name, Description, GraphQL Api Definition, Created Date, Last Modified Date, Created By, Modified By, Endorsement (Certified By, Endorsement Badge)
Refresh Schedule	ID, Frequency, Recurrence Interval, Time Of Day, Day Of Week, Day Of Month, Start Time, End Time, Enabled
Eventstreams	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, event throughput level, retention time in days, state, Endorsement (Certified By, Endorsement Badge)
Eventstream Source	ID, Name, Status, Type
Eventstream Destination	ID, Name, Status, Type
Environments	ID, Name, Description, Created Date, Last Modified Date, Created By, Modified By, State, Library Dependency (name, library version, library type), Publish State, Spark Compute (driver cores, driver memory, executor cores, executor memory), Dynamic Executor Allocation (dynamic executor allocation state, max executors, min executors) Instance Pool (Type, Id, Name), Spark Property (key, value), Run Time Version, Publish Start Time, Publish End Time, Spark Libraries Publish State, Spark Settings Publish State, Endorsement (Certified By, Endorsement Badge)
Database resource types from SQL Server	For a complete list of metadata harvested from SQL server, see the Microsoft SQL Server collector documentation.
Variable library	ID, Name, Description, Created Date, Last Modified Date, Created By, Last Modified By, Active Value Set Name, Variable (variable type, value, note)

The Microsoft Fabric collector supports the profiling and sampling specific parameters which the SQL Server collector supports and these apply to Warehouses and Lakehouses. When profiling and sampling parameters are enabled, the following additional column information is cataloged:

Profiling and sampling information

Object	Information cataloged
Column	• Average Length (sample) • Average Value (sample) • Data Distribution • Distinct Values • Estimated Distinct Values • Estimated Non-null Values • Maximum Length (sample)

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Profiling and sampling information (continued)

Object	Information cataloged
	• Maximum Value (sample) sorted numerically or alphabetically (z-a) • Minimum Length (sample) • Minimum Value (sample) sorted numerically or alphabetically (a-z) • Non-null Values (sample) • Sample String Values (first 5 items in a column)
Table	• Row Count • Sample Count (Target sample size)

Relationship between objects

Catalog pages show relationships between the following data asset types:

Microsoft Fabric resource page relationships

Object	Relationship
Workspace	Warehouses, Lakehouses, Fabric Data Pipelines, Notebooks, Dataflows, Semantic Models, SQL Analytics Endpoints, Eventhouses, Spark Job Definitions, Reports, Dashboards, App, Org App, GraphQL API, Environments, Variable Library
App	Workspace
Org App	Workspace
GraphQL API	Workspace
Warehouses	Workspace, Schemas
Lakehouses	Workspace, Schemas, Lakehouse Folders, Fabric Delta Lakehouse Table
Fabric Data Pipelines	Workspace, Activities which belong to the Pipeline, Refresh Schedule, Variable Library, Data Pipeline Activities, Warehouses, Lakehouses, or SFTP files, Fabric Data Pipelines, Fabric Notebooks, Fabric Dataflows, or Fabric Spark Job Definitions executed by the Activity, Semantic Models refreshed by the Activity, Stored Procedures executed by the Activity
Eventhouses	Workspace, KQL Database
KQL Databases	Eventhouse

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Microsoft Fabric resource page relationships (continued)

Object	Relationship
Dataflows	Workspace, Logical Tables, Data Sources
Notebooks	Workspace, Job Runs, Refresh Schedule, Environments
Spark Job Definitions	Workspace, Job Runs, Refresh Schedule, Environments
SQL Analytics Endpoints	Workspace, Lakehouse Folders, Lakehouse
Lakehouse Folders	Lakehouse, Child Folders, Lakehouse Files
Lakehouse Files	Lakehouse Folder
Schemas	Lakehouse/Warehouse/Database, Tables, Views
Fabric Database Tables	Schema, Columns
Fabric Mirrored Database Table	Schema, Columns, Source Database Table
Database Columns	Table or View
Views	Schema, Columns
Reports	Workspace, Dashboard Tile, Report Pages
Report Pages	Report
Dashboards	Workspace, Dashboard Tiles
Dashboard Tiles	Dashboard
Semantic Models	Workspace, Logical Tables, Data Sources
Data Sources	Semantic Models, Dataflows
Dataflow Gen2	Workspace, Logical Tables, Data Sources, Data Destinations, Refresh Schedule
Dataflow Gen2 CI/CD	Workspace, Logical Tables, Data Sources, Data Destinations, Refresh Schedule, Job Runs
Fabric Lakehouse Delta Tables	Column, Lakehouse, Lakehouse Folder
Eventstream	Workspace, Eventstream source, Eventstream destination
Eventstream Destination	Published data to lakehouse table, KQL database
Environments	Notebooks, Spark Job Definitions, Variable Library, Workspace, Data Pipeline
Notebooks	Environments
Spark	Job DefinitionsEnvironments
Variable Library	Workspace Data Pipeline

Lineage and dependencies for Microsoft Fabric

The following lineage information is collected by the Microsoft Fabric collector.

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Microsoft Fabric lineage

Object	Lineage available
Database View	The collector identifies the associated column in an upstream view or table: • Where the data is sourced from • That sort the rows via ORDER BY • That filter the rows via WHERE/HAVING • That aggregate the rows via GROUP BY **Note:** For views, the collector first tries to parse the view SQL to harvest lineage metadata. If the SQL parser cannot parse the view SQL, the collector catalogs some lineage relationships using the dm_sql_referencing_entities system function, when available. For each row in the referenced entities, if `is_selected` or `is_select_all` is true, the collector catalogs a relationship between the referencing entity and the database column.
Semantic Model	Dataflows and Semantic Models this Semantic Model uses data from.
Dataflow	Other Dataflows this Dataflow uses data from.
Logical Table	Associated tables that the table sources its data from. **Note:** The collector uses expressions returned by the Metadata Scan APIs to parse the lineage to the source columns and tables.
Calculated Table	Logical tables and columns from which the calculated table calculates its values.
Logical Column	Associated logical and database columns that the column sources its data from or calculates its values from.
Measure	Associated logical columns that the measure sources its data from.
Dashboard Tile	Associated Semantic Model.
Report	Associated Semantic Model and the Report this Report was published from.
Activity	Establishes lineage between tables or files an Activity copies data to and copies data from. For Copy Activities, see cross-system lineage for supported lineage.
Report Pages	Logical columns and measures from Semantic Model tables that the Report Page uses data from.
Fabric Delta Lakehouse Table	Sourced data from eventstream.
KQL Databases	Sourced data from eventstream.

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Supported cross-system lineage

The following data sources support cross-system lineage with Microsoft Fabric.

Note: While other data sources are not formally supported, running the collector for those sources may still enable you to view cross-system lineage between Microsoft Fabric and those sources.

Cross-system lineage data sources

Object	Supported data sources
Semantic Models and Dataflows	• Fabric Lakehouse • Fabric Warehouse • Oracle • Denodo • Snowflake • SQL Server • PostgreSQL • Redshift • Databricks • CSV documents
Fabric Data Pipelines	• Fabric Delta Lakehouse Tables • Fabric Lakehouse Files and Folders • Fabric Warehouse Tables • SFTP Server Files • SQL Server Tables • SQL Server Stored Procedures • Oracle Tables
Dataflow Gen2 and Dataflow Gen2 CI/CD	• Fabric Warehouses • Fabric Lakehouses

Supported Power Query (M) functions and expressions for lineage metadata

This section captures supported transformations, source expressions, calculated columns, and measure expressions when harvesting lineage metadata.

Note: Any table operations or transformations not listed in the following table as supported or unsupported are ignored.

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Power Query (M) functions and expressions

Category	Supported and unsupported objects
Supported parameterized expressions	The collector parses source expressions that use parameters in place of the following elements: full source value, server or host value, warehouse value, database name, schema name, table name, and SQL expressions that incorporate parameters.
Supported data functions	Csv.Document, Excel.Workbook, File.Contents, Folder.Contents, Folder.Files, Json.Document, Odbc.DataSource, Odbc.InferOptions, Odbc.Query, Xml.Document, Web.Contents, Web.Headers, Web.BrowserContents, AmazonRedshift.Database, Sql.Database, Sql.Databases, Snowflake.Databases, PostgreSQL.Database, Databricks.Catalogs, Oracle.Database, Denodo.Contents, Databricks.Query, Lakehouse.Contents, Fabric.Warehouse
Supported table functions	Table.AddColumn, Table.AddIndexColumn, Table.RenameColumns, Table.NestedJoin, Table.ExpandTableColumn, Table.SplitColumn, Table.DuplicateColumn, Table.CombineColumns
Unsupported table operations	Table.Pivot, Table.PromoteHeaders, Table.DemoteHeaders, Table.PrefixColumns, Table.TransformColumnNames, Table.Unpivot, Table.UnpivotOtherColumns, Table.AddFuzzyClusterColumn, Table.AddJoinColumn, Table.AggregateTableColumn, Table.Combine, Table.CombineColumnsToRecord, Table.ExpandRecordColumn, Table.Join, Table.Transpose **Note:** Contact support if you have expressions that use these unsupported table operations.
Supported dataflow functions	PowerPlatform.Dataflows, PowerBI.Dataflows
Supported value functions	Value.NativeQuery
Supported calculated columns	Lineage from calculated column expressions containing columns with and without table references. Columns or tables with alphanumeric characters, spaces, hyphens, and underscores are supported.
Supported measures	Lineage from measure expressions containing columns or tables with alphanumeric characters, spaces, hyphens, underscores, and surrounding quotes are supported.

Dependencies

Dependencies between Microsoft Fabric resources are cataloged from the Fabric metadata scan APIs. These relationships are visible in the Lineage Explorer.

Authentication supported

The collector supports Service principal authentication method.

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Prepare to run the Microsoft Fabric collector

Set up access and authentication for your Fabric instance before running the collector.

Before you begin

A Fabric administrator is needed to enable settings in the Fabric Admin Portal.

The collector can only harvest metadata for Fabric workspaces to which the service principal has been given access.

The collector uses a JDBC connection to catalog database resources from Warehouses and Lakehouses with service principal authentication. The collector also uses the following APIs to catalog detailed metadata about Fabric resources: Fabric APIs, OneLake APIs, and Power BI APIs.

Role required: admin

Procedure

1. Register your application in the Azure Portal and obtain the required IDs.

   See Register application and get IDs for the Microsoft Fabric collector.

2. Set up service principal authentication.

   See Set up service principal authentication for the Microsoft Fabric collector.

3. Set up metadata scanning.

   See Set up metadata scanning for the Microsoft Fabric collector.

4. **Optional:** Configure report image harvesting.

   (Optional) See Configure report image harvesting for the Microsoft Fabric collector.

Register application and get IDs for the Microsoft Fabric collector

Register an application in the Azure Portal and obtain the Client ID, Tenant ID, and client secret for the Microsoft Fabric collector.

Before you begin

Role required: admin

Procedure

1. Go to the Azure Portal and select **App Registrations** in the Azure services.
2. Select **New Registration** and enter the following information.

Application registration fields

Field	Value
Application Name	For example, DataDotWorldFabricApplication
Supported account types	Accounts in this organizational directory only

3. Select **Register** to complete the registration.
4. Create a client secret.

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a. On the application page, select **Certificates and Secrets**.

b. Select **Secret** and add a description.

c. Select the desired expiration date.

d. Select **Create** and copy the secret value.

5. Obtain the Client ID and Tenant ID.

a. Select the **Overview** tab in the left sidebar of the App registration.

b. Copy the Client ID from the Essentials section.

c. Copy the Tenant ID from the Essentials section.

Set up service principal authentication for the Microsoft Fabric collector

Enable service principal access to Fabric APIs and grant workspace access for the Microsoft Fabric collector.

Before you begin

The service principal must have at least contributor access to the workspace.

Role required: admin

Procedure

1. Sign in to Fabric using a Fabric Admin account.
2. Navigate to **Settings** > **Admin Portal**.
3. Under developer settings, search for **Service principals can use Fabric APIs**.
4. Enable the setting and select whether it applies to the entire organization or a specific security group that includes the service principal.
5. Select **Apply** to save the changes.
   For more information, see the Microsoft documentation.
6. Open the workspace and select **Manage access**.
7. Search for the service principal or the security group the service principal belongs to.
   At a minimum, Contributor access is required.
8. Select **Add**.

Set up metadata scanning for the Microsoft Fabric collector

Enable metadata scanning to allow the collector to access detailed data source information and establish lineage.

Before you begin

A Fabric administrator must complete this setup before running metadata scanning on an organization's Fabric workspaces. Familiarize yourself with the limitations to the scanner APIs.

Role required: admin

About this task

The collector uses the Fabric Scanner APIs to establish lineage to source tables and columns.

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Procedure

1. Follow the Fabric documentation to enable service principal authentication for Fabric read-only APIs.
2. Follow the Fabric documentation to enable the following enhanced tenant settings for metadata scanning.
   - Enhance admin APIs responses with detailed metadata
   - Enhance admin APIs responses with DAX and mashup expressions

> **Warning:** When running under a service principal, no API permissions are required, and the registered app must have no admin-consent-required permissions set in the Azure portal. For more information, see Enable service principal authentication for read-only admin APIs.

Configure report image harvesting for the Microsoft Fabric collector

Enable report image harvesting to allow the collector to export Fabric reports as images.

Before you begin

Reports must be located in a workspace with Premium, Embedded, or Fabric capacity. For details, see the Fabric documentation.

Role required: admin

Procedure

1. Enable the **Export reports as image files** setting from the Admin settings.
2. Confirm that the reports to be exported are in a workspace with Premium, Embedded, or Fabric capacity.
3. **Optional:** If using non-Fabric database sources, set up a data source YAML file for lineage mapping.
   See the Power BI collector documentation for instructions. This can be used with the **Datasource Name Mapping File** option in the Microsoft Fabric collector.

Create a Microsoft fabric metadata collector

Create a collector to import metadata from Microsoft Fabric.

Before you begin

Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the Microsoft Fabric collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Microsoft Fabric**.

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5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

Microsoft Fabric metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the authentication options.

Authentication options

Field	Description
Microsoft Entra Tenant ID	The tenant ID that identifies the organization in Microsoft Entra.
Client ID	The client ID of the registered application in Microsoft Entra.
Client secret	The client secret for the registered application in Microsoft Entra.

8. Configure the connection options.

Connection options

Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.

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Field	Description
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

9. Configure the MID server options.

MID server options

Field	Description
Use MID server	Enable the **Use MID server** toggle to connect to the source system through a MID Server. The system automatically selects an available MID Server.

10. Configure the workspace options.

Workspace options

Field	Description
Include fabric workspaces	Match the workspaces to be collected. Use either a workspace name or a regular expression.
Exclude fabric workspaces	Match the workspaces and contents to exclude from cataloged. Use either a workspace name or a regular expression. If a workspace is specified in both Include Workspace and Exclude Workspace, Include Workspace takes precedence.

11. Select from **Collect all schemas** or **Specify which schema to collect** to configure the schema collection options.

Schema collection options

Field	Description
Collect all schemas	
Collect all schemas	Catalog all schemas to which the user has access.
Exclude Schema	Name or regular expression of the database schema to be excluded.
Include Information Schema	Include the database's Information Schema in catalog collection.

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Field	Description
Specify which schema to collect	
Specify which schema to collect	Catalog only the specified schemas.
Schema	Name of the database schema to catalog.

12. Configure the advanced options.

Advanced options

Field	Description
Collect extended properties for SQL database resources	Harvest information about extended properties from SQL Server type databases.
Disable harvesting notebook definition	Specify whether to skip harvesting notebook definition.
Disable harvesting GraphQL API definition	Specify whether to skip harvesting GraphQL API definition.
Exclude delta table internal files	Specify whether to exclude delta table internal files (parquet files and _delta_log folders) from lakehouse file cataloging. Delta tables themselves are still cataloged via the Table API.
OneLake API page size	Page size for OneLake API pagination. Default is 5000.
Exclude system functions	Specify to exclude harvesting of built-in system functions.
JDBC properties	JDBC driver properties to pass through to driver connection, as name=value. Use the parameter multiple times for multiple properties. By default the collector uses authentication=ActiveDirectoryServicePrincipal, and encrypt=true

13. Configure the statistics and sampling options.

Statistics and sampling options

Field	Description
Disable Lineage collection	Skip harvesting of intra-database lineage metadata.
Disable Extended Metadata collection	Skip harvesting of extended metadata for data asset types such as database, schema, table, columns functions, stored procedures, user defined types, synonyms. Basic metadata for these data asset types will still be harvested.

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Field	Description
Enable column statistics collection	Enable harvesting of column statistics (that is, data profiling). **Note:** Enabling profiling can increase the collector's runtime, as the collector must read table data to generate profiling metadata.
Target sample size for column statistics	Number of rows sampled for computation of column statistics and string-value histograms. For example, to sample 1000 rows, set the parameter as: 1000. Default: 100000
SQL parsing timeout	Specify the timeout in seconds for SQL parsing during lineage collection. The default is 60.

14. Configure the Power BI options.

Power BI options

Field	Description
Maximum power BI expression length	Maximum number of characters in a Table expression (coming from Semantic Models and Dataflows) that will be parsed for lineage metadata. Expressions longer than this will be skipped. Default: 32000.
Datasource name mapping file	If you have configured source details in the datasources.yml file, upload the file.
Disable power BI expression lineage collection	Skip harvesting of intra-database lineage metadata. This applies only to database resources such as views.
Catalog report preview images	Specify if the collector should catalog preview images. The default setting is false. Ensure that you have met all pre-requisites for using this feature.
Disable max requests wait	Disable waiting up to an hour for the Power BI API endpoints to reset throttling limits (error code 429 - too many requests). When not disabled, the collector retries every 5 minutes for up to an hour. If this option is disabled, the Max retries and Retry delay options will be used instead.
Max retries	The number of times the system retries a failed API call.

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Field	Description
	Default: 5
Retry delay	The number of seconds to wait between retry attempts for a failed API call. Default: 2 seconds

15. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Enable vault classification for columns harvested by the collector. This option is available only from the connection details of a saved collector. See Enable Vault classification for a metadata collector.
- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Microsoft SQL Server metadata collector

Provides read-only access to metadata from a Microsoft SQL Server account.

The collector harvests metadata from Microsoft SQL Server databases, including tables, columns, views, schemas, stored procedures, functions, and Agent jobs, making them searchable and discoverable in the data catalog. Supports both self-hosted Microsoft SQL Server instances and managed instances, such as those hosted on AWS RDS or Azure SQL.

Metadata cataloged

The collector catalogs the following information.

Note: The collector harvests all versions of overloaded functions and stored procedures. Each version has its own title/name in the catalog, but a distinct identifier.

Cataloged metadata

Object	Information cataloged
Agent Job	Name, Description, Version, Enabled, Category, Server Name, Created Date, Last Modified Date, Owner, Starting Job Step, Email Notification Level, Page Notification

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Cataloged metadata (continued)

Object	Information cataloged
	Level, Network Notification Level, Event Log Notification Level, Delete Notification Level, Email Notification Sent To, Page Notification Sent To, Network Notification Sent To
Agent Job Step	Name, Command, Subsystem, Flag, Additional Parameters, Server, Database, Database Username, Proxy ID, Output File, OS Run Priority, Retry Attempts, Retry Interval, Last Run Outcome, Last Run Duration, Last Run Date, Last Run Time, On Success Action, On Success Go To Step, On Failure Action, On Failure Go To Step
Columns	Name, JDBC type, Column Type, Is Nullable, Default Value, Key type (Primary, foreign), Column size, Column index Extended property: Description
Table	Name, Description, Primary key, Schema Extended metadata: Created date, Modified date
Table Index	Index Cardinality, Column name, Index Type, Index Name, is non Unique, Ordinal Position, Pages, Sort Sequence
Views	Name, Description, SQL definition
Materialized View	Name, description
Schema	Identifier, Name Extended metadata: Created date, Modified date
Database	Type, Name, Identifier, Server, Port, Environment, JDBC URL
Functions	Name, Description, Function Type
Stored Procedures	Name, Description, Stored Procedure Type Extended metadata: Definition, Created, Last modified
Publication	Name, Description, Status, Publication Type, Allow Push, Allow Pull, Allow Anonymous, Allow Subscription Copy, Retention, Enabled for Internet, Snapshot in Default Folder, Alternate Snapshot Folder, Pre Snapshot Script, Post Snapshot Script, Compress Snapshot, FTP Address, FTP Port, FTP Subdirectory, FTP Login, Active Directory Guid, Centralized Conflicts, Decentralized Conflicts, Conflict Retention, Backward Compatibility, Replicate DDL, Publication Sync Method, Immediate Sync, Immediate Sync Ready, Allow Queued Transaction, Allow Sync Transcation, Allow DTS, Options, Autogen Sync Procedure, Allow Initialize From Backup,

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Cataloged metadata (continued)

Object	Information cataloged
	Has Conflict Policy, Independent Agent, Is Filtered, Snapshot Status, Max Concurrent Merge, Allow Subscriber Initiated Snapshot, Allow Web Synchronization, Allow Sync To Alternate, Web SynchronizationUrl, Allow Partition Realignment, Generation Leveling Threshold, Automatic Reinitialization Policy
Article	Name, Description, Destination Object, Destination Owner, Source Object, Source Owner, Filter Clause, Creation Script, Delete Command, Insert Command, Update Command, Status, Type, Precreation command, Executes Trigger On Snapshot
Subscription	Description, Type, Sync Type, Status Server, Database, Queued Reinitialization, Login Name, Update Mode, Loopback Detection Send Back, No Sync Type, Subscriber Type, Datasource Type, Priority, Attempted Validate, Last Validated, Last Sync Date, Last Sync Status, Last Makegeneration Datetime, Replica Version, Cleanedup Unsent Changes
Synonym	Name

Note: All versions of overloaded functions and stored procedures are cataloged. Each version has its own title in the catalog but a distinct identifier.

When profiling and sampling parameters are enabled, the following additional column information is cataloged:

Profiling and sampling information

Object	Information cataloged
Column	• Average Length (sample) • Average Value (sample) • Data Distribution • Distinct Values • Estimated Distinct Values • Estimated Non-null Values • Maximum Length (sample) • Maximum Value (sample) sorted numerically or alphabetically (z-a) • Minimum Length (sample) • Minimum Value (sample) sorted numerically or alphabetically (a-z)

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Profiling and sampling information (continued)

Object	Information cataloged
	• Non-null Values (sample) • Sample String Values (first 5 items in a column)
Table	• Row Count • Sample Count (Target sample size)

Relationship between objects

Catalog pages show relationships between the following data asset types:

Relationships between cataloged objects

Data asset page	Relationship
Agent Job	Agent Job contains Job Step
Job Step	Job Step command is executed in Database
Table	Columns, Table Indexes, Schema
View	Schema that contains Views, Columns that are part of Views
Materialized View	Schema that contains Materialized Views, Columns that are part of Materialized Views
Columns	Table
Schema	Database that contains Schema, Table that is part of Schema, View that is part of Schema, Materialized View that is part of Schema, Synonym
Database	Schema contained in Database
Publication	Contains Article, Has Parent Publication, Published by Publisher Database
Article	Refers Table
Subscription	Subscribes to Publication, Delivered To Subscriber Database, Delivery Executed By Distributor Database, Supplies Data to Table

Lineage and dependencies for Microsoft SQL Server

The following lineage information is collected by the Microsoft SQL Server collector. This lineage information is available only for the target server and databases specified while running the collector. Harvesting lineage from referenced objects located in another server is not supported.

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Lineage availability by object

Object	Lineage available
View	Column-level lineage showing source columns for: • Data sourcing • Sorting (ORDER BY) • Filtering (WHERE/HAVING) • Aggregation (GROUP BY)
Stored Procedure	Column-level lineage showing source columns for data sourcing, sorting, filtering, and aggregation. Table-level lineage showing downstream tables updated by the procedure.

Note: The collector parses SQL to harvest lineage metadata. For Views, if SQL parsing fails, the collector uses the `dm_sql_referencing_entities` system function when available. For Stored Procedures, the collector parses INSERT, UPDATE, and SELECT statements and additionally uses the `dm_sql_referencing_entities`system function when available. Limitations:Multitable inserts are not supported.Multiple SELECT and INSERT statements must be separated by semicolon delimiters.

The collector catalogs dependencies between tables, views, and stored procedures using `sys.sql_expression_dependencies`. Dependencies are created when one entity appears by name in a persisted SQL expression of another entity. See the Microsoft SQL Server dependencies documentation for details.

Prepare to run the Microsoft SQL Server collector

Configure authentication and permissions before running the collector.

Before you begin
Role required: admin

About this task
The collector supports three authentication methods for Microsoft SQL Server. All methods require SELECT ON DATABASE permission for metadata access. VIEW DEFINITION permission is required for column-level lineage harvesting.

Procedure

1. Select an authentication method and complete the corresponding setup task.
   - Username and password authentication - See Set up username and password authentication
   - NTLM authentication- See Set up NTLM authentication
   - Microsoft Entra Service Principal authentication - See Set up Service Principal authentication
2. Grant SQLAgentReaderRole permissions to harvest Agent job metadata.
   See Set up permissions for harvesting SQL Server Agent jobs.

Set up NTLM authentication

Create a service account and grant permissions for NTLM authentication.

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Before you begin
Role required: admin

The computer running the collector must be attached to the Active Directory domain.

About this task
Configure NTLM authentication using an Active Directory service account with the minimum required permissions for metadata harvesting.

Procedure
1. Create a service account in Active Directory.
2. Grant SELECT ON DATABASE permission.

   This permission allows the collector to harvest catalog data assets such as tables, views, and columns.

   ```
   GRANT SELECT ON DATABASE :: <databaseName> TO <user>;
   ```

   Replace `<databaseName>` and `<user>` with your values.
3. Grant VIEW DEFINITION permission.

   This permission enables column-level lineage harvesting from views.

   ```
   GRANT VIEW DEFINITION ON DATABASE :: <databaseName> TO <user>;
   ```

   Replace `<databaseName>` and `<user>` with your values.
4. **Optional:** Assign the public role for table size information.

   (Optional) This allows the collector to run the sp_spaceused stored procedure.

   See the sp_spaceused documentation for details.

What to do next
When configuring the collector, set these JDBC properties: `integratedSecurity=true`, `authenticationScheme=NTLM`

Set up username and password authentication for SQL Server collector
Create a SQL Server login and grant permissions for username and password authentication.

Before you begin
Role required: admin

About this task
Configure a SQL Server login with the minimum required permissions for metadata harvesting.

Procedure
1. Create a login with password.

   ```
   CREATE LOGIN <loginName> WITH PASSWORD = '<password>';
   ```

   Replace `<loginName>` and `<password>` with your values.
2. Create a user for the login.

   ```
   CREATE USER <user> FOR LOGIN <loginName>;
   ```

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Replace `<user>` and `<loginNam>` with your values.

3. Grant SELECT ON DATABASE permission.

   This permission allows the collector to harvest catalog data assets such as tables, views, and columns.

   ```
   GRANT SELECT ON DATABASE :: <databaseName> TO <user>;
   ```

   Replace `<databaseName>` and `<user>` with your values.

4. Grant VIEW DEFINITION permission.

   This permission enables column-level lineage harvesting from views.

   ```
   GRANT VIEW DEFINITION ON DATABASE :: <databaseName> TO <user>;
   ```

   Replace `<databaseName>` and `<user>` with your values.

5. **Optional:** : Grant execute permission for sp_spaceused.

   (Optional) This permission allows the collector to harvest table size information.

   ```
   GRANT EXECUTE ON sp_spaceused TO <user>;
   ```

   Replace `<user>` with your value.

What to do next

See the Microsoft SQL Server permissions documentation for more information about database permissions.

Set up Service Principal authentication

Register an Azure application and grant permissions for Service Principal authentication.

Before you begin

Role required: admin

About this task

Configure Microsoft Entra Service Principal authentication by registering an Azure application and granting database access.

Procedure

1. Register a new application in Azure.

   a. Navigate to **Azure Portal** > **App Registrations**.

   b. Select **New Registration**.

   c. Enter the application name.

      Example: MySQLServerApplication.

   d. For **Supported account types**, select **Accounts in this organizational directory only**.

   e. Select **Register**.

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2. Create a client secret.
   a. On the application page, select **Certificates and Secrets** > **Client secrets**.
   b. Select **New client secret**.
   c. Add a description and set the expiration date.
   d. Select **Add**.
   e. Copy the secret value.
3. Grant the service principal access to SQL Server.
   a. In Azure Portal, navigate to your SQL Server instance.
   b. Select **Access control (IAM)** > **Add Role Assignment**.
   c. Select **Reader** under the **Job function roles** tab.
   d. Select **Next**.
   e. For **Assign access to**, verify that **User, group or service principal** is selected.
   f. Select **Select members**.
   g. Search for your registered application name and select it.
   h. Select **Review + assign**.
4. Grant the service principal access to the database.
   a. Connect to SQL Server using SQL Server Management Studio.
   b. Run this command:

```
CREATE USER [<service-principal>] FROM EXTERNAL PROVIDER;
```

   Replace `<service-principal>` with your service principal name.

   c. Grant SELECT ON DATABASE permission.

```
GRANT SELECT ON DATABASE :: <databaseName> TO
 [<service-principal>];
```

   Replace `<databaseName>` and `<service-principal>` with your values.

   d. Grant VIEW DEFINITION permission.

```
GRANT VIEW DEFINITION ON DATABASE :: <databaseName> TO
 [<service-principal>];
```

   Replace `<databaseName>` and `<service-principal>` with your values.

What to do next
See the Microsoft Entra authentication documentation for more information.

Set up permissions for harvesting SQL Server Agent jobs

Grant SQLAgentReaderRole permissions to harvest Agent job metadata.

Before you begin
Role required: sysadmin

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About this task
To harvest SQL Server Agent job metadata, assign the SQLAgentReaderRole in the msdb system database.

Procedure
1. Locate the user that is used for running the collector.
2. Grant SQLAgentReaderRole to the user.

```
USE msdb;
EXEC sp_addrolemember 'SQLAgentReaderRole', '<username>';
```

   Replace `<username>` with your user name.

Create a Microsoft SQL Server metadata collector

Create a collector to import metadata from Microsoft SQL Server.

Before you begin
Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the Microsoft SQL Server collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure
1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Microsoft SQL Server**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

Microsoft SQL Server metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

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7. Configure the connection options.

Connection options

Field	Description
Server	Hostname of the database server to connect to.
Server port	Port of the database server (if not the default).
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication options

Field	Description
Username	Username to use to connect to the database.
Password	Password of the databsase user.

9. Configure the connection information.

Connection information

Field	Description
Include database	Name of the database to connect to. Specify multiple databases by adding one value per line.

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Field	Description
Excluded database	Name or regular expression indicating databases not to catalog when the Database field is empty. **Note:** This parameter is ignored if the Database field is specified.

10. Select from **Collect all schemas** or **Specify which schema to collect** to configure the schema collection options.

Schema collection options

Field	Description
Collect all schemas	
Collect all schemas	Catalog all schemas to which the user has access.
Exclude Schema	Name or regular expression of the database schema to be excluded.
Include Information Schema	Include the database's Information Schema in catalog collection.
Specify which schema to collect	
Specify which schema to collect	Catalog only the specified schemas.
Schema	Name of the database schema to catalog.

11. Configure the statistics and sampling options.

Statistics and sampling options

Field	Description
Enable column statistics collection	Enable harvesting of column statistics (that is, data profiling). **Note:** Enabling profiling can increase the collector's runtime, as the collector must read table data to generate profiling metadata.
Target sample size for column statistics	Number of rows sampled for computation of column statistics and string-value histograms. For example, to sample 1000 rows, set the parameter as: 1000. Default: 100000
Disable Lineage collection	Skip harvesting of intra-database lineage metadata.
Disable Extended Metadata collection	Skip harvesting of extended metadata for data asset types such as database,

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Field	Description
	schema, table, columns functions, stored procedures, user defined types, synonyms. Basic metadata for these data asset types will still be harvested.

12. Configure the harvesting scope and limits options.

Harvesting scope and limits options

Field	Description
Collect extended properties	Harvest information about extended properties from SQL Server. For example, column descriptions.
Disable replication collection	Skip harvesting of replication metadata.
Enable Sample String Values collection	Enable harvesting of sample values and histograms for columns containing string data.
Exclude system functions	Exclude system functions from metadata collection.

13. Configure the connection and reliability options.

Connection and reliability options

Field	Description
Server environment	Friendly name for the environment in which your database server runs when the server name is localhost. Helps differentiate it from other environments.
Database ID	Unique identifier for this database. Used to generate the database ID when the database name is not sufficiently unique.
Disable agent job collection	Skip harvesting of agent jobs metadata.
JDBC properties	JDBC driver properties to pass through to driver connection.
SQL parsing timeout	Timeout in seconds for SQL parsing during lineage collection. Default: 60

14. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

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- Enable vault classification for columns harvested by the collector. This option is available only from the connection details of a saved collector. See Enable Vault classification for a metadata collector.
- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

MongoDB metadata collector

MongoDB metadata collector provides read-only access to metadata from a MongoDB account.

The MongoDB collector harvests metadata from MongoDB instances (clusters), databases, collections, indexes, search indexes, and document fields. The collector supports harvesting nested fields for Document and Object field types. The collector captures relationship information between instances, databases, collections, document fields, search indexes, and indexes.

Authentication supported

The MongoDB collector supports the following authentication methods:

- Username and password authentication (SCRAM)
- X.509 authentication
- AWS Authentication

Metadata cataloged

The MongoDB collector catalogs the following information:

Cataloged metadata

Object	Information cataloged
MongoDB	MongoDB (instance, cluster) name, MongoDB (instance, cluster) version, Is Debug Mode
MongoDB Database	Database Name, Size On Disk, Is Empty, Views Number, Collections Number, Average Database Object Size, Data Size, Storage Size, Total Free Storage Size, Database Indexes Number, Database Indexes Size
MongoDB Collection (including Materialized View)	Collection Name, Documents Count, Collection Size, Average Object Size, Orphan Documents Number, Storage Size, Collection Free Storage Size, Total Index Size, Index Number, Collection Total Size, Is Capped, Capped Collection Maximum Size, Capped Documents Maximum Number

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Cataloged metadata (continued)

Object	Information cataloged
MongoDB View	View Name
MongoDB Collection Field	Field Name
MongoDB Index	Index Name, Index Size, Is Unique, Default Language
MongoDB Search Index	Index Name, Type, Status, Is Queryable, Is Dynamic, Creation Time

Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between cataloged objects

Data asset page	Relationship
MongoDB	MongoDB Databases
MongoDB Database	• MongoDB Collections • MongoDB instance • MongoDB Views
MongoDB Collection	• MongoDB Database • MongoDB Collection Fields • MongoDB Indexes • MongoDB Search Indexes
MongoDB View	MongoDB Collection Field
MongoDB Collection Field Note: The Analysis samples count parameter specifies the number of documents sampled from a collection to determine collection field types. This value must be a non-negative integer, with a default of 1000. Sampling is performed using the $sample aggregation. For more information, see the MongoDB sampling documentation.	• Nested MongoDB Collection Fields • MongoDB Collection • MongoDB View
MongoDB Index	MongoDB Collection
MongoDB Search Index	MongoDB Collection

Prepare to run the MongoDB collector

Create a MongoDB user and configure authentication before running the collector.

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Before you begin
Role required: admin

Procedure
1. Navigate to **MongoDB Project properties** > **Database Access**.
2. Select **Add new database user**.
3. Select an authentication method:
   - User-password (SCRAM) authentication
   - X.509 authentication
   - AWS authentication
4. Configure user permissions.
   - For built-in roles: Assign the Read any database role.
   - For specific privileges: Assign Read permission for every database that you want to collect.

Create a MongoDB metadata collector

Create a collector to import metadata from MongoDB.

Before you begin
Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the MongoDB collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure
1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **MongoDB**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. On the form, fill in the fields.

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MongoDB metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Enter the MongoDB connection details.

MongoDB connection details

Field	Description
Connection String	Connection string for your MongoDB cluster or instance. Make sure that any option parameters in the connection string are URL-encoded.

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9. Enter the MongoDB configuration details.

MongoDB configuration details

Field	Description
Included Databases	Databases to collect. Provide database names or regular expressions. List only one database per line. Databases matching any specified expression are collected.
Excluded Databases	Databases to exclude from collection. Provide database names or regular expressions. List only one database per line. Databases matching any specified expression are excluded. Included databases take precedence over excluded databases.

10. Configure the advanced options.

Advanced options

Name	Description
Analysis samples count	Number of documents sampled from each collection for field type analysis. This field must be a non-negative integer. Default: 1000.

11. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

MySQL metadata collector

The MySQL metadata collector provides read-only access to metadata from an external MySQL database.

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This collector is designed to directly harvest metadata from your MySQL server. It is suitable for both self-hosted MySQL instances and managed MySQL instances, such as those hosted on AWS RDS. This collector also works with MariaDB instances.

Metadata cataloged

The collector catalogs the following information.

Metadata harvested

Object	Information cataloged
Columns	Name, Description, JDBC type, Column Type, Is Nullable, Default Value, Key type (Primary, foreign), column size, column index
Table	Name, description, primary key, schema
Table Index	Index Cardinality, Column name, Index Type, Index Name, is non Unique, Ordinal Position, Pages, Sort Sequence
Views	Name, description, SQL definition
Schema	Identifier, Name
Database	Type, name, identifier, server, port, environment, JDBC URL
Function	Name, Description, Function Type
Stored Procedure	Name, Description, Stored Procedure Type

If you include the profiling and sampling specific parameters while running the collector, the following additional information is harvested for Columns.

Note: The user/role must have read access to data to be able to harvest profiling information (column statistics).

Profiling and sampling specific information

Object	Information cataloged
Column	• Average Length (sample) • Average Value (sample) • Data Distribution • Distinct Values • Estimated Distinct Values • Estimated Non-null Values • Maximum Length (sample) • Maximum Value (sample) sorted numerically or alphabetically (z-a) • Minimum Length (sample) • Minimum Value (sample) sorted numerically or alphabetically (a-z)

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Profiling and sampling specific information (continued)

Object	Information cataloged
	• Non-null Values (sample) • Sample String Values (first 5 items in a column)
Table	• Row Count • Sample Count (Target sample size)

Relationships between objects

The harvested metadata includes catalog pages for the following data asset types. Each catalog page has a relationship to the other related data asset types.

Relationships between harvested data asset pages

Data asset page	Relationship
Table	Columns, Table Indexes
Columns	Table
Schema	Database that contains Schema, Table that is part of Schema
Database	Schema contained in Database

Authentication supported

The MySQL collector supports username/password authentication to MySQL.

Prepare to run the MySQL collector

Create a MySQL user and grant permissions before running the collector.

Before you begin
Role required: admin

About this task
Configure a MySQL user with the minimum required permissions for metadata harvesting.

Procedure

1. Create a user.

```
CREATE USER 'catalog_user'@'%' IDENTIFIED BY '<password>';
```

   Replace `<password>` with a secure password.

2. Grant permissions to the user.

```
GRANT SELECT, SHOW VIEW, EXECUTE ON *.* TO 'catalog_user'@'%';
```

   This grants the following permissions:

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- SELECT: Read access to tables and views
- SHOW VIEW: View definition access
- EXECUTE: Stored procedure and function access

Create a MySQL metadata collector

Create a collector to import metadata from MySQL.

Before you begin

Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the MySQL collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **MySQL**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

MySQL Server metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Server	Hostname of the database server to connect to.
Server port	Port of the database server (if not the default).

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Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication options

Field	Description
Username	Username to use to connect to the database.
Password	Password of the databsase user.

9. Configure the connection information.

Connection information

Field	Description
Database	Name of the database to connect to. Specify multiple databases by adding one value per line.
Excluded database	Name or regular expression indicating databases not to catalog when the Database field is empty. **Note:** This parameter is ignored if the Database field is specified.

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10. Configure the statistics and sampling options.

Statistics and sampling options

Field	Description
Enable column statistics collection	Enable harvesting of column statistics (that is, data profiling). **Note:** Enabling profiling can increase the collector's runtime, as the collector must read table data to generate profiling metadata.
Target sample size for column statistics	Number of rows sampled for computation of column statistics and string-value histograms. For example, to sample 1000 rows, set the parameter as: 1000. Default: 100000
Disable Lineage collection	Skip harvesting of intra-database lineage metadata.
Disable Extended Metadata collection	Skip harvesting of extended metadata for data asset types such as database, schema, table, columns functions, stored procedures, user defined types, synonyms. Basic metadata for these data asset types will still be harvested.
Enable Sample String Values collection	Enable sampling and storage of sample values for string-valued columns.
Exclude system functions	Exclude harvesting of built-in system functions.

11. Configure the connection and reliability options.

Connection and reliability options

Field	Description
Server environment	Friendly name for the environment in which your database server runs when the server name is localhost. Helps differentiate it from other environments.
Database ID	Unique identifier for this database. Used to generate the database ID when the database name is not sufficiently unique.
JDBC properties	JDBC driver properties to pass through to driver connection.
SQL parsing timeout	Timeout in seconds for SQL parsing during lineage collection.

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Field	Description
	Default: 60

12. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Oracle metadata collector

The Oracle metadata collector provides read-only access to metadata from an external Oracle account.

The collector harvests metadata for Oracle objects, such as tables and columns, from an Oracle database, making them searchable and discoverable in the data catalog. It is suitable for both self-hosted Oracle instances and managed Oracle instances, like those hosted on AWS RDS.

Metadata cataloged

The Oracle collector catalogs the following information.

Note: The collector harvests all versions of overloaded functions and stored procedures. Each version has its own title/name in the catalog, but a distinct identifier.

Metadata harvested

Object	Information cataloged
Columns	Name, JDBC type, Column Type, Is Nullable, Default Value, Key type (Primary, Foreign), Column size, Column index Extended metadata: Comment
Table	Name, Primary key, Schema Extended metadata: Comment
Table Index	Index Cardinality, Column name, Index Type, Index Name, is non Unique, Ordinal Position, Pages, Sort Sequence
Views	Name, Definitions, SQL Definition Extended metadata: Description

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Metadata harvested (continued)

Object	Information cataloged
Schema	Identifier, Name
Database	Type, Name, Identifier, Server, Port, Environment, JDBC URL
Function	Name, Description, Function Type Extended metadata: Function definition, Package Name
Stored Procedure	Name, Description, Stored Procedure Type Extended metadata: Procedure Definition, Package Name
Synonym	Identifier Extended metadata: Name
Package	Name, Specification Extended metadata: Body definition, Package Body
Public Synonym (accessible to all users in database)	Identifier, Name

If you include the profiling and sampling specific parameters while running the collector, the following additional information is harvested for Columns.

Note: The user/role must have read access to data to be able to harvest profiling information (column statistics).

Profiling and sampling specific information

Object	Information cataloged
Column	• Average Length (sample) • Average Value (sample) • Data Distribution • Distinct Values • Estimated Distinct Values • Estimated Non-null Values • Maximum Length (sample) • Maximum Value (sample) sorted numerically or alphabetically (z-a) • Minimum Length (sample) • Minimum Value (sample) sorted numerically or alphabetically (a-z) • Non-null Values (sample) • Sample String Values (first 5 items in a column)

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Profiling and sampling specific information (continued)

Object	Information cataloged
Table	• Row Count • Sample Count (Target sample size)

Relationships between objects

The harvested metadata includes catalog pages for the following data asset types. Each catalog page has a relationship to the other related data asset types.

Relationships between harvested data asset pages

Data asset page	Relationship
Table	Columns, Table Indexes
Columns	Table
Schema	Database that contains Schema, Table that is part of Schema
Database	Schema contained in Database
Synonym	The schema which contains the synonym, The table, view, function, procedure, or package the synonym is for
Package	Schema that contains package Extended metadata: Stored Procedures contained in package, Functions contained in package
Database	Public synonym contained in database

Lineage for Oracle

The following lineage information is collected by the Oracle collector. To harvest lineage from referenced objects located in another server, you must set up the Linked host parameter while running the collector.

Note:

Any lineage for SQL Statements defined via variable statements are not supported.

Lineage for Oracle

Object	Lineage available

Column in View	The collector identifies:
	• The associated column in an upstream view or table
	  ○ Where the data is sourced from
	  ○ That sort the rows via ORDER BY

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Lineage for Oracle (continued)

Object	Lineage available
	○ That filter the rows via WHERE/HAVING ○ That aggregate the rows via GROUP BY • The downstream table that has its data updated by this function.
User-defined function	A Function and: • Views referenced in Function • Tables referenced in Function • Functions referenced in Function • Stored procedures referenced in function A View and: • Function referencing View The collector identifies: • The associated column in an upstream view or table ○ Where the data is sourced from ○ That sort the rows via ORDER BYThat filter the rows via WHERE/HAVING ○ That aggregate the rows via GROUP BY • The downstream table that has its data updated by this Stored Procedure.
Stored Procedure	A Stored Procedure and: • Views referenced in Stored Procedure • Tables referenced in Stored Procedure • Functions referenced in Stored Procedure • Stored procedures referenced in Stored Procedure A View and: • Stored Procedure referencing View The collector identifies: • The associated column in an upstream view or table ○ Where the data is sourced from ○ That sort the rows via ORDER BY

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Lineage for Oracle (continued)

Object	Lineage available
	○ That filter the rows via WHERE/HAVING ○ That aggregate the rows via GROUP BY • The downstream table that has its data updated by this Stored Procedure. The following stored procedures are not supported: • Stored procedures with multitable inserts. However, multiple separate insert statements that insert into one table are supported. • Stored procedure with multiple SELECT and INSERT statements not separated by a semicolon delimiter. • Stored procedures used to create tables or any transient tables created during the execution scope of a stored procedure.

Oracle version supported

The collector supports Oracle database version 19.0.0.0.

Authentication supported

The Oracle collector supports username/password authentication to Oracle.

Prepare to run the Oracle collector

Set up database user permissions and configure advanced features before running the collector.

Before you begin
Role required: admin

About this task
The collector requires a dedicated Oracle database user with SELECT and EXECUTE permissions. You must create the database user and grant appropriate permissions to catalog schemas, tables, views, procedures, functions, and packages.

Procedure

1. Create Oracle user and grant permissions.

   See Set up user permissions.

2. **Optional:** Prepare to harvest cross-server lineage.

   (Optional) See Set up AWR permissions for lineage extraction.

3. **Optional:** Prepare to harvest from autonomous databases.

   (Optional) See Prepare to harvest cross-server lineage.

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Set up user permissions

Create a dedicated Oracle user and grant permissions for metadata harvesting.

Before you begin

Role required: admin

About this task

To harvest data from an Oracle database, create a dedicated user with the required permissions. Grant this user SELECT and EXECUTE privileges on the necessary schemas, tables, views, procedures, functions, and packages. Alternatively, you can grant broader access using DBA views or catalog roles to ensure full data harvesting capabilities.

These steps configure a user with the permissions required for efficient data harvesting.

Procedure

1. Create a user.

```
CREATE USER ddw_user IDENTIFIED BY <password>;
```

   Replace <password> with a secure password.

2. Grant SELECT and EXECUTE permissions to the user.

   Primary approach: Grant permissions on specific objects.

```
GRANT CREATE SESSION, SELECT_CATALOG_ROLE TO ddw_user;

                        -- Update <schemaName> and <tableName>
for each schema, table, or view you want to harvest.
                        GRANT SELECT ON
"<schemaName>"."<tableName>" TO ddw_user;

                        -- Update <schemaName> and
<procedureName> for each schema and procedure, function, or
package you want to harvest.
                        GRANT EXECUTE ON
"<schemaName>"."<procedureName>" TO ddw_user;
```

   - In the SELECT command, update <schemaName> and <tableName> for each schema, table, or view you want to harvest.
   - In the EXECUTE command, update <schemaName> and <procedureName> for each schema and procedure, function, or package you want to harvest.

   Alternate approach for EXECUTE permissions: Grant SELECT permission on the following DBA views, or give the user the SELECT_CATALOG_ROLE role, which grants SELECT privileges on all DBA static data dictionary views:

   - DBA_PROCEDURES
   - DBA_ARGUMENTS
   - DBA_SOURCE
   - DBA_DEPENDENCIES
   - DBA_OBJECTS
   - DBA_SYNONYMS

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Alternative approach for SELECT permissions: Grant SELECT permission on the following DBA views, or give the user the SELECT_CATALOG_ROLE role, which grants SELECT permission on all DBA static data dictionary views:

> **Important:** If SELECT privileges aren't granted for the tables, the collector is unable to catalog column statistics.

- DBA_VIEWS
- DBA_MVIEWS
- DBA_OBJECTS
- DBA_CONS_COLUMNS
- DBA_CONSTRAINTS
- DBA_COL_COMMENTS
- DBA_TAB_COMMENTS
- DBA_SOURCE
- DBA_DEPENDENCIES
- DBA_SYNONYMS

Grant comprehensive permissions: If you want to grant the user permission to catalog any object in any schema, use the following commands:

```
GRANT SELECT ANY TABLE TO ddw_user;
                        GRANT EXECUTE ANY PROCEDURE TO
 ddw_user;
```

Set up AWR permissions for lineage extraction

Grant AWR view permissions to enable historical lineage extraction from CREATE TABLE statements.

Before you begin

Role required: admin

License required: Oracle Diagnostics Pack license.

About this task

The Oracle collector queries AWR (Automatic Workload Repository) views to extract lineage from historical CREATE TABLE statements. Grant SELECT permissions on DBA_HIST_* views to enable this capability.

Procedure

Grant AWR view permissions.

```
GRANT SELECT ON DBA_HIST_SQLTEXT TO ddw_user;
           GRANT SELECT ON DBA_HIST_SQLSTAT TO ddw_user;
           GRANT SELECT ON DBA_HIST_SNAPSHOT TO ddw_user;
```

Prepare to harvest cross-server lineage

Configure database links and gather connection information for cross-server lineage harvesting.

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Before you begin
Role required: admin

About this task
If your Oracle database includes objects with SQL definitions that reference another server, follow these steps to capture cross-server lineage. In Oracle, these references are called database links (DB links). To resolve lineage for SQL that uses DB links, the collector requires the host and port information for each linked database.

Procedure
1. Find all database links.

   Use ALL_DB_LINKS or DBA_DB_LINKS to find the full list of DB links.

   See the Oracle database links documentation for details.

2. Gather connection information for each DB link.

   For each DB link entry, work with your Oracle Admin to find:

   - Hostname
   - Database name
   - Port information

3. Record the information for collector configuration.

   This information is passed to the collector using the Linked host parameter.

Create an Oracle metadata collector

Create a collector to import metadata from Oracle.

Before you begin
Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the Oracle collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure
1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Oracle**.
5. From the Connection type list, select one of the following:

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a. Select **New connection** to configure a new connection.

b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

Microsoft SQL Server metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Server	Hostname of the database server to connect to.
Server port	Port of the database server (if not the default).
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

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8. Configure the authentication options.

Authentication options

Field	Description
Username	Username to use to connect to the database.
Password	Password of the databsase user.

9. Select from **Collect all schemas** or **Specify which schema to collect** to configure the schema collection options.

Schema collection options

Field	Description
Collect all schemas	
Collect all schemas	Catalog all schemas to which the user has access.
Exclude Schema	Name or regular expression of the database schema to be excluded.
Include Information Schema	Include the database's Information Schema in catalog collection.
Specify which schema to collect	
Specify which schema to collect	Catalog only the specified schemas.
Schema	Name of the database schema to catalog.

10. Configure the connection information.

Connection information

Field	Description
Include database	Name of the database to connect to. Specify multiple databases by adding one value per line. If not specified, the collector harvests metadata from all databases.
Excluded database	Name or regular expression indicating databases not to catalog when the Database field is empty. **Note:** This parameter is ignored if the Database field is specified.

11. Configure the statistics and sampling options.

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Statistics and sampling options

Field	Description
Enable column statistics collection	Enable harvesting of column statistics (that is, data profiling). **Note:** Enabling profiling can increase the collector's runtime, as the collector must read table data to generate profiling metadata.
Target sample size for column statistics	Number of rows sampled for computation of column statistics and string-value histograms. For example, to sample 1000 rows, set the parameter as: 1000. Default: 100000
Disable Lineage collection	Skip harvesting of intra-database lineage metadata.
Disable Extended Metadata collection	Skip harvesting of extended metadata for data asset types such as database, schema, table, columns functions, stored procedures, user defined types, synonyms. Basic metadata for these data asset types will still be harvested.

12. Configure the harvesting scope and limits options.

Harvesting scope and limits options

Field	Description
Database is an Oracle SID	Indicate that the database is actually an Oracle SID.
Oracle JDBC Connection Timezone	Specify whether the default timezone of JVM should be used as the Oracle JDBC connection timezone.
Enable Sample String Values collection	Enable harvesting of sample values and histograms for columns containing string data.
Exclude system functions	Exclude system functions from metadata collection.

13. Configure the connection and reliability options.

Connection and reliability options

Field	Description
Server environment	Friendly name for the environment in which your database server runs when the server

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Field	Description
	name is localhost. Helps differentiate it from other environments.
Database ID	Unique identifier for this database. Used to generate the database ID when the database name is not sufficiently unique.
Use Oracle Autonomous Database	Option to connect to an Autonomous Database. When this option is enabled: ○ Enter the service name as the value for the Database parameter. For example, g0404_ktest_high.adb.oraclecloud.com ○ Enter the host name as the value for the Server parameter. For example, adb.us-chicago-1.oraclecloud.com
Oracle Autonomous Database Connection String	The connection string for an Autonomous Database. The connection string should be in the format: jdbc:oracle:thin:@<host>:<port>/<service_name> or jdbc:oracle:thin:@(address=(protocol=tcps)(port=<port>) (host:<host>))(connect_data=(service_name=<service_name>))(security=(ssl_server_dn_match=yes))). **Note:** The collector connects to the Oracle Cloud instance using the value in the Oracle Autonomous Database Connection String field. However, the server, port, and database parameters are still required—they are used for IRI coining and to uniquely identify the database data assets within your catalog.
JDBC properties	JDBC driver properties to pass through to driver connection.
SQL parsing timeout	Timeout in seconds for SQL parsing during lineage collection. Default: 60

14. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

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- Enable vault classification for columns harvested by the collector. This option is available only from the connection details of a saved collector. See Enable Vault classification for a metadata collector.
- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

PostgreSQL metadata collector

Provides read-only access to metadata from a PostgreSQL database.

The collector harvests metadata for PostgreSQL tables and columns, making them searchable and discoverable in the data catalog. Supports both self-hosted PostgreSQL instances and managed PostgreSQL instances, such as those hosted on AWS RDS.

Authentication supported

Username and password authentication and AWS IAM authentication.

Metadata cataloged

The PostgreSQL collector catalogs the following information.

Note: All versions of overloaded functions and stored procedures are cataloged. Each version has its own title in the catalog but a distinct identifier.

Cataloged metadata

Object	Information cataloged
Columns	Name, Description, JDBC type, Column Type, Is Nullable, Default Value, Key type (Primary, foreign), column size, column index
Table	Name, description, primary key, schema
Table Index	Index Cardinality, Column name, Index Type, Index Name, is non Unique, Ordinal Position, Pages, Sort Sequence
Views	Name, description, SQL definition
Materialized View	Name, description, SQL definition
Schema	Identifier, Name
Database	Type, name, identifier, server, port, environment, JDBC URL
Function	Name, Description, Function Type
Stored Procedure	Name, Description, Stored Procedure Type

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When profiling and sampling parameters are enabled, the following additional column information is cataloged:

Note: The user/role must have read access to data to be able to harvest profiling information (column statistics).

Profiling and sampling specific information

Object	Information cataloged
Column	• Average Length (sample) • Average Value (sample) • Data Distribution • Distinct Values • Estimated Distinct Values • Estimated Non-null Values • Maximum Length (sample) • Maximum Value (sample) sorted numerically or alphabetically (z-a) • Minimum Length (sample) • Minimum Value (sample) sorted numerically or alphabetically (a-z) • Non-null Values (sample) • Sample String Values (first 5 items in a column)
Table	• Row Count • Sample Count (Target sample size)

Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between harvested data asset pages

Data asset page	Relationship
Table	Columns, Table Indexes
Columns	Table
Schema	• Database that contains Schema • Table that is part of Schema • View that is part of Schema • Materialized View that is part of Schema

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Relationships between harvested data asset pages (continued)

Data asset page	Relationship
View	• Schema that contains Views • Columns that are part of Views
Materialized View	• Schema that contains Materialized Views • Columns that are part of Materialized Views

Lineage for PostgreSQL

The collector identifies column-level lineage for Views and Materialized Views, tracing data sources from view columns to source table columns across SQL expressions and subqueries.

Establishes relationships between Views and source Table columns that:

- Sort rows (SQL ORDER BY)
- Filter rows (SQL WHERE and HAVING clauses)
- Aggregate rows (SQL GROUP BY)

Note: View-to-table relationships can be established transitively through column-level relationships. Variable statement lineage isn't supported.

Prepare to run the PostgreSQL collector

Create a PostgreSQL user and configure permissions before running the collector.

Before you begin

Role required: admin

Procedure

1. Create a new role.

```
CREATE ROLE ddw_role;
```

2. Grant metadata harvesting permissions to the role.

```
GRANT SELECT ON ALL TABLES IN SCHEMA information_schema TO
 ddw_role;
GRANT SELECT ON ALL TABLES IN SCHEMA "<schemaName>" TO
 ddw_role;
GRANT SELECT ON TABLE pg_namespace TO ddw_role;
GRANT SELECT ON TABLE pg_class TO ddw_role;
GRANT SELECT ON TABLE pg_description TO ddw_role;
GRANT SELECT ON TABLE pg_attribute TO ddw_role;
GRANT SELECT ON TABLE pg_type TO ddw_role;
GRANT SELECT ON TABLE pg_attrdef TO ddw_role;
GRANT SELECT ON TABLE pg_index TO ddw_role;
GRANT SELECT ON TABLE pg_proc TO ddw_role;
GRANT SELECT ON TABLE pg_database TO ddw_role;
GRANT SELECT ON TABLE pg_matviews TO ddw_role;
```

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Replace `<schemaName>` with your schema name.

3. **Optional:** Grant permissions for column statistics harvesting.

   (Optional) Run these commands for each database and schema you want to collect statistics from:

   ```
   GRANT USAGE ON SCHEMA "<schemaName>" TO ddw_role;
    GRANT SELECT ON ALL TABLES IN SCHEMA "<schemaName>" TO
    ddw_role;
   ```

   Replace `<schemaName>` with your schema name.

4. Create a user and assign the role.

   ```
   CREATE USER ddw_user PASSWORD '<password>';
   GRANT ddw_role TO ddw_user;
   ```

   Replace `<password>` with a secure password.

5. **Optional:** Configure IAM authentication.

   (Optional) See the AWS IAM authentication documentation for setup instructions.

Create a PostgreSQL metadata collector

Create a collector to import metadata from PostgreSQL.

Before you begin

Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the PostgreSQL collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **PostgeSQL**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

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PostgeSQL metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Server	Hostname of the database server to connect to.
Server port	Port of the database server (if not the default).
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication options

Field	Description
Authenticate using username and password	Option to authenticate using username and password to connect to the database.

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Field	Description
Authenticate using AWS IAM (Explicit credentials)	Option to authenticate using the AWS access key ID and AWS secret access key.

9. Select from **Collect all schemas** and **Specify which schema to collect**.

Schema collection options

Field	Description
Collect all schemas	
Collect all schemas	Catalog all schemas to which the user has access.
Exclude Schema	Name or regular expression of the database schema to be excluded.
Include Information Schema	Include the database's Information Schema in catalog collection.
Specify which schema to collect	
Specify which schema to collect	Catalog only the specified schemas.
Schema	Name of the database schema to catalog.

10. Configure the connection information.

Connection information

Field	Description
Database	Name of the database to connect to. Specify multiple databases by adding one value per line.
Excluded database	Name or regular expression indicating databases not to catalog when the Database field is empty. **Note:** This parameter is ignored if the Database field is specified.

11. Configure the statistics and sampling options.

Statistics and sampling options

Field	Description
Enable column statistics collection	Enable harvesting of column statistics (that is, data profiling). **Note:** Enabling profiling can increase the collector's runtime, as the collector must read table data to generate profiling metadata.

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Field	Description
Target sample size for column statistics	Number of rows sampled for computation of column statistics and string-value histograms. For example, to sample 1000 rows, set the parameter as: 1000. Default: 100000
Disable Lineage collection	Skip harvesting of intra-database lineage metadata.
SQL parsing timeout	Timeout in seconds for SQL parsing during lineage collection. Default: 60
Disable Extended Metadata collection	Skip harvesting of extended metadata for data asset types such as database, schema, table, columns functions, stored procedures, user defined types, synonyms. Basic metadata for these data asset types will still be harvested.

12. Configure the harvesting scope and limits options.

Harvesting scope and limits options

Field	Description
Enable Sample String Values collection	Enable harvesting of sample values and histograms for columns containing string data.
Exclude system functions	Exclude system functions from metadata collection.

13. Configure the connection and reliability options.

Connection and reliability options

Field	Description
Server environment	Friendly name for the environment in which your database server runs when the server name is localhost. Helps differentiate it from other environments.
Database ID	Unique identifier for this database. Used to generate the database ID when the database name is not sufficiently unique.
JDBC properties	JDBC driver properties to pass through to driver connection.
SQL parsing timeout	AddSQL parsing timeoutSaveTimeout in seconds for SQL parsing during lineage collection.

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Field	Description
	Default: 60

14. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Enable vault classification for columns harvested by the collector. This option is available only from the connection details of a saved collector. See Enable Vault classification for a metadata collector.
- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

PowerBI metadata collector

The PowerBI metadata collector provides read-only access to metadata from a PowerBI account.

Power BI is a collection of software services, apps, and connectors that work together to transform unrelated data sources into coherent, visually immersive, and interactive insights. Data sources can include Excel spreadsheets, cloud-based data warehouses, or on-premises hybrid data warehouses. Power BI enables you to connect to data sources, visualize and discover important information, and share insights across the organization.

The Power BI collector harvests metadata from Power BI service workspaces. Use harvested metadata to discover reports and dashboards across workspaces and perform impact analysis to understand how changes to upstream data sources affect Power BI reports.

Version supported

The collector supports Power BI Cloud API v 1.0.

Authentication supported

Power BI supports two authentication methods:

- Service principal
- User and password

The collector harvests metadata for all Power BI apps and workspaces the authenticated account has access to.

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Metadata cataloged

The Power BI collector catalogs the following information:

Metadata harvested

Object	Information collected
Workspaces	Title, Description
Apps	Title, Description
Power BI measures	Title, Description, Is hidden, Expression
Reports	Title, Reports type, External URL, Embed URL, Preview Image (not supported for paginated report types), Created date, Last modified, Created by, Last modified by, Descriptions
Report pages	Title Note: Report pages within Apps can't be cataloged when using Service Principal authentication due to restrictions in the Power BI APIs.
Dashboards	Title, External URL, Embed URL
Dashboard tiles	Title, Embed URL
Data Sources	Title, Data source type, Connection Details (kind and path)
Semantic model	Title, External URL, Description, Created date, Created by, Refresh Schedule
Dataflows	Title, Last modified, Description, Created by, Refresh Schedule
Power BI tables (Semantic model and Dataflows)	Title, Is hidden, Is Entered Data, Description, Source expression
Power BI calculated table	Title, Is hidden, Is Entered Data, Description, Source expression
Power BI columns	Title, Descriptions, Data type, Column type, Is hidden, Expression
Tabular file	File path, File name
File directory	Directory path
Database	Title, Type, Identifier, Server, Port
Database schema	Title
Database table	Title
Database column	Title
Table	Title, Description
Column	Title, Type
Calculation group	Title, Description
Calculation item	Title, Description, Expression

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Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between cataloged objects

Data asset page	Relationship
App	Report, Dashboard, Workspace
Power BI Column	Power BI Table
Data source	Semantic model, Dataflow, Tabular Data source (Database, Tabular File)
Tile	Dashboard, Report, Semantic model
Dashboard	Tile, Workspace
Dashboard Tile	Associated Semantic model
Semantic model	Dashboard Tile, Report
Report	Tile, Workspace, Report pages (not applicable for paginated report types), Semantic model (not applicable for paginated report types), Report **Note:** In Power BI, app reports and their associated workspace reports are two separate reports with unique report IDs. The collector catalogs the relationship between them.
Report Pages	Report (not applicable for paginated report types)
Semantic model	Tile, Workspace, Report, Table, Data source, Semantic model, Dataflow
Workspace	Report, Semantic model, Dataflow, Dashboard, App
Dataflow	Workspace, Table, Data source, Dataflow
Power BI Table	Semantic model, Dataflow, Power BI Column, Power BI Measure
Power BI Measure	Power BI Table
Tabular Data source (Database, Tabular File)	Data source
Calculation Group	Power BI Table
Calculation Item	Calculation Group

Lineage for PowerBI

The following lineage information is collected by the Power BI collector. The collector uses the Power BI Scanner APIs to establish lineage to source tables and columns. Be sure to familiarize yourself with the limitations to the scanner APIs

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Lineage availability by object

Object	Lineage available
Dashboard Tile	Associated Semantic model
Semantic model	Associated Dataflow, Semantic model
Dataflow	Dataflow
Power BI Column	Associated columns that the column sources its data from or calculates its values from. **Note:** Lineage can be harvested from Power BI expressions that use parameters in place of server, schema, table, or database names. Table-level and column-level lineage and catalog relationships aren't available between tables or columns and reports through the Power BI API.
Power BI table	Associated tables that the table sources its data from Note: **Note:** The collector uses Power BI expressions returned by the APIs to parse the lineage to the source columns/ tables.
Power BI calculated table	Power BI tables and columns from which the calculated table derives its values.
Power BI Measure	Associated columns that the measure sources it data from

The following table lists supported and unsupported table operations and transformations. This includes source expressions, calculated columns, and measure expressions used in lineage metadata harvesting. Unlisted operations are not harvested.

Supported transformations and expressions for harvesting lineage metadata

Category	Category
Supported Parameterized Expressions	The collector parses source expressions that use parameters in place of the following values: full source, server or host, warehouse, database name, schema name, table name, and SQL expressions.
Supported data functions	Csv.Document, Excel.Workbook, File.Contents, Folder.Contents, Folder.Files, Json.Document, Odbc.DataSource, Odbc.InferOptions, Odbc.Query, Xml.Document, Web.Contents, Web.Headers, Web.BrowserContents, AmazonRedshift.Database, Sql.Database, Sql.Databases, Snowflake.Databases, PostgreSQL.Database,

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Supported transformations and expressions for harvesting lineage metadata (continued)

Category	Category
	Databricks.Catalogs, Oracle.Database, Denodo.Contents, Databricks.Query, DatabricksMultiCloud.Catalogs, AnalysisServices.Database, GoogleBigQuery.Database
Supported table functions	Table.AddColumn, Table.AddIndexColumn, Table.RenameColumns, Table.NestedJoin, Table.ExpandTableColumn, Table.SplitColumn, Table.DuplicateColumn, Table.CombineColumns
Unsupported table operations	Table.Pivot, Table.PromoteHeaders, Table.DemoteHeaders, Table.PrefixColumns, Table.TransformColumnNames, Table.Unpivot, Table.UnpivotOtherColumns, Table.AddFuzzyClusterColumn, Table.AddJoinColumn, Table.AggregateTableColumn, Table.Combine, Table.CombineColumnsToRecord, Table.ExpandRecordColumn, Table.Join, Table.Transpose
Supported dataflow functions	PowerPlatform.Dataflows, PowerBI.Dataflows
Supported value functions	Value.NativeQuery
Supported calculated columns	Lineage from calculated column expressions containing columns with and without table references, Columns or tables with alphanumeric characters, Spaces, Hyphens, and Underscore are supported
Supported measures	Lineage from measure expressions containing columns or tables with alphanumeric characters, Spaces, Hyphens, Underscore, Surrounding quotes are supported

Prepare to run the PowerBI collector

Set up Azure application registration, authentication, and permissions before running the collector.

Before you begin

Role required: admin

Important: A Power BI Administrator is needed to enable settings in the Power BI Admin Portal.

About this task

The collector uses Azure application registration and supports two authentication methods: service principal or username and password. You must register an application, configure authentication, enable metadata scanning, and retrieve the tenant ID. Optionally, configure report image harvesting and lineage mapping.

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Procedure

1. Register an application in Azure and create client credentials.

   See Register Power BI application.

2. Configure authentication based on your preferred method.

   - For service principal authentication, see Configure Power BI service principal authentication.
   - For username and password authentication, see Configure Power BI username and password authentication.

3. Enable metadata scanning to access detailed data source information.

   See Configure Power BI metadata scanning.

4. Get the Power BI tenant ID.

   See Get Power BI tenant ID.

5. **Optional:** Configure report image harvesting to collect preview images from Power BI reports.

   (Optional) See Configure Power BI report image harvesting.

6. **Optional:** Configure lineage mapping for ODBC connections, server aliases, or custom SQL statements.

   (Optional) See Configure Power BI lineage mapping .

Register Power BI application

Register an application in Azure and create client credentials for Power BI collector authentication.

Before you begin

Role required: admin

You must have permissions to register applications in Azure Active Directory.

About this task

Register an application in Azure to obtain the client ID and client secret needed for Power BI collector authentication.

Procedure

1. Register a new application in Azure.

   a. Navigate to the Azure Portal.

   b. Select **App Registrations** from Azure services.

   c. Select **New Registration**.

   d. Enter the registration information.

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- Application Name: DataDotWorldPowerBIApplication
- Supported account types: Accounts in this organizational directory only

e. Select **Register** to complete the registration.

2. Create a client secret.

a. On the application page, select **Certificates and Secrets**.

b. Select **New client secret**.

c. Add a description for the secret.

d. Select the desired expiration date.

e. Select **Add**.

f. Copy the secret value.

Save this value securely. You will use it when configuring the Power BI collector.

3. Get the client ID.

a. Select the **Overview** tab in the left sidebar of the application page.

b. Copy the Client ID from the Essentials section.

Save this value. You will use it when configuring the Power BI collector.

Configure Power BI service principal authentication

Set up service principal authentication to enable Power BI metadata collection.

Before you begin

Role required: admin

You must be a Power BI administrator to enable service principal settings.

Important: When running under a service principal, there must be no Power BI admin-consent-required permissions set on your app. For more information, see the Microsoft documentation.

About this task

When using service principal authentication, the collector harvests all objects except personal workspaces, user workspaces, and report pages. To harvest all apps and workspaces in the tenant, enable Catalog all workspaces and apps in the tenant. To include personal and user workspaces, enable Catalog contents of user's My Workspace.

Note: To harvest report pages, grant the service principal access to each workspace. The admin API doesn't have an endpoint for report pages.

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Procedure

1. Sign in to Power BI using a Power BI Admin account.
2. Navigate to **Settings** > **Admin Portal**.
3. Enable service principal API access.
   a. Under **Developer settings**, locate **Service principals can use Fabric APIs**.
   b. Enable the setting.
   c. Select whether the setting applies to the entire organization or specific security groups.
      If using specific security groups, confirm that the group includes the service principal.
   d. Select **Apply** to save the changes.
4. **Optional:** Add the service principal to workspaces for dataflow and report page access.
   (Optional) Dataflows require the service principal to have at least Contributor access to the workspace. For report pages, the service principal also needs workspace access because the admin API doesn't provide an endpoint for report pages.
   a. Open the workspace.
   b. Select **Manage access**.
   c. Search for the service principal or the security group the service principal belongs to.
   d. Select the appropriate access level.
      (Optional) If dataflows are used, select at least Contributor access. Otherwise, select Viewer.
   e. Select **Add**.

Configure Power BI username and password authentication

Set up API permissions for username and password authentication to enable Power BI metadata collection.

Before you begin

Role required: admin

You must have permissions to configure API permissions in Azure Active Directory.

Note: Only administrators of the tenant can grant admin consent.

About this task

When using user authentication, the collector harvests all objects except personal workspaces, user workspaces, and report pages. To harvest all apps and workspaces in the tenant, enable Catalog all workspaces and apps in tenant. To include personal and user workspaces, enable Catalog contents of user's My Workspace.

To harvest report pages, grant the user access to each workspace. The admin API doesn't have an endpoint for report pages.

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Note: Catalog all workspaces and apps in the tenant requires the user to have Microsoft 365 Global Administrator or Power BI Service Administrator rights for metadata scanning. For details, see the Power BI documentation.

Procedure

1. Navigate to the Azure Portal and open the application registration.
2. Select **API Permissions**.
3. Add Microsoft Graph permissions.
   a. Select **Add a permission**.
   b. Search for and select **Microsoft Graph**.
   c. Add the following permissions.
      - Application permission: Application.Read.All
      - Delegated permission: User.Read (assigned by default)
4. Add Power BI service permissions.
   a. Select **Add a permission**.
   b. Search for and select **Power BI service**.
   c. Select **Delegated permissions**.
   d. Add the following permissions.
      - App.Read.All
      - Dashboard.Read.All
      - Dataflow.Read.All
      - Dataset.Read.All
      - Report.Read.All
      - Tenant.Read.All
      - Workspace.Read.All
5. Select the **Grant admin consent** button located next to the **Add a permission** button.

   This permission enables the collector to run without asking you for permission on every run.

Configure Power BI metadata scanning

Enable metadata scanning to access detailed data source information including tables and columns.

Before you begin

Role required: admin

You must be a Power BI administrator to enable metadata scanning settings.

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About this task

Metadata scanning provides access to detailed data source information, such as tables and columns, through Power BI read-only admin APIs. The collector uses the Power BI Scanner APIs to establish lineage to source tables and columns. Review the limitations to the scanner APIs before configuring the collector.

Procedure

Enable metadata scanning based on your authentication method.

- For service principal authentication:
  a. Follow the Power BI documentation to enable service principal authentication for Power BI read-only APIs
  b. Enable the following enhanced tenant settings for metadata scanning:
     - Enhance admin APIs responses with detailed metadata
     - Enhance admin APIs responses with DAX and mashup expressions
- For username and password authentication, enable the following enhanced tenant settings for metadata scanning:

  Important: The user must have administrator rights (Microsoft 365 Global Administrator or Power BI Service Administrator) to use metadata scanning. For details, see the Power BI documentation.

  - Enhance admin APIs responses with detailed metadata
  - Enhance admin APIs responses with DAX and mashup expressions

Get Power BI tenant ID

Retrieve the tenant ID from the Power BI application.

Before you begin

Role required: admin

About this task

The tenant ID is required when configuring the Power BI collector. Retrieve this value from the Power BI application.

Procedure

1. In the Power BI application, select the question mark icon.
2. Select **About Power BI**.
3. Copy the tenant ID from the end of the Tenant URL.

   Save this value. You will use it when configuring the Power BI collector.

Configure Power BI report image harvesting

Enable report image harvesting to collect preview images from Power BI reports.

Before you begin

Role required: admin

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Note: Report image harvesting isn't supported for Power BI Apps.

About this task
Enable report image harvesting to collect preview images from Power BI reports for display in the Data Catalog.

Procedure
1. Enable the export setting in the Power BI Admin Portal.
   a. Sign in to Power BI using a Power BI Admin account.
   b. Navigate to **Settings** > **Admin Portal**.
   c. Locate and enable the **Export reports as image files** setting from the Admin settings.
2. Verify workspace capacity.

   Confirm that the reports to be exported are located in a workspace with Premium, Embedded, or Fabric capacity. For details, see the Power BI documentation.

Configure Power BI lineage mapping

Create a YAML file to map data sources for lineage harvesting.

Before you begin
Role required: admin

About this task
This is an optional task for harvesting lineage information. Create a YAML file and pass it using the Datasource name mapping file option when running the collector.

Set up a YAML file in the following scenarios:

Lineage mapping scenarios

Scenario	Details	Action
ODBC Connections in Power BI	You have a data source in Power BI that uses an ODBC connection. In these instances, Power BI doesn't provide the host or database type of the source	In the YAML file, map the DSN to a specific database host and type. If the database name is missing in the Power BI data source, add the defaultDatabaseName option to the data source in the YAML file
Multiple Server Name Aliases	You have multiple server names (aliases) for the same database instance (host) and the database collector uses a different alias than the one defined in the Power BI connection	Use the YAML file to map the database host to user-specified aliases
Custom SQL Statements	Custom SQL statements are used in Power BI table source definitions. The Power BI collector currently supports connecting to the following database types to resolve lineage from SQL statements: Snowflake, SQL Server, PostgreSQL, Redshift, Oracle, Databricks, Denodo, BigQuery. Lineage resolution for	Configure databases specified in custom SQL statements by including datasourceKey, host, and secure credentials using environment variables

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Lineage mapping scenarios (continued)

Scenario	Details	Action
	table sources using SQL statements only supports SQL consisting of a single SELECT statement	

Note: You can use environment variables in the file for sensitive information such as passwords.

Procedure

1. Create a YAML file named datasources.yml.
2. Configure the YAML file based on your scenario.

   - For multiple server name aliases:

     Add the following to map a host alias:

     ```
     datasources:
      - datasourceKey: "<host or data source key in Power BI
     source>"
       host: <my-datasource-host>
     ```

     For example, if your Power BI table source is:

     ```
     let Source =
      Snowflake.Database("host-alias.snowflakecomputing.com",
      "KOS_TEST"),
     PowerBiTest_Test_Table =
      Source{[Schema="POWERBI_TEST",Item="TEST_TABLE"]}[Data]
     in PowerBiTest_Test_Table
     ```

     Then the datasourceKey will be host-alias.snowflakecomputing.com. Your datasources.yml file will look like:

     ```
     datasources:
     - datasourceKey: host-alias.snowflakecomputing.com
     host: host-actual.snowflakecomputing.com
     ```

   - For custom SQL statements:

     Add the following for databases specified in custom SQL statements. Environment variables are supported:

     ```
     datasources:
       - datasourceKey: "<host or data source key in Power BI
      source>"
       OR
      - name: <data source name>
      host: <my-datasource-host>
      databaseUsername: <username> # recommend setting up env
      variable
      databasePassword: <password> # recommend setting up env
      variable
     ```

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Use the following option to specify which databases a datasource configuration applies to. If not provided, it's assumed that the datasource settings apply to all databases on the given host:

```
applicableDatabases:
  - <database_name>
```

For example:

```
datasources:
- datasourceKey:
 "example.cpcnqsn422gx.us-east-1.rds.amazonaws.com, 1433"
 host: example.cpcnqsn422gx.us-east-1.rds.amazonaws.com
 databaseUsername: ${DB_USERNAME}
 databasePassword: ${DB_PASSWORD}
 applicableDatabases:
 - 8bank_database
```

- For ODBC connections:

  Map the DSN to a specific database host and type. For ODBC connections, list data sources with their corresponding host and database type. If ODBC connections use Odbc.Query, specify the user name and password. If ODBC connections specify the database name, include defaultDatabaseName:

  ```
  datasources:
  - name: "Name-for-datasource"
  host: <my-datasource-host>
  databaseType: <type-of-database>
  databaseUsername: <username> # optional
  databasePassword: <password> # optional
  defaultDatabaseName: <database name> # optional
  ```

  The list of possible databaseTypes are: postgres, redshift, bigquery, oracle, mysql, netezza, snowflake, sqlanywhere, sqlserver, databricks, denodo. Types aren't case-sensitive but should be a single word with no spaces.

  For example:

  ```
  datasources:
  - name: "SQL Server DSN Production"
  databaseType: sqlserver
  host: 8bank-sqlserver.cpetgx.us-east-1.rds.amazonaws.com
  ```

3. **Optional:** Add database-specific configuration options if necessary.

   (Optional) JDBC properties options:

   JDBC properties

Option	Description
jdbcProperties	Multiple JDBC properties can be specified using a YAML list. The expected format is jdbcProperties: key=value (Optional) For example: jdbcProperties: encrypt=true For multiple values:

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Option	Description
	jdbcProperties: - encrypt=true - readOnly=true

Snowflake database credentials options:

Snowflake options

Option	Description
databaseUsername: ${DB_USERNAME}	Required if custom SQL queries are used in Power BI database sources
databasePassword: ${DB_PASSWORD}	Required if SQL queries are used and if a private key isn't used for authentication to Snowflake
snowflakePrivateKeyFile: privateKeyFile	Required if SQL queries are used and if a private key is used for authentication to Snowflake
snowflakePrivateKeyFilePassword: ${privateKeyFilePassword}	Required if SQL queries are used and if a private key is used for authentication to Snowflake
snowflakeRole: role	Required if SQL queries are used
snowflakeWarehouse: warehouse	Use to override warehouses used in Power BI expressions in the database connection

Databricks database credentials options:

Databricks options

Option	Description
databricksHttpPath	Required if the source database is Databricks

Oracle Autonomous Database options:

Oracle Autonomous Database options

Option	Description
oracleAutonomousDbConnectionString	Required if the source is an Oracle Autonomous Database. The connection string should be in the format: jdbc:oracle:thin:<host>:<port>/<service_name>, jdbc:oracle:thin:@(address=(protocol=tcps)(port=<port>)(host:<host>)) (connect_data=(service_name=<service_name>)) (security=(ssl_server_dn_match=yes)), or jdbc:oracle:thin:@alias_name?TNS_ADMIN=/path/to/wallet

BigQuery options:

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BigQuery options

Option	Description
project	Required if the source is a BigQuery table
bigQueryCredentialJsonString	Required for supplying BigQuery credentials

Example for BigQuery database:

```
datasources:
 - project: "project-name"
databaseType: bigquery
bigQueryCredentialJsonString: '{"key": "value","key": "value"}'
```

4. Save the datasources.yml file.
5. Pass the YAML file to the collector using the --datasource-mapping-file parameter when running the collector.

Create a PowerBI metadata collector

Create a collector to import metadata from PowerBI.

Before you begin

Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the PowerBI collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **PowerBI**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

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PowerBI metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication options

Field	Description
Authenticate using Azure username and password	Azure Active Directory username and password. Set the Azure Tenant ID if you want to specify the Azure tenant ID while using the user name and password authentication.

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Field	Description
Authenticate using Azure Service principal	Azure Active Directory application tenant ID for Power BI app. To find the tenant ID, select the question mark in the Power BI app and then choose About Power BI. The tenant ID is found at the end of the Tenant URL.

9. Configure the client ID and client secret details.

Configuration details

Field	Description
Microsoft Entra client ID	Application client ID for the PowerBI app.
Microsoft Entra client secret	Application client secret for the PowerBI app.

10. Configure the workspace scope and filters options.

Workspace scope and filters options

Field	Description
Disable Lineage collection	Option to skip harvesting lineage metadata from Power BI source expressions.
Catalog contents of user's My Workspace	Option to catalog the contents of a user's My Workspace in Power BI. Default: Skip the user's workspace.
Catalog all workspaces and apps in tenant	Option to catalog all workspaces and apps in a tenant, rather than only the workspaces and apps the credentials have explicit access to. Admin privileges are required for the credentials used.
Include Power BI workspace(s)	Workspaces to collect. Enter the exact workspace name or a regular expression to match. **Note:** If a workspace name includes special characters [. , + , * , ? , ^ , $, (,) , [,] , { , } , | , \], escape each special character with a backslash (\). For example, enter Workspace \(Dev\) for Workspace (Dev).
Exclude Power BI Workspaces	Power BI workspaces and their contents to exclude from cataloging. Enter the exact workspace name or a regular expression to match. If both Include Workspaces and Exclude Workspaces are configured, Include Workspaces takes precedence.

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Field	Description
	Note: If a workspace name includes special characters [. , + , * , ? , ^ , $, (,) , [,] , { , } , | , \], escape each special character with a backslash (\). For example, enter Workspace \(Dev\) for Workspace (Dev).

11. Configure the connection and reliability options.

Connection and reliability options

Field	Description
Maximum Power BI Expression Length	Maximum number of characters in a Power BI expression that is parsed for lineage metadata. Expressions longer than this value are skipped. Default: 32000
Datasource Name Mapping File	File that maps ODBC source details configured in the datasources.yml file. Upload the file if you have configured ODBC source details.
Catalog report preview images	Option to catalog preview images. Default: false
Disable max requests wait	Option to disable waiting for the Power BI API to reset throttling limits (error code 429). When not selected, the collector retries every 5 minutes for up to an hour. When selected, the Max retries and Retry delay settings are used instead.
Max retries	Number of times the system retries a failed API call. Default: 5
Retry delay	Number of seconds to wait between retry attempts for a failed API call. Default: 2 seconds

12. Select **Save**.

Result

The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next

After creating the collector, you can perform any of the following tasks:

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- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

SAP HANA metadata collector

Provides read-only access to metadata from a SAP HANA instance.

Use this collector to harvest database, schema, tables, columns, views, stored procedures, and functions from SAP HANA.

Metadata cataloged

The collector catalogs the following information.

Cataloged metadata

Object	Information cataloged
Database	Name, Database Type, Connection Info (Database Name, Port, Server, JDBC URL), Associated Schema
Schema	Name, Associated Database, Associated Functions, Associated Stored Procedures, Associated Tables Extended Metadata: Owner, Created
Tables	Name, Associated Columns, Primary Key (Key Name, Key Columns), Foreign Keys (Key Name, Source Columns, Target Columns), Sample rows (if data sampling is enabled)
Table Index	Index Cardinality, Column name, Index Type, Index Name, is non Unique, Ordinal Position, Pages, Sort Sequence
Columns	Index Cardinality, Column name, Index Type, Index Name, is non Unique, Column Ordinal Position, Pages, Column Sort Sequence
Views	Name, SQL Definition, Associated Columns, Rows Filtered By, Rows Ordered By
Functions	Name, Description, Function Type Extended Metadata: Function Definition, Owner, Created
Stored Procedures	Name, Description, Stored Procedure Type, Rows Filtered By, Sourced Data From

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Cataloged metadata (continued)

Object	Information cataloged
	Extended Metadata: Procedure Definition, Owner, Created

Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between harvested data asset pages

Object	Relationship
Database	Has schema
Schema	Part of database, Has functions and stored procedures, Has tables
Tables	Has Columns
Table Indexes	Part of schema, Was generated by Stored Procedures
Columns	Part of tables or views
Table Indexes	Table Indexes, Columns
Views	Has columns

Lineage for SAP HANA

The following lineage information is collected by the collector.

Lineage availability by object

Object	Lineage available
Views	Has rows filtered by, Has rows ordered by, Has rows aggregated by
Functions	Has rows filtered by, Has rows ordered by, Has rows aggregated by, Sourced data from
Stored Procedures	Has rows filtered by, Has rows ordered by, Has rows aggregated by, Sourced data from

SAP HANA version supported

The collector supports SAP HANA version 2.00.076.00.20240701.1.

Authentication supported

The SAP HANA collector supports username and password authentication.

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Prepare to run the SAP HANA collector

Set up authentication and configure the necessary privileges before you run the SAP HANA metadata collector.

Before you begin
Role required: admin

About this task
An account is required with a role that has SELECT privileges on the resources that you want the collector to harvest metadata from. See SAP HANA Database Roles.

Procedure

1. Log in to the SAP HANA instance.
2. Set up a role with either of the following privileges:
   a. System privileges (CATALOG READ)
   b. Object privileges (SELECT METADATA)

Create an SAP HANA metadata collector

Create a collector to import metadata from SAP HANA.

Before you begin
Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the SAP HANA collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **SAP HANA**.
5. From the Connection type list, select one of the following:
   a. Select **New connection** to configure a new connection.
   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.
6. Complete the form.

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SAP HANA metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.
Server	Hostname of the database server to connect to.
Server port	Port of the database server (if not the default).

8. Configure the authentication options.

Authentication options

Field	Description
Username	Username to use to connect to the database.
Password	Password of the databsase user.

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9. Configure the connection information.

Connection information

Field	Description
Include database	Name of the database to connect to. Specify multiple databases by adding one value per line.
Excluded database	Name or regular expression indicating databases not to catalog when the Database field is empty. **Note:** This parameter is ignored if the Database field is specified.

10. Select from **Collect all schemas** or **Specify which schema to collect** to configure the schema collection options.

Schema collection options

Field	Description
Collect all schemas	
Collect all schemas	Catalog all schemas to which the user has access.
Exclude Schema	Name or regular expression of the database schema to be excluded.
Include Information Schema	Include the database's Information Schema in catalog collection.
Specify which schema to collect	
Specify which schema to collect	Catalog only the specified schemas.
Schema	Name of the database schema to catalog.

11. Configure the statistics and sampling options.

Statistics and sampling options

Field	Description
Enable column statistics collection	Enable harvesting of column statistics (that is, data profiling). **Note:** Enabling profiling can increase the collector's runtime, as the collector must read table data to generate profiling metadata.
Target sample size for column statistics	Number of rows sampled for computation of column statistics and string-value histograms.

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Field	Description
	For example, to sample 1000 rows, set the parameter as: 1000. Default: 100000
Disable Lineage collection	Skip harvesting of intra-database lineage metadata.
Disable Extended Metadata collection	Skip harvesting of extended metadata for data asset types such as database, schema, table, columns functions, stored procedures, user defined types, synonyms. Basic metadata for these data asset types will still be harvested.
Exclude system functions	Specify to exclude system functions.

12. Configure the connection and reliability options.

Connection and reliability options

Field	Description
Server environment	Friendly name for the environment in which your database server runs when the server name is localhost. Helps differentiate it from other environments.
Database ID	Unique identifier for this database. Used to generate the database ID when the database name is not sufficiently unique.
JDBC properties	JDBC driver properties to pass through to driver connection.
SQL parsing timeout	Timeout in seconds for SQL parsing during lineage collection. Default: 60

13. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Enable vault classification for columns harvested by the collector. This option is available only from the connection details of a saved collector. See Enable Vault classification for a metadata collector.
- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.

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- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Salesforce metadata collector

Salesforce metadata collector provides read-only access to metadata from a Salesforce instance.

The collector harvests metadata for Salesforce Objects and Fields, Reports, and Dashboards in a Salesforce instance and make it searchable and discoverable in the data catalog.

Metadata cataloged

The collector catalogs the following information.

Cataloged metadata

Object	Information cataloged
Object	Name, Description, Custom Object (true or false), Mergeable Object (true or false), Queryable Object (true or false)
Field	Name, Description, Field Type, Security Classification, Compliance Group, Inline Help Text, Length, Default Value, Formula (calculated fields), Allowed Values (picklist fields), Created Date, Created By, Last Modified Date, Last Modified By
Summary field	Summarized object, Aggregation type, Aggregated field, Any filters on the summarization (filter field, filter operation, and filter value)
Dashboard	Name, Type, External URL
Report	Name, Type, Format
Detail column	Name, Fully-Qualified Name
Grouping column	Name, Fully-Qualified Name, Grouping level
Aggregation column	Name, Formula

Following additional information is cataloged when you run the collector with the Enable Governance Metadata Collection parameter.

Cataloged governance policies

Object	Information cataloged
Row Filter Access Control	Name
Column Mask Access Control	Name
Attribute Based Access Control	Name, Description, Created by, Created at, Modified by, Modified at, On securable type,

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Cataloged governance policies (continued)

Object	Information cataloged
	For securable type, To principals, Except principals
Workspace bindings	Workspace ID, Binding type
Privileges	Granted to, Granted by, Privilege type, Granted on object, Inherited from

Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between harvested data asset pages

Object	Relationship
Field	Object
Report	Detail Column, Grouping Column, Aggregate Column
Grouping Column	Report
Aggregation Column	Report
Detail Column	Report
Row Filter Access Control	Applies to table, Uses function, Using column, Contained within schema
Column Mask Access Control	Applies to column, Uses function, Contained within schema
Attribute Based Access Control	Applies to catalog, Schema and table, Defined on catalog, Schema and table, Uses function
Catalog	Has workspace bindings, Has privileges
Schema	Has privileges
Table	Has privileges
Storage credential	Has workspace bindings
External Location	Has workspace bindings

Lineage for Salesforce

The following lineage information is collected by the Salesforce collector:

Lineage available by object

Field	Report Column that uses data from the field

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Authentication supported

The collector uses username and password authentication to connect to Salesforce via connected applications.

Prepare to run the Salesforce collector

Set up access for cataloging Salesforce resources by configuring user credentials, security tokens, and connected applications.

Before you begin
Role required: admin

About this task
Before running the Salesforce collector, configure the necessary access credentials and permissions in Salesforce.

Procedure

1. Set up a user that the collector will use to connect to Salesforce.
2. **Optional:** Set up a security token.
3. Set up a connected application for OAuth.
   When setting up the connected application, confirm that the following scopes are enabled:
   - Access Lightning applications
   - Manage user data via APIs
   - Perform requests at any time
4. Follow the Salesforce documentation to get the client credentials.
5. Confirm that the user set up for running the collector has authorization to use APIs and the connected application.

Create a Salesforce metadata collector

Create a collector to import metadata from Salesforce.

Before you begin
Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the Salesforce collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Salesforce**.
5. From the Connection type list, select one of the following:

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a. Select **New connection** to configure a new connection.

b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

Salesforce metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

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Field	Description
Salesforce Hostname	The host name of the Salesforce instance using the following format: <organization_domain><--optional-sandbox_name.sandbox>.my.salesforce.com. Do not include the protocol https. For example, for a production environment, it might look like acme.my.salesforce.com, and for a sandbox environment, it could be acme--dev.sandbox.my.salesforce.com

8. Configure the authentication options.

Authentication options

Field	Description
Connected app client ID	OAuth client ID for the Salesforce connected app on the instance.
Connected app client secret	OAuth client secret for the Salesforce connected app on the instance.
Username	The username to use to make the JDBC connection.
Password	The password of the user.
Security Token	Personal security token for the provided Salesforce credentials.

9. Configure the connection and reliability options.

Connection and reliability options

Query batch size	Number of Salesforce objects to query as a batch. Default: 20
Related object depth	Number of related (parent-child) object relationships to navigate. Default is to navigate all relationships.
Include objects	Specify one or more regular expressions to match Salesforce objects that should be included. Default is to include all objects.
Max retries	Number of times the system retries a failed API call. Default: 5
Retry delay	Number of seconds to wait between retry attempts for a failed API call.

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	Default: 2 seconds

10. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

ServiceNow metadata collector

Provides read-only access to metadata from a ServiceNow instance.

The collector harvests metadata from ServiceNow instances including system applications, application scopes, tables, fields, views, and Data Fabric tables. Catalogs ServiceNow Data Fabric metadata for virtualized data integration.

Metadata cataloged

The collector catalogs the following information.

Cataloged metadata

Object	Information cataloged
ServiceNow Instance	Instance URL, Connection metadata
System Application	App Name, Vendor, Version, Active status, Short Description, Source Table
Application Scope	Scope Name, Scope Identifier, Vendor, Version, Active status, Source Table
Table	Table Name, Description, Is Extendable, sys_updated_on (timestamp), Source Table, Parent Table (for table inheritance)
Data Fabric Table	Inherits all Table properties, Plus: Association with external DatabaseTable
View	Inherits all Table properties, Plus: View Definition (SQL definition including source tables and join conditions)

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Cataloged metadata (continued)

Object	Information cataloged
Field	Field Name, Description, Column Label, Reference Table (for reference fields), Mandatory, Is Primary (for Data Fabric fields), SQL Type (for Data Fabric fields) Enhanced metadata: Field type, Field size, Max length, Nullable (true/false), Default value, Internal Type
View Table Mapping	Maps To Table, WHERE clause conditions, Is Left Join, Variable Prefix, Mapping Order
Transform Map	Map Name, Source Table, Target Table, Active status
Transform Entry	Source Field, Target Field, Coalesce, Transform Map (parent)
Data Product	Data Product Name, Description, State (lifecycle status), Tags, Created By, Created On, Updated On, Source Table
Data Interfaces	Table Name, Is Extendable, sys_updated_on (timestamp), Source Table, Parent Table (for table inheritance)
Vault Data Classification	Classification Name, Description, Classification Type, Parent Classification (for hierarchical relationships), Source Table
Dashboard	Name, Description, Active, Certified, UI Generation (Next Experience or Core UI), Workspace Visible In, Categories, Users Granted To, Owner, Created By, Last Modified By, Requested By, Created At, Last Modified At
Visualization	Name, Description, Active, Certified, UI Generation, Created By, Last Modified By, Created At, Last Modified At, Granted To, Requested By, Owner
Indicator	Name, Description, Active, Type (Automated/ Formula/Manual/External), Collection Frequency, Unit, Granted To, Created By, Modified By, Created At, Last Modified At
Indicator Source	Name, Description, Facts Table, Conditions, Collection Frequency, Created By, Last Modified By, Created At, Last Modified At
Dashboard Tab	Name, Display Order, UI Generation
Breakdown	Name, Description, Type (Automated/Manual/ External), Created By, Last Modified By, Created At, Last Modified At

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Cataloged metadata (continued)

Object	Information cataloged
Breakdown Source	Name, Active, Conditions, Facts Table, Facts Field, Created By, Last Modified By, Created At, Last Modified At
Data Collection Job	Name, Description, Active, Run Type, Run Time, Collect Scope (scores only, text indexes only, or both), Created By, Modified By, Created At, Last Modified At

Note: ServiceNow Vault data classifications can be generated automatically for ServiceNow assets using the Classifying ServiceNow assets with Vault agents agentic workflow. Classifications produced by the agent are written to Vault's classification tables and are picked up by the metadata collector on its next run. Avoid running the agent and the collector at the same time to prevent a mismatch between source data and the catalog.

Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between harvested data asset pages

Data asset page	Relationship
ServiceNow Instance	Contains Application Scopes, System Applications, Tables, Data Interfaces
System Application	Contained within Application Scope
Application Scope	Contains System Applications and Tables (via has scoped data asset), Data Interfaces
Table	Contained within Application Scope, Has Fields, May extend another Table (via extends table), May be extended by child Tables, Has Inherited Field
Data Fabric Table	Inherits all Table relationships, Plus: Derived from external DatabaseTable (via prov:wasDerivedFrom)
View	Inherits all Table relationships, Has View Table Mappings
Field	Belongs to a Table (via has field), May reference another Field (for reference/foreign key fields)
Transform Map	Has Source Table, Has Target Table, Has Transform Entries
Transform Entry	Belongs to a Transform Map (via has transform entry), Maps Source Field to Target Field
View Table Mapping	Belongs to a View (via has view table mapping), Maps To Table (via maps to table), Selects data from Table

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Relationships between harvested data asset pages (continued)

Data asset page	Relationship
Data Product	Contained within Application Scope, Has Data Content (contains Tables and Views)
Data Interface	Contained within Application Scope, Has Fields, May extend another Table (via extends table), May be extended by child Tables
Vault Data Classification	May have Parent Classification (via parent classification), May have Child Classifications, Classifies Fields and Tables (via has classification)
Dashboard	Contained within Application Scope, Tabs contained in the Dashboard
Dashboard Tab	Dashboard the Tab is contained within
Data Collection Job	Contained within Application Scope, Indicators the Data Collection Job collects
Indicator	Contained within Application Scope, Data Collection Jobs that collect this Indicator
Indicator Source	Contained within Application Scope
Visualization	Contained within Application Scope
Breakdown	Contained within Application Scope
Breakdown Source	Contained within Application Scope

Lineage for ServiceNow

The following lineage information is collected by the ServiceNow collector:

Lineage availability by object

Object	Lineage available
View	View Table Mappings show: • JOIN conditions and WHERE clauses • Tables from which the view selects data • Variable prefixes and mapping order
Table	Table inheritance lineage: • Parent table (via extends table relationship) • Child tables that extend this table
Field	Reference field lineage:

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Lineage availability by object (continued)

Object	Lineage available
	• Fields in other tables that this field references • Indicates foreign key relationships
Data Fabric Table	External data source lineage: • External DatabaseTable from which data is virtualized (via prov:wasDerivedFrom)
Data Interfaces	Table inheritance lineage: • Parent table (via extends table relationship) • Child tables that extend this table • The tables whose structure and attributes this Data Interface governs
Dashboard	Visualizations embedded in the Dashboard, Tables and Fields the Dashboard uses data from, Indicators the Dashboard uses
Dashboard Tab	Visualizations embedded in the Dashboard Tab
Indicator	Indicator Sources the Indicator uses data from, Fields or Tables the Indicator uses data from, Indicators the Indicator calculates values from, Breakdowns that segment Indicator values, Dashboards that use the Indicator, Visualizations that use the Indicator
Indicator Source	Indicators that use the Indicator Source, Table the Indicator Source sourced data from
Breakdown	Breakdown Sources that define segment values for the Breakdown, Tables and Fields the Breakdown segments its values from, Indicators whose values are segmented by the Breakdown
Visualization	Dashboards that embed the Visualization, Dashboard Tabs that embed the Visualization, Indicators the Visualization uses data from, Tables or Fields the Visualization uses data from
Breakdown Source	Breakdowns which the Breakdown Source defines segment values for, Fields it derives elements from
Data Snapshot Source	Snapshot indicator backed by this source
Data Snapshot Source	Table the source data comes from, snapshot indicator backed by this source

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Lineage availability by object (continued)

Object	Lineage available
Transform map	Tables this table transforms into (as source in an active transform map), tables this table is populated from (as target in an active transform map) Only harvested for active transform maps.
Transform field	Fields this field maps into (as source in an active transform map entry), fields this field is populated from (as target in an active transform map entry)

ServiceNow version supported

Supports ServiceNow instances that expose the Table API. Tested with ServiceNow Zurich and Australia releases.

Authentication supported

The collector authenticates to ServiceNow using Basic Authentication (User name and Password).

Prepare to run the ServiceNow collector

Create a ServiceNow user and configure permissions before running the collector.

Before you begin
Role required: admin

About this task
The collector uses Basic Authentication with username and password. ServiceNow determines authorization based on roles.

Procedure

1. Log in to the ServiceNow instance.
2. Navigate to **All** > **System Security** > **Users and Groups** > **User**.
3. Create a new user.
   a. Select **New**.
   b. Complete the required fields.
   c. Select **Save**.
4. Set a password for the user.
5. Assign roles to the user.

   Assign these roles:

   - rest_api_explorer
   - admin

   These roles provide read access to the following tables:

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Standard metadata tables:

- sys_app (System Applications)
- sys_scope (Application Scopes)
- sys_db_object (Tables)
- sys_dictionary (Fields)
- sys_db_view (Views)
- sys_db_view_table (View Table Mappings)
- sys_user (Users - for connection testing)

Data Fabric tables:

- sn_df_connector (Data Fabric Connectors)
- sys_df_connection_metadata (Connection Metadata)
- sys_df_data_dictionary (Data Dictionary)
- sys_df_connection_data (Connection Data)
- sn_df_connection_attributes (Connection Attributes)
- sys_variable_value (Variable Values)

Create a ServiceNow metadata collector

Create a collector to import metadata from ServiceNow.

Before you begin

Verify the following:

- All prerequisite tasks are completed. For more information, see Prepare to run the ServiceNow collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **ServiceNow**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

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ServiceNow metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
ServiceNow Instance URL	Base URL of your ServiceNow instance, such as `https://your-instance.service-now.com`. Do not include a trailing slash.
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication options

Field	Description
Username	ServiceNow username to use for authentication.
Password	Password for the specified username.

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9. Configure the advanced options.

Advanced options

Field	Description
ServiceNow API Page Size	Number of records to request per page from the ServiceNow Table API. Default is 1000.
Skip Glide Tables, Fields, and Views	Select to skip harvesting of Glide tables, fields, and views.

10. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
You can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.
- After the first collector run, serviceNow Vault data classifications can be generated automatically for ServiceNow assets using the Classifying ServiceNow assets with Vault agents agentic workflow. Classifications produced by the agent are written to Vault's classification tables and are picked up by the metadata collector on its next run. Avoid running the agent and the collector at the same time to prevent a mismatch between source data and the catalog.

Snowflake metadata collector

The Snowflake metadata collector provides read-only access to metadata from an external Snowflake account.

The collector harvests metadata from Snowflake Data Cloud. It collects tabular objects, Horizon objects such as policies and tags, and Snowflake data quality artifacts. It also harvests functions and stored procedures. The collector can gather column statistics and table query counts. In addition, it can harvest metadata for Streamlit applications.

Metadata cataloged

The Snowflake collector catalogs the following information.

Note: The collector harvests all versions of overloaded functions and stored procedures. Each version has its own title/name in the catalog, but a distinct identifier.

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Metadata harvested

Object	Information cataloged
Column	Name, Comments, Data Type, Is Nullable, Default Value, Key type (Primary, foreign)
Table	Name, Comments, Primary key, Schema, External URL (Snowsight) Extended metadata: Is Iceberg, Is dynamic, Is transient, Created Date, Last Modified Date, Last Updated By (Snowflake LAST_DDL_BY), Owner (Snowflake role that owns table), Definition Altered Date, Table Size
View	Name, Comments, Schema, External URL (Snowsight), Definition Altered Date, Last Modified By (Snowflake LAST_DDL_BY), Is Iceberg, Is dynamic, Is temporary, Created Date, Last Modified Date, Owner (Snowflake role that owns table), SQL definition
Materialized View	Name, Comments, Schema, External URL (Snowsight), Definition Altered Date, Last Modified By (Snowflake LAST_DDL_BY), Is Iceberg, Is dynamic, Is temporary, Created Date, Last Modified Date, Owner (Snowflake role that owns table)
Schema	Identifier, Name Extended metadata: Comments, Created date, Updated
Database	Type, Name, Identifier, Server, Port, Environment, JDBC URL Extended metadata: Comments
User-defined function (this includes User-defined functions created in Snowpark)	Name Extended metadata: Function Definition, Comments, Created Date, Owner (Snowflake Role), Snowflake Function Type (Return Type), Function Signature, Function Language, Packages, Runtime version, Updated
Stored Procedure (this includes Stored Procedures created in Snowpark)	Name Extended metadata: Function Definition, Owner (Snowflake Role), Comments, Return Type, Function Language, Packages, Created Date, Function signature, Snowflake Function Type, Runtime Version, Updated, Stored Procedure Type

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Relationships between objects

The harvested metadata includes catalog pages for the following data asset types. Each catalog page has a relationship to the other related data asset types.

Relationships between harvested data asset pages

Data asset page	Relationships
Snowflake Row access policies	Tables
Snowflake Masking Policies	Columns, Tag value
Table	Columns, Tag value, Data Metric Function that analyzes, Views, Tables, or Functions which the Table depends on
Snowflake Tags	Tag value
Columns	Table, Tag Value, System Tag Value
View	Schema that contains Views, Columns that are part of Views, Data Metric Function that analyzes View, Views, Tables, or Functions which the View depends on
Materialized View	Schema that contains Materialized Views, Columns that are part of Materialized Views
Schema	Database that contains Schema, Table that is part of Schema, View that is part of Schema, Materialized View that is part of Schema, Streamlit app that is part of schema
Streamlit App	Schema that contains Streamlit App
Database	Schema contained in Database
Data Metric Function	Table or View analyzed by this Snowflake Data Metric Function, Table, Views, Tables, or Functions which the Function depends on

Lineage and dependencies for Snowflake

The following lineage information is collected by the Snowflake collector. Note that any lineage for SQL Statements defined via variable statements are not supported.

Important things to note:

- Any lineage for SQL Statements defined via variable statements are not supported.
- The collector traces these relationships from a View's columns to ultimate source Table columns across SQL expressions and subqueries.

Object Lineage Availability

Object	Lineage available
Column in View	The collector identifies the associated column in an upstream view or table:

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Object Lineage Availability (continued)

Object	Lineage available
	• Where the data is sourced from • That sort the rows via ORDER BY • That filter the rows via WHERE/HAVING • That aggregate the rows via GROUP BY
User-defined function	A Function and: • Views referenced in Function • Tables referenced in Function • Functions referenced in Function A View and Function referencing View

Stored Procedure	The collector identifies:
	• The associated column in an upstream view or table
	  ○ Where the data is sourced from
	  ○ That sort the rows via ORDER BY
	  ○ That filter the rows via WHERE/HAVING
	  ○ That aggregate the rows via GROUP BY
	• The downstream table that has its data updated by this stored procedure.
	Note: The following stored procedures are not supported:
	• Stored procedures with multitable inserts. However, multiple separate insert statements that insert into one table are supported.
	• Stored procedure with multiple SELECT and INSERT statements not separated by a semicolon delimiter.
	• Stored procedures used to create tables or any transient tables created during the execution scope of a stored procedure.

Dependencies

The Snowflake collector catalogs dependencies between tables, views, and functions using the Snowflake Account Usage view OBJECT_DEPENDENCIES. See the Snowflake documentation for more information about the OBJECT_DEPENDENCIES view.

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If you include the profiling and sampling specific parameters while running the collector, the following additional information is harvested for Columns.

Note: The user/role must have read access to data to be able to harvest profiling information (column statistics).

Profiling and sampling specific information

Object	Information cataloged
Column	• Average Length (sample) • Average Value (sample) • Data Distribution • Distinct Values • Estimated Distinct Values • Estimated Non-null Values • Maximum Length (sample) • Maximum Value (sample) sorted numerically or alphabetically (z-a) • Minimum Length (sample) • Minimum Value (sample) sorted numerically or alphabetically (a-z) • Non-null Values (sample) • Sample String Values (first 5 items in a column)
Table	• Row Count • Sample Count (Target sample size)

Following additional information is cataloged when you run the collector with the Collect Snowflake policy information and Collect Snowflake tag information options enabled.

Cataloged Snowflake tags and policies

Object	Information cataloged
Columns	Snowflake masking policies
Snowflake Tags	Name, Allowed Values, Comments
Snowflake Tag Values	Name, Value
Snowflake Masking Policies	Name, Comments , Date created, Snowflake tags, Owner, Type, Policy body, Schema, Database
Snowflake Row access policies	Name, Comments , Date created, Snowflake tags, Owner, Type, Policy body, Schema, Database

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Following additional information is cataloged when you run the collector with the Collect Snowflake table usage information and Table usage lookback days options enabled.

Cataloged Snowflake table query counts

Object	Information cataloged
Table	Query Count

Following additional information about data quality metrics is cataloged when you run the collector with the Collect data metric function information option enabled.

Cataloged Snowflake Data Metric Functions

Object	Information cataloged
Data Metric Function	• Identifier: Name of the function • Title: Name of the function • Description • Body Definition of the function
Table	• Schedule: cron expressions • Data metric function observations: function name, column arguments, most recent metric time, value

Following additional information is cataloged when you run the collector with theCollect Streamlit app information option enabled.

Cataloged Snowflake Streamlit Applications

Object	Information cataloged
Snowflake Streamlit App	• Identifier: App Name • Title: App Title • Description: App comments • Main file • Root location • Date Created • Owner

Prepare to run the Snowflake collector

Set up authentication and grant role permissions to enable Snowflake metadata collection.

Before you begin

Role required: ACCOUNTADMIN

You must have an ACCOUNTADMIN role in Snowflake to grant permissions.

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About this task

The collector supports username and key-pair authentication. For details, see the Snowflake documentation.

Snowflake determines authorization based on roles. A role must be specified when connecting to Snowflake. The ACCOUNTADMIN role is required to harvest the full range of metadata. Other roles provide access to basic metadata only, without extended metadata or lineage information. When using a role other than ACCOUNTADMIN, grant the role-specific permissions outlined in this task.

Some collector features require executing queries in Snowflake, which requires a warehouse. If the user credentials have a default warehouse configured, no additional warehouse configuration is needed. To use a different warehouse, or if no default warehouse is set, specify the warehouse using the Snowflake Warehouse configuration option.

Procedure

1. Create a role and grant warehouse permissions.

```
CREATE OR REPLACE ROLE DDW_ACCOUNT_ROLE;
                        GRANT OPERATE, USAGE ON WAREHOUSE
 <warehouse_name> TO ROLE DDW_ACCOUNT_ROLE;
```

2. Grant permissions to enable metadata harvesting for database, schema, tables, and views.

```
GRANT USAGE ON DATABASE <database_name> TO ROLE
 DDW_ACCOUNT_ROLE;
                        GRANT USAGE ON ALL SCHEMAS IN DATABASE
 <database_name> TO ROLE DDW_ACCOUNT_ROLE;
                        GRANT SELECT ON ALL TABLES IN DATABASE
 <database_name> TO ROLE DDW_ACCOUNT_ROLE;
                        GRANT SELECT ON ALL EXTERNAL TABLES IN
 DATABASE <database_name> TO ROLE DDW_ACCOUNT_ROLE;
                        GRANT SELECT ON ALL VIEWS IN DATABASE
 <database_name> TO ROLE DDW_ACCOUNT_ROLE;
                        GRANT USAGE ON FUTURE SCHEMAS IN
 DATABASE <database_name> TO ROLE DDW_ACCOUNT_ROLE;
                        GRANT SELECT ON FUTURE TABLES IN
 DATABASE <database_name> TO ROLE DDW_ACCOUNT_ROLE;
```

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Note: If you don't plan to use the Enable Sample String Values collection and Enable column statistics collection options, you can grant the REFERENCES permission instead of SELECT:

```
GRANT USAGE ON DATABASE <database_name> TO ROLE
 DDW_ACCOUNT_ROLE;
                              GRANT USAGE ON ALL SCHEMAS IN
 DATABASE <database_name> TO ROLE DDW_ACCOUNT_ROLE;
                              GRANT REFERENCES ON ALL TABLES
 IN DATABASE <database_name> TO ROLE DDW_ACCOUNT_ROLE;
                              GRANT REFERENCES ON ALL
 EXTERNAL TABLES IN DATABASE <database_name> TO ROLE
 DDW_ACCOUNT_ROLE;
                              GRANT REFERENCES ON ALL VIEWS
 IN DATABASE <database_name> TO ROLE DDW_ACCOUNT_ROLE;
                              GRANT USAGE ON FUTURE SCHEMAS
 IN DATABASE <database_name> TO ROLE DDW_ACCOUNT_ROLE;
                              GRANT REFERENCES ON
 FUTURE TABLES IN DATABASE <database_name> TO ROLE
 DDW_ACCOUNT_ROLE;
```

3. Grant permissions to harvest the following: object dependency-based lineage, user-defined functions, data metric functions, stored procedures, tags and tag values, row access policies, masking policies, and table usage.

   Important: You need the ACCOUNTADMIN role to grant these permissions.

   There are two options for assigning these permissions:

   - Option 1: Use the ACCOUNTADMIN role to grant broad imported privileges across databases:

     ```
     USE ROLE ACCOUNTADMIN;
                                  GRANT IMPORTED PRIVILEGES ON
      DATABASE SNOWFLAKE TO ROLE DDW_ACCOUNT_ROLE;
     ```

   - Option 2: Assign specific database roles for targeted permission allocation:

     ```
     USE ROLE ACCOUNTADMIN;
                                  USE DATABASE SNOWFLAKE;
                                  GRANT DATABASE ROLE OBJECT_VIEWER
      TO ROLE DDW_ACCOUNT_ROLE;
                                  GRANT DATABASE ROLE
      GOVERNANCE_VIEWER TO ROLE DDW_ACCOUNT_ROLE;
     ```

     For more information about these database roles, see the Snowflake documentation.

4. **Optional:** Grant permissions for Streamlit apps.

   (Optional) These permissions are only required if you want to harvest metadata from Streamlit apps:

   ```
   GRANT USAGE ON STREAMLIT <streamlit_app_name> TO ROLE
    DDW_ACCOUNT_ROLE;
   ```

5. Create a dedicated Snowflake user for the collector.

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To create key-pair authentication for this user, you need a minimum of SECURITYADMIN role to alter the user settings. See the Snowflake documentation.

```
CREATE USER DDW_ACCOUNT
                          RSA_PUBLIC_KEY = '<rsa_public_key>'
                          TYPE = SERVICE
                          DEFAULT_ROLE = DDW_ACCOUNT_ROLE
                          DEFAULT_WAREHOUSE = '<warehouse_name>'
                          DISPLAY_NAME = 'data.world';

                          GRANT ROLE DDW_ACCOUNT_ROLE TO USER
 DDW_ACCOUNT;
```

6. Grant user access to the warehouse.

```
GRANT USAGE ON WAREHOUSE <warehouse_name> TO ROLE
 DDW_ACCOUNT_ROLE;
```

7. Verify that the appropriate permissions are granted.

   Run the following query:

```
SHOW GRANTS TO ROLE DDW_ACCOUNT_ROLE;
```

Create a Snowflake metadata collector

Create a collector to import metadata from Snowflake.

Before you begin

Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the Snowflake collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Snowflake**.
5. From the Connection type list, select one of the following:

   a. Select **New connection** to configure a new connection.

   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

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Snowflake metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection options.

Connection options

Field	Description
Server	Hostname of the database server to connect to.
Server port	Port of the database server (if not the default).
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication options

Field	Description
Authenticate using username and password	

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Field	Description
Username	Username to use to make the JDBC connection.
Password	Password of the user.
Authenticate using a private key	
Username	Username to use to make the JDBC connection.
Snowflake private key file	Upload the private key file to use for authentication.
Private key file password	Password for the private key file, if the key is encrypted and a password is set.

9. Select from **Collect all schemas** and **Specify which schema to collect**.

Schema collection options

Field	Description
Collect all schemas	
Collect all schemas	Catalog all schemas to which the user has access.
Exclude Schema	Name or regular expression of the database schema to be excluded.
Include Information Schema	Include the database's Information Schema in catalog collection.
Specify which schema to collect	
Specify which schema to collect	Catalog only the specified schemas.
Schema	Name of the database schema to catalog.

10. Enter the Snowflake connection details.

Connection details

Field	Description
Database	Name of the database to connect to. Specify multiple databases by adding one value per line.
Snowflake Role	The role used to execute the query.
Excluded database	Name or regular expression indicating databases not to catalog when the Database field is empty. **Note:** This parameter is ignored if the Database field is specified.

11. Configure the statistics and sampling options.

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Harvesting scope and lineage options

Field	Description
Collect Data Metric Function Information	Option to harvest metadata about data metric functions and their associations to tables.
Data Metric Observation Count	Number of most recent data metric observations to harvest. Ignored unless Collect Data Metric Function Information is enabled. Default: 1
Enable column statistics collection	Option to harvest column statistics, that is, data profiling. **Note:** Activating this option may extend the collector running time because the collector reads table data to gather profiling metadata.
Target sample size for column statistics	Number of rows sampled for computing column statistics and string-value histograms. For example, to sample 1000 rows, set the value to 1000. Default: 100000 **Note:** Applies only if Enable column statistics collection is enabled.
Collect Snowflake Table Usage Information	Option to harvest metadata about Snowflake table usage in queries, including popularity. For each table in the database, calculates the percentage of tables queried no fewer times than the subject table.
Table Usage Lookback Days	Number of days in the past from which to begin harvesting table usage. Default: 7 days
Disable Lineage collection	Option to skip harvesting intra-database lineage metadata.
Disable Extended Metadata collection	Option to skip harvesting extended metadata for data asset types such as database, schema, table, columns, functions, stored procedures, user-defined types, and synonyms. Basic metadata for these data asset types is still harvested.

12. Configure the harvesting scope and limits options.

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Harvesting scope and limits options

Field	Description
Collect Snowflake Tag Information	Option to harvest metadata about Snowflake tags in or associated with the database specified in the database setting.
Collect All Snowflake Tag Information	Option to harvest metadata about Snowflake tags regardless of the database in which they reside.
Collect Snowflake Policy Information	Option to harvest metadata about Snowflake masking and row-access policies in or associated with the database specified in the database setting.
Collect All Snowflake Policy Information	Option to harvest metadata about Snowflake masking and row-access policies regardless of the database in which they reside.
Collect Streamlit App Information	Option to harvest metadata about Snowflake Streamlit applications.
Enable Sample String Values collection	Option to harvest sample values and histograms for columns containing string data. **Note:** Applies only if Enable column statistics collection is enabled.
Exclude system functions	Option to exclude built-in system functions from harvesting.

13. Configure the connection and reliability options.

Connection and reliability options

Field	Description
Snowflake Warehouse	Snowflake warehouse to use when connecting. Default: User's assigned default warehouse
Server environment	Friendly name for the environment in which your database server runs. Useful when the server name is localhost and you need to differentiate it from other environments.
Database ID	Unique identifier for this database, used to generate the database ID when the database name is not sufficiently unique.
JDBC properties	JDBC driver properties passed to the driver connection.
SQL parsing timeout	Timeout in seconds for SQL parsing during lineage collection.

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Field	Description
	Default: 60

14. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Enable vault classification for columns harvested by the collector. This option is available only from the connection details of a saved collector. See Enable Vault classification for a metadata collector.
- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Tableau metadata collector

Tableau metadata collector provides read-only access to metadata from a Tableau account.

The Tableau collector harvests metadata from Tableau objects (such as workbooks and dashboards) in the Tableau Online or Tableau Server instances. Use harvested metadata to perform impact analysis and understand how changes to upstream data sources affect Tableau objects.

Tableau version supported

The collector supports Tableau Cloud and Tableau Server. Supports Tableau API versions 3.10 and above on Tableau Server v2022.1.

Authentication supported

The Tableau collector supports the following authentication methods:

- Personal Access Token
- Username and password

Metadata cataloged

The Tableau collector catalogs the following information:

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Metadata harvested

Object	Information cataloged
Databases	Name, Identifier, Description, Database Connection Type
Database Schemas	Name, Identifier
Database tables	Name, Identifier
Database columns	Name, Identifier
Tableau Databases	Name, Identifier, Connection Type
Tableau Database tables	Name, Identifier, Connection Type
Tableau Database columns	Name, Identifier
Projects	Name, Description
Workbooks	Name, Description, Creator Email, Creator Name, Creator Tableau User, Preview Image, and Workbook URL **Note:** Unpublished workbooks aren't cataloged because the Tableau REST APIs don't return unpublished objects.
Dashboards	Name, Creator Email, Creator Name, Creator Tableau User, Preview Image, Dashboard URL, Number of Favorites, and Number of Views **Note:** Unpublished dashboards aren't cataloged because the Tableau REST APIs don't return unpublished objects.
Views	Name, Creator Email, Creator Name, Creator Tableau User, Number of Views, Number of Favorites, Preview Image, and View URL **Note:** Unpublished views aren't cataloged because the Tableau REST APIs don't return unpublished objects.
Datasource fields	Name, Identifier, Description
Calculated fields	Name, Identifier, Description, Calculation Formula, Category, Role, Type
Group fields	Name, Identifier, Description, Category, Role, Type
Bin fields	Name, Identifier, Description, Category, Role, Type, Bin Size
Column fields	Name, Identifier, Description, Category, Role, Type
Metrics	Name, Identifier, Description, Creator Email, Creator Name, Creator Tableau User, Metric Url

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Metadata harvested (continued)

Object	Information cataloged
Custom SQL tables	Name, Identifier, Description, SQL Query
Embedded data sources	Name, Identifier, Last refresh date
Published data sources	Name, Identifier, Description, Last refresh date

Relationships between objects

Catalog pages show relationships between the following data asset types:

Relationships between cataloged objects

Data asset page	Relationship
Databases	• Schemas contained within the database • Tables contained within the database
Database Schemas	Tables contained within the schema
Database tables	• Schema containing database table • Database containing the database table • Views using the database table as a data source • Column fields using the database table as a data source
Database columns	• Tables containing the database columns • Column fields referencing the database columns
Tableau Databases	Tableau Tableau Database table contained within the Tableau Database
Tableau Database tables	Tableau Column contained within the Tableau Database table
Tableau Database columns	Tableau Column Field referencing the Tableau Database Column
Projects	• Views contained within the project • Workbooks contained within the project • Dashboards contained within the project • Subprojects contained within the project • Published Data source

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Relationships between cataloged objects (continued)

Data asset page	Relationship
Workbooks	• Projects that contain a workbook • Data sources embedded within the workbook • Views contained within the workbook • Custom SQL Tables embedded within the workbook
Dashboards	• Fields used by dashboard • Custom SQL tables used by dashboard • Projects containing dashboard • Tables used by dashboard • Workbooks containing dashboard • Views embedded in dashboard
Views	• Fields used by view • Custom SQL tables used by view • Projects containing view • Database Tab;es used by view • Workbooks containing view • Dashboards that embed the view • Metrics presenting the view
Datasource fields	• Views that use the datasource field • Dashboards that use the datasource field • Data source fields containing the datasource field
Calculated fields	• Views that use the calculated field • Dashboards that use the calculated field • Data sources containing the calculated field
Group fields	Data sources containing group field
Bin fields	Data sources containing group field

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Relationships between cataloged objects (continued)

Data asset page	Relationship
Column fields	• Data Source containing the column field • Views that use the column field • Dashboards that use the column field
Custom SQL tables	• Views using Custom SQL table • Dashboards using Custom SQL table • Workbooks using Custom SQL table
Embedded data sources	• Fields contained within the embedded data source • Workbook containing embedded data source
Published data sources	Fields contained within the published data source

Lineage for Tableau

Collected lineage information:

Lineage availability by object

Object	Lineage available
Database columns and tables	Fields that use database columns and tables
Projects	Databases, Database schemas, Database Tables, Database Columns, Workbooks, Views, Dashboards, custom SQL tables, and Data sources that projects contain
Dashboards	Fields and tables that dashboards source their data from
Views	Fields and tables that views source their data from
Fields	Columns, tables, and other fields that a field uses its data from
Tableau Database tables	Tableau Databases containing the Tableau Database table
Tableau Database columns	Fields that reference the Tableau Database column, Tableau Database tables containing the Tableau Database column
Published data sources	Embedded data sources that were derived from published data source

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Lineage availability by object (continued)

Object	Lineage available
Embedded data sources	Database tables and Database columns that the Embedded data source uses data from.
Custom SQL Tables	Database tables and Database columns that the Custom SQL Table uses data from. Note: Lineage isn't created between Custom SQL Tables and columns or tables that aren't available in the API.

Note: Cross-system lineage isn't supported for ODBC connections or when columns or tables are unavailable in the API.

Supported data sources for cross-system lineage:

- Postgresql
- Snowflake
- BigQuery
- Redshift

Prepare to run the Tableau collector

Set up API access, authentication, and permissions before running the collector.

Before you begin

Role required: admin

About this task

The collector uses the Tableau Metadata API to harvest metadata. You must enable the API (for Tableau Server), configure user permissions, and choose an authentication method. Optionally, configure hostname mapping for database aliases.

Procedure

1. Enable the Metadata API on Tableau Server.

   See Enable Tableau Metadata API.

   Note: The Metadata API is enabled by default for Tableau Cloud. This step applies only to Tableau Server.

2. Configure user permissions and create a Personal Access Token.

   See Configure Tableau user permissions.

3. **Optional:** Configure JWT authentication using a Connected App.

   (Optional) See Configure Tableau JWT authentication.

4. **Optional:** Configure hostname mapping for database aliases.

   (Optional) See Set up a YAML file for hostnames mapping.

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Enable Tableau Metadata API

Enable the Metadata API on Tableau Server to allow metadata collection.

Before you begin

Role required: admin

You must have:

- Tableau Server 2019.3 or later
- Account with Server Admin role in Tableau Server
- REST API enabled (not disabled)

Note: The Metadata API is enabled by default for Tableau Cloud. This procedure applies only to Tableau Server.

About this task

The Tableau collector uses the Metadata API to harvest metadata from Tableau Server. By default, this API is disabled on Tableau Server and must be enabled using the Tableau Services Manager (TSM) command line interface.

Procedure

1. Open a command prompt as an admin on the initial node where Tableau Services Manager (TSM) is installed in the cluster.
2. Run the following command to enable the Metadata API.

```
tsm maintenance metadata-services enable
```

3. Enable derived permissions if you do not have the Data Management license.

   Derived permissions allow you to see related external assets. For detailed instructions, see the Tableau documentation.

Result

The Metadata API is now enabled on Tableau Server and ready for metadata collection.

Configure Tableau user permissions

Create a Tableau user with admin permissions and generate a Personal Access Token.

Before you begin

Role required: admin

You must have permissions to create users and assign roles in Tableau Server or Tableau Cloud.

About this task

The Tableau collector requires a user account with administrative privileges to access and harvest metadata. Create a dedicated user account and generate a Personal Access Token (PAT) for authentication.

Procedure

1. Create a new user in Tableau with admin permissions.
   - For Tableau Server, assign the Server Admin role. See the Tableau documentation for details
   - For Tableau Cloud, assign the Site Admin role. See the Tableau documentation for details

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2. Create a Personal Access Token (PAT) for the user.

   For detailed instructions on creating a PAT, see the Tableau documentation.

3. Save the Personal Access Token securely.

   You will need this token when configuring the Tableau metadata collector.

Configure Tableau JWT authentication

Set up a Connected App in Tableau for JWT authentication

Before you begin

Role required: admin

You must have permissions to create and manage Connected Apps in Tableau.

Important: The APIs to fetch workbook revisions and datasource revisions are not supported by JWT authentication.

About this task

Configure a Connected App to use JWT (JSON Web Token) authentication with the Tableau collector. The Connected App provides the client ID, secret ID, and secret value needed to generate JWT tokens.

Procedure

1. Log in to the Tableau instance.
2. Navigate to **Settings**.
3. Create a Connected App.

   For detailed instructions, see the Tableau documentation.

4. Enable the Connected App.
5. Generate a secret in the Connected App.
6. Save the Connected App credentials.

   Record the following values for use when configuring the Tableau collector:

   - Client ID
   - Secret ID
   - Secret value

   These credentials are used to generate JWT tokens for authentication.

Set up a YAML file for hostnames mapping

Create a YAML file to map database hostname aliases to canonical names.

Before you begin

Role required: admin

About this task

Use a hostname mapping file when you have multiple server names (aliases) for the same database instance and the database collector uses a different alias than the one defined in the Tableau connection. This optional configuration maps database hostnames to canonical names for consistent IRI coining.

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Procedure

1. Create a YAML file named hostnames.yml.
2. Add hostname mapping entries to the file.

   Use the following format:

```
mappingValues:
                          - originalHostname:
 "<Original_HostName>"
                          canonicalHostname:
 "<canonical_HostName>"
```

   Example: If your Tableau source uses db-server-01.company.local but you want to use db.company.com as the hostname during database object IRI coining:

```
mappingValues:
                          - originalHostname:
 "db-server-01.company.local"
                          canonicalHostname: "db.company.com"
```

   Note: You can use environment variables in the file for sensitive information such as passwords.

3. Save the hostnames.yml file.
4. Pass the YAML file to the collector using the Hostnames mapping file option.

   Use the Hostnames mapping file option when running the collector to upload the hostnames.yml file.

Result

The collector will use the canonical hostname in place of the original hostname when coining database object IRIs.

Create a Tableau metadata collector

Create a collector to import metadata from Tableau.

Before you begin

Before you begin, verify the following:

- All per-requisite tasks are completed. For more information, see Prepare to run the Tableau collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.
- Role required: connection-admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Tableau**.
5. From the Connection type list, select one of the following:

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a. Select **New connection** to configure a new connection.

b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.

6. Complete the form.

Tableau metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the API base URL and authentication options.

Configuration options

Field	Description
Tableau API base URL	Base URL for the Tableau API. For example: `https://8bank/api/3.10/`.
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID**

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Field	Description
	Cluster is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication options

Field	Description
Authenticate using username and password	
Username	Tableau user name for authentication.
Password	Tableau password for authentication.
Authenticate using a private access token (PAT)	
Tableau personal access token name	Tableau personal access token name.
Personal Access Token Secret	Tableau personal access token secret.
Authenticate using JSON Web Tokens (JWT)	
username	Username associated with the connected app for JWT authentication.
Connected App Client ID	Client ID of the connected app required for JWT authentication.
Connected App secret ID	Secret ID of the connected app required for JWT authentication.
Connected App Secret Value	Secret value of the connected app required for JWT authentication.
JWT Token Expiration Minutes	Number of minutes the JWT token remains valid. Default: 5 minutes

9. Configure the harvesting scope and filtering options.

Harvesting scope and filtering options

Field	Description
Skip cataloging of preview images	Option to exclude preview images from cataloging.

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Field	Description
Tableau site	ID or name of the Tableau site to catalog. Leave blank to catalog all accessible sites.
Tableau pagination size	Number of records per page for GraphQL queries.
Tableau project	ID or name of the Tableau project to catalog. Leave blank to catalog all projects. **Note:** Specify nested projects individually.
Exclude object types	Tableau object types to exclude from cataloging. Supported object types: ○ View ○ Dashboard ○ Database ○ PublishedDataSource ○ EmbeddedDataSource ○ CalculatedField ○ ColumnField ○ BinField ○ GroupField ○ DatasourceField ○ CustomSQLTable ○ Metric
Tableau project exclude	ID or name of a project to exclude from cataloging. This field overrides the **Tableau project** field.
Whether to include/exclude descendant projects	Option to apply project settings to descendant projects.

10. Configure the content and data source options

Content and data source options

Field	Description
Catalog personal space workbooks	Option to catalog personal space workbooks. Personal space workbooks are workbooks that are not associated with a project.
Convert Database Identifier	Option to convert database identifiers to the default case used by the target database (for example, lowercase for PostgresSQL, uppercase for Oracle).

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Field	Description
Exclude Unpublished Views	Option to exclude unpublished views and dashboards from cataloging.
Hostname mapping file	If you have configured hostname mapping in the hostnames.yaml file, upload the file.
Exclude Hidden Fields	Option to exclude hidden fields within published data sources from cataloging.

11. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. It is now ready to connect to the source system and harvest metadata.

What to do next
After creating the collector, you can perform any of the following tasks:

- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Teradata metadata collector

The Teradata metadata collector harvests read-only metadata from a Teradata account.

The collector harvests metadata from Teradata, including user defined functions, stored procedures, triggers, user defined types, and user defined methods.

Authentication supported

The collector authenticates to Teradata using username and password. Before running the collector, set up a dedicated database user with the required permissions. See Prepare to run the Teradata Collector.

Metadata cataloged

Teradata metadata cataloged by object type

Object	Information cataloged
Database	Type, Name, JDBC URL Extended metadata: Created By, Created At, Updated By, Updated At, Owner name, Space allocation (permanent, spool, temporary), Description
Table	Name, Description, Primary Key, Foreign Key, Sample rows (if data sampling is enabled)

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Teradata metadata cataloged by object type (continued)

Object	Information cataloged
	Extended metadata: Created By, Created At, Updated By, Updated At, Size
Table index	Index Cardinality, Column name, Index Type, Index Name, Is Non Unique, Column Ordinal Position, Pages, Column Sort Sequence
Schema	Name
Column	Name, Description, Data Type, Is Nullable
View	Name, Description, SQL definition, Created By, Created At, Updated By, Updated At
User defined functions	Name, Function type Extended metadata: Definition, Deterministic characteristic, Null-call characteristic, Description, Number of parameters, Source file language, Data access, Parameter style, Execution protection mode, Platform type, Character type, Created, Created By, Last Modified, Last Modified By, External File Reference
SQL stored procedures	Name, Description, Stored procedure type, Definition Extended metadata: Created, Created By, Last Modified, Last Modified By
External stored procedures	Name, Stored procedure type Extended metadata: Definition, Application category, Description, Number of parameters, External file reference, Execution protection mode, Character type, Platform type, Source file language, Parameter style, Data access
Triggers	Name, Fired at instant Extended metadata: Created By, Created At, Updated By, Updated At, Name, Evaluation type, Fired on event, Trigger enabled, Order number, Definition, Trigger Comment, Subject Table Name, Action Time, Trigger Definition
User defined types	Extended metadata: Name, Type, Default transform group, Ordering form, Ordering Category, Default null specified for array, All operators supported, Encryption supported, Compression supported, Instantiable, Final
User defined methods	Name, Description, Number of parameters, Source file language, Data access, Parameter style, Deterministic characteristic, Null-call characteristic, Execution protection mode, Character type, Platform type

Profiling and sampling specific information.

If you include the profiling and sampling specific parameters while running the collector, the following additional information is harvested for columns.

Note: Users or roles must have read access to data to harvest profiling information (column statistics).

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Profiling and sampling metadata cataloged by object type

Object	Information cataloged
Column	• Average Length (sample) • Average Value (sample) • Data Distribution • Distinct Values • Estimated Distinct Values • Estimated Non-null Values • Maximum Length (sample) • Maximum Value (sample) sorted numerically or alphabetically (z–a) • Minimum Length (sample) • Minimum Value (sample) sorted numerically or alphabetically (a–z) • Non-null Values (sample) • Sample String Values (first 5 items in a column)
Table	• Row Count • Sample Count (target sample size)

Relationships between objects

By default, the harvested metadata includes catalog pages for the following resource types. Each catalog page has a relationship to the other related resource types. If the metadata presentation for this data source has been customized, you might see other resource pages and relationships.

Teradata resource page relationships

Resource page	Relationship
Table	• Columns contained in tables • Table indexes
Columns	• Table • Table indexes
Table indexes	Columns
Trigger	Table triggers on tables
Schema	• Database that contains schema • Table that is part of schema
Database	Schema contained in database

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Lineage for Teradata

The Teradata collector collects the following lineage information.

Note: Lineage for SQL statements defined via variable statements is not supported.

Teradata lineage by object type

Object	Lineage available
View	The collector identifies the associated column in an upstream view or table: • Where the data is sourced from • That sort the rows via ORDER BY • That filter the rows via WHERE/HAVING • That aggregate the rows via GROUP BY
Stored procedure	The collector identifies: • The associated column in an upstream view or table • Where the data is sourced from • That sort the rows via ORDER BY • That filter the rows via WHERE/HAVING • That aggregate the rows via GROUP BY • The downstream table that has its data updated Lineage is not available in the following cases: • The SQL statement in stored procedures contains the SELECT INTO clause • Stored procedures with multiple insert statements • Stored procedures used to create tables or transient tables created during the execution scope of a stored procedure

Prepare to run the Teradata Collector

Create a dedicated Teradata user with the permissions required for the metadata collector to harvest metadata from a target database.

Before you begin

Role required: admin

About this task

The collector authenticates to Teradata using username and password. For more information, see the Teradata documentation on Authentication Mechanisms.

Procedure

1. Create a Teradata user.

```
CREATE USER <user> AS PERM=60000000 BYTES, PASSWORD=<password>
```

2. Grant `SELECT` privileges on the target database and on DBC to the user.

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These grants allow the collector to harvest extended metadata for databases, tables, views, user defined functions, stored procedures, triggers, and user defined types.

```
GRANT SELECT ON <database> TO <user>
GRANT SELECT ON DBC TO <user>
```

Result
The user has the permissions required to run the Teradata metadata collector.

What to do next
Use these credentials when configuring the collector parameters. See Create a Teradata metadata collector.

Create a Teradata metadata collector

Create a collector to import metadata from Teradata.

Before you begin

- All prerequisite tasks are complete. For more information, see Prepare to run the Teradata Collector.
- If you plan to run the collector on-premise, a MID Server is setup for the collector. For more information, see MID Server for metadata collectors.

Role required: connection-admin or admin.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub  icon in the left sidebar.
3. Select **Create** > **Metadata collector**.
4. From the System list, select **Teradata**.
5. From the Connection type list, select one of the following:
   a. Select **New connection** to configure a new connection.
   b. Select **Existing connection** to reuse an existing connection and select an existing connection from the **Connections** list.
   The configuration form is filled with details from the existing connection. The name is appended with the word Copy and sensitive details like password aren't copied.
6. Complete the form.

Teradata metadata collector form

Field	Description
Connection name	Unique identifier for the connection. This field can't be modified once the connection is established.
Short description	Purpose and details of the connection.

7. Configure the connection properties.

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Connection options

Field	Description
Server	Hostname of the database server to connect to.
Server port	Port of the database server, if not the default.
Use MID server	Option to connect to the source system through a MID Server. When selected, the **MID selection** options appear.
MID selection	MID Server routing option for the collector job. This field appears only when **Use MID server** is selected. ○ **Auto-Select MID Server** — The system selects an available MID Server at job execution time. Default selection. ○ **Specific MID Server** — The collector job runs on the selected MID Server. If the MID Server is offline at job execution time, the job fails with an error identifying the MID Server by name. ○ **Specific MID Cluster** — The collector job runs on any available MID Server within the selected cluster.
MID Server	MID Server to use for the collector job. This field appears only when **Specific MID Server** is selected. The selected MID Server is saved on the collector record and used for all subsequent collection runs until changed.
MID Cluster	MID cluster to use for the collector job. This field appears only when **Specific MID Cluster** is selected. The selected cluster is saved on the collector record; any available MID Server within the cluster may serve the job.
Capabilities	One or more capability labels that restrict auto-selection to MID Servers advertising those capabilities. This field appears only when **Auto-Select MID Server** is selected.
MID application	MID Server application to use for the collector job. This field appears only when **Auto-Select MID Server** is selected.

8. Configure the authentication options.

Authentication options

User name	Username for authenticating with the database server.
Password	Password for authenticating with the database server.

9. Configure the database options.

Configuration options

Include databases	Name of the database to connect to. To add multiple databases, select **Add**.

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	Note: If this property is not specified, the collector harvests metadata from all databases. Use the optional **Excluded databases** parameter to exclude specific databases.
Excluded databases	Regular expressions indicating databases not to catalog. Use when the **Include databases** parameter is not set — the collector then harvests metadata from all databases, and this parameter excludes specific ones. **Note:** This parameter is ignored if the **Include databases** parameter is specified. To use **Excluded databases**, do not set the **Database** parameter.

10. Configure the advanced options.

Advanced options

Enable column statistics collection	Whether to enable harvesting of column statistics, that is, data profiling. **Note:** Enabling this feature may extend the running time of the collector because the collector requires access to table data to gather profiling metadata.
Target sample size for column statistics	Target number of rows to sample from tables.
Disable lineage collection	Whether to skip harvesting of intra-database lineage metadata.
Disable extended metadata collection	Whether to skip harvesting of extended metadata for resource types such as database, schema, table, columns, functions, stored procedures, user-defined types, and synonyms. Basic metadata for these resource types is still harvested.
Exclude system functions	Whether to exclude system functions.
Server environment	Friendly name for the environment in which the database server runs. Use this field when the server name is `localhost` to differentiate it from other environments.
Database ID	Unique identifier for this database, used to generate the ID for the database. Provide this value only if the database name used for the connection does not uniquely identify the database.

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JDBC properties	JDBC driver properties to pass to the driver connection, in `name=value` format.
SQL parsing timeout	Timeout in seconds for SQL parsing during lineage collection. The default is 60.

11. Select **Save**.

Result
The metadata collector is created and appears on the Connectors page with a Configured status. The collector is ready to connect to the source system and harvest metadata.

What to do next
After the collector is created, perform any of the following tasks:

- Enable vault classification for columns harvested by the collector. This option is available only from the connection details of a saved collector. See Enable Vault classification for a metadata collector.
- Run the collector manually to harvest metadata immediately. See Run metadata collectors manually.
- Automate metadata collection by scheduling regular collector runs. See Schedule metadata collector runs.
- Monitor execution status and troubleshoot issues by viewing the runtime logs. See View runtime logs for collector runs.
- Discover and evaluate the harvested data assets in the Data Catalog. See Governing the Data Catalog.

Running metadata collectors

A metadata collector run harvests technical metadata from the connected data platform and updates the Data Catalog. Collectors can run on demand or on a defined schedule. Runtime logs record the status and details of each run.

Collectors support two run modes:

- Manual: An immediate, on-demand run. Use this after initial setup to verify that the collector connects and collects expected metadata.
- Scheduled: A recurring run at a defined interval. Use this to keep catalog metadata current as the source system changes.

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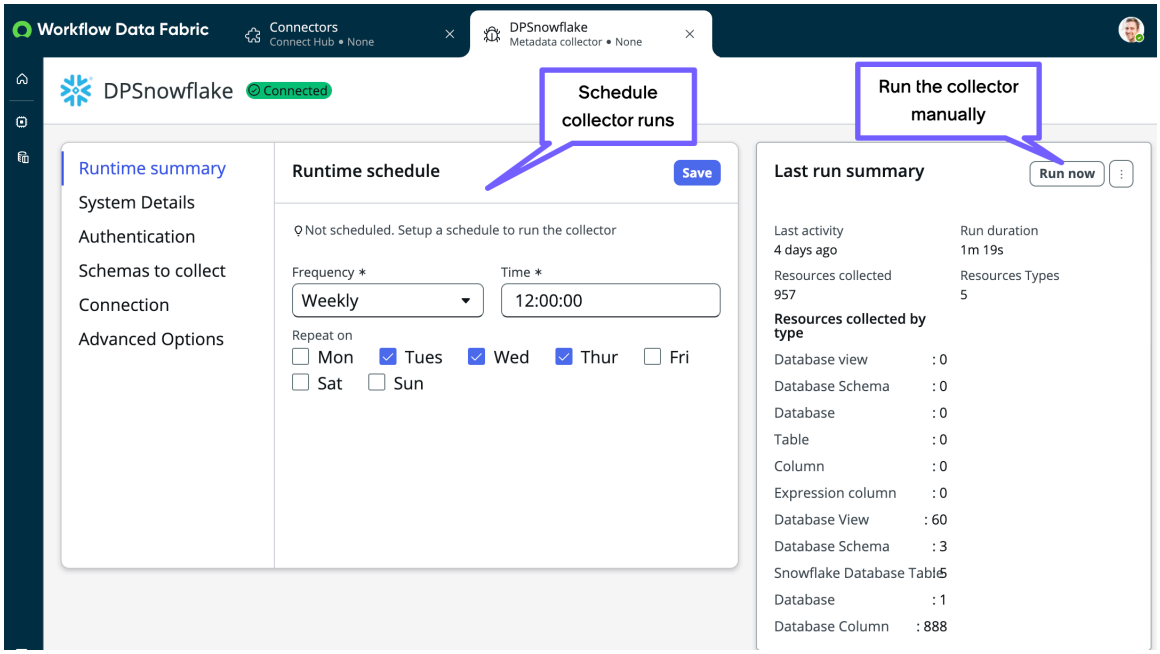

Run notifications

When a collector run completes or fails, the platform sends an email notification to the collector owner and any subscribers. Notifications use the ServiceNow Notification framework — no custom setup is required.

Notifications appear under the **Collector Run Notification** category in **Preferences** > **System notifications**, alongside other platform categories such as Connect. Two notifications are available:

- **DCG Metadata Collector Run Completed**: Sent when a collector run succeeds.
- **DCG Metadata Collector Run Failed**: Sent when a collector run fails.

Email is the only supported delivery channel. Opt in or out and manage your subscription through the standard Notification preferences UI. For steps, see Subscribe to metadata collector run notifications.

Run metadata collectors manually

Execute a metadata collector on-demand to import metadata immediately.

Before you begin

Role required: connection_admin

About this task

Running a collector manually initiates immediate metadata harvesting from the configured source system. Use manual execution to verify new collector configurations, refresh metadata after source system changes, or gather updated information outside the scheduled collection cycle. Collection duration varies based on the volume of metadata in the source system.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Connectors**.

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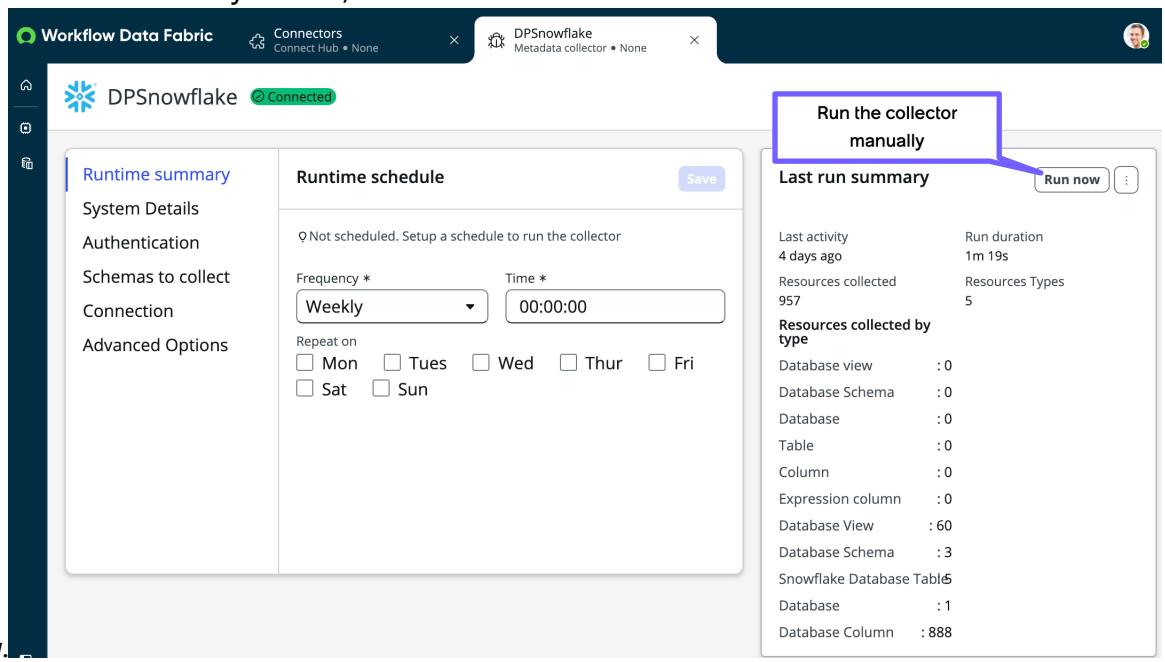
4. Select **Metadata collector**.
5. Select the metadata collector you want to run manually.
6. In the Last run summary section, select **Run now**.



Schedule metadata collector runs

Schedule a metadata collector to run automatically at a specified frequency.

Before you begin

Role required: connection_admin

About this task

Configure collection schedules to maintain up-to-date catalog metadata without manual intervention. Scheduled runs execute automatically and refresh data assets with current information from source systems. Schedule frequency should balance freshness requirements against system load and source system availability.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Connectors**.
4. Select **Metadata collector**.
5. Select the metadata collector you want to schedule to run automatically.
6. In the **Runtime schedule** section, set the fields.

Runtime schedule form

Field	Description
Frequency	How often the collector runs, such as daily or weekly.
Time	Time of day to run the collector, in 24-hour format.

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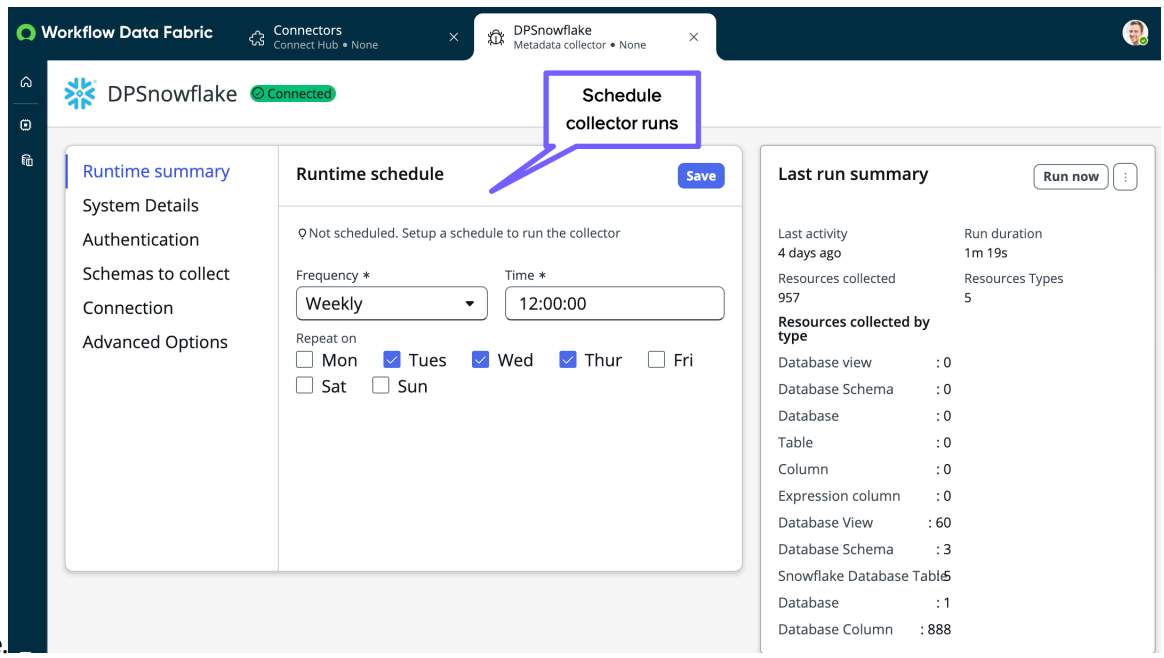
Field	Description
Repeat on	Days of the week on which the collector runs. Applies only when Frequency is set to Weekly.

Note: Schedule collections during low-usage periods to minimize impact on source systems.

7. Select Save.



View runtime logs for collector runs

Access execution logs and download detailed log files for metadata collector runs.

Before you begin

Role required: connection_admin

About this task

Runtime logs provide visibility into collector execution progress, discovered metadata, and any errors or warnings that occurred during the collection process. Use these logs to monitor collection health, troubleshoot failed runs, verify that expected data assets were discovered, and diagnose connectivity or permission issues.

The execution run page displays real-time status information and a searchable table of log entries organized by severity level (Info, Warning, Error). For advanced troubleshooting or detailed analysis, you can download complete log files containing granular execution details and the raw collected metadata in RDF format.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Connect Hub icon in the left sidebar.
3. Select **Connectors**.
4. Select **Metadata collector**.
5. Select a metadata collector for which you want to review the logs.

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6. Access the runtime logs.
   - To view the most recent run logs, select **Runtime logs** from the form context menu.
   - To view logs from previous runs, select **Previous runs** and then select a specific execution run from the list.
7. Review the execution details.

   The execution run page displays:
   - Current Phase: Status of the collector run (COMPLETED, FAILED, IN PROGRESS)
   - Start time and End time: Timestamp information
   - Percent Complete: Progress percentage
   - State: Overall execution state
   - Configuration: Associated collector configuration name
8. Review the execution logs table.

   Scroll to the **Execution logs** section to view log entries. The table displays:

Execution logs columns

Column	Description
Level	Log severity (Info, Warning, Error)
Logged At	Timestamp when the log entry was created
Message	Log message describing the event or issue
Exception Class Name	Type of exception if an error occurred
Exception Message	Detailed error message
Recommended Action	Suggested steps to resolve the issue

9. Download detailed log files for advanced troubleshooting.

   In the **Manage Attachments** section, select the download link next to the log file name. Two types of log files are available:

Log file types

File Type	Description
execution_projection_*.log	Detailed execution logs containing timestamped entries about: ○ Log projection start and completion status ○ Discovered data asset types and counts (for example, tables, columns, views) ○ Attribute projection processing for each data asset type ○ Mapping information between source metadata and catalog tables

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File Type	Description
	○ SPARQL queries used for data extraction ○ Processing statistics including error counts Use this file to understand what the collector discovered, how data assets were mapped, and identify processing issues
catalog-*-results.nt	Raw collected metadata in N-Triples RDF format containing: ○ Collector execution metadata (start time, end time, execution properties) ○ System environment information (OS, architecture, version) ○ Complete data asset definitions using Open KOS schema URIs ○ Relationships between discovered data assets ○ Technical metadata for all collected assets This machine-readable format is primarily for advanced troubleshooting and integration scenarios. Use RDF tools to parse and analyze this data

Result
Use the logs to identify collection issues, verify data asset discovery, and troubleshoot failed runs. Focus on Warning and Error level messages for troubleshooting. Download detailed log files when you need to share diagnostic information with support or perform deep analysis of collection behavior.

Subscribe to metadata collector run notifications

Opt in to email notifications for metadata collector run completion and failure through Notification preferences.

Before you begin
Role required: connection_admin

About this task
The platform sends an email when a metadata collector run completes or fails. You subscribe to these notifications through the standard Notification preferences UI. You can subscribe to run completion notifications, failure notifications, or both.

Procedure
1. Open Notification preferences.
   Select your profile icon, then select **Notification preferences**.
2. Enable the **Allow Notifications** toggle at the top of the page.

   ⚠ **Warning:** If **Allow Notifications** is off, no notifications are delivered regardless of individual subscription settings.

3. Select the **System notifications** tab.
4. Enable the **System notifications** toggle.
5. In the search field, enter `metadata` to filter to the **Collector Run Notification** category.

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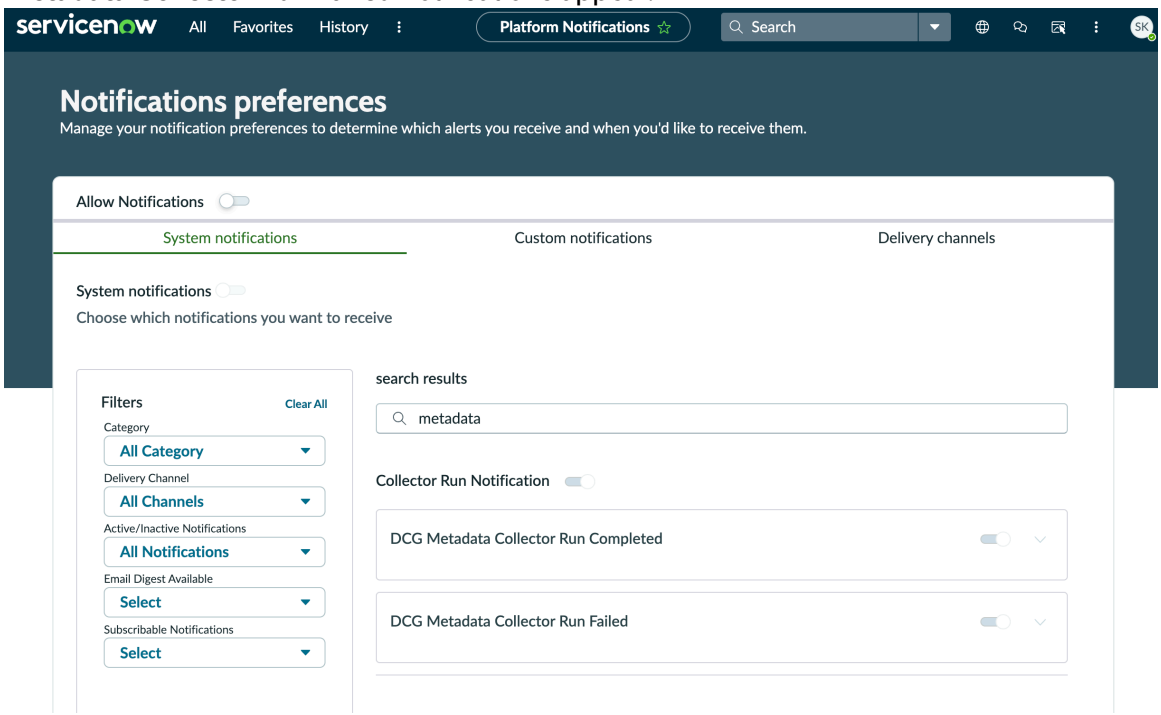
The **DCG Metadata Collector Run Completed** and **DCG Metadata Collector Run Failed** notifications appear.



6. Enable the toggle for each notification you want to receive.
   - Enable **DCG Metadata Collector Run Completed** to receive an email when a collector run succeeds.
   - Enable **DCG Metadata Collector Run Failed** to receive an email when a collector run fails.

Result

You receive an email within one minute of a collector run completing or failing. The email includes the collector name, source name, start and end times, and — for failures — an error summary with a link to the run log.

What to do next

To stop receiving notifications, return to Notification preferences and disable the relevant toggles.

Finding and accessing data assets

The Data Catalog provides a searchable view of data assets collected from connected systems. You can find assets by keyword, tag, domain, or glossary term, view metadata and lineage, and request access to data products and data interfaces.

The catalog aggregates metadata from multiple connected systems into a single location. Each asset record includes technical metadata collected automatically, along with any business context that data stewards have added — such as glossary terms, tags, and domain assignments.

When you find an asset, you can view its full details: schema, data lineage, related assets, and ownership information. For data products and data interfaces, you can submit an access request directly from the asset details page.

Explore data assets in the data catalog

Find and explore catalog assets through search, filtering, and browsing.

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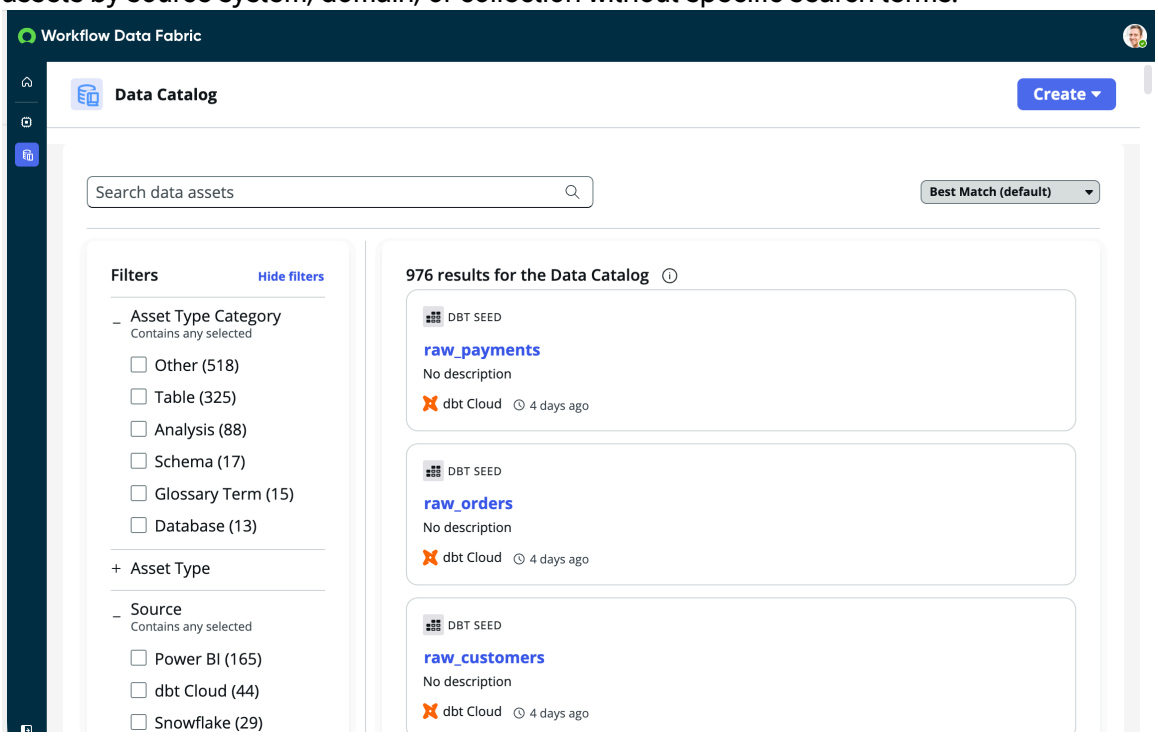
https://player.vimeo.com/video/1195705976?h=a6edac4cb6&badge=0&autopause=0&player_id=0&app_id=58479%22

Before you begin

Role required: WDF Consumer (wdf_consumer)

About this task

Discover data assets using search or browsing. Search looks across asset names, descriptions, tags, and other metadata fields. Browse lets you explore assets by source system, domain, or collection without specific search terms.



Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Data catalog icon in the left sidebar.
3. Browse the data assets available in the catalog.
4. Apply filters to narrow the list of data assets.

   Filters help narrow large result sets to the most relevant assets. Apply multiple filters to create precise searches combining different attributes.

   a. Review available filters in the left panel.

   b. Select filter options to refine the list.

      Common filters:

      - Asset Type: Table, Column, View, Dashboard, Report
      - Source System: Filter by the originating data platform
      - Domain: Organization or business area
      - Tags: Applied classification tags

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- Owner: Data owner or steward
- Has Lineage: Yes or No

5. Change the sort order to organize the list by different criteria.

   From the sort dropdown menu, select a sort option:

   - Relevance: Best matches first based on search keywords (default)
   - Name: Alphabetical order (A-Z)
   - Last Modified: Most recently updated first

6. Find assets using search.
   a. Enter keywords in the search bar.
   b. Review suggested results as you type or press Enter to view all results.
   c. Select any asset to view full details.

   Search tips:

   - Use specific terms for better results (for example, "customer orders" instead of "data")
   - Search looks across multiple fields including names, descriptions, and business context
   - Results display with key information including asset type, source system, and description

View data asset details

The asset detail page organizes data asset information into tabs, including overview, columns, relationships, lineage, quality, and activity.

Before you begin

Role required: WDF Consumer (wdf_consumer)

About this task

Asset detail pages organize information into tabs for easy navigation. The Overview tab provides summary information, while additional tabs offer detailed views of specific aspects like columns, relationships, and lineage.

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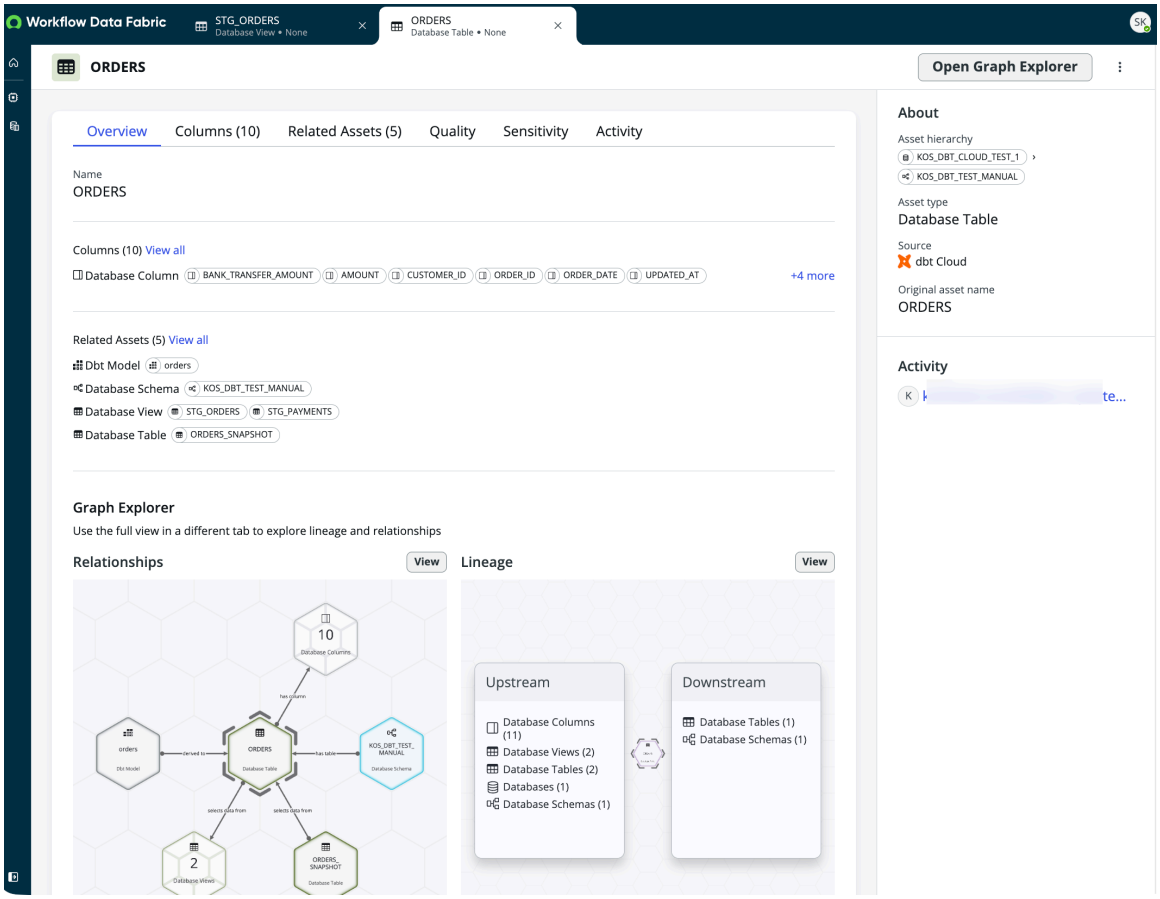

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Data catalog icon in the left sidebar.
3. Select the data asset you want to view.
4. On the Overview tab view the general details about the asset, such as, the name, source, columns included (if it is a table), the preview of relationships and lineage.
   General details include the name, source, and columns included (for table assets). The Overview tab also shows a preview of asset relationships and asset lineage. For table and column assets, the Overview tab also shows a Quality section with the overall data quality status, the number of rules, the number of passed rules, and when quality was last evaluated. Select **View all** to open the Quality tab.
5. On the Columns tab, view column information for tabular assets, such as tables.
   The tab displays details like Asset name, Relationship, Data type, etc. The Classifier field displays the classification assigned to the columns harvested by the ServiceNow collector. If classification has not run on the table, the Classifier column displays null.

   Check that you have the right roles (data_classification_admin or admin) to assign classifications to columns. For details, see Data Classification.

   Select a column name to browse to the details page of the column.
6. On the Related assets tab, view the list of connected catalog assets.
7. On the Quality tab, review data quality information for the asset.
   The Quality tab is available for table and column assets. The summary shows the overall data quality status, the total number of rules, and the number of passed rules. Quality badges awarded to the resource are also displayed here.

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The Rules table lists each rule with its source, asset type, asset name, category, status, and last run time. External data quality tools submit rule results via the Data Quality API. Use filters and search to locate a specific rule. To control how long data quality audit and unmatched queue records are retained before they are purged, configure the retention property. For more information, see Data quality properties.

8. On the Sensitivity tab, view the sensitivity classification assigned to the columns of a table. This tab is populated for the ServiceNow collectors and for collectors for which Vault classification is enabled.

   Note: ServiceNow Vault data classifications can be generated automatically for ServiceNow assets using the Classifying ServiceNow assets with Vault agents agentic workflow. Classifications produced by the agent are written to Vault's classification tables and are picked up by the metadata collector on its next run. Avoid running the agent and the collector at the same time to prevent a mismatch between source data and the catalog.

9. On the Activity tab, review the activities performed on the data asset.
   The system stores the name of the user who made the change, the change details, and the timestamp. Use filters, search, and sort to locate the change you want to track.

Explore data asset relationships

See the data assets, business terms, and governance objects connected to a data asset. Open the relationships view in Graph Explorer to expand, hide, and rearrange the graph.

https://player.vimeo.com/video/1200468592?h=ec681db3b0&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

Role required: WDF Consumer (wdf_consumer)

About this task

Graph Explorer is a visual tool in the Data Catalog for exploring how data assets and business concepts are connected. Graph Explorer has two views: **Relationships** shows direct semantic, conceptual, and governance connections among assets; **Lineage** shows the directed upstream and downstream flow of data.

The relationships view in Graph Explorer shows how a data asset connects to other assets, business concepts, and governance objects in the Data Catalog. The view covers semantic, conceptual, and governance connections across tables, columns, dashboards, business terms, policies, and other catalog objects. It presents the same content as the Related Assets tab of the asset page, in a graph for visual exploration.

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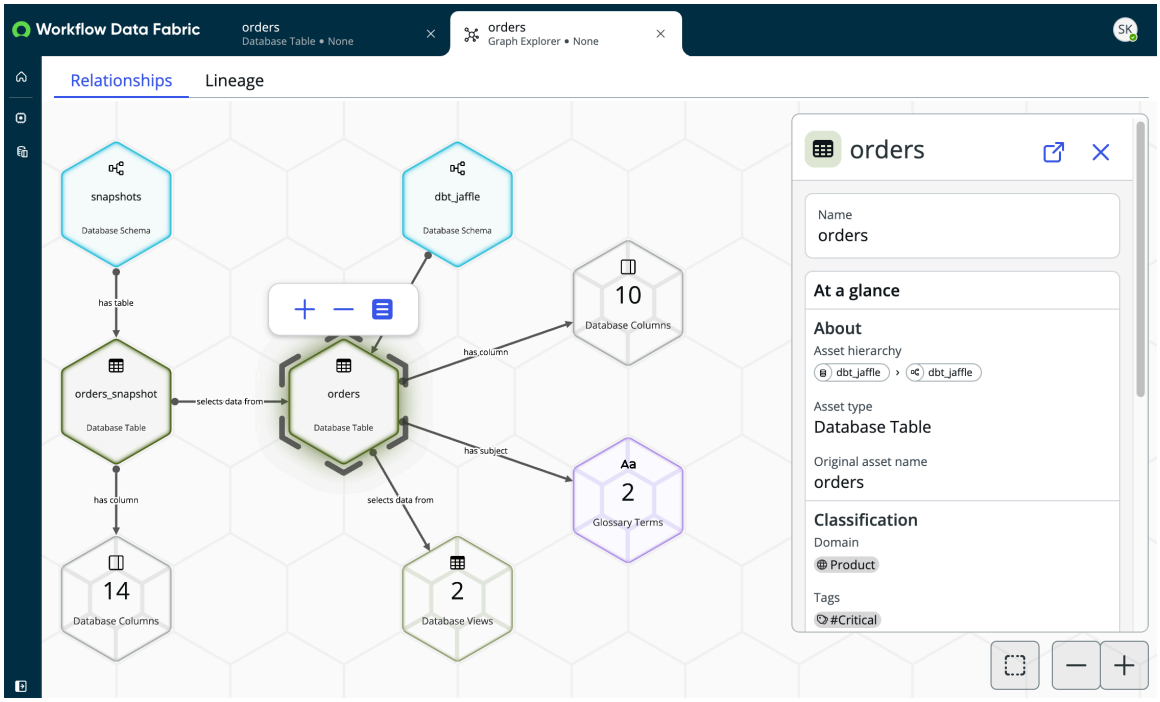

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Data catalog icon in the left sidebar.
3. In Data Catalog, open the asset whose relationships you want to explore.
4. On the **Overview** tab, locate the **Graph Explorer** section.

   The section contains side-by-side previews for **Relationships** and **Lineage**.

5. Open the full relationships view.
   - Select **View** on the **Relationships** preview.
   - Select **Open Graph Explorer** at the top of the asset page.

   The full visualization opens in a new tab. The Relationships view opens by default.

6. Interact with the visual representation of relationships.

   The central node represents the data asset from which you opened Graph Explorer . All connected nodes represent different types of related data assets, with arrows indicating the type of relationship. This is the same information shown in the Related assets tab of the data asset, but presented visually.

7. To expand or hide the connections of a related asset, select the node, then select **Show relationships** or **Hide relationships**.
8. To inspect a grouped node, select the node, then select **Unpack**.

   The group expands to show the individual assets it contains. To collapse the group again, select **Repack**.

9. To view the details of a related asset, select the node, then select **Show asset details**.

   The asset preview panel opens with the asset name, hierarchy, type, original name, and recent activity. To navigate to the asset's full page, select the link next to the asset name.

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10. To customize the layout, drag nodes to new positions on the canvas.
11. Use the controls in the diagram toolbar to zoom in, zoom out, or recenter the visualization.

Explore data assets lineage

Trace the upstream sources and downstream consumers of a data asset. Open the lineage view in Graph Explorer to examine specific relationships, focus on a path, and review related asset details.

https://player.vimeo.com/video/1200457168?h=7eb98602b6&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

Role required: WDF Consumer (wdf_consumer)

About this task

Graph Explorer is a visual tool in the Data Catalog for exploring how data assets and business concepts are connected. Graph Explorer has two views: **Relationships** shows direct semantic, conceptual, and governance connections among assets; **Lineage** shows the directed upstream and downstream flow of data.

The lineage view displays upstream sources, downstream consumers, and the relationships that connect them, at both the table level and the column level. It supports four primary use cases:

- Impact analysis and change management. Identify the downstream reports, dashboards, models, and datasets that depend on a data asset before you modify or deprecate it.
- Root cause analysis. Trace upstream from a problematic asset to find where a data quality issue originated, whether in a source system, a transformation, or a join.
- Data discovery and understanding. Assess an asset's context and reliability by examining its sources and consumers.

Each asset's **Overview** tab includes a **Graph Explorer** section with side-by-side previews for **Relationships** and **Lineage**. The full visualization opens in a new tab and contains both views.

The lineage diagram has a sidebar that lists every asset, grouped by direction (**Upstream**, **Lineage Target**, **Downstream**, **Ignored**) and by degree of separation. The graph shows each asset as a node, with edges representing lineage relationships. An axis indicates the degree of separation for each column, from upstream to downstream. When multiple relationships connect the same two assets, the edge shows a numbered badge with the count of bundled relationships.

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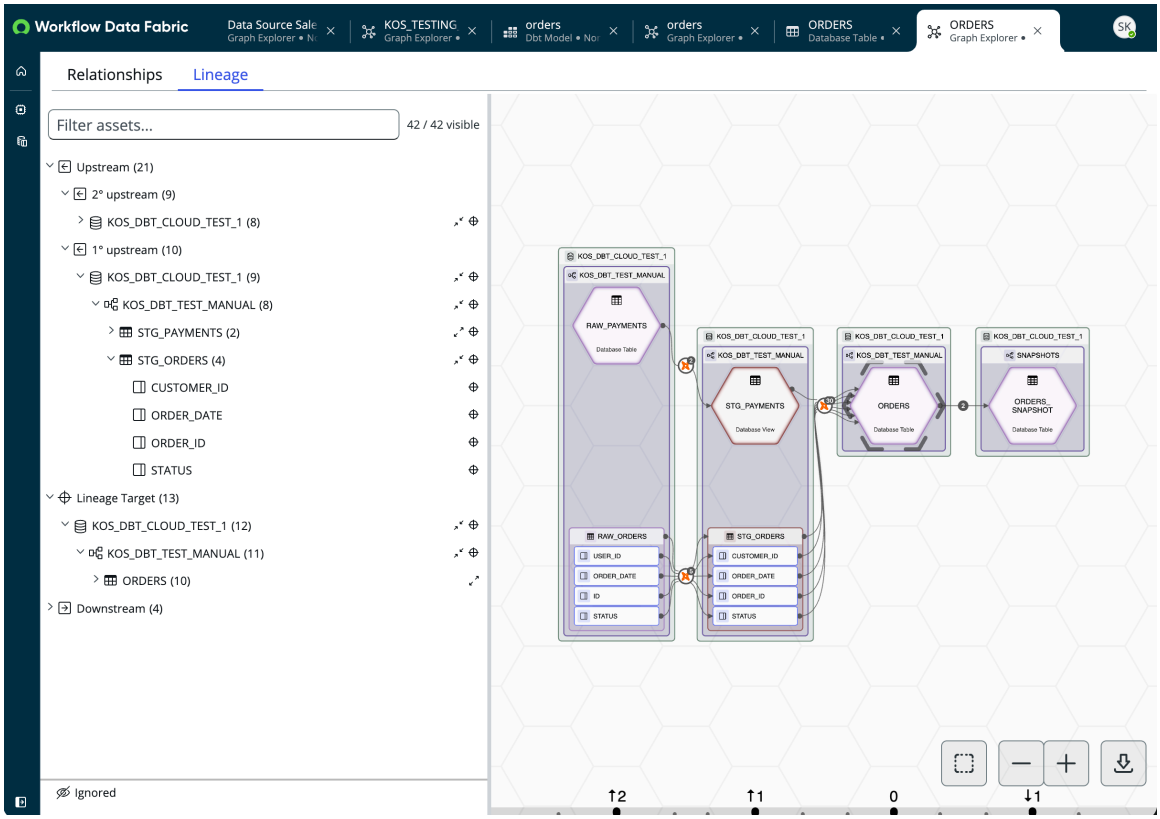

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. In the sidebar, select the Data Catalog icon.
3. In Data Catalog, open the asset whose lineage you want to explore.
4. On the **Overview** tab, locate the **Graph Explorer** section.

   The section contains side-by-side previews for **Relationships** and **Lineage**.
5. Open the full lineage view.
   - Select **View** on the **Lineage** preview.
   - Select **Open Graph Explorer** at the top of the asset page, then select the **Lineage** tab.

   The full visualization opens in a new tab.
6. Interact with the visual representation of lineage.

   The focused asset appears in the diagram with upstream sources and downstream consumers, organized by degree of separation. The sidebar lists every asset in the lineage. This is the same data flow that the asset participates in, presented visually so that you can trace dependencies in either direction.
7. Review the lineage tree in the sidebar.

   The sidebar groups assets by direction — **Upstream**, **Lineage Target**, **Downstream**, and **Ignored** — and by degree of separation within each direction. To narrow the list, enter text in the **Filter assets** field.
8. Select an edge in the diagram to inspect its lineage relationships.

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A numbered badge on the edge shows the count of bundled relationships. Selecting the edge reveals the table-level and column-level dependencies it represents.

9. Expand a container node to reveal the assets inside.

   Containers — such as databases that contain schemas, tables, and columns — appear as single nodes by default. Expanding a container reveals its nested assets so that you can examine the lineage in more detail.

10. Select a node to open the asset preview panel and view its details.

    The preview panel shows the asset name, hierarchy, type, original name, and recent activity. To navigate to the asset's full page, select the link next to the asset name.

11. Focus on a node to narrow the view to a specific path.

    Other assets are hidden and move to the **Ignored** group in the sidebar. To restore the hidden assets, select **Unignore**.

12. Use the controls in the diagram toolbar to zoom in, zoom out, or recenter the visualization.
13. **Optional:** Download the lineage data as a CSV file.

    a. Select **Download as CSV**.

    b. In the Download lineage of this resource window, configure the download options.

Download lineage form

Field	Description
Direction	Select from **Upstream and downstream**, **Upstream only**, **Downstream only**.
Upstream	Number of upstream levels to include. Select **All levels** or specify a number.
Downstream	Number of downstream levels to include. Select **All levels** or specify a number.

    c. Select **Download**.

Request access to data assets

Request access to data products and data interfaces in the Workflow Data Fabric to consume data for your workflows and applications.

Before you begin

Role required: WDF Consumer (wdf_consumer)

About this task

Use the data catalog to discover and request access to data products and data interfaces that contain the data you need for your workflows. Data stewards review and approve access requests based on data governance policies and business requirements.

Note: This feature is only available for data interfaces and data products and not other data assets.

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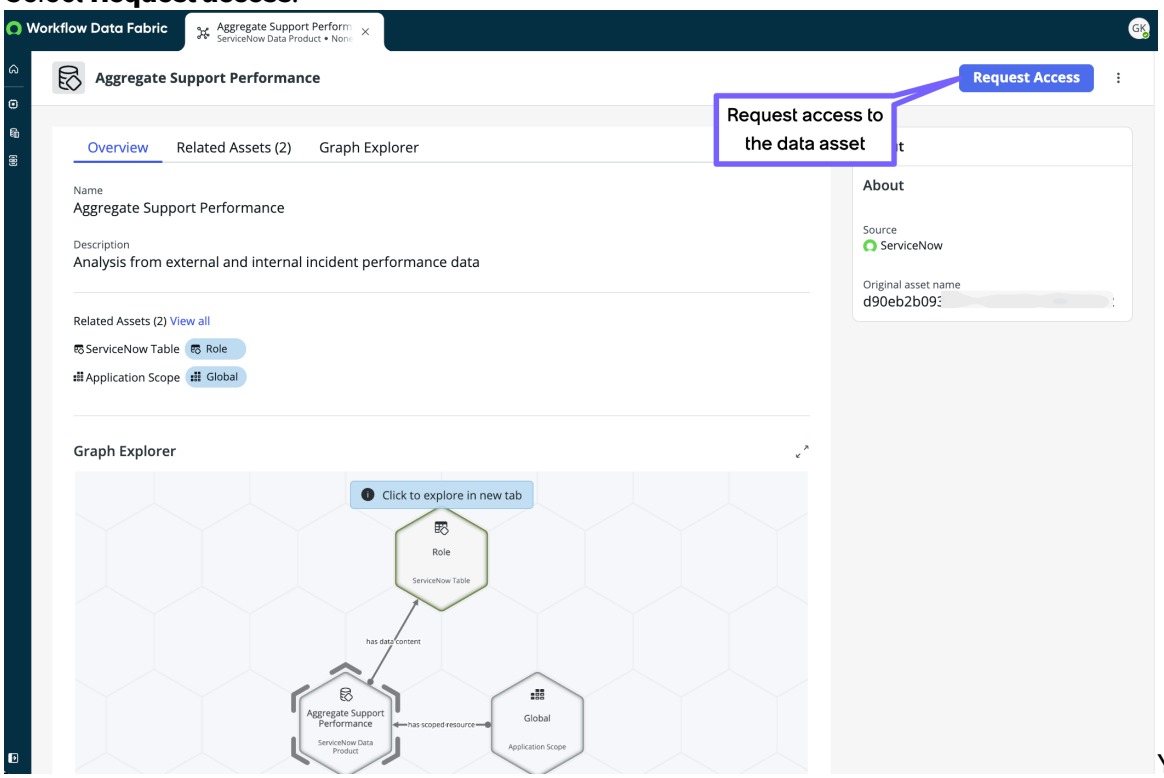
Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Data catalog icon in the left sidebar.
   The data catalog displays all available data assets that you can browse and search.
3. Browse or search for the data product or data interface you want to access.
   You can filter by data domain, category, or use the search functionality to find specific data assets.
4. Select the data product or data interface you want to request access to.
   The data asset details page opens, displaying metadata, schema information, data lineage, and access controls.
5. Select **Request access**.



Your access request is submitted to the data steward for review and approval.

Result

The data steward receives a notification about your access request and can review, approve, or deny the request. You receive an email notification when the request status changes.

Governing the Data Catalog

Data stewards add business context to catalog assets, making them more discoverable for catalog consumers. Governance tools include glossary terms, tags, domains, and direct asset updates.

The catalog automatically collects technical metadata from connected external systems — identifying what data exists, its schema, source, and lineage. Data stewards add business context on top of that collected metadata.

Catalog governance tools include:

- Glossary terms to standardize business terminology and link it to relevant assets
- Tags to classify assets by topic, sensitivity, or use case

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- Domains to group assets by business area or ownership
- Asset record updates to correct or supplement collected metadata

Update a data asset

Edit catalog asset metadata to add business context, improve discoverability, and provide additional information.

Before you begin

Role required: data steward (*df_data_steward*)

About this task

Enrich assets with descriptions, business context, and organizational metadata to help users understand what the data represents and how to use it. Some fields are auto-populated from source systems and are read-only to maintain data integrity with the source.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the **Data catalog** icon.
3. Select a data asset to open its details page.
4. From the form context menu, select **Edit**.
5. Update the general details.
   - Name: Name of the data asset.
   - Description: Description of the asset. Use the rich text editor tools to format the content and add images, links, tables, etc.
6. Update the governance details.
   - Lifecycle status: Current state of the data asset. Possible values are: Approved, Deprecated, Draft, In review, Rejected.
   - Status message: Description of why the data asset is in its current status. Use the rich text editor tools to format the content and add images, links, tables, etc.
   - Owner: Person responsible for business decisions about the data. Adding or removing an owner sends the owner an email notification.
   - Steward: Person responsible for data quality and governance. Adding or removing a steward sends the steward an email notification.
7. Update the classification details.
   - Domain: Terms that represent the logical grouping of related data assets (like customer or product data). For details about creating domains, see Create catalog domains.
   - Tags: Non-hierarchical label or keyword that provides context and descriptive metadata, making data easier to organize, locate, and manage. For details about creating tags, see Create catalog tags.
   - Related terms: Glossary terms connected to this data asset.

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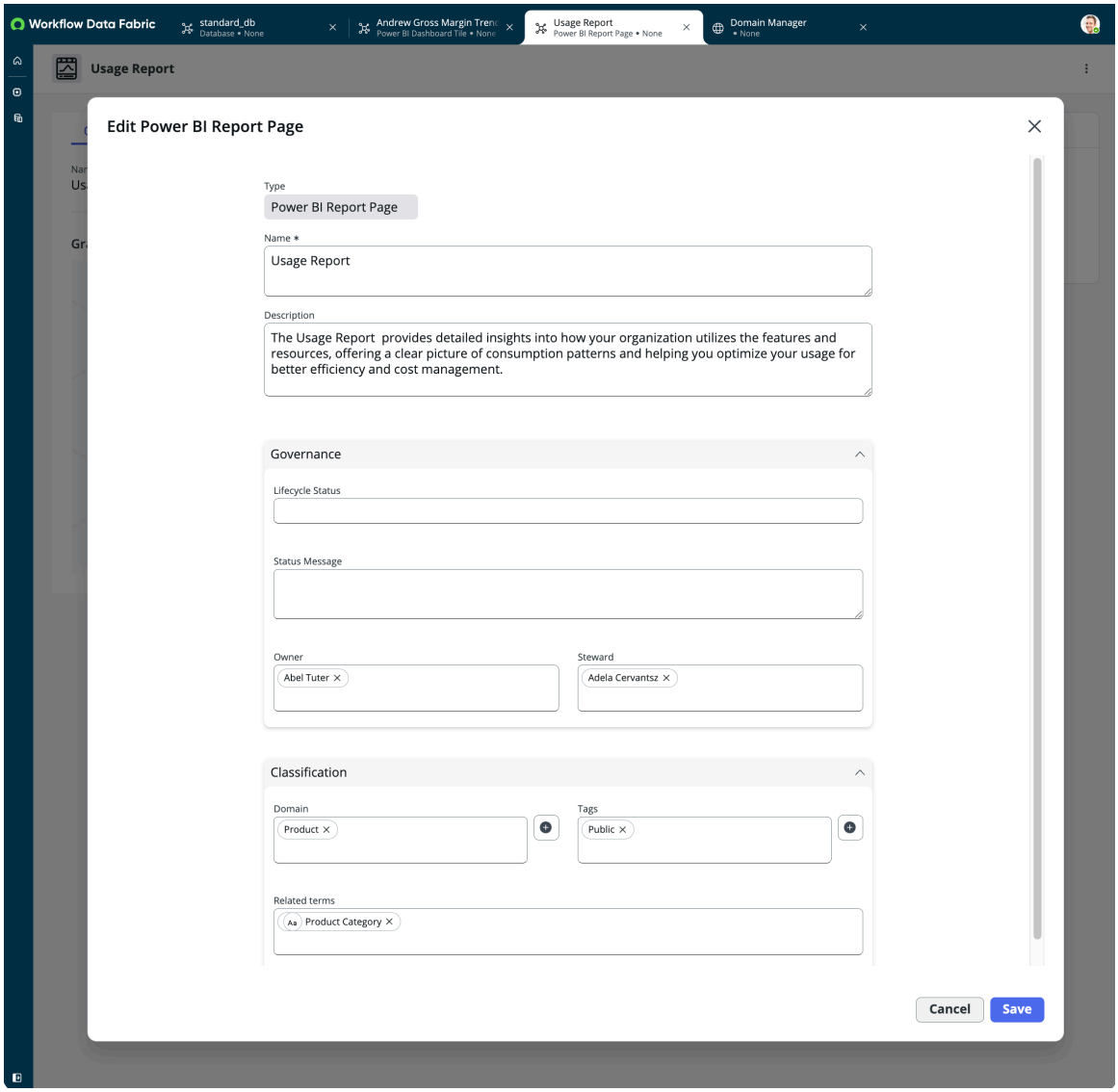
8. Select **Save**.



Create catalog tags

Create tags that can be applied to data assets for classification and categorization.

https://player.vimeo.com/video/1195433271?h=a260a01259&badge=0&autopause=0&player_id=0&app_id=58479%22

Before you begin

Role required: Data Steward (df_data _ steward)

About this task

Catalog tags are metadata labels that you can apply to data assets to enable classification, categorization, and discovery. Tags provide a flexible way to describe data characteristics, business context, data quality, sensitivity levels, or any other attributes relevant to your organization.

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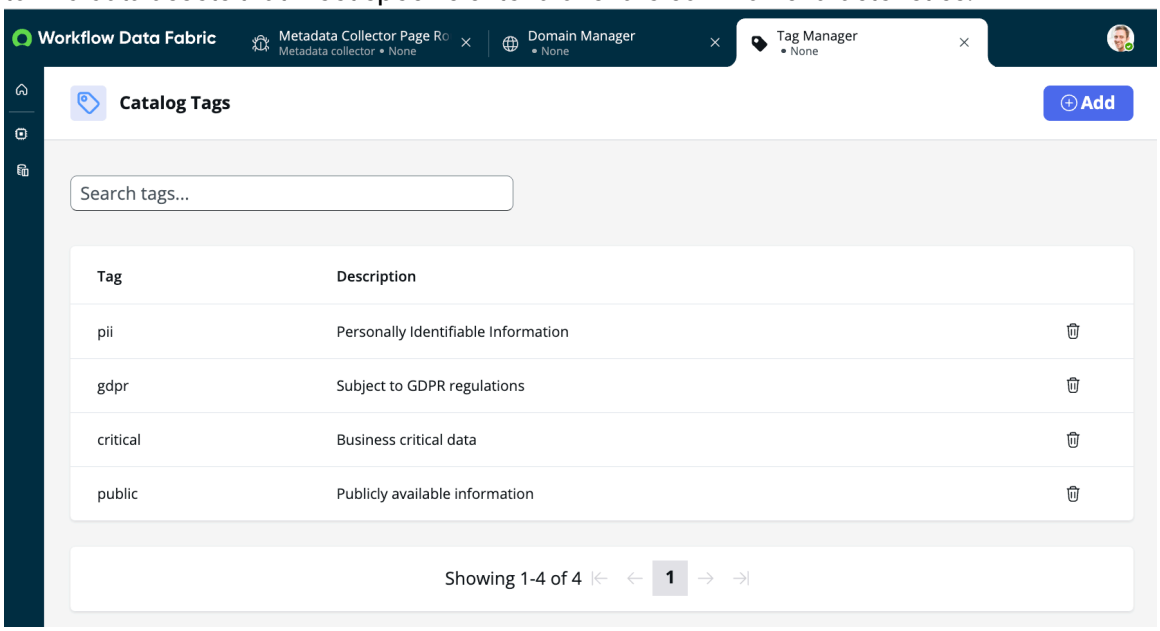
You can search and filter data assets based on applied tags, making it easier to find data assets that meet specific criteria or share common characteristics.



Procedure

1. Navigate to **All > Workflow data Fabric > Data Catalog**.
2. Select a data asset to open its details page.
3. Select **Edit**.
4. In the Classification section, select the + icon next to Tags.
   The Tag Manager opens.
5. Select **Add**.
6. Complete the tag form with the tag name and description.
   The tag name can't be edited once it is saved.
7. Select **Create**.
   The tag is created and appears in the Tag Manager list. From here, you can edit the tag description or delete the tag.
8. Select the tag in the tag manager list to edit its description.
9. Locate the tag that you want to delete and select the delete icon.
   The system displays whether the tag is applied to any assets before allowing deletion.

Result

The tag is created and appears in the Tag Manager list. The tag is now available to apply to any data asset in the catalog.

What to do next

After creating tags, apply them to data assets in the Tags field of the Classification section when editing a data asset. For details, see Update a data asset.

Create catalog domains

Organize data assets by creating hierarchical domain structures that represent business areas, departments, or data categories.

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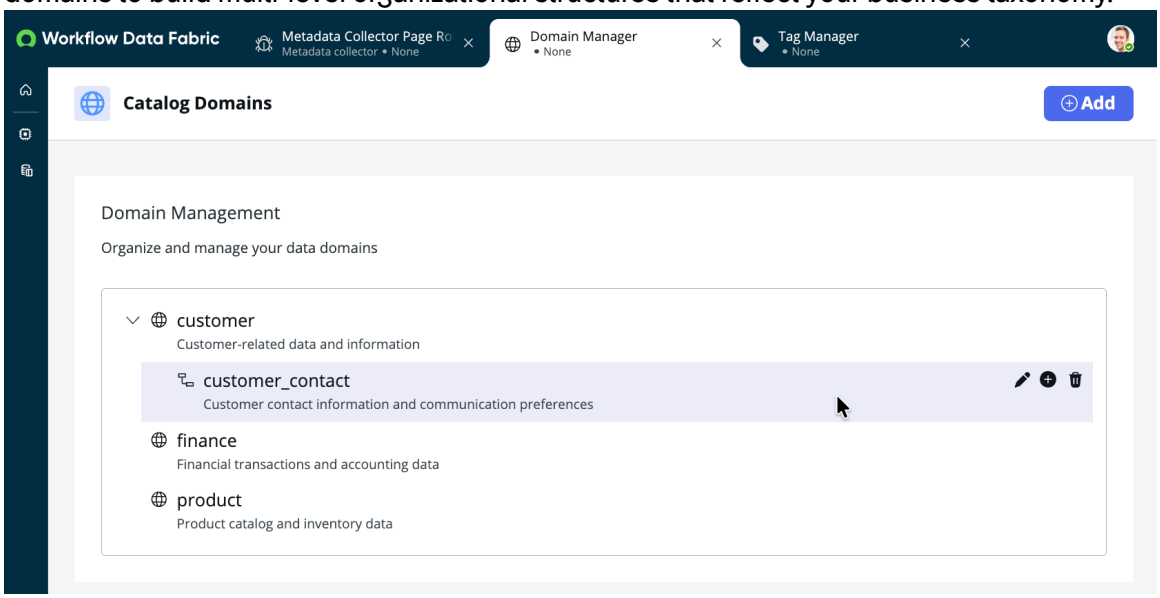
Before you begin

Role required: Data Steward (df_data _ steward)

About this task

Catalog domains help you organize data assets into logical groupings based on business areas, departments, or data types. Domains provide a hierarchical classification system that makes it easier for users to discover and navigate related data assets.

You can create root domains at the top level and subdomains (child domains) under existing domains to build multi-level organizational structures that reflect your business taxonomy.



Procedure

1. Navigate to **All > Workflow data Fabric > Data Catalog**.
2. Select a data asset to open its details page.
3. Select **Edit**.
4. In the Classification section, select the + icon next to Domains.
   The Domain Manager opens.
5. Select **Add**.
6. Complete the domain form.
   - Name: Enter the domain name.
   - Description: Enter a description (maximum 1000 characters).
   - Parent Domain: Select None (root domain) to create a root domain, or select an existing domain to create a subdomain.
7. Select **Create**.
   The domain is created and appears in the Domain Manager list. From here, you can add child domains and edit or delete a domain.
8. Locate the domain for which you want to create child domains and select **Add child domains**
9. Locate the domain that you want to edit and select **Edit domain**.
   Changing the parent domain moves the domain and all its subdomains to a new location in the hierarchy.

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10. Locate the domain that you want to delete and select **Delete domain**.
    Before deleting a domain, you must first remove all of its child domains.

What to do next

After creating domain, apply them to data assets in the Domains field of the Classification section when editing a data asset. For details, see Update a data asset.

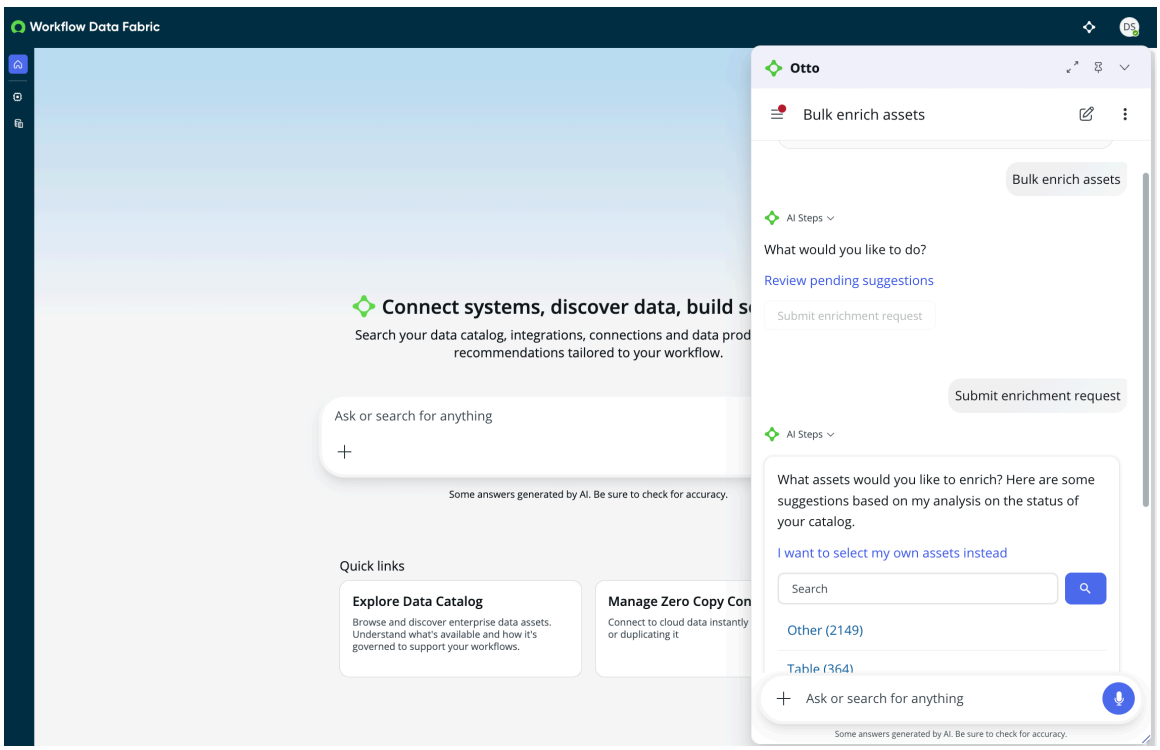
Metadata enrichment with ServiceNow Otto

ServiceNow Otto can generate AI-suggested metadata for a batch of Data Catalog assets for a data steward to review and publish.

Data Catalog assets accumulate incomplete or missing metadata over time —domains, tags, and glossary-term associations— especially as new sources are onboarded through metadata collectors. Filling this in one asset at a time is not practical. ServiceNow Otto can generate suggested metadata for many assets at once, as a tracked, asynchronous job. Nothing changes in the catalog until a data steward reviews the suggestions and chooses to publish them.

Entry points

Start a bulk enrichment job two ways — from ServiceNow Otto, using the assistant icon available in the Workflow Data Fabric header, or directly from the Data Catalog page. Both entry points create the same kind of job and route to the same review workspace. For step-by-step instructions, see Bulk-enrich assets with ServiceNow Otto and Bulk-enrich assets from the Data Catalog.



How it works

Enrichment jobs run asynchronously, in the background, and can take from a few minutes to a few hours depending on the number of assets and fields included. You're notified by email when the job finishes.

Every suggestion includes an AI confidence score and stays in a pending state. Submitting a job doesn't enrich assets immediately — a suggestion has no effect on the actual asset

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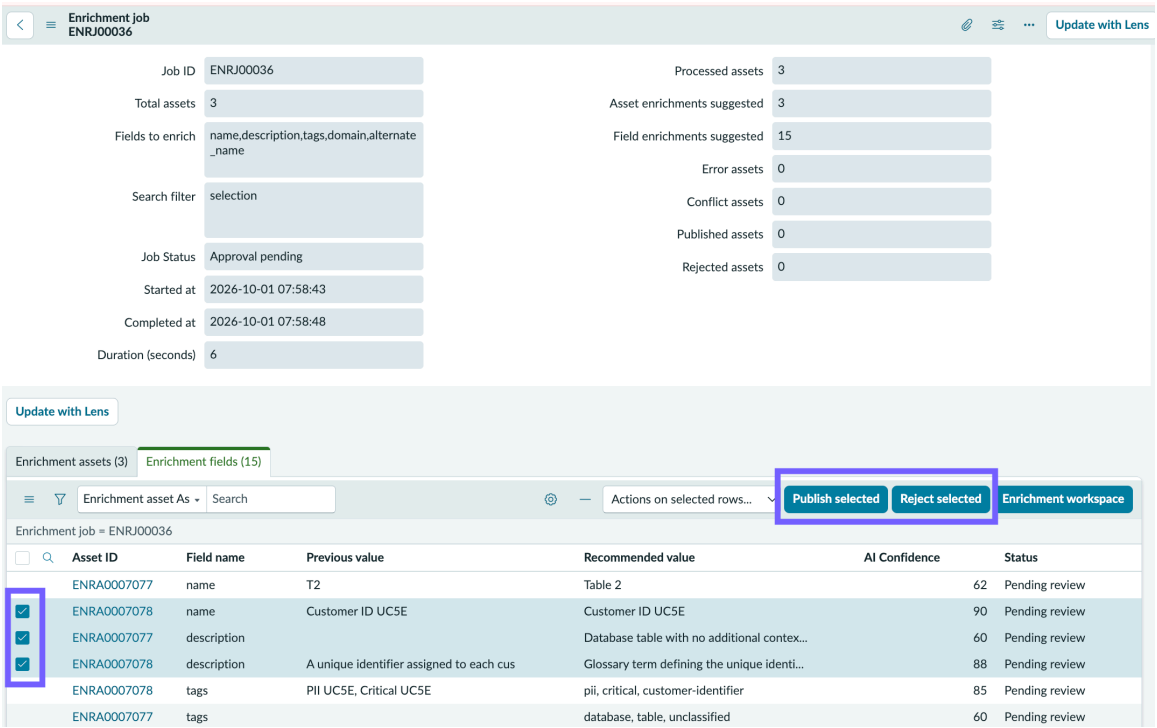
until a data steward reviews and either publishes or rejects it. For a list of job statuses and their meanings, see Data assets enrichment statuses and AI confidence scores.



Metadata Enrichment workspace

The Metadata Enrichment workspace gives a consolidated view of all enrichment activity across jobs. Use it to track the overall enrichment program rather than a single job.

The workspace includes:

- A dashboard summary showing the number of jobs completed, in progress, and failed
- Asset enrichment status and metadata field enrichment status charts, showing counts across all jobs
- An enrichment jobs list with job status, asset counts, and duration for each job
- An enrichment assets and fields list, grouped by job, where you can select a job ID, asset ID, or field ID to review enrichments at the level of detail you need

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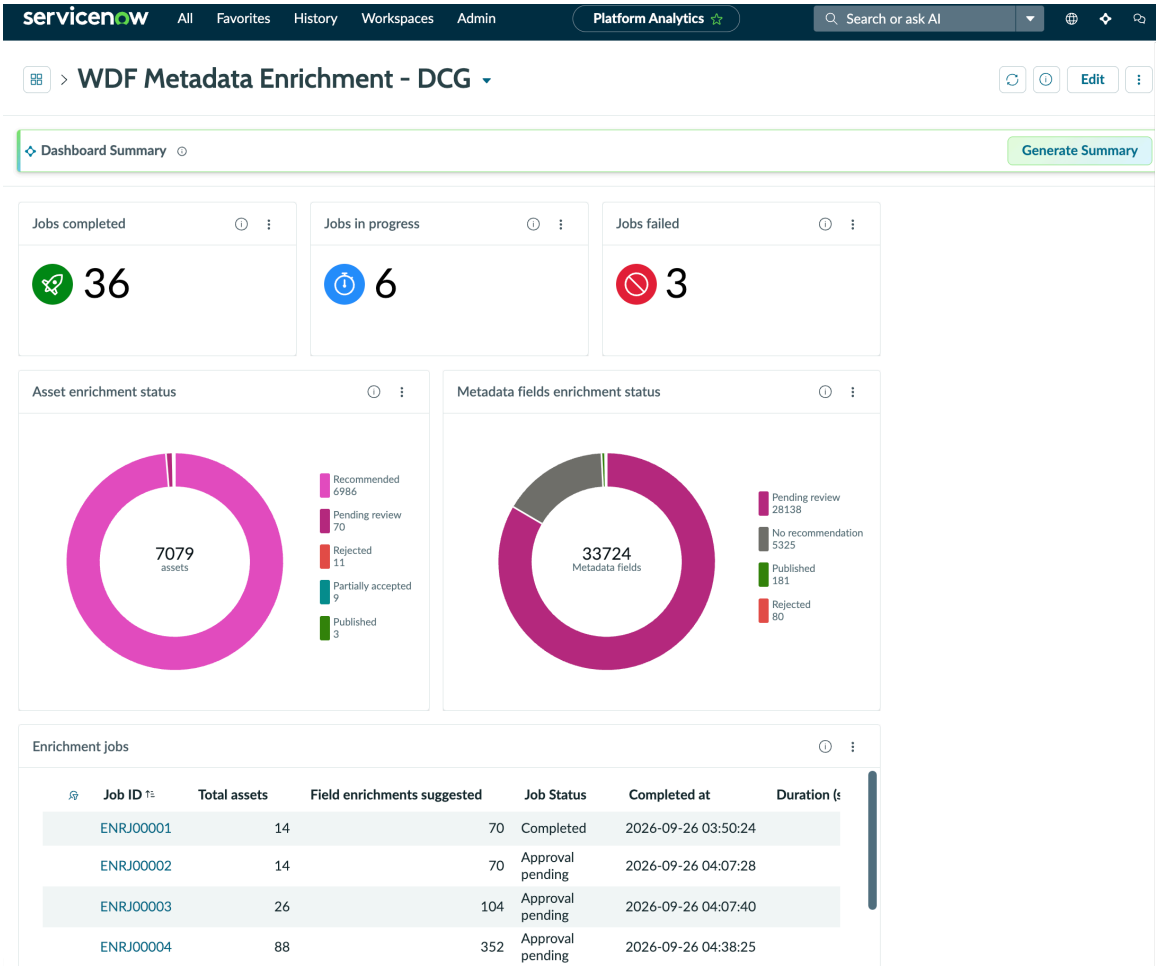

Prerequisites

This capability requires ServiceNow Otto to be configured and Data Catalog to be installed.

Metadata enrichment with ServiceNow Otto setup

Before running AI enrichment jobs, activate the enrichment launcher and configure data steward role access.

To use Metadata enrichment with ServiceNow Otto, complete the following setup tasks:

- Activate the enrichment launcher: Add the *DCGEnrichLauncher* script include to the Global application scope to activate the enrichment review experience.
- Grant data steward access to the enrichment workspace: Configure the *bulk_enrich.default_dashboard_sys_id* system property so that users with the data steward role can open the enrichment workspace.

For system properties that control enrichment batch size, parallel lanes, and lane timeouts, see Data assets enrichment system properties. These properties are optional. The default values work for most implementations. Adjust them only if enrichment jobs are running slower than expected or you are tuning performance.

Activate the enrichment launcher

Add the *DCGEnrichLauncher* script include to the Global application scope to activate the enrichment review experience.

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Before you begin
The following applications must be installed:

- Otto for Workflow Data Fabric (sn_nowassist_wdf) version 2.1.4 or later

Role required: admin

About this task
The *DCGEnrichLauncher* script include activates the enrichment review experience.

Procedure
1. Set the **Application scope** to **Global**.
2. Navigate to **All** > **Script Includes**.
3. Filter the list by **Scope** = `ServiceNow Data Catalog`, then open *DCGEnrichLauncher*.
4. Select **Insert and Stay** to add *DCGEnrichLauncher* to Global application scope.
   The newly inserted script is in the Global application scope.

Grant data steward access to the enrichment workspace

Configure the *bulk_enrich.default_dashboard_sys_id* system property to allow users with the data steward role to open the enrichment workspace.

Before you begin
Role required: admin

About this task
The *bulk_enrich.default_dashboard_sys_id* system property controls who can open the enrichment workspace that monitor-progress links lead to.

Procedure
1. Navigate to **All** > **System Properties**.
2. Filter the list by **Scope** = `ServiceNow Data Catalog`, then open the *bulk_enrich.default_dashboard_sys_id* property record.
3. In the **Read roles** field, add `df_data_steward`.
4. Save the property record.

Result
Users with the df_data_steward role can open the enrichment workspace from monitor-progress links and the job-completion email.

Enriching data assets with AI

Use ServiceNow Otto to generate and publish AI-suggested metadata for Data Catalog assets in bulk.

ServiceNow Otto can generate suggested metadata — names, descriptions, tags, and domains — for Data Catalog assets and glossary terms in bulk. A data steward reviews and publishes the suggestions before any changes take effect in the catalog.

For an overview of how bulk enrichment works, see Metadata enrichment with ServiceNow Otto.

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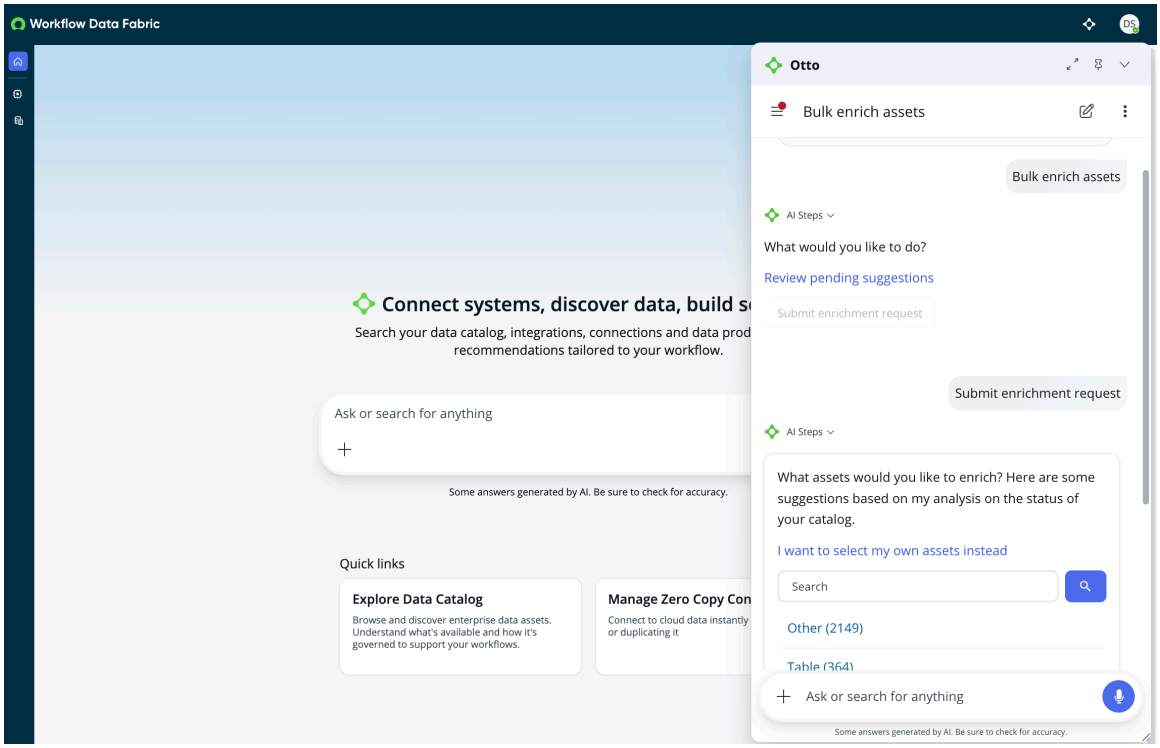

Bulk-enrich assets with ServiceNow Otto

Ask ServiceNow Otto to bulk-enrich a batch of Data Catalog assets from anywhere in Workflow Data Fabric.

Before you begin

Role required: df_data_steward

Procedure

1. In the Workflow Data Fabric header, select the ServiceNow Otto icon.
   You can access this from any Workflow Data Fabric page, including Data Catalog.
2. In the panel that opens, select the bulk-enrich promoted topic, or type a request such as `bulk enrich assets`.

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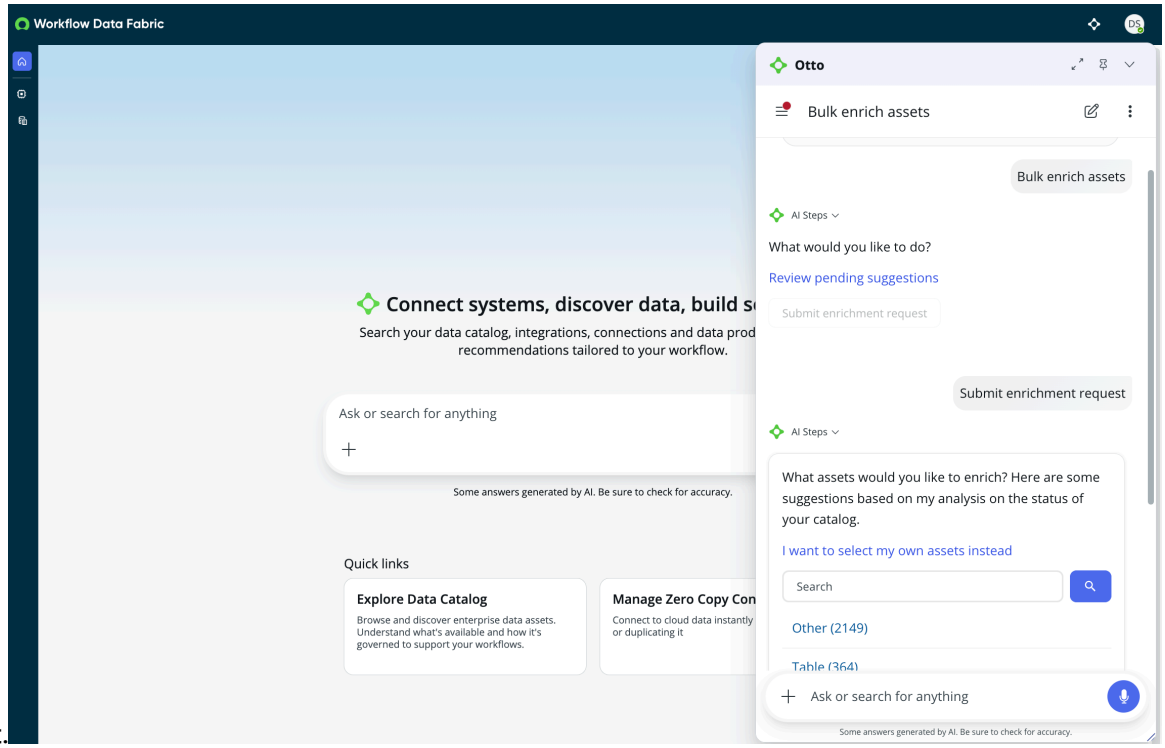
3. Choose whether to review pending suggestions from a previously submitted request, or start a new request.



4. If starting a new request, select an asset type from the list to enrich.
   ServiceNow Otto suggests asset types based on the assets available in your catalog. Use the search field to find a specific asset type.
5. If you want to select specific assets, select **I want to select my own assets instead**.
   The Select assets to enrich page opens. Use the search field and filters to find assets, then select the assets to add to the enrichment request.
   Select **Confirm selection** to return to the panel with your selected assets queued.
6. Select **Confirm** to submit the request.

Result

ServiceNow Otto creates the job and returns a job ID, plus links to monitor progress and open the review workspace. See Monitor an enrichment job.

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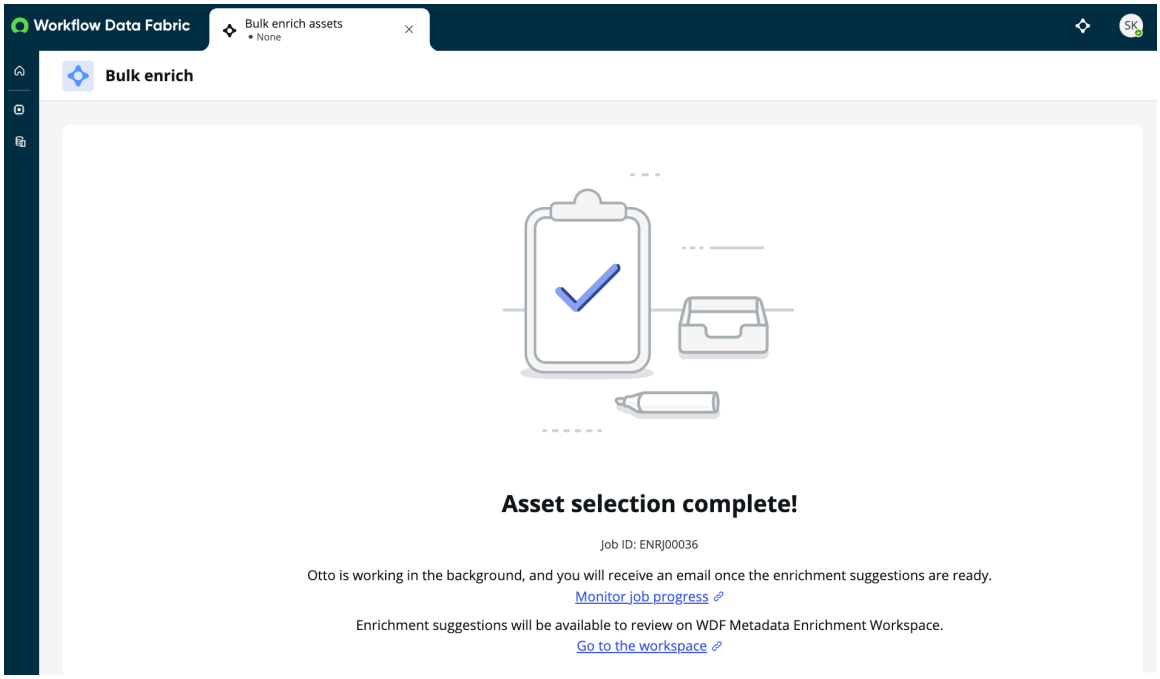

Bulk-enrich assets from the Data Catalog

Select specific assets directly from the Data Catalog page and submit them for bulk enrichment by AI agents.

Before you begin

Role required: df_data_steward

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. In the left sidebar, select the Data Catalog icon.
3. Open the three-dot menu and select **Bulk Enrich Assets**.
4. Select data assets to bulk enrich.
   a. In the asset-selection view, search, filter, or browse to narrow down the assets to enrich.
   b. Use the **Add all** button to select all data assets, or select **Add** next to each asset to select them individually.

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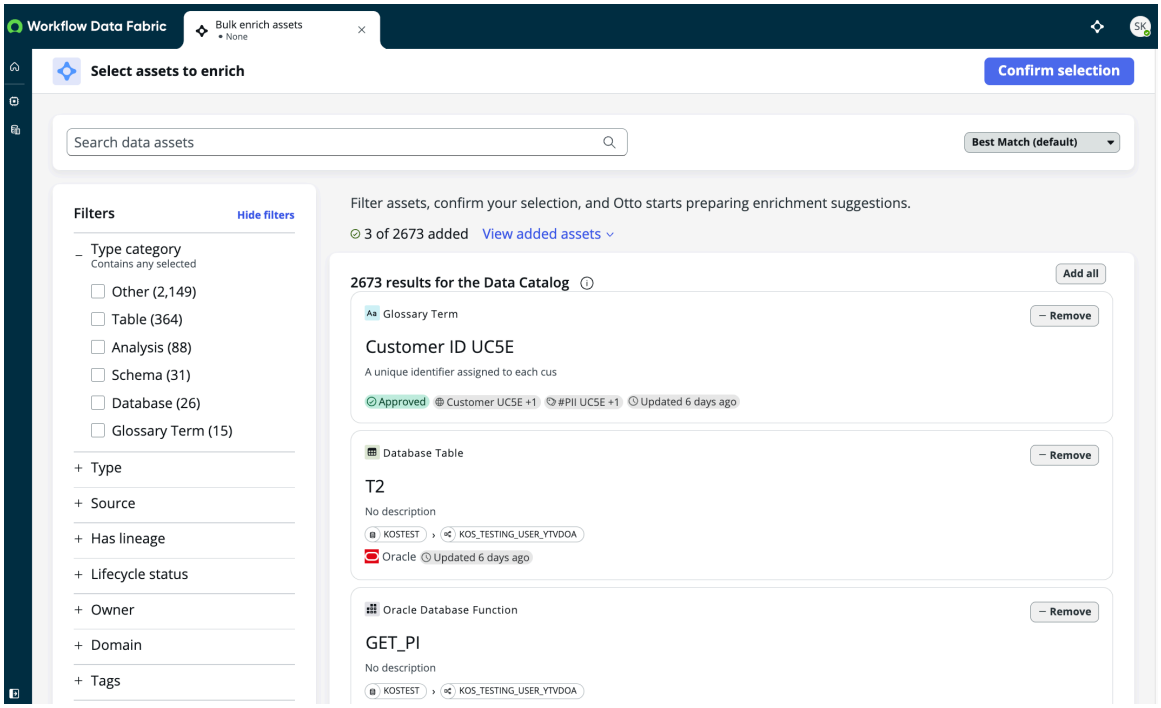
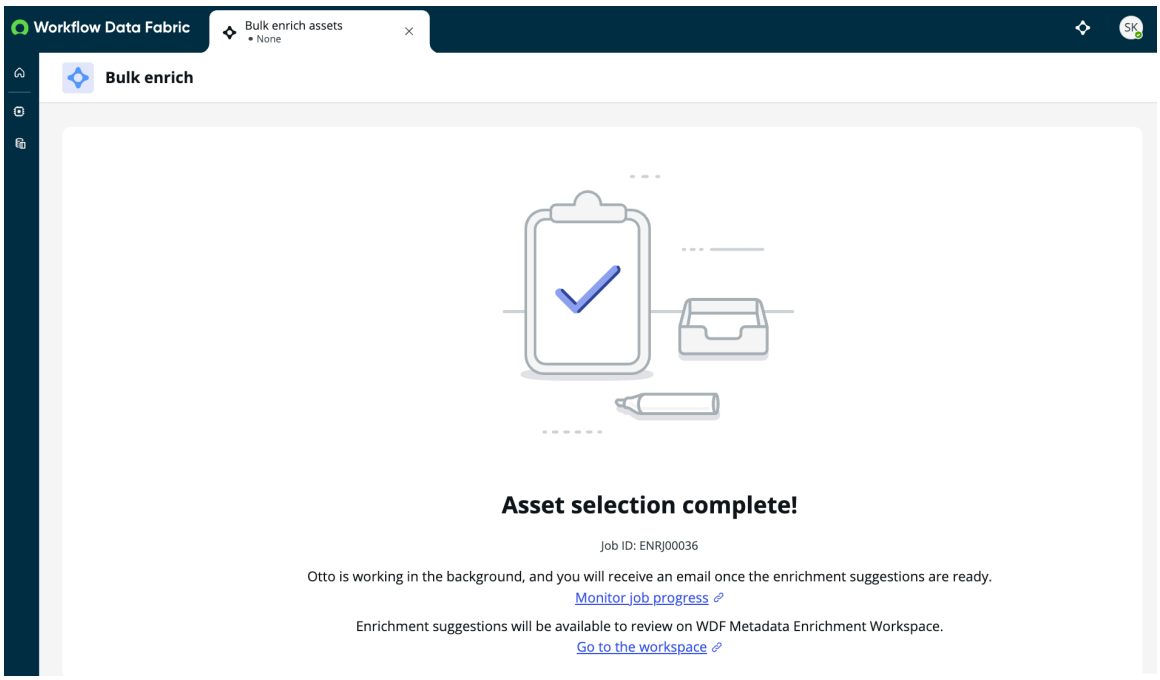


5. Confirm the selection.

Result

Workflow Data Fabric creates the job and shows a selection-completion screen with a job ID, plus links to monitor progress and open the review workspace. See Monitor an enrichment job.



Monitor an enrichment job

Open a submitted enrichment job to see its progress and how many suggestions are pending review, published to catalog, or rejected.

About this task

The Metadata Enrichment workspace provides a consolidated view of all enrichment activity. It includes a dashboard summary of jobs completed, in progress, and failed, along with enrichment

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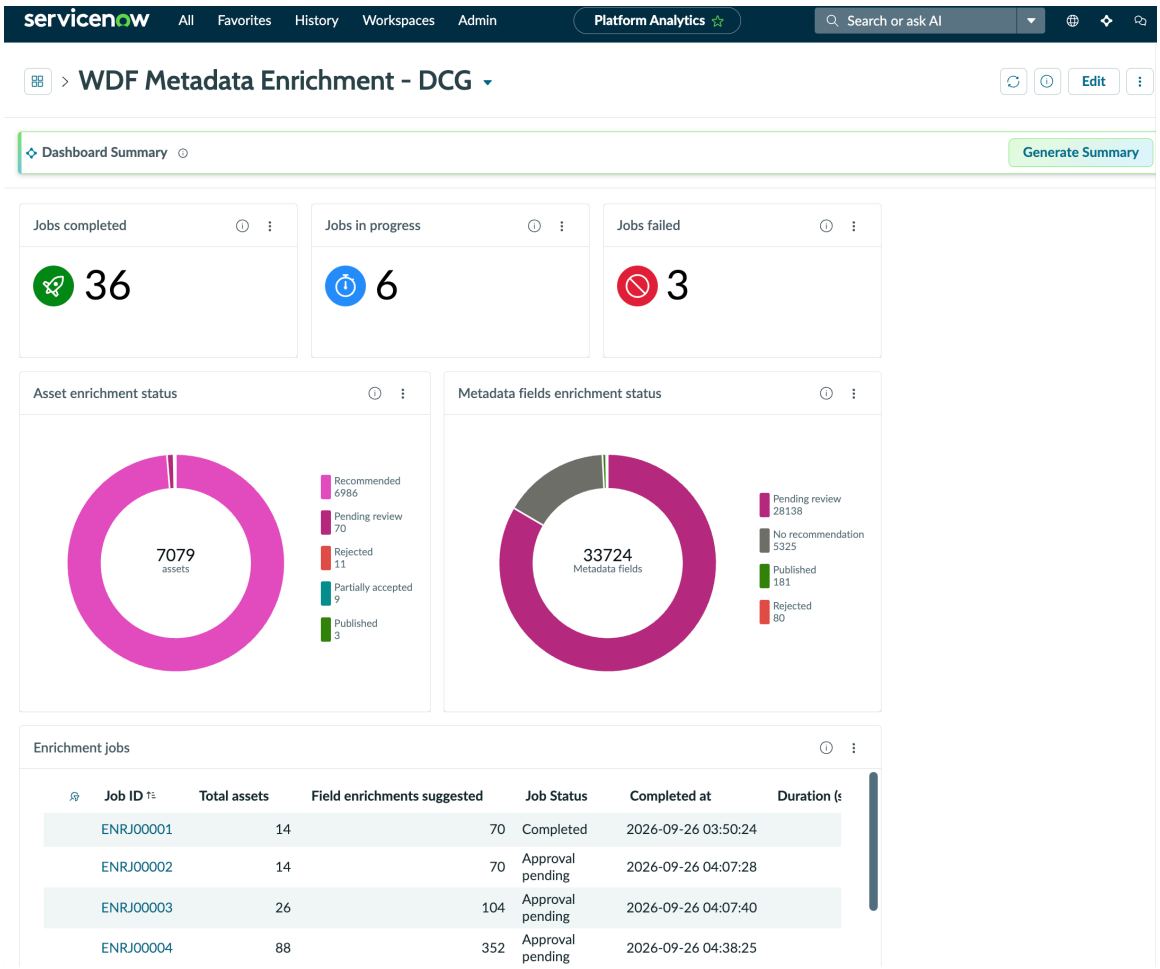
status charts and a cross-job list of assets and fields. From the workspace, select a job ID to open and monitor a specific job.



Before you begin

A bulk enrichment job has already been submitted from either ServiceNow Otto or Data Catalog. See Bulk-enrich assets with ServiceNow Otto or Bulk-enrich assets from the Data Catalog.

Role required: df_data_steward

Procedure

1. Open the monitor job progress link returned when the job was created.
2. From the enrichment job page, review the job details and suggestion counts.
   The page shows:
   - Job details: The number of assets included, when the job started and finished, and how long it took
   - Suggestion counts by status: The number of assets processed and how many suggestions are pending, published, or rejected
   - Asset and field list: Each asset included in the job and the fields that were enriched

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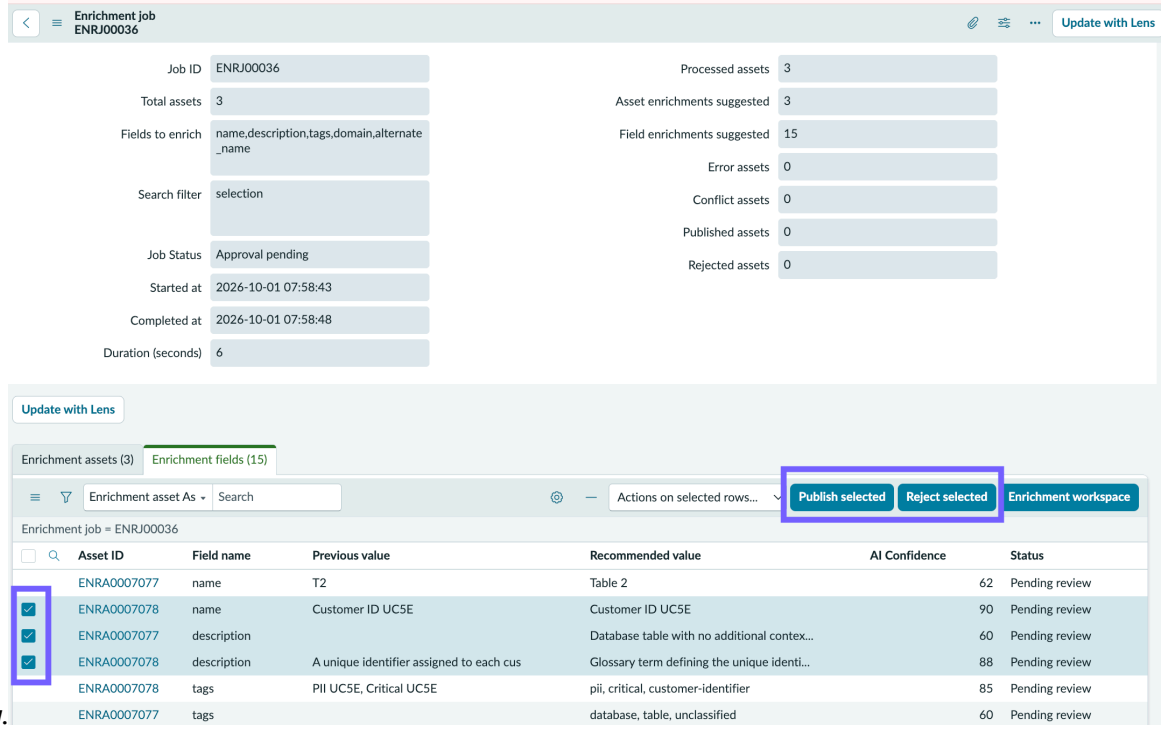
For a description of each status, see Data assets enrichment statuses and AI confidence scores.

3. Select a job to open its detailed view.



Result

The job's detail view opens, listing every processed asset and field. To act on the suggestions, see Review and publish suggested metadata.

Review and publish suggested metadata

Compare ServiceNow Otto's suggested values against previous values, correct anything that needs it, then publish or reject the suggestions.

Before you begin

Role required: df_data_steward

About this task

Every row in the job's field list shows an asset, a field name, the field's previous value (if they exist), the suggested value, and an AI confidence score. You can review at the job level, or drill into a single asset or a single field for the same information and the same actions. You can also reach individual job, asset, and field records directly from the Metadata Enrichment workspace, which provides a consolidated view across all jobs.

⚠ **Warning:** AI-generated suggestions may be inaccurate. Review each suggestion carefully before publishing. Published suggestions update Data Catalog assets immediately.

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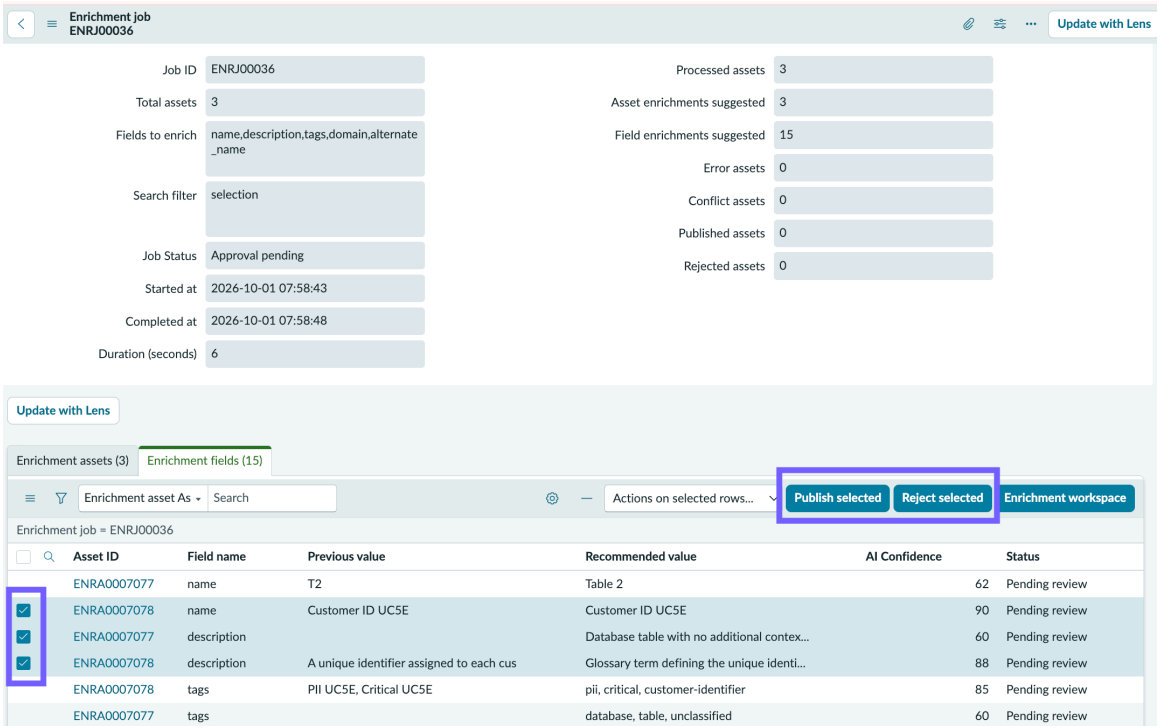
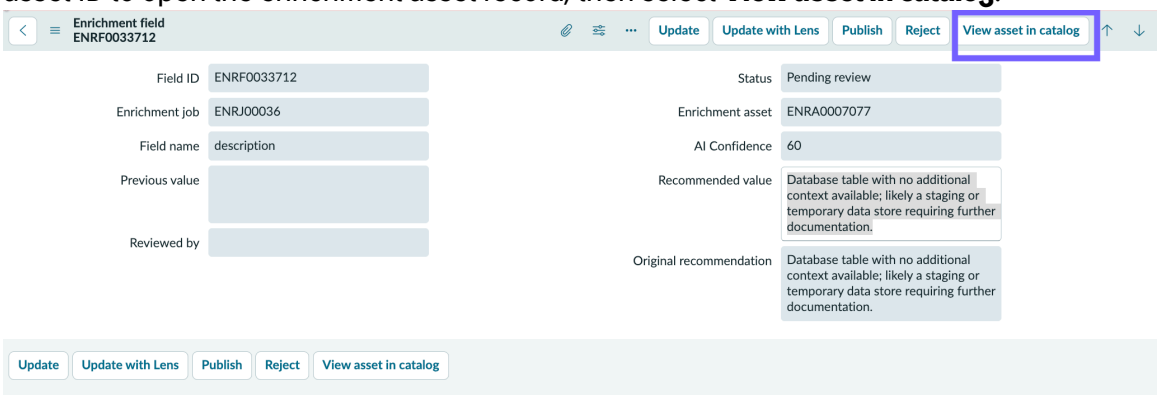
Procedure

1. Open an enrichment job.



2. From the Enrichment fields tab, review the suggested values against the previous values and the AI confidence score.
3. **Optional:** To see the full asset details before accepting or rejecting a suggestion, select an asset ID to open the enrichment asset record, then select **View asset in catalog**.



   The asset opens in the Data Catalog in a new tab.
4. **Optional:** If a suggestion needs a change, select it, edit the value inline, and save.
5. Select the suggestions you want to act on.
6. Choose one of the following actions.
   - Select **Publish selected** to write the selected values to their Data Catalog assets.
   - Select **Reject selected** to discard the selected suggestions without changing the catalog.

Result

Published suggestions update their Data Catalog assets and drop off the pending list. See Data assets enrichment statuses and AI confidence scores.

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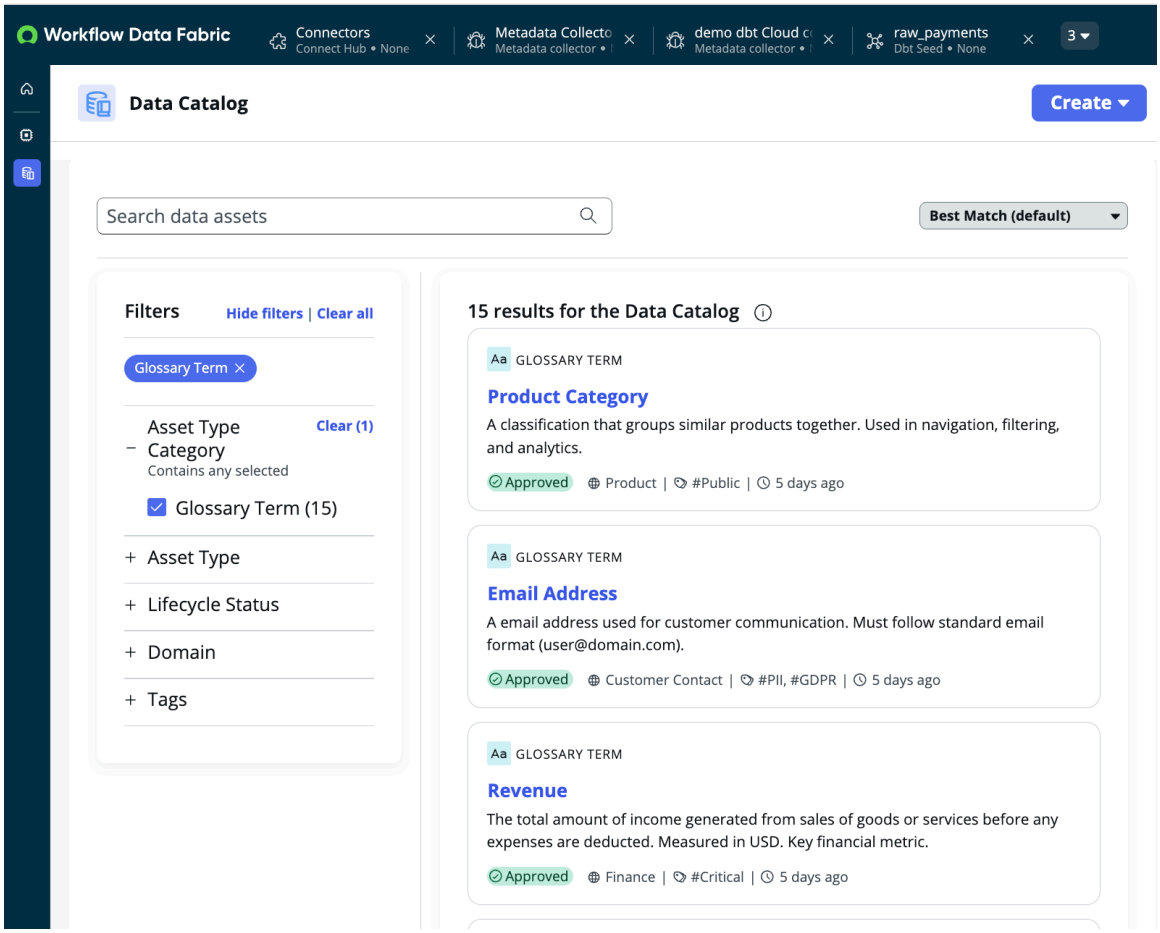
Managing glossary terms

Glossary terms define business concepts and provide business context for catalog assets through definitions, synonyms, related concepts, and ownership information.

Link glossary terms to catalog assets to provide business context and help users understand data meaning and usage. Terms include definitions, synonyms, related concepts, and ownership information. Use glossary terms to bridge the gap between technical data structures and business understanding.



Bulk operations

Bulk upload glossary terms using spreadsheets. You can also download and edit existing glossary terms.

Note: Use the bulk download and upload feature to manage the business glossary within an instance only. This feature is not intended for downloading the glossary from one instance and uploading it to another instance.

- If this is the first time you are adding a glossary to an organization, download the template from the application. Follow the instructions in the spreadsheet, and upload your glossary to the application.
- If you are working in an instance that already has a glossary, download the existing glossary as a spreadsheet and make edits to it or add new terms. After you are done, upload the updated glossary to the application.

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- The spreadsheet has guidelines on how to make edits and set field values. Follow those instructions carefully to ensure successful upload.
- You cannot use the bulk feature to delete business terms.

Create a glossary term

Create glossary terms to define business concepts and provide context for data assets.

Before you begin

Role required: Data Steward (df_data_steward)

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Data catalog icon in the left sidebar.
3. Select **Create** > **Glossary term**.
4. Complete the general details:
   - **Name**: The name of the business term. For example, Customer Lifetime Value.
   - **Alternate name**: Alternative names for the same concept.
   - **Description**: A clear explanation of what the term means. Use the rich text editor tools to format the content and add images, links, tables, and other elements.
5. Complete the governance details:
   - **Lifecycle status**: Current state of the glossary term. Possible values are: **Approved**, **Deprecated**, **Draft**, **In review**, **Rejected**.
   - **Version**: Version number or label for the term.
   - **Status message**: Description of why the glossary term is in its status. Use the rich text editor tools to format the content and add images, links, tables, and other elements.
   - **Owner**: Person responsible for the term definition.
   - **Reviewer**: Person responsible for reviewing the glossary term.
6. Complete the classification details:
   - **Domain**: Select from the list of available domains. Domains organize data assets into logical groupings based on business areas, departments, or data types. For details about creating domains, see Create catalog domains.
   - **Tags**: Select from the list of available tags. Catalog tags are metadata labels for classifying, categorizing, and discovering data assets. For details about creating tags, see Create catalog tags.
7. Complete the context details:
   - **Related terms**: Other glossary terms connected to this concept.
   - **Related assets**: Link the glossary term to a collected data asset (non-glossary term) to provide further context to the data asset.
   - **Parent Term**: Relationship with a broader or more general term or concept that provides context and disambiguation of the child term.

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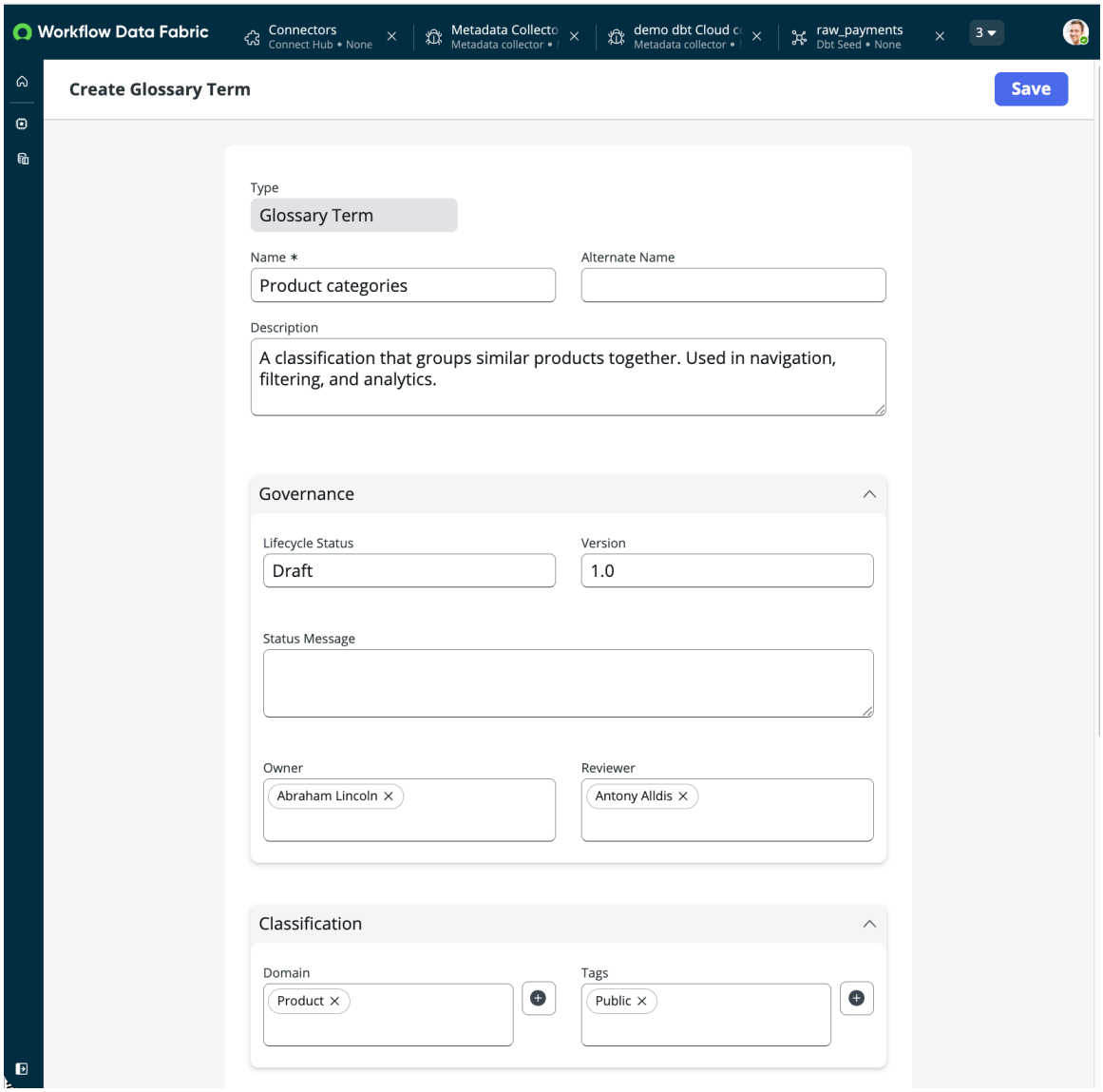
- **Child Term**: Relationship with a narrower or more specific term or concept that provides context and helps disambiguate child terms.
- **Reference URL**: URLs where the term is defined or more context is accessed.

8. Select **Save**.



Bulk export glossary terms

Download existing glossary terms to an XLSX file for offline review and editing, or download an empty template to create new glossary terms with properly formatted fields.

Before you begin

Role required: Data Steward (df_data_steward)

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the **Data Catalog** icon.
3. Download a glossary terms template or export existing terms:

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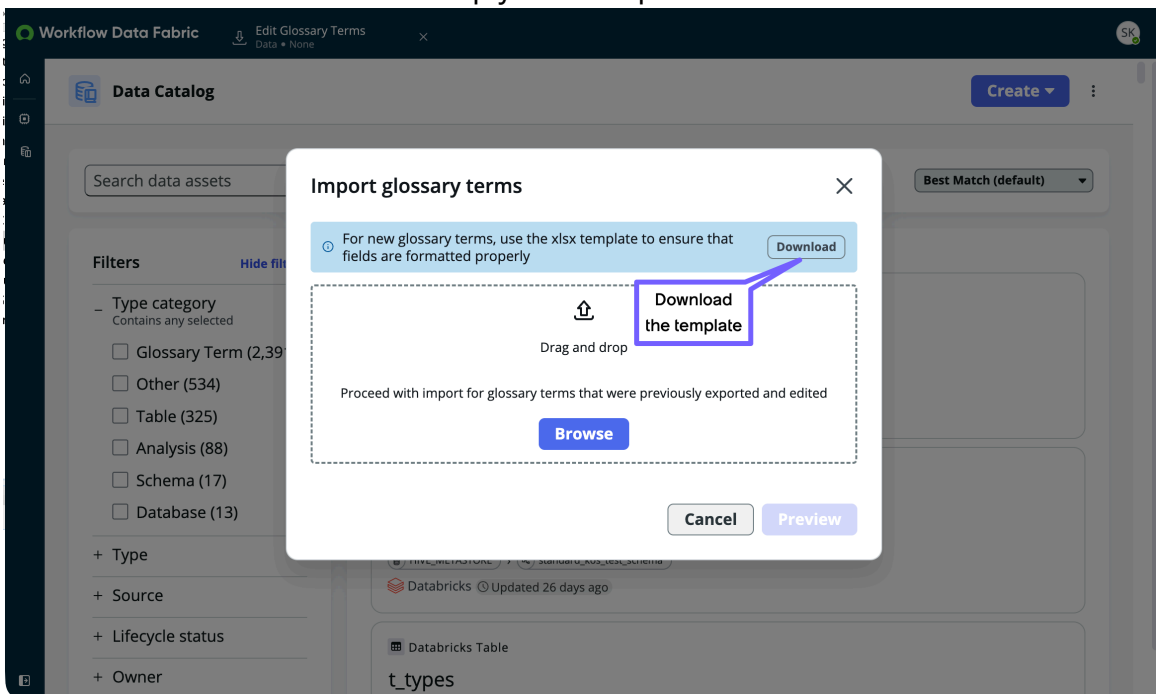
a. To download an empty template for creating new glossary terms:

i. Select the three-dot menu and select **Import glossary terms**.

ii. Select **Download** to download the empty XLSX template.



A blank glossary terms template is downloaded in XLSX format with properly formatted fields.

b. To export existing glossary terms for review or editing:

i. Select the three-dot menu and select **Bulk edit glossary terms**.

ii. Select glossary terms to export. Use the **Add all** button to select all terms, or select **Add** next to each term to select them individually. Use the filters to narrow the list. You can select up to 2000 glossary terms.

iii. Select **Done** to proceed to the summary screen.

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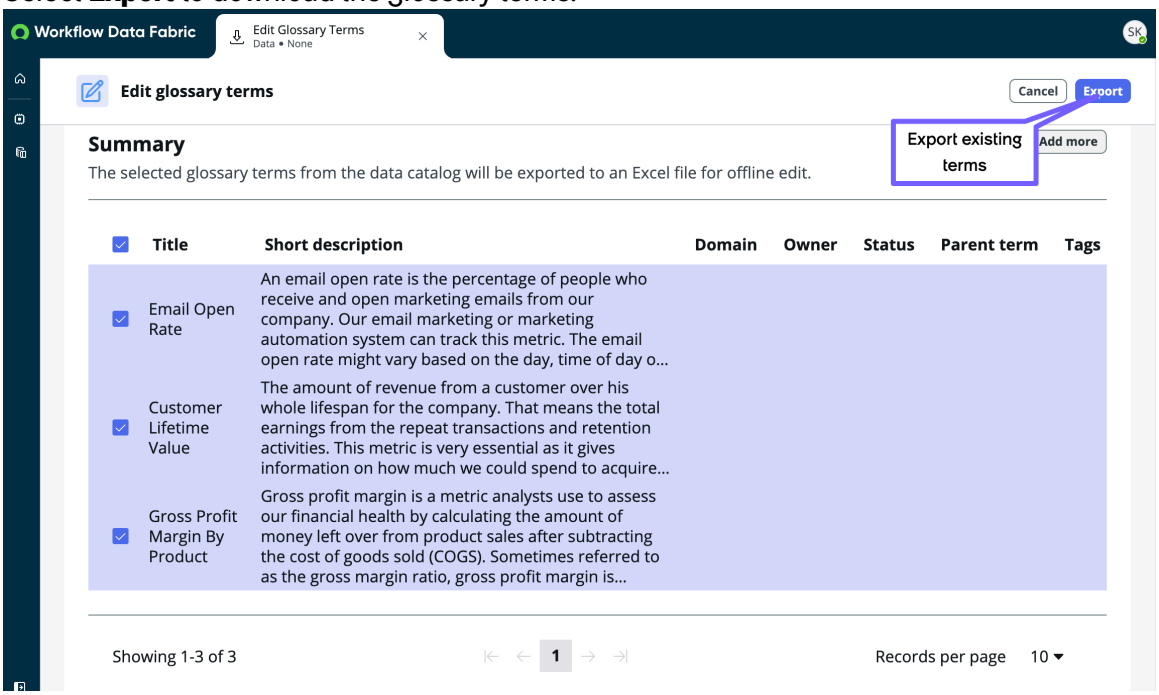
iv. Review the list of glossary terms. If needed, select **Add more** to return to the previous screen and adjust your selection.

v. Select **Export** to download the glossary terms.



The glossary terms are exported in an XLSX file.

Result

The downloaded XLSX file has a set structure with all the sheets you need to add and edit the business glossary. Before editing the file, read the instructions in the Overview tab carefully. See Edit glossary spreadsheet for detailed guidance on editing the spreadsheet.

Edit glossary spreadsheet

Edit the downloaded glossary spreadsheet to add or update glossary terms before importing them back into the Data Catalog.

Before you begin

Export glossary terms to generate the XLSX template file.

Role required: Data Steward (df_data_steward)

About this task

You can obtain the glossary spreadsheet by exporting existing glossary terms or downloading an empty template. The exported spreadsheet contains two sheets: Instructions and Export Template (glossary terms). The Instructions sheet provides detailed guidance on column formatting, field requirements, and editing rules.

Procedure

1. Open the downloaded XLSX file in Microsoft Excel or Apple Numbers.

> ⚠ **Warning:** If you use Apple Numbers, you must export the file to Excel format (.xlsx) before importing it back into the Data Catalog. The import process accepts only XLSX files.

2. Review the Instructions sheet to understand the column color coding and field requirements.

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- Gray columns are read-only: **Sys ID**, **IRI**, **Parent Term**
- Yellow columns are required for new terms: **Title**
- Blue columns are editable: **Short Description**, **Domain**, **Owner**, **Status**, **Tags**

3. Navigate to the Glossary terms sheet to edit glossary terms.
4. Edit existing glossary terms or add new terms based on your needs.

   a. To update an existing term, edit the values in the blue columns for that row. Leave a cell empty to leave that field unchanged.

   b. To add a new term, insert a new row and enter values in the required and editable columns. The **Title** field is required for new terms. Leave the Sys ID, IRI, and Parent Term columns empty for new terms.

5. Format multi-select fields using comma-separated values.
   For fields that accept multiple values (such as Tags and Domain), separate each value with a comma. For example: Customer,Finance,Sales
6. Verify that user account fields contain valid usernames from your ServiceNow instance.
   Fields such as **Owner** must reference existing user accounts. Invalid usernames cause import errors.
7. Verify that Status values match the options listed in the Status values sheet.
   Valid status values are: draft, in_review, approved, deprecated, rejected
8. Save the file in XLSX format.

> ⚠ **Warning:** Do not change the file structure, sheet names, or column headers. Changes to the template structure cause import failures.

Result

The edited spreadsheet is ready to import back into the Data Catalog. Import the glossary terms to add or update them in the Data Catalog.

Bulk import glossary terms

Import multiple glossary terms at once using an XLSX file to quickly populate your data catalog with business terminology and definitions.

Before you begin

Role required: Data Steward (df_data_steward)

About this task

Before importing, export glossary terms to obtain the XLSX template, then edit the spreadsheet to add or update glossary terms.

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home**.
2. Select the Data catalog icon in the left sidebar.
3. Select the three-dot menu and select **Import glossary terms**.
4. Select **Browse** and upload the XLSX file with glossary terms.

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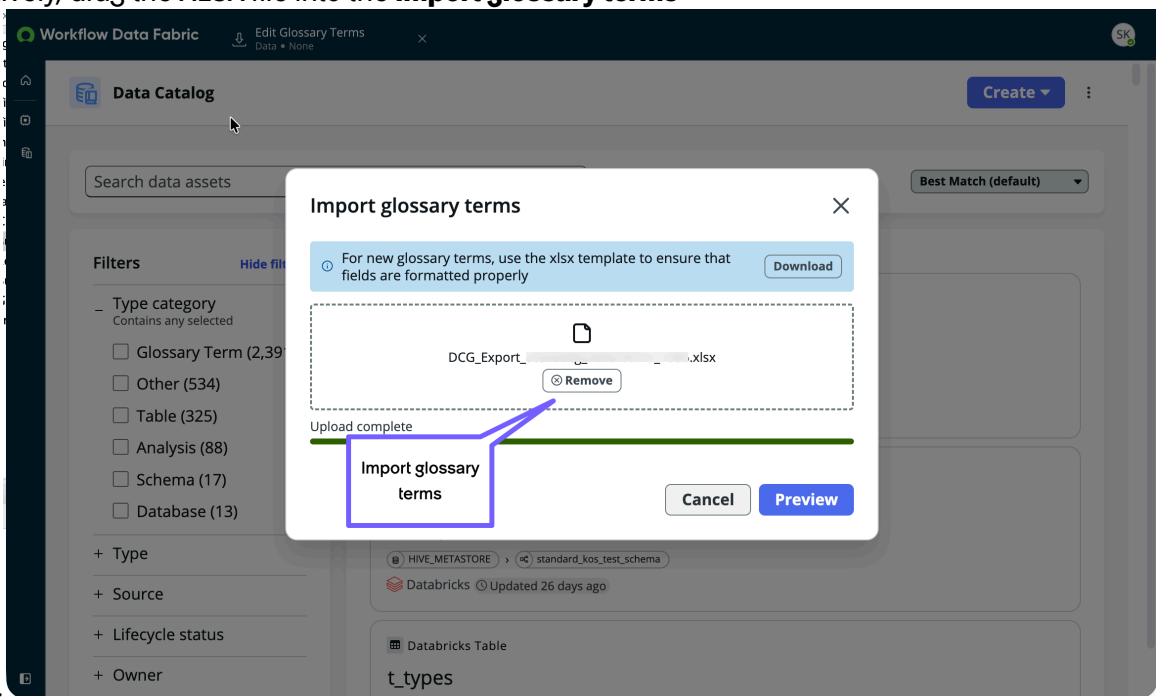
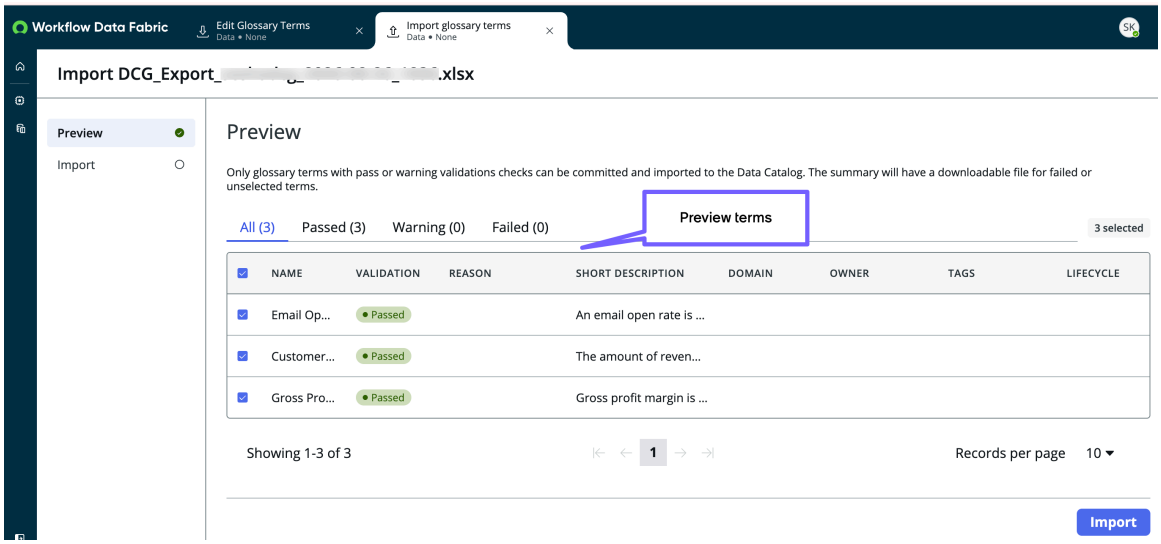
Alternatively, drag the XLSX file into the **Import glossary terms** window.



5. Select **Preview**.
6. Review all the terms selected for import in the Preview window.
   If there are any warnings or validation failures for the terms, they are tagged as such. To fix the errors, abort the import, make fixes in the file, and initiate the import again.
7. Select **Import**.
   The import process begins and the system displays the status of the import. If any terms are not imported, you can download a file that includes the list of terms that aren't imported and the reason for failure.



8. Select **Done**.
   The glossary terms are imported in the data catalog.

Result

After the import completes, the system displays one of the following status values:

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- COMMITTED — All rows imported successfully
- PARTIAL — Some rows imported; others failed
- FAILED — No rows imported

Related topics

Glossary import error scenarios

Glossary import error scenarios

Error and warning messages that can occur when uploading glossary term files, and their impact on the import process.

An error state indicates that the file cannot be uploaded without fixing the issue. A warning state means the specific field or value with the warning is skipped, but the rest of your data imports successfully.

File-level errors

File-level error scenarios

Scenario	Type	Will import succeed?
The file format is incorrect. Only XLSX files are supported.	Error	NO
The file size exceeds the maximum allowed limit.	Error	NO
The file contains more rows than allowed. Consider splitting your upload into smaller files.	Error	NO
The file structure is invalid.	Error	NO
A system error occurred while processing your file.	Error	NO

Row-level errors

Row-level error scenarios

Scenario	Type	Will import succeed?
The required **Title** field is empty for a new row.	Error	Partial — row is skipped
The **Title** field has been removed from an existing row. Title is required.	Error	Partial — row is skipped
The record cannot be found or you don't have permission to access it.	Error	Partial — row is skipped

Row-level warnings

Row-level warning scenarios

Scenario	Type	Will import succeed?
The domain does not exist in the system.	Warning	YES — domain field is skipped

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Row-level warning scenarios (continued)

Scenario	Type	Will import succeed?
The owner email does not match any user in the system.	Warning	YES — owner field is skipped
The status value is not valid for this field.	Warning	YES — status field is skipped
One or more tag names do not exist in the system.	Warning	YES — invalid tags are skipped; valid tags are applied
The title already exists in the system.	Warning	YES — row imports as a duplicate
A field value is too long and will be automatically shortened.	Warning	YES — value is truncated and applied
You attempted to change a system-managed field. The original value is retained.	Warning	YES — field is unchanged

Commit-time errors

Commit-time error scenarios

Scenario	Type	Will import succeed?
The record was modified by another user after your preview was generated.	Error	Partial — row fails; others may succeed
The record could not be updated due to a system error.	Error	Partial — row fails; others may succeed

Final import status

After the import completes, the system displays one of the following status values:

- `COMMITTED` — All rows imported successfully
- `PARTIAL` — Some rows imported; others failed
- `FAILED` — No rows imported

Data catalog reference

Reference topics provide information about roles and key terms.

Data catalog key terms

Key terms used in Data catalog.

Data catalog key terms

Term	Description
Metadata Collector	An automated scanner that runs against a connected data source to discover schemas, build lineage relationships, and populate governance metadata into the Data Catalog.

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Data catalog key terms (continued)

Term	Description
Data Catalog	The self-service discovery layer where consumers browse and evaluate Data Products, Data Interfaces, and other cataloged assets. The Data Catalog displays trust scores, lineage, and governance metadata, enabling consumers to request access and confirm data usability before building on it.
Data assets	A cataloged data object in the Data Catalog, such as a table, column, view, dashboard, report, database, or schema. Data assets are discovered through metadata collectors and enriched with business context, lineage, classifications, and governance metadata. Assets can be searched, browsed, filtered, and explored by consumers to understand their structure, purpose, and relationships before requesting access.
Workflow Data Fabric Home	The main landing page and navigation hub for the Workflow Data Fabric application. From this interface, users access the Data Catalog, Connect hub, metadata collectors, business glossary, and other data governance capabilities.
Glossary term	Business glossary terms define business concepts and can be linked to catalog assets to provide business context. Terms include definitions, synonyms, related concepts, and ownership information. Use glossary terms to bridge the gap between technical data structures and business understanding.
Connect Hub	The interface in Workflow Data Fabric Home where Connection Admins create and manage connections to external systems. From Connect Hub, admins configure credentials and authentication and set up metadata collectors.

Data catalog roles

Assign roles to specify what different users can see and do.

Roles

For more information about managing and assigning roles, see Managing roles.

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Data catalog roles

Role	Description	Role inherited
Connection Admin (connection_admin)	Configures and manages metadata collectors that import data from external systems. Schedules data collection, monitors integration health, and verifies collected assets. Cannot create or edit catalog assets directly.	• df_data_steward • external_app_install_admin • agent_admin • wdf_operator • credential_admin • web_service_admin • sn_nowassist_wdf.creator_admin • df_connection_admin
Data Steward [df_data_steward]	Creates and manages catalog assets, business glossary terms, tags, domains, and metadata. Has full edit permissions for organizing and enriching catalog content. Can perform bulk operations and manage asset lifecycle.	• sn_nowassist_wdf.creator_admin • wdf_consumer
WDF Consumer [wdf_consumer]	Searches and views catalog assets, explores relationships and lineage, and connects to data sources for analysis. Has read-only access to catalog content.	sn_nowassist_wdf.creator_admin

Data assets enrichment statuses and AI confidence scores

Enrichment statuses track the state of AI-generated suggestions at the field, asset, and enrichment run levels. Each suggestion also carries a confidence score that reflects how certain ServiceNow Otto is about that suggestion.

Enrichment job statuses

Enrichment job statuses

Status	Description
Processing	Number of jobs currently generating enrichment recommendations.
Completed	Number of jobs where review is finished with nothing published — every field was rejected or had no recommendation.
Cancelled	Number of jobs stopped by a Data Steward before completion.

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Data asset enrichment statuses

Data asset enrichment statuses

Status	Description
Recommended	Enrichment recommendations have been generated for the requested fields on this asset.
Error	Enrichment generation failed for one or more fields on this asset.
Pending review	One or more field recommendations on this asset are awaiting Data Steward or Asset Owner review.
Partially accepted	Some field recommendations on this asset were accepted and published to the data catalog; the remainder were rejected.
Rejected	All AI-generated field recommendations on this asset were rejected by the Data Steward or Asset Owner.
Published	All AI-generated field recommendations on this asset were published to the data catalog.

Field enrichment statuses

Field enrichment statuses

Status	Description
Pending review	AI-generated enrichment suggestions are awaiting validation by the Data Steward or Asset Owner.
Published	AI-generated enrichment recommendations have been reviewed, approved, and published to the data catalog.
Rejected	AI-generated enrichment suggestions rejected by the Data Steward or Asset Owner.
No recommendation	No enrichment recommendations were generated for this field due to insufficient information or context.

AI confidence scores

Every suggestion carries a confidence score, shown alongside its previous and suggested values, so a data steward can judge how much to trust it before publishing or rejecting.

Data assets enrichment system properties

System properties that control how the AI enrichment process batches assets, runs parallel enrichment lanes, and manages lane timeouts.

Note: To open the System Properties [sys_properties] table, enter `sys_properties.list` in the filter navigator.

These properties are optional. The default values work for most implementations. Adjust them only if enrichment jobs are running slower than expected or you are tuning performance.

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Properties for AI enrichment

Property	Description
sn_dcg_app.dcg.enrichment.batch_size	Number of assets sent to the AI at a time. • Type: integer • Default value: 50 • Who can change: Admin, Data Steward • When to change: Rarely. Leave as is unless enrichment jobs are running slower or failing more than expected.
sn_dcg_app.dcg.enrichment.max_lanes	Number of asset groups enriched in parallel. More lanes means more work happening at the same time. • Type: integer • Default value: 10 • Who can change: Admin, Data Steward • When to change: Only between jobs, never while a job is running.
sn_dcg_app.dcg.enrichment.deadline_ms	Duration in milliseconds that one lane keeps working before it hands off and restarts itself. For example, 270000 equals 4.5 minutes. • Type: integer • Default value: 270000 • Who can change: Admin, Data Steward • When to change: Rarely. Only when tuning performance with platform support.

Data quality properties

System property that controls how long data quality records are retained in the data quality audit and unmatched resource queue tables.

Note: To open the System Properties [sys_properties] table, enter `sys_properties.list` in the filter navigator.

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Properties for Data Quality

Property	Description
sn_dcg_core.dq.purge_retention_days	Number of days that records in the data quality audit [sn_dcg_core_dq_audit] and unmatched resource queue [sn_dcg_core_dq_unmatched_resource_queue] tables are retained before the *DCG Core - DQ Daily Maintenance* scheduled job deletes them. Values that are empty, non-numeric, or outside the valid range fall back to the default of 7, and the job records a warning in the system log. • Type: integer • Default value: 7 • Other possible values: Any integer from 1 to 90

Data Products

Create and manage data products and data interfaces to enable data sharing and consumption across your organization.

Learn how data products enable you to package and share data assets as reusable products, making data discovery and consumption easier for your organization.

Get started

Explore  Learn about data products and data interfaces	Configure  Plan and configure your implementation	**Manage data interfaces**  Create data interfaces
Manage data products  Create and publish data products		

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Data products provide a framework for packaging, sharing, and governing data assets within your organization. Creating data products makes data more discoverable, reusable, and accessible to teams across your enterprise. Data interfaces define how external systems access and consume your data products, enabling integration and data sharing workflows.

Explore data products

Data products package data interfaces with metadata and governance to provide reusable, discoverable data for workflows, AI agents, and analytics.

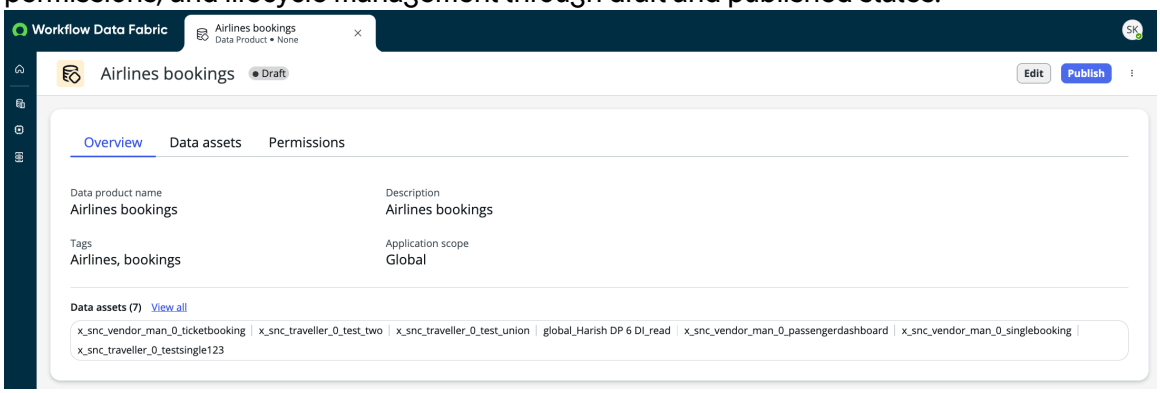
A data product is a governed collection of data interfaces that represents a business concept or use case. Data products combine one or more data interfaces. Teams discover data products and data interfaces in the Data Catalog, request access through governance workflows, and query data through stable interfaces.

Data product components

Data interfaces define the schema, field names, and data types that consumers use to access data. A data product can include multiple interfaces that provide different views of related business entities. Interfaces act as stable contracts between data providers and consumers.

Metadata makes data products discoverable and understandable. This includes business descriptions, tags, ownership information, usage guidelines, and documentation that help consumers evaluate whether the data product meets their requirements.

Governance controls provide data quality and managed access. Each data product has defined ownership, access controls through role-based permissions, and lifecycle management through draft and published states.



How data products work

Data products expose business entities exclusively through data interfaces. When you create a data product, you select existing data interfaces and package them with metadata and access controls.

The data interfaces enable to read data from source systems, whether ServiceNow tables or external systems, for example, Snowflake, Databricks, Oracle, and other supported data sources. Consumers query the data interfaces without requiring knowledge about underlying source systems, connection details, or data mapping logic.

When source systems change, the data interface schema remains stable. Dashboards, workflows, and applications built on data products continue working when source tables are upgraded, fields are renamed, or data sources are replaced.

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Data product users

Users

User	Description
Data Steward	Creates and maintains data interfaces. Packages data interfaces into data products with metadata and documentation. Configures access controls and publishes data products to the Data Catalog. Manages data product lifecycle.
Security Administrator	Reviews and approves access control configurations for data products. Manages parent data product roles and validates appropriate reader role assignments to underlying data interfaces.
Data Consumer	Discovers data products in the Data Catalog. Reviews metadata and documentation to understand available data. Requests access with business justification. Queries data through data interfaces using Flow Designer, Dashboard Builder, APIs.

Data product workflow

This workflow shows the lifecycle from creation to consumption:

1. Build: A Data Steward creates data interfaces in Data Workbench, using zero-copy connectors configured in Connect Hub to connect to external source tables. Data Stewards create data interfaces by entering basic details, selecting source tables, defining table structure, verifying source connections, and setting permissions.
2. Package: Data Stewards select data interfaces and combine them into a data product with metadata, documentation, and usage guidelines.
3. Secure: Data Stewards work with Security Administrators to configure parent data product roles and validate access controls.
4. Publish: Data Stewards publish the data product and data interfaces. After the metadata collector runs, the data product and data interfaces appears in the Data Catalog.
5. Discover: Data Consumers search the Data Catalog to find data products and data interfaces that meet their requirements. They review metadata, documentation, and sample data.
6. Access: Data Consumers request access to data products. After Security Administrator approval, they receive role assignments granting access to all product data interfaces.
7. Consume: Data Consumers query data through data interfaces in workflows, dashboards, APIs, or AI applications.

Data products and external data

Data products can expose data from external systems without moving data into ServiceNow. Supported external sources include Snowflake, Databricks, Oracle, PostgreSQL, MySQL, MongoDB, Redshift, BigQuery, SAP HANA, and Teradata. Data interfaces built on external sources can be packaged into data products, providing governed access through the same contract model used for ServiceNow data.

Data product lifecycle

Data products support two lifecycle states.

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- Draft state is for authoring and testing. Draft products are not visible to consumers in the Data Catalog. Data Stewards build data interfaces, package them into products, and validate functionality.
- Published state makes data products visible in the Data Catalog where teams can discover and request access. Published products have completed governance review.

Access control model

Data products use a parent-child role model. The data product has a parent role that grants access to all included data interfaces. Each data interface has its own reader role controlling access to underlying data.

When consumers request access to a data product, they receive the parent role. This automatically grants access to all data interface reader roles included in the product. Consumers don't request access to individual data interfaces.

Security Administrators validate that parent role configuration includes appropriate data interface roles before approving data product publication.

What to explore next

To learn more about data products, see:

- Data products use cases
- Managing data products
- Data interfaces

Data interfaces

Data interfaces provide stable contracts for accessing data from single tables or combined sources through JOIN or UNION operations.

A data interface defines the schema, field names, and data types that consumers use to query data. Interfaces act as stable access layers between consumers and underlying data sources. When source systems change, the data interface schema remains consistent and protects dashboards, workflows, and applications from breaking changes.

How data interfaces work

Data interfaces map source data to a target schema that consumers query. The data interface defines which columns appear, their names, and their data types.

A data interface can expose data from a single ServiceNow table, a single Data Fabric Table connected to an external system, or multiple sources combined through JOIN or UNION operations.

Consumers query the data interface without requiring knowledge about which source systems provide the data. The data interface handles connections to

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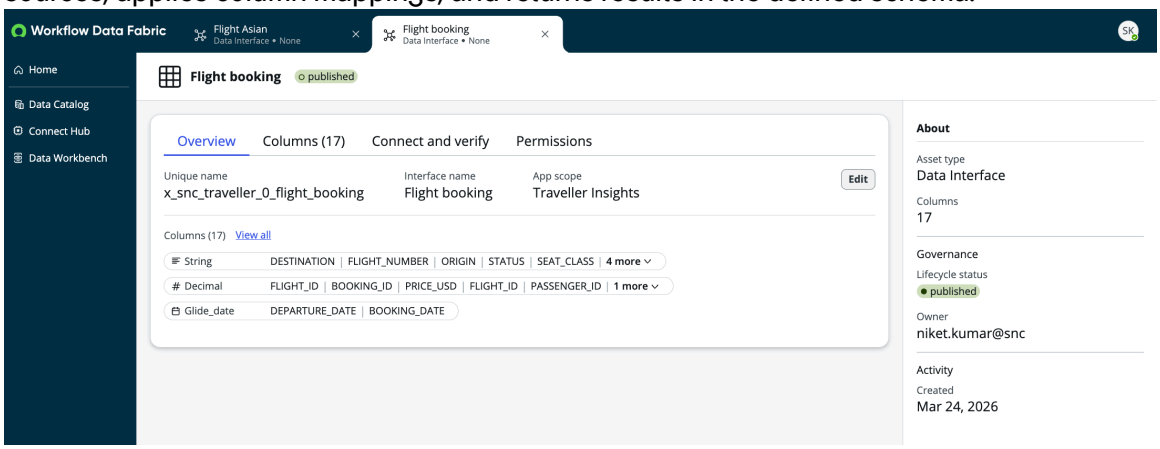
sources, applies column mappings, and returns results in the defined schema.



Combination methods

Combination methods

Method	Description	When to use
Single table	Exposes one source table through a governed interface with consistent naming and documentation.	Provide controlled access to a ServiceNow tables or external tables when no combination is required.
JOIN	Combines related data from multiple tables based on matching column values. The current release supports INNER JOIN operations.	Merge customer data with order data, match purchase orders with approval records, or create comprehensive entity views across systems.
UNION	Stacks rows from multiple tables with similar structures into one unified result. The current release supports UNION operations.	Combine data from multiple regions, aggregate similar data across systems, or consolidate records from different sources.

Schema stability

Data interfaces provide schema permanency. After publication, the data interface maintains its structure even when underlying source tables change.

This stability protects consumers from breaking changes. A dashboard built on a data interface continues working when you upgrade or replace a source system. Workflows that query a data interface don't break when column names change in source tables.

When you extend a data interface by adding new columns, existing queries continue working. Consumers retrieve only the columns they originally queried, plus any new columns they choose to include.

Data interfaces and data products

You can query data interfaces directly from workflows or dashboards. More commonly, data products package interfaces and provide additional metadata, documentation, and access controls.

Multiple data products can include a single interface. For example, a Customer Profile interface might be part of a Customer 360 data product and also included in a Sales Analytics data product.

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Data interfaces and external sources

Data interfaces can access external data through Data Fabric Tables. These tables provide zero-copy access to external databases such as Snowflake, Databricks, and Oracle. Data stays in the source system but can be queried through ServiceNow.

When you create a data interface using JOIN or UNION with Data Fabric Tables, the system generates intermediate tables for the operation. These intermediate tables are implementation details that remain hidden from the Data Catalog. Consumers interact only with the published interface.

Querying data interfaces

Consumers access data interfaces through multiple channels:

- Flow Designer for building automated workflows
- Dashboard Builder for creating visualizations and reports
- APIs for programmatic access from applications and scripts
- AI Data Explorer for natural language queries

What to explore next

To learn more about data interfaces, see:

- Managing data interfaces
- Managing data products

Data products use cases

Explore common scenarios for publishing data products and learn which pattern fits your data and your consumers' needs.

A data product is built on one or more data interfaces, each of which determines how source data is accessed and combined. The right data interface type depends on where your data lives, how it is structured, and what consumers want to do with it.

A travel company's loyalty analytics team is seeing a clear trend: Gold Star members are flying less. The central question driving the investigation is: on which routes are Gold members booking less, and is it getting worse? The data lives in Snowflake — flight segments, a points ledger, and member profiles. No analyst has direct warehouse access, and the data is too sensitive to export. The team needs a way to query live Snowflake data from within ServiceNow, with access controls they can manage.

The team breaks the investigation into four specific questions, each answered by a dedicated data interface:

- Which routes generate the most points-earning activity?
- How many unique Gold members booked each route last quarter?
- Which routes are seeing declining booking volume over time?
- How many long-tenured Gold members are currently inactive?

Tracking booking trends across routes and cabin classes

To track booking volume over time, the team needs route, month, and cabin class. All of this data lives in a single Snowflake table, FLIGHT_SEGMENTS. A single-table data interface over

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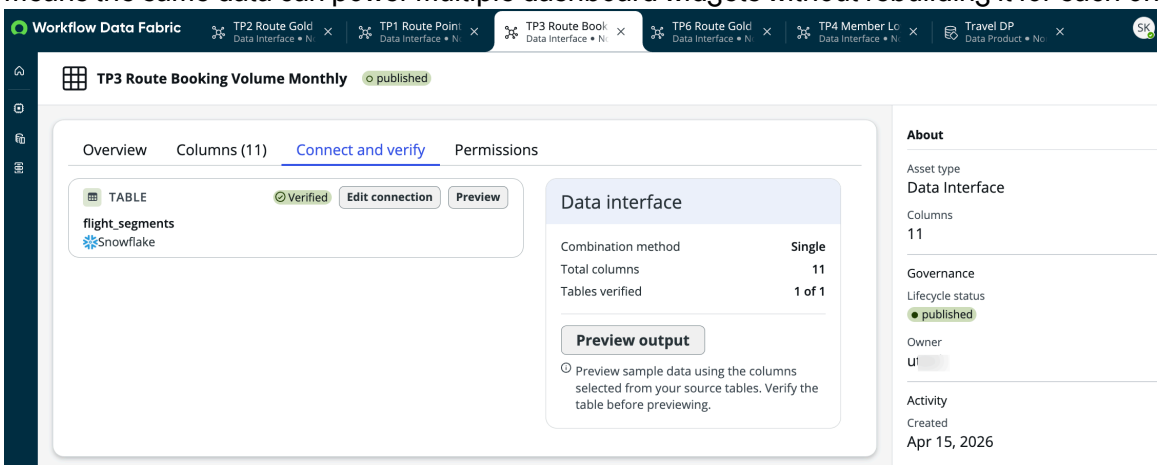
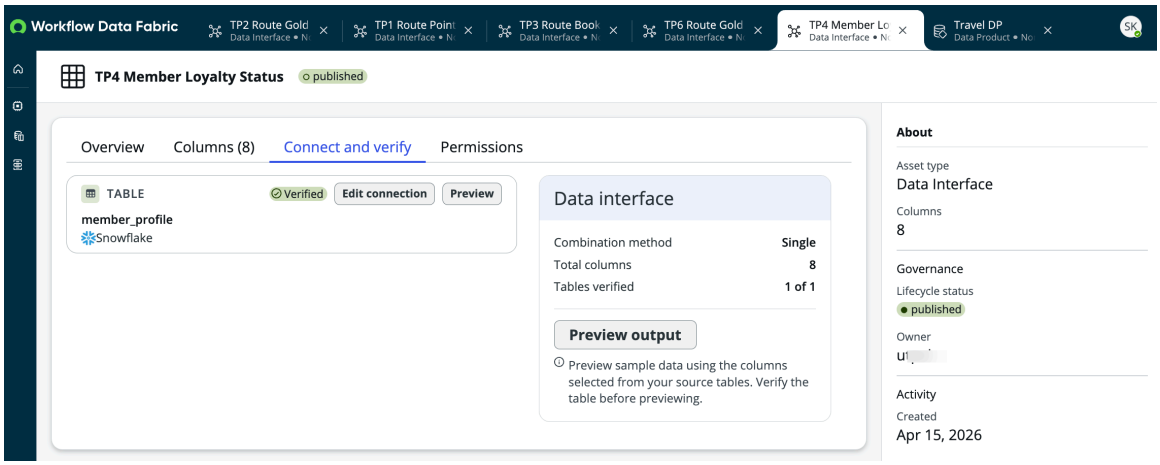
FLIGHT_SEGMENTS exposes the raw segment data, and the Platform Analytics dashboard applies date filters and top-route rankings at query time. Keeping the interface general-purpose means the same data can power multiple dashboard widgets without rebuilding it for each one.



Identifying long-tenured members who have gone quiet

Everything needed to answer the inactive member question — loyalty tier, tenure length, active or inactive status — lives in MEMBER_PROFILE. A single-table interface filters for Gold members with five or more years of tenure and inactive status. That interface powers both the KPI widget showing 10 inactive high-tenure Gold members and the drop-off chart broken down by hub airport.



Connecting points earnings to the routes where they happen

Knowing which routes drive the most points-earning activity requires connecting two tables. Points transactions live in POINTS_LEDGER, but the route information — origin, destination — lives in FLIGHT_SEGMENTS. The two tables share a booking_id. A JOIN data interface links them on that key, filters for EARN transactions only, and produces a flat result showing total points earned per route. The analyst

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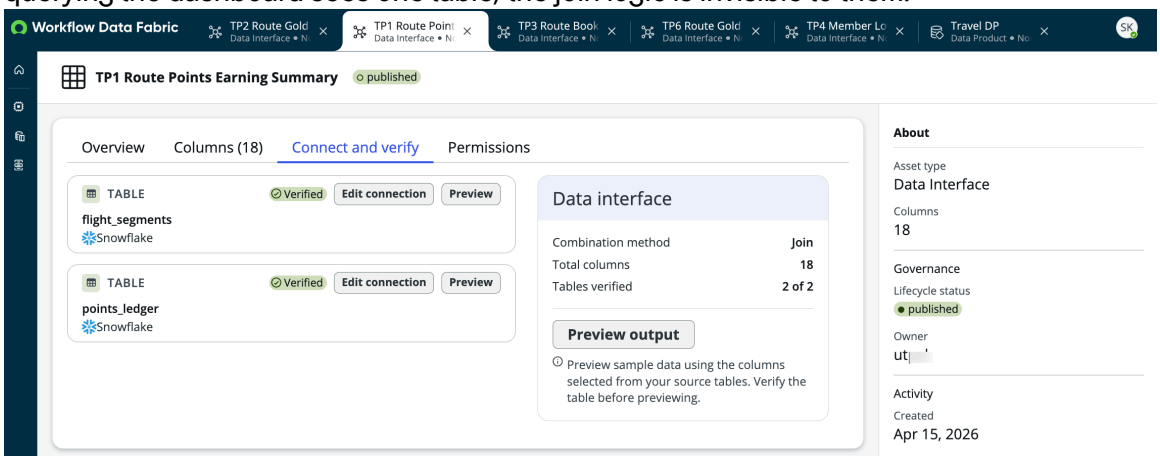
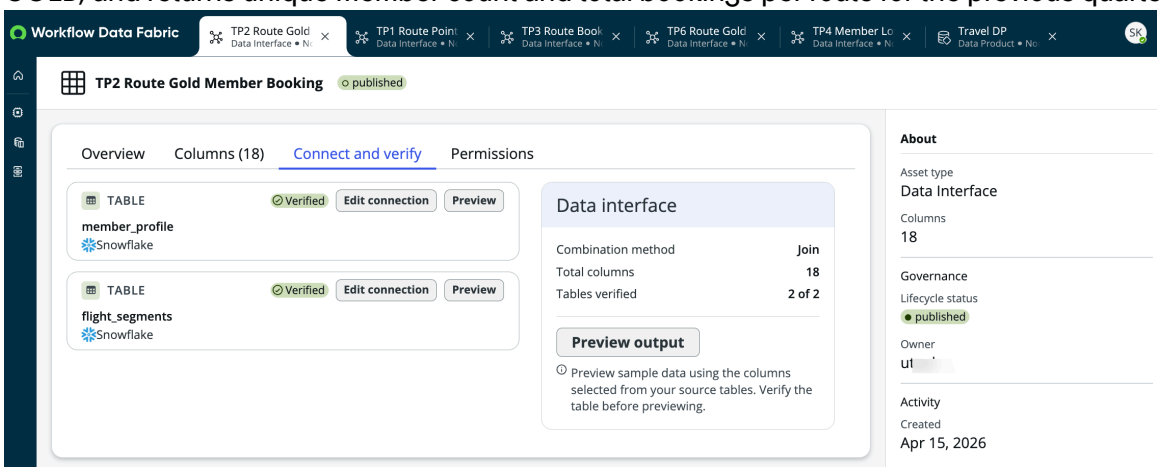
querying the dashboard sees one table; the join logic is invisible to them.



Measuring Gold member engagement route by route

The fourth question — how many Gold members are booking each route — requires connecting flight data to member data. FLIGHT_SEGMENTS holds the route and booking records; MEMBER_PROFILE holds the loyalty tier. A JOIN interface links the two tables, filters for tier = GOLD, and returns unique member count and total bookings per route for the previous quarter.



The outcome: Travel Pulse Dashboard

The Data Steward packages all four data interfaces into a single data product. The steward publishes it to the Data Catalog. The loyalty analyst — who has no warehouse access — discovers the product, requests access, and builds the Travel Pulse Dashboard in Platform Analytics. Each widget queries one interface

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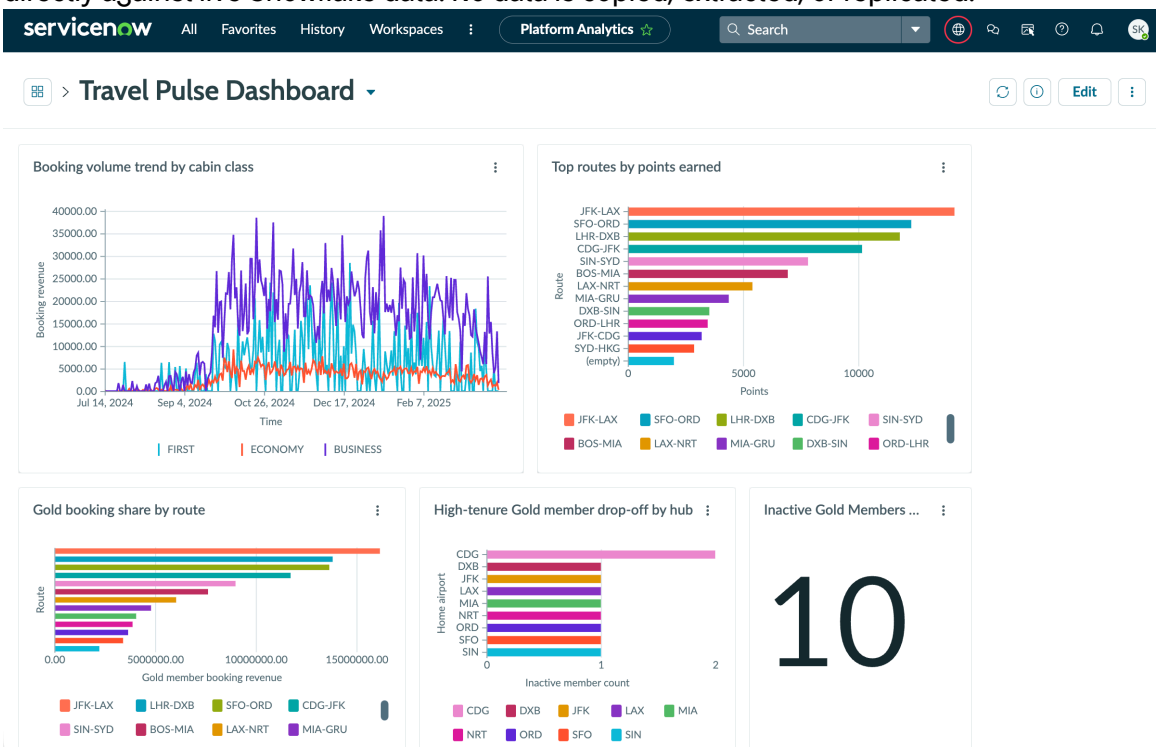
directly against live Snowflake data. No data is copied, extracted, or replicated.



Extending the pattern: combining data from multiple sources

If the team later needs to include booking data from a partner airline, they can use a UNION data interface. The partner data is stored in a separate Snowflake table with the same schema as FLIGHT_SEGMENTS. A UNION data interface stacks both tables into a single queryable view. Consumers query one unified dataset. No existing interfaces change.

This pattern fits whenever the same kind of record is tracked in multiple systems. Records such as bookings, orders, transactions, or events may be divided by region, time period, or business unit. The reporting need is to cover all of them at once.

Data products navigation

Navigate to four areas to build, publish, and manage data products from data ingestion through consumer access.

The data products workflow spans four platform areas, each serving a specific stage from data ingestion to consumer access. Navigate to **All** > **Workflow Data Fabric** > **Workflow Data Fabric Home** to access all areas from the sidebar.

Connect Hub

Connect Hub is where zero-copy connectors and metadata collectors are configured. Zero-copy connectors establish the live data pathway between ServiceNow and external systems such as Snowflake, Databricks, and Oracle. Metadata collectors are configured

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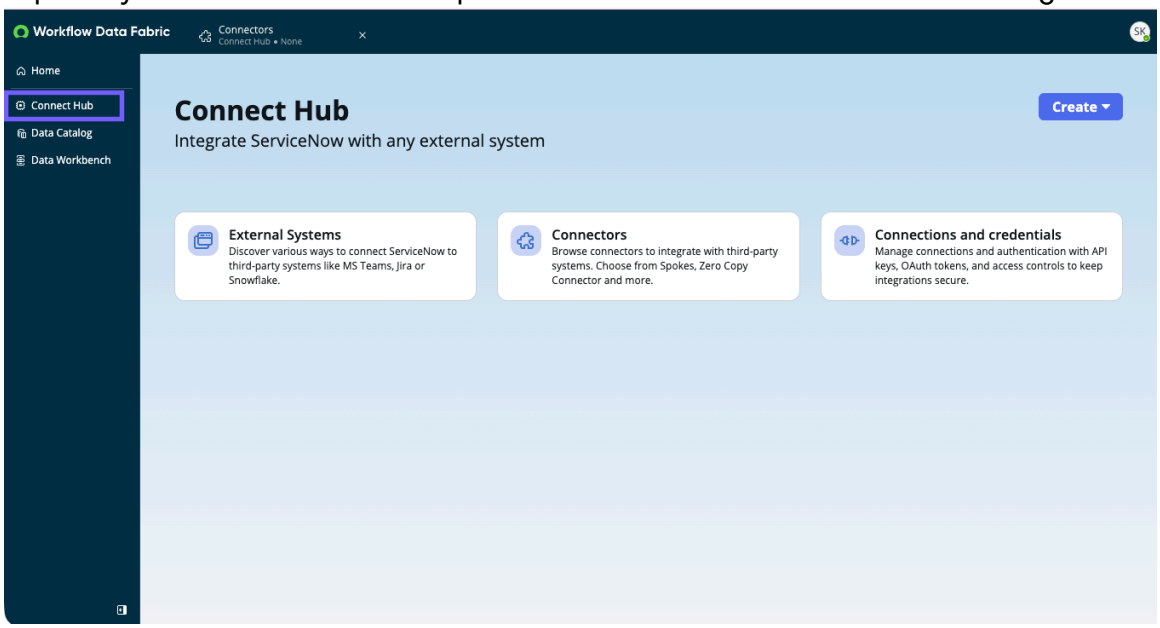
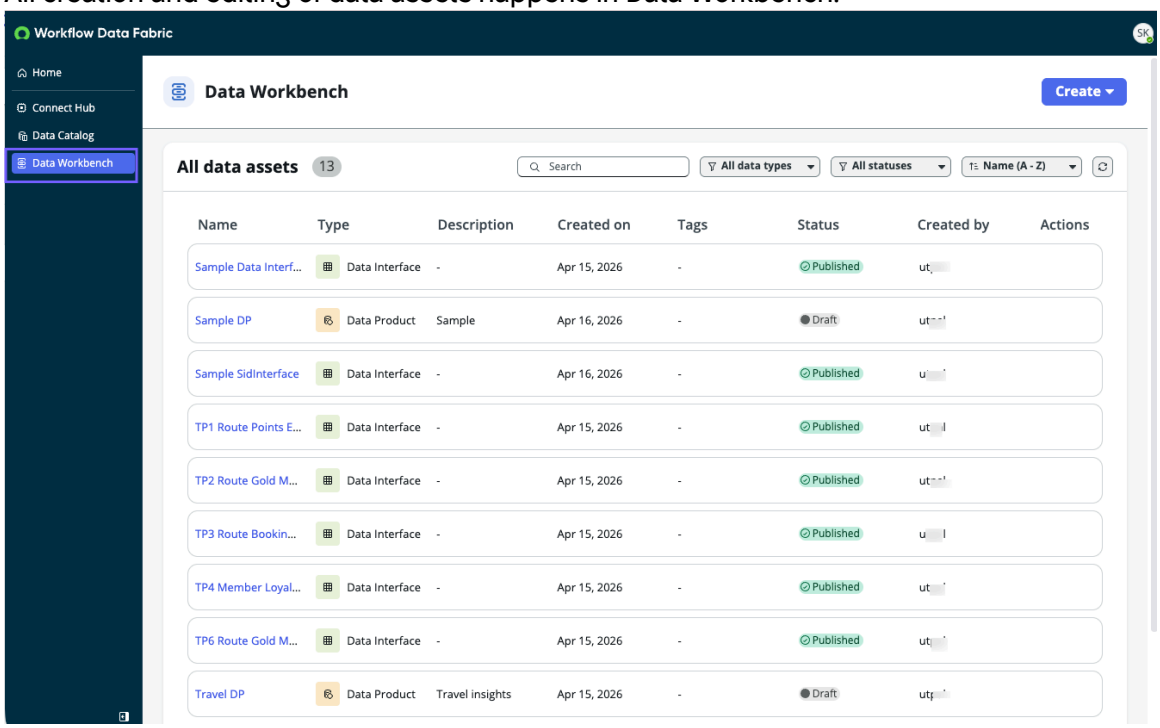
separately and run on a schedule to publish data asset metadata to the Data Catalog.



Data Workbench

Data Workbench is the authoring environment where Data Stewards create, configure, and manage data interfaces and data products. It provides a list of all draft and published assets, with filtering by type and status. All creation and editing of data assets happens in Data Workbench.



Data Catalog

The Data Catalog is where consumers discover published data products and request access. After a data product is published and the metadata collector runs, it is set to visible in the Data Catalog with its name, description, tags, and

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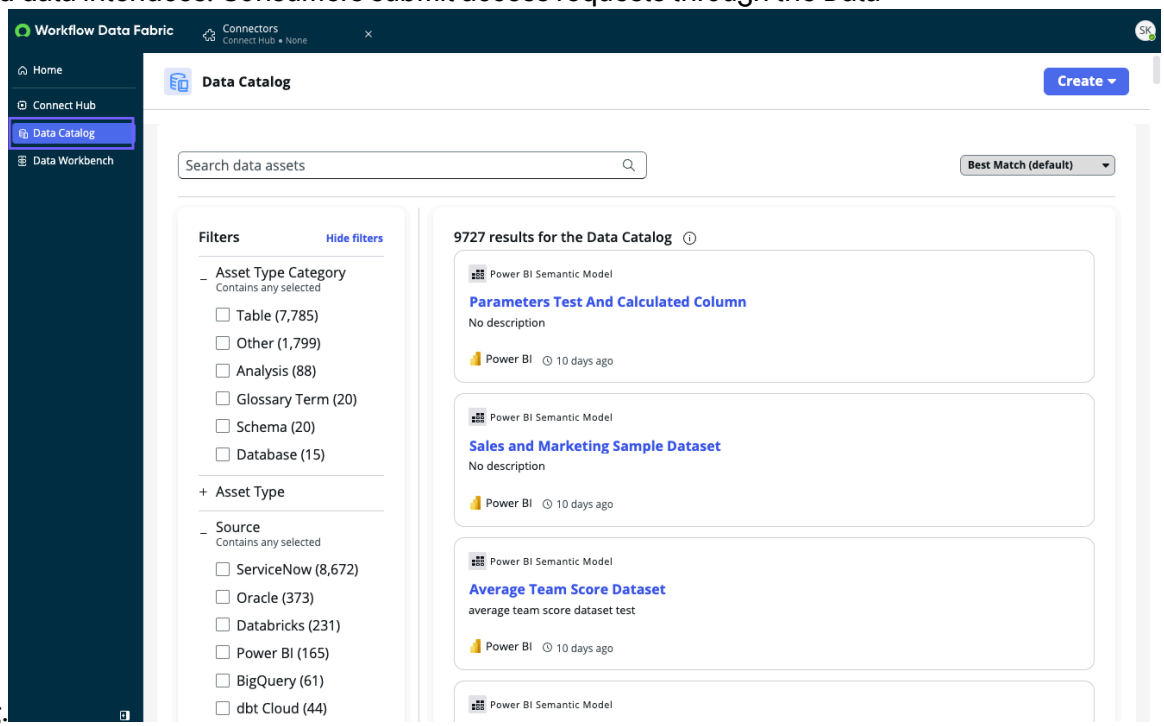
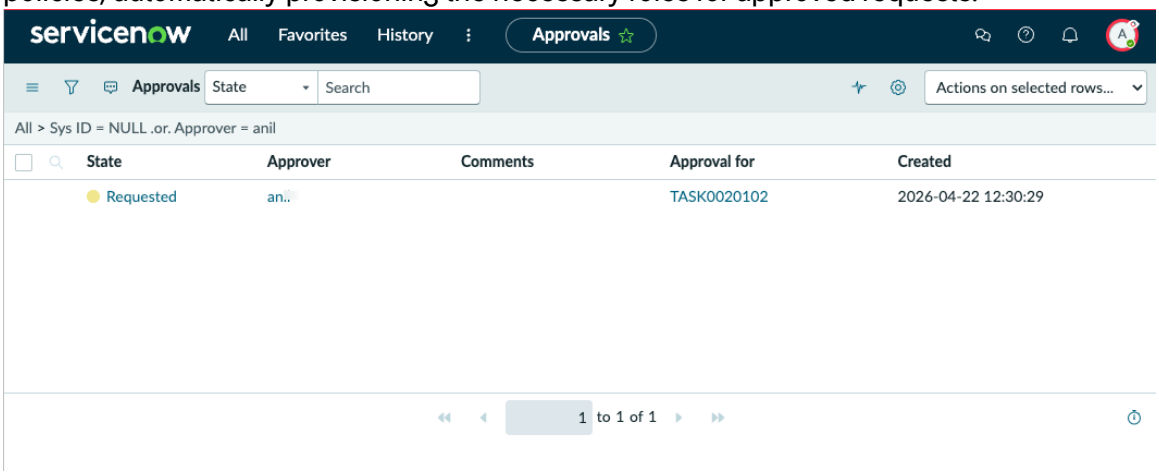
included data interfaces. Consumers submit access requests through the Data Catalog.



Approval Center

Approval Center is where approvers review and process access requests for data products. When consumers request access to a data product, approval tasks are routed here for review. Approvers can grant or deny access based on governance policies, automatically provisioning the necessary roles for approved requests.



Configure data products

You can plan and configure a Data Products implementation in your organization.

Install data products store application

You can install the Data Products application (sn_data_product) if you have the admin role. The application include installs related ServiceNow® Store applications and plugins if they are not already installed.

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Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the Data products application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin

About this task

Installing Data products automatically installs the Data Catalog application as a dependency.

The following items are installed with Data products:

- Plugins
- Store applications
- Roles
- Scheduled jobs
- Tables

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Data Products application (sn_data_product) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   A list of the versions available to you are displayed.
3. Select a version from the list and select **Install**.

   In the Review Installation Details dialog box, any dependencies installed with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. Select **Install**.

Assign roles to data product users

Assign roles to control access to features, capabilities, and data in data products.

Before you begin

Role required: admin

About this task

For detailed information about roles that are installed with Data Products, see Prerequisites and setup.

Procedure

Assign roles to users and groups using the Data Products feature.

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- Assign a role to a user
- Assign a role to a group

Prerequisites and setup

Before creating data interfaces and data products, confirm that the required plugin is activated, roles are assigned, and external data sources are connected.

Note:

Build and test data interfaces and data products in a development or subproduction instance first. When you're ready for production, use a ServiceNow update set to move your assets. See Move data interfaces and data products to production

Required roles

The following roles are required to work with data products:

- df_data_steward: Required to create and manage data interfaces in Data Workbench.
- data_product_admin: Required to create, update, and publish data products.
- data_product_user: Read-only access. Required for consumers who query published data products.

Contact your system administrator to have these roles assigned to your account.

Zero-copy connectors for external data sources

If your data interfaces will use tables from external systems such as Snowflake, Databricks, or Oracle, a zero-copy connector for each system must be configured in Connect Hub before you begin. If your data interfaces use only ServiceNow tables, no connector is required.

A zero-copy connector establishes a live data pathway between ServiceNow and the external system. When a consumer queries a data interface built on an external table, ServiceNow uses the connector to retrieve data directly from the source. No data is copied into ServiceNow — the source system remains authoritative.

Zero-copy connectors and metadata collectors serve different purposes and are both required for external sources:

- A zero-copy connector provides the live data pathway used when querying a data interface or verifying a connection during data interface creation.
- A metadata collector reads schema information from the source system and publishes it to the Data Catalog. It makes source tables discoverable when building data interfaces, and makes published data products visible to consumers. It does not provide access to live data.

The zero-copy connector must be tested and verified as operational before creating data interfaces. Connection failures during data interface creation indicate that the connector is not properly configured or the external system is unavailable.

For setup instructions, see Zero Copy Connectors.

Metadata collectors and Data Catalog visibility

Metadata collectors read schema information — table names, column names, and data types — from a source system and publish it to the Data Catalog. They do not move or copy data.

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Two points in the workflow depend on a metadata collector having run:

- **Before creating a data interface:** Source tables must be discoverable in the Data Catalog before you can select them in the data interface wizard. If a table is not appearing in search, the metadata collector for that source has not run or has not been configured. Ask your administrator to run it manually from Connect Hub.
- **After publishing a data interface or data product:** There is a delay between publishing and the asset appearing in the Data Catalog. The metadata collector must run before consumers can discover the published product. If you cannot wait for the scheduled run, ask your administrator to run the collector manually from Connect Hub.

Metadata collectors typically run on a scheduled basis, but can be triggered manually when immediate catalog updates are required. The collection process may take several minutes to complete depending on the size and complexity of the source system schema.

For setup instructions, see metadata collector documentation in the ServiceNow product documentation.

Application scope

Data interfaces and data products are created within an application scope. Confirm that the correct scope is active in your instance before you begin. Assets created in one scope are not editable from a different scope.

Managing data interfaces

Create a data interface to control how source data is filtered, combined, and exposed to consumers as a stable, governed schema.

When you create a data interface, you select a combination method that determines how data from source tables is structured. The method you choose depends on where your data lives and what consumers want to query.

If you select one source table, the combination method is automatically set to Single table. If you select two or more tables, you choose between JOIN and UNION in the combination method step. The method cannot be changed after the target table is created.

Single table

Exposes a subset of columns from one source table. Use this when all the data consumers need comes from a single table and you want to control which columns are visible.

JOIN

Combines related data from multiple tables that share a common key, using INNER JOIN. Use this when consumer data is split across tables and you want to correlate records by a shared identifier. Only records with matching values in all joined tables are included.

UNION

Stacks rows from multiple source tables with compatible schemas into a single view. Use this when the same type of data is distributed across systems or regions and consumers need a consolidated view. All rows from all tables are included.

Create a data interface from a single table

Create a governed data interface on a single source table and publish it to the Data Catalog so consumers can access the data through a stable schema.

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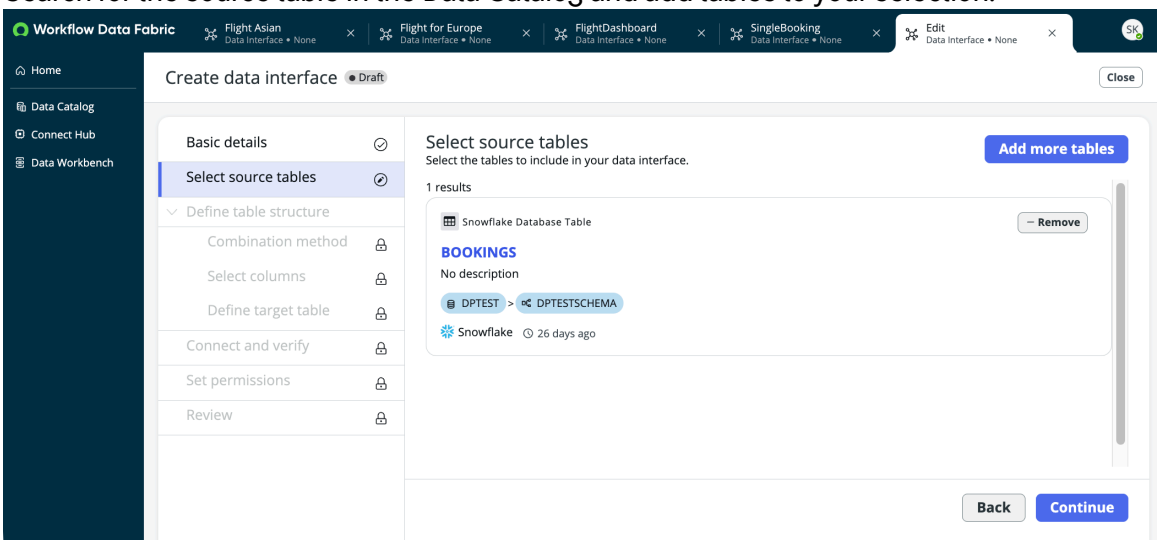
Before you begin

Role required: data_product_admin, df_data_steward, delegated_developer, df_data_steward, and delegatedadmin (scope admin)

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Data Workbench**.
2. Select **Create** > **Create data interface**.
   The data interface wizard opens to the **Basic details** step.
3. Enter the basic details for the data interface and select **Continue**.
   - **Interface label**: Enter a name for the data interface. This label identifies the data interface in the Data Catalog.
   - **Unique name**: Auto-generated from the data interface label.
   - **Application scope**: Select the scope in which to create the data interface.
4. On the Select source tables page, select **Add**.
5. Search for the source table in the Data Catalog and add tables to your selection.



Note: The following platform table types are not supported as source tables:

- Tables with names that begin with `sys_`
- Child tables

6. Review the list of tables and select **Continue**.
   Because one table is selected, no combination method is required. The wizard advances to column selection.
7. Select the columns to include in the data interface and select **Continue**.

   Select only the columns that consumers require. Limiting columns reduces the impact of future schema changes in the source table.

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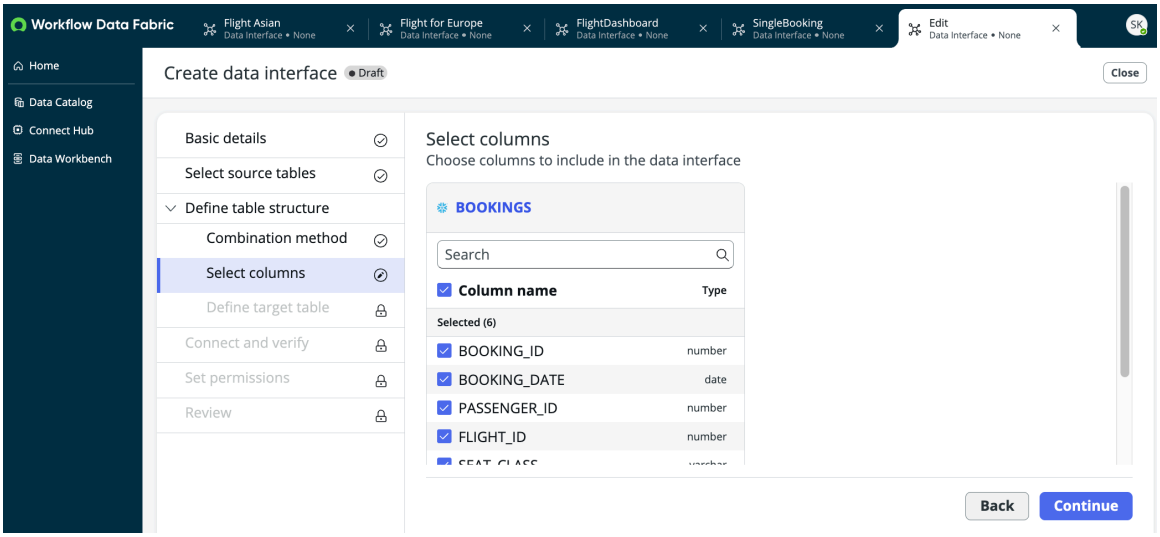
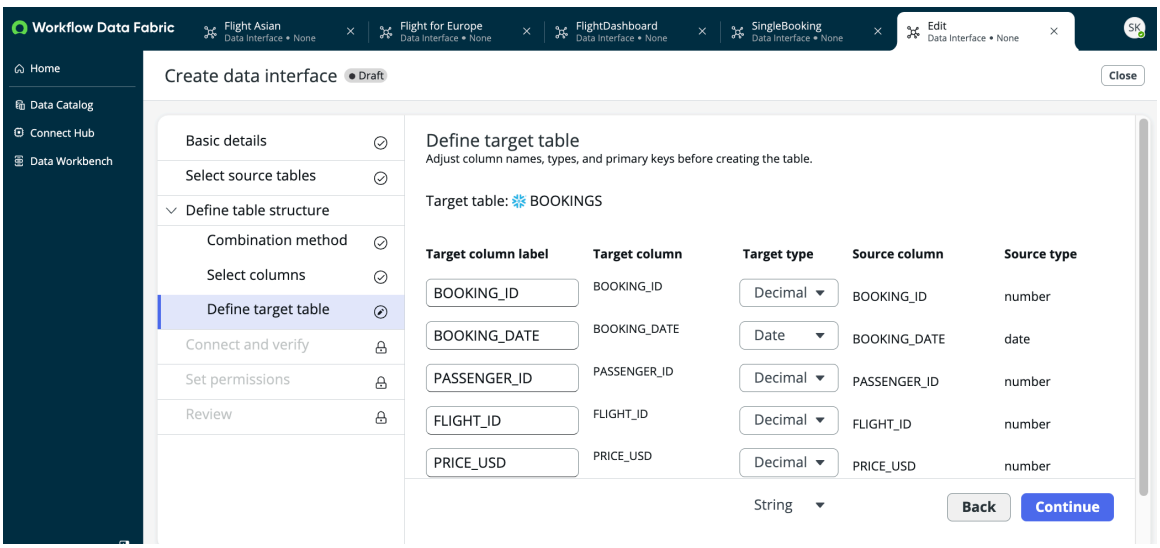


8. Review the target table column mapping and select **Create table**.

   The **Define target table** step shows the selected columns with their auto-mapped target names and data types. You can adjust column labels and types before creating the table.



   The system creates the data interface table and the underlying Data Fabric Table. The wizard advances to the **Connect and verify** step.

9. Connect and verify the source table.

   a. Select **Connect and verify** next to the source table.

   b. Select the connector for your source system from the list of available connections.

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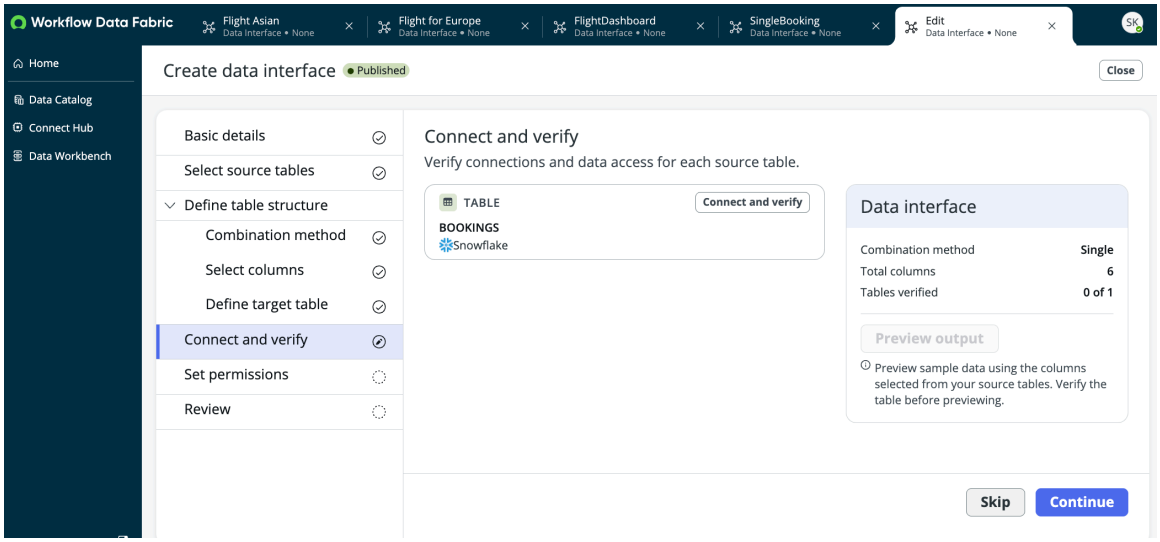
c. Select **Verify**.
The table shows a **Verified** status when the connection is confirmed.



10. **Optional:** Select **Preview** to review sample data from the data interface.

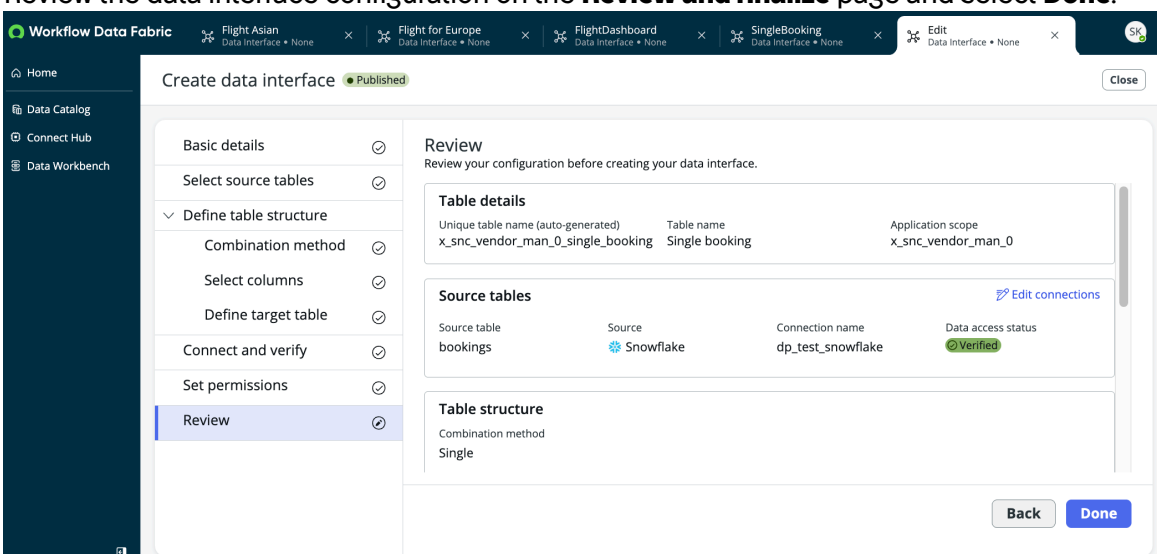
    (Optional) The preview shows the top 10 live records from the combined output. Verify the columns and data match what consumers expect before continuing.

11. Review the permissions and select **Continue**.

    For data interfaces built entirely on external source tables, the system automatically configures the required access roles.

    Note: If the data interface includes any ServiceNow tables, this step requires a manual permissions request. Copy the provided email template and send it to the security administrator. The security administrator must add the correct read roles to the composite role generated for the data interface. Select the confirmation check box before continuing.

12. Review the data interface configuration on the **Review and finalize** page and select **Done**.



The data interface is published and the overview page opens.

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Result
The data interface is published and visible in Data Workbench. After the metadata collector runs, the data interface appears in the Data Catalog where consumers can discover and request access to it.

Note: A delay occurs between publishing a data interface and its appearance in the Data Catalog. The metadata collector must run before the data interface is discoverable. To make the data interface available without waiting for the scheduled run, ask the administrator to run the collector manually from Connect Hub.

What to do next
To package this data interface into a data product, see Create a data product.

Create a data interface using UNION

Create a governed data interface that consolidates rows from two or more source tables with compatible schemas using UNION. Publish it to the Data Catalog so consumers can access an aggregated view through a stable schema.

Before you begin
Before you begin, verify the following:

- All source tables are discoverable in the Data Catalog.
- The source tables have compatible schemas. Columns that you map to the same target column must have compatible data types.
- For tables in external systems, a zero copy connector for each system is configured in Connect Hub. For setup instructions, see the Zero copy connectors documentation.
- Role required: data_product_admin, df_data_steward, delegated_developer, df_data_steward, and delegatedadmin (scope admin)

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Data Workbench**.
2. Select **Create** > **Create data interface**.
   The data interface wizard opens to the **Basic details** step.
3. Enter the basic details for the data interface and select **Continue**.
   - **Interface label**: Enter a name for the data interface. This label identifies the interface in the Data Catalog.
   - **Unique name**: Auto-generated from the data interface label.
   - **Application scope**: Select the scope in which to create the data interface.
4. On the Select source tables page, select **Add**.

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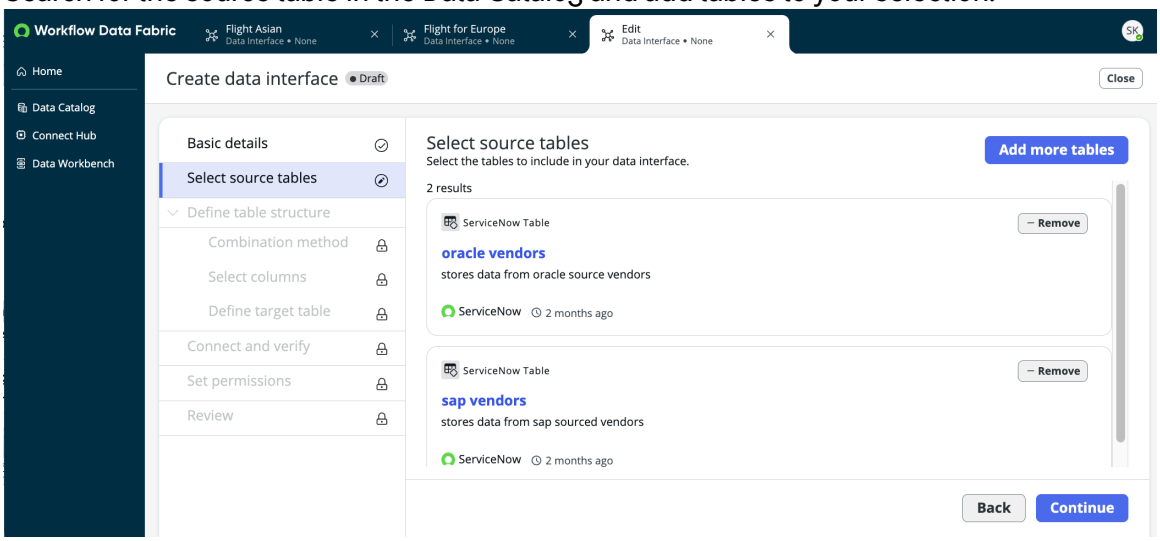
5. Search for the source table in the Data Catalog and add tables to your selection.



Note: The following platform table types are not supported as source tables:

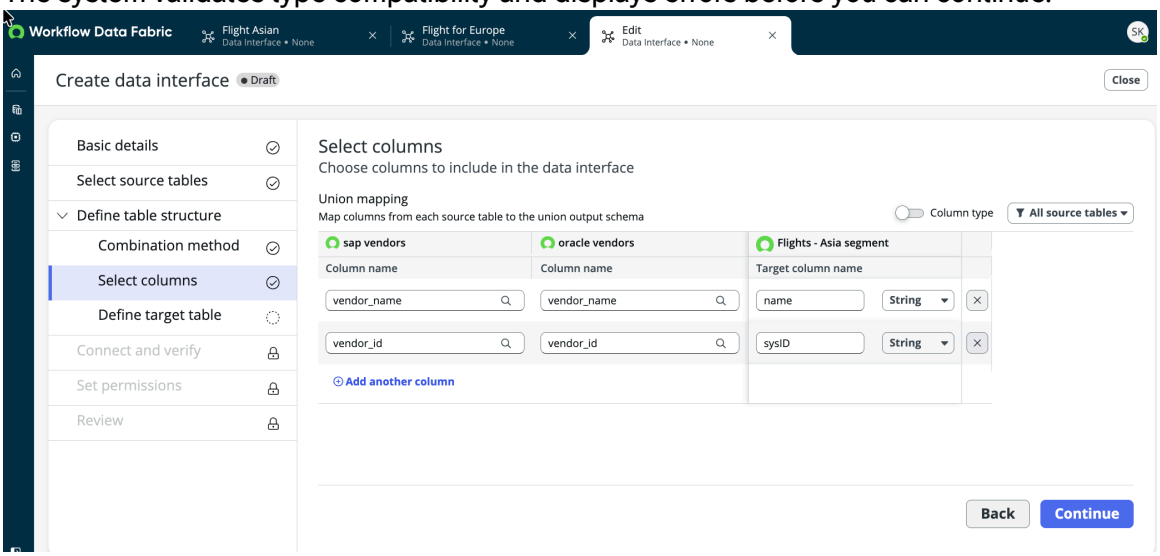
- Tables with names that begin with `sys_`
- Child tables

6. Review the list of tables and select **Continue**.
   The wizard advances to the combination method step.
7. Select **Union** as the combination method and select **Continue**.
8. Map source columns from each table to the union output schema and select **Continue**.

   The **Union mapping** step shows a row for each output column. For each row:

   - Select the source column from each table that maps to this output column.
   - Enter a target column name.
   - Select the target column type.

   All source columns mapped to the same output column must have compatible data types. The system validates type compatibility and displays errors before you can continue.



9. Review the target table column mapping and select **Create table**.

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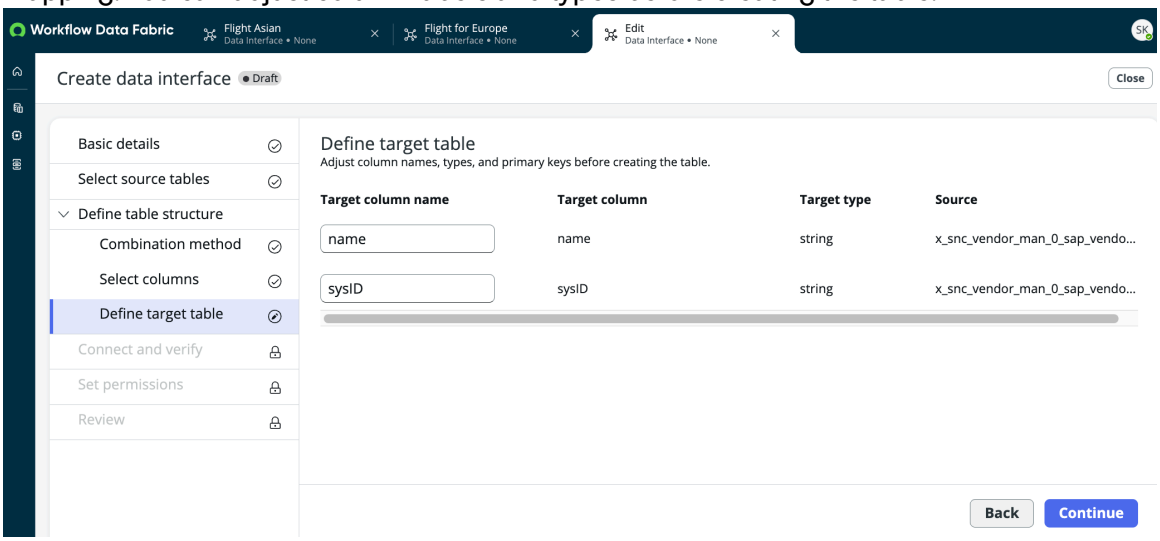
The **Define target table** step shows the output schema based on your union mapping. You can adjust column labels and types before creating the table.



The system creates the data interface table and the underlying Data Fabric Tables. The wizard advances to the **Connect and verify** step.

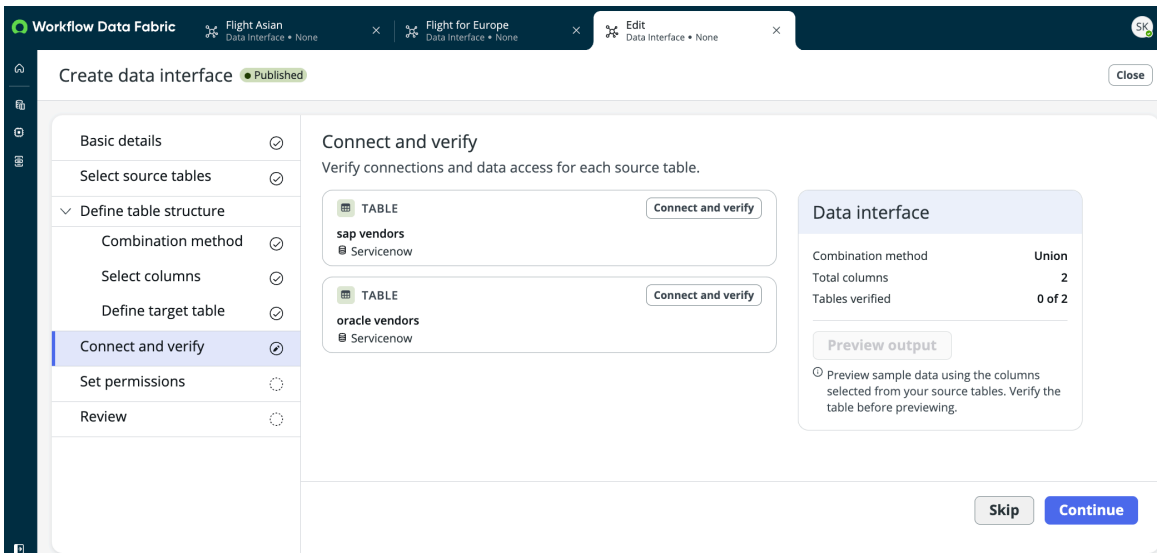
10. Connect and verify each source table.

    Repeat the following substeps for each source table.

    a. Select **Connect and verify** next to the source table.

    b. Select the connector for your source system from the list of available connections.

    c. Select **Verify**.
    The table shows a **Verified** status when the connection is verified.



11. **Optional:** Select **Preview** to review sample data from the data interface.

    (Optional) The preview shows the top 10 live records from the combined output. Verify the columns and data match what consumers expect before continuing.

12. Review the permissions and select **Continue**.

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For data interfaces built entirely on external source tables, the system automatically configures the required access roles.

Note: If the data interface includes any ServiceNow tables, this step requires a manual permissions request. Copy the email template provided and send it to your Security Administrator. The Security Administrator must add the correct read roles to the composite role generated for the data interface. Select the confirmation check box before continuing.

13. Review the data interface configuration on the **Review and finalize** page and select **Done**.
    The data interface is published and the overview page opens.

Result

The data interface is published and visible in Data Workbench. After the metadata collector runs, the data interface appears in the Data Catalog where consumers can discover and request access to it.

Important: There is a delay between publishing a data interface and its appearance in the Data Catalog. The metadata collector must run before the data interface is discoverable. To make the data interface available without waiting for the scheduled run, ask your administrator to run the collector manually from Connect Hub.

What to do next

To package this data interface into a data product, see Create a data product.

Create a data interface using JOIN

Create a governed data interface that combines rows from two or more source tables using an INNER JOIN and publish it to the Data Catalog. Consumers can access a unified view through a stable schema.

Before you begin

Role required: data_product_admin, df_data_steward, delegated_developer, df_data_steward, and delegatedadmin (scope admin)

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Data Workbench**.
2. Select **Create** > **Create data interface**.
   The data interface wizard opens to the **Basic details** step.
3. Enter the basic details for the data interface and select **Continue**.
   - **Interface label**: Enter a name for the data interface. This label identifies the data interface in the Data Catalog.
   - **Unique name**: Auto-generated from the data interface label.
   - **Application scope**: Select the scope in which to create the data interface.
4. On the Select source tables page, select **Add**.
5. Search for the source table in the Data Catalog and add tables to your selection.

   Note: The following platform table types are not supported as source tables:
   - Tables with names that begin with `sys_`
   - Child tables

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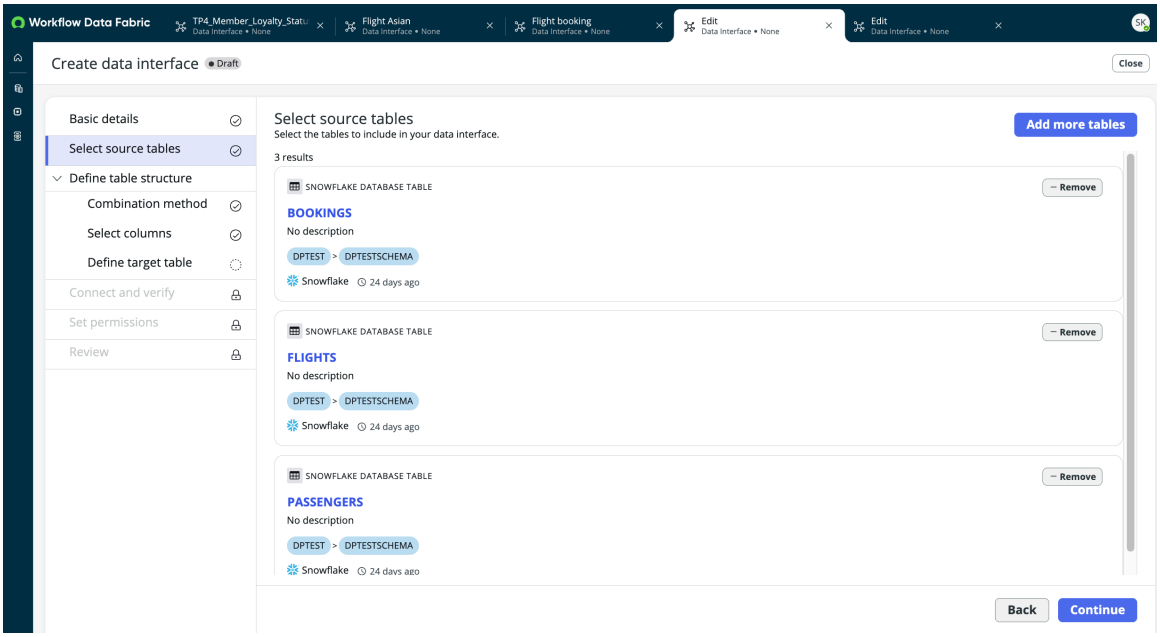
6. Review the list of tables and select **Continue**



The wizard advances to the combination method step.

7. Select **Join** as the combination method and select **Continue**.

   Under **Define join sequence**, the selected tables are listed in the order they are joined. The first table in the list acts as the primary source. Drag the tables to reorder them before continuing.

8. Define the join conditions and select **Continue**.

   For each join condition, select a column from one table and the matching column from another table. The columns must have compatible data types. Select **Add matching column** to add more conditions.

   You must define at least one join condition to continue. If any selected table has no join condition, the system prompts you to confirm before proceeding. Columns from unjoined tables are excluded from the output.

   Note: This data interface uses INNER JOIN. Only records that have a matching value in all joined tables appear in the output. Records with no match in any joined table are excluded.

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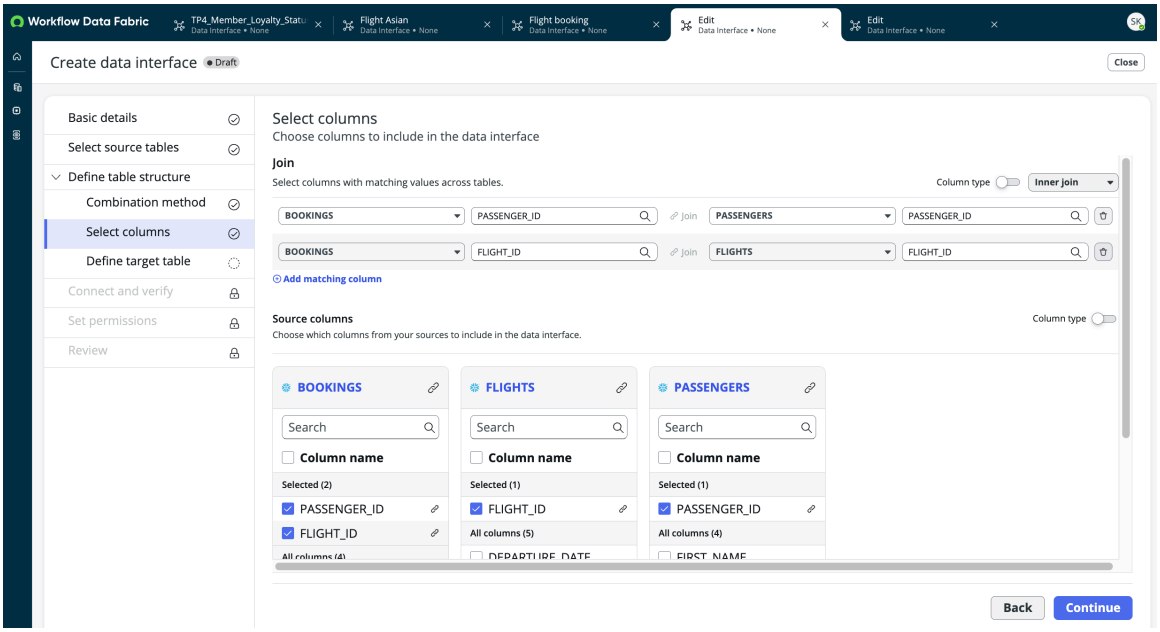
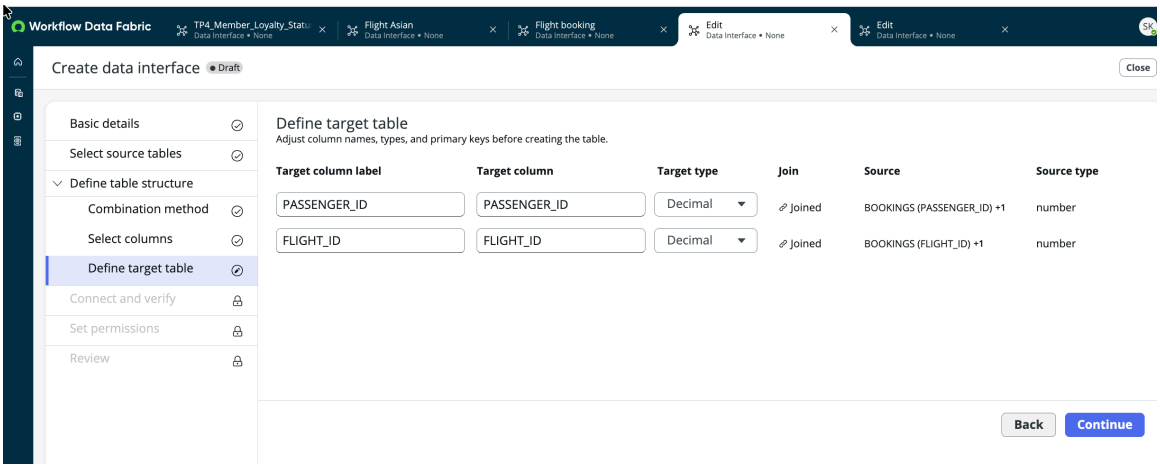


9. Review the target table column mapping and select **Create table**.

   The **Define target table** step shows the selected columns with their auto-mapped target names and data types. You can adjust column labels and types before creating the table.



   The system creates the data interface table, the underlying Data Fabric Tables, and the database view that represents the JOIN. The wizard advances to the **Connect and verify** step.

10. Connect and verify each source table.

    Repeat the following substeps for each source table.

    a. Select **Connect and verify** next to the source table.

    b. Select the connector for your source system from the list of available connections.

    c. Select **Verify**.
    The table shows a **Verified** status when the connection is confirmed.

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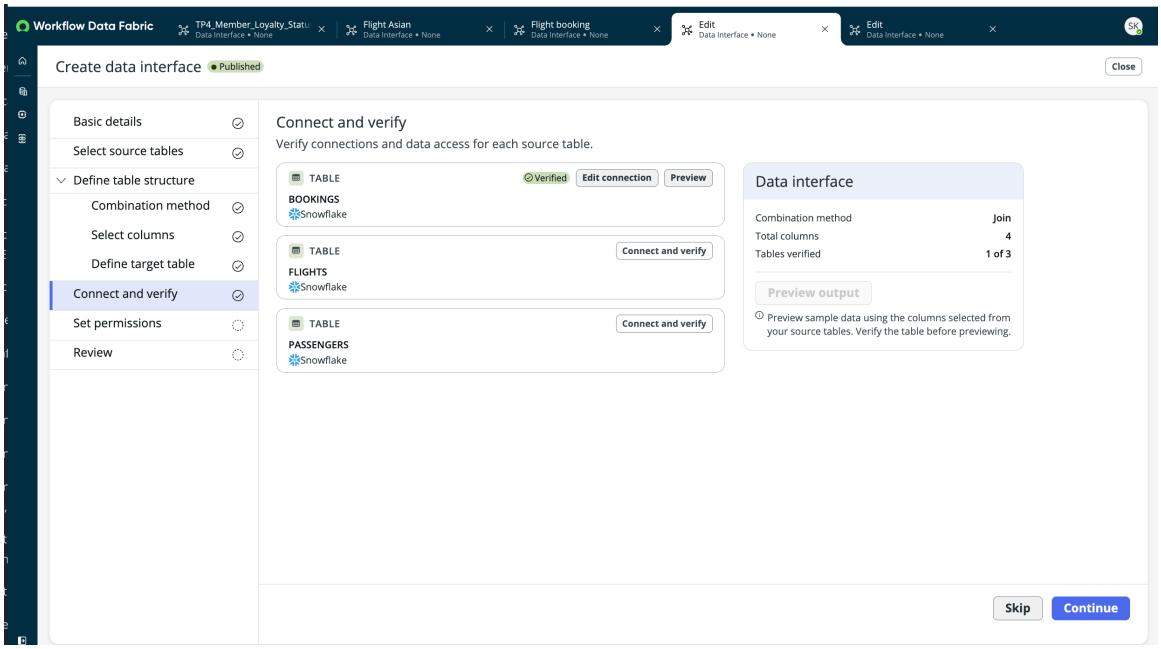

11. **Optional:** Select **Preview** to review sample data from the data interface.

    (Optional) The preview shows the top 10 live records from the combined output. Verify the columns and data match what consumers expect before continuing.

12. Review the permissions and select **Continue**.

    For data interfaces built entirely on external source tables, the system automatically configures the required access roles.

    Note: If the data interface includes any ServiceNow tables, this step requires a manual permissions request. Copy the email template provided and send it to your Security Administrator. The Security Administrator must add the correct read roles to the composite role generated for the data interface. Select the confirmation check box before continuing.

13. Review the data interface configuration on the **Review and finalize** page and select **Done**.

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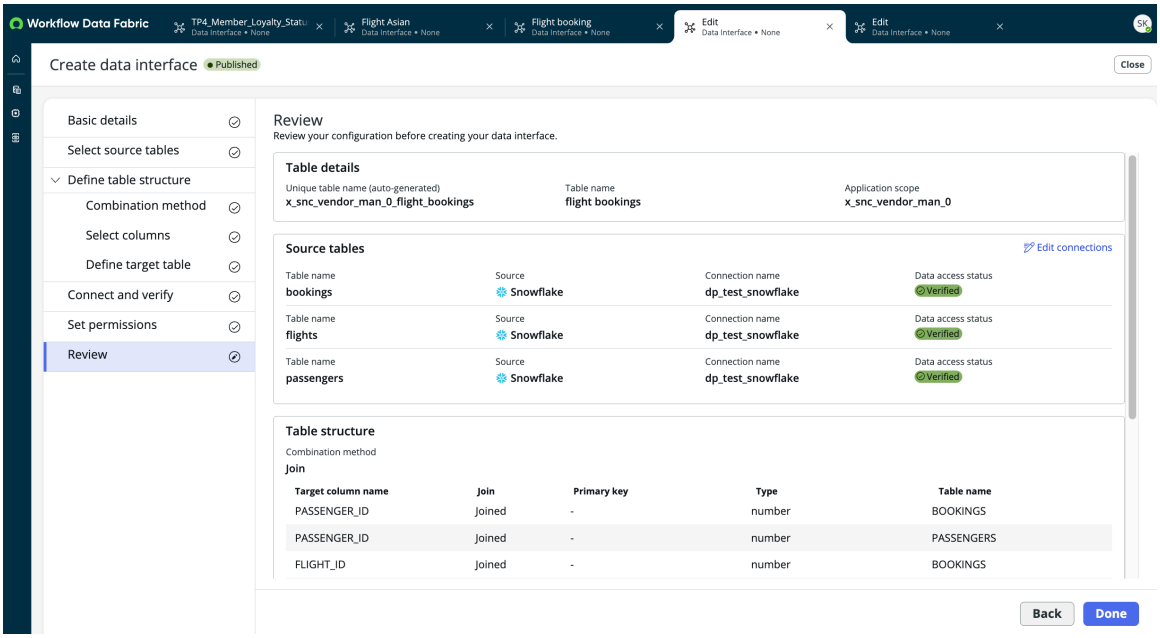

The data interface is published and the overview page opens.

Result

The data interface is published and visible in Data Workbench. After the metadata collector runs, the data interface appears in the Data Catalog where consumers can discover and request access to it.

> **Important:** There is a delay between publishing a data interface and its appearance in the Data Catalog. The metadata collector must run before the data interface is discoverable. To make the data interface available without waiting for the scheduled run, ask your administrator to run the collector manually from Connect Hub.

What to do next

To package this data interface into a data product, see Create a data product.

Edit a data interface

Update a published data interface in place when source data or consumer requirements change, without unpublishing or recreating the interface.

Before you begin

The data interface must be in the Published state.

Role required: data_product_admin, df_data_steward, delegated_developer, df_data_steward, and delegatedadmin (scope admin)

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Data Workbench**.
2. Open the published data interface and select **Edit**.

   An edit mode banner appears at the top of the wizard and remains visible throughout the edit session as a reminder that table, column, and combination changes affect consumers and that consumers aren't notified automatically.

3. Update the interface label and select **Continue**.

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The **Unique name** field is locked because downstream consumers reference the data interface by name.

4. On the **Select source tables** page, add or remove source tables and select **Continue**.

   Note: You can't remove a source table that is referenced by a join condition. Remove the join condition first.

5. On the **Combination method** step, keep or change the combination method and select **Continue**.

   If you select a different combination method, the Change combination method dialog opens. Select **Change method** to restructure the target table, remove the current column mappings, and clear any saved join configurations. This action can't be undone.

6. On the **Select columns** step, update the column selection and select **Continue**.
7. On the **Define target table** step, review the column mappings, adjust target column labels and types as needed, and select **Create table**.

   For target columns that were part of the published interface, the column name is locked. The target column label and type remain editable. If you select a target type that doesn't match the source type, the field shows a type-mismatch warning.

   If you made structural changes — added or removed source tables, changed the combination method, or changed join conditions — the Confirm structure changes dialog opens. The dialog lists the structural changes that will be applied. Select **Confirm changes** to apply them. The earlier wizard steps lock and the wizard advances to the **Connect and verify** step. All source tables must be re-verified and permissions reviewed before you can save.

8. On the **Connect and verify** step, verify each source table.

   The **Tables verified** count on the Data interface summary panel tracks progress. The **Preview output** button remains inactive until all tables are verified.

   a. Select **Connect and verify** next to a source table.

   b. Select the connector for your source system from the list of available connections.

   c. Select **Verify**.

      The table shows a Verified status when the connection is confirmed.

9. **Optional:** Review sample data from the updated interface by selecting **Preview output**.

   (Optional) The preview shows the top 10 live records from the combined output. Confirm the columns and data match what consumers expect before continuing.

10. Review the permissions and select **Continue**.

    For data interfaces built on external source tables such as Snowflake, the access roles required are configured automatically.

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Note: For data interfaces that includes any ServiceNow tables, this step requires a manual permissions request. Copy the email template provided and send it to your security administrator. The security administrator must add the correct read roles to the composite role generated for the data interface. Select the confirmation check box before continuing.

11. Review the updated data interface configuration on the **Review** page and select **Save changes**.

    The edits are applied and the data interface overview page opens. The data interface remains in the Published state.

Result
The published data interface reflects your updates. Existing consumers continue to use the data interface but must reconnect and verify their tables to pick up structural changes such as added or removed source tables, a changed combination method, or new target columns.

Important: There is a delay between saving an edit and its appearance in the Data Catalog. The metadata collector must run before consumers see the changes. To make the changes available without waiting for the scheduled run, ask your administrator to run the collector manually from Connect Hub.

Managing data products

Create, publish, and promote data products to make governed data available to consumers in your organization.

A data product groups one or more data interfaces into a governed, publishable collection. Once published, consumers can discover the data product in the Data Catalog and request access. When your data product is ready for production use, you promote it from your development instance using a ServiceNow update set.

Create a data product

Create a data product to group one or more data interfaces into a governed, publishable collection that consumers can discover and access through the Data Catalog.

Before you begin
Role required: data_product_admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Data Workbench**.
2. Select **Create** > **Create data product**.
   The data product wizard opens to the **Basic details** step.
3. Complete the basic details for the data product, then select **Continue**.
   - **Data product name**: Enter a name for the data product.
   - **Description**: Describe the data product and its intended use.
   - **Tags**: Optionally add tags separated by commas to make the data product easier to find in the Data Catalog.
   - **Application scope**: Auto-populated from your current application scope.
4. Select **Add assets**, select the data interfaces to include, and select **Continue**.

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The data product inherits access permissions from each data interface you add. There is no separate permissions configuration at the data product level.

5. Review the inherited permissions and select **Continue**.

   The Set permissions step lists each data interface with its role and configuration status. Permissions are read-only at this level. To change access, update the roles on the individual data interfaces.

6. Review the data product configuration and select **Done**.
   The data product details page opens. The data product is in draft state and is not yet available to consumers.

Result
The data product is created in draft state and visible in Data Workbench. Publish it to make it available to consumers in the Data Catalog.

What to do next
To make the data product available to consumers, see Publish a data product

Publish a data product

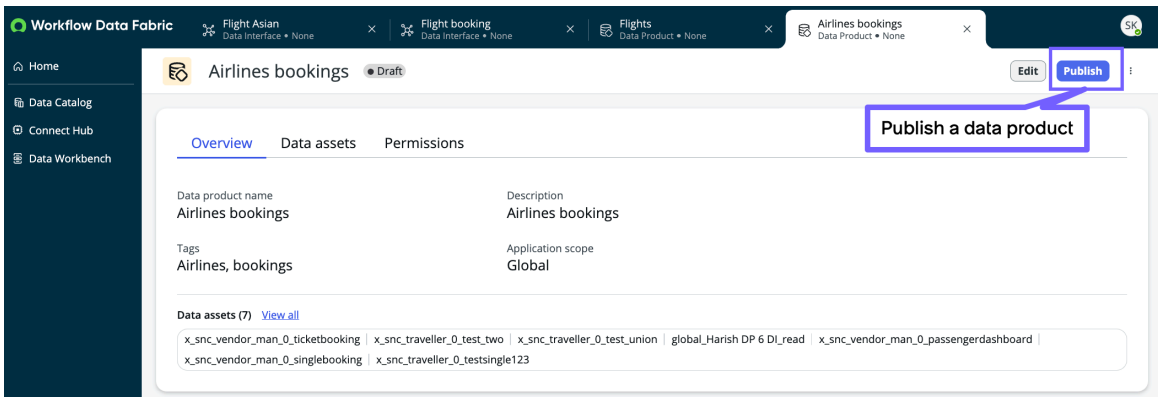
Publish a data product to make it available to consumers in the Data Catalog.

Before you begin
Role required: data_product_admin

Procedure

1. Navigate to **All** > **Workflow Data Fabric** > **Data Workbench**.
2. In Data Workbench, open the data product and select **Publish**.

   The **Publish** button is available only when the data product is in draft state.



3. Review the confirmation and select **Publish**.
   The data product state updates to **Published**.
4. To make changes to a published data product, select **Edit** on the details page.

   This returns the data product to draft state. You can republish it when your changes are complete.

Result
The data product is published. After the metadata collector runs, it appears in the Data Catalog. Consumers can discover and request access to it.

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Important: A delay occurs between publishing a data product and its appearance in the Data Catalog. The metadata collector must run before the data product is discoverable. To make it available without waiting for the scheduled run, ask your administrator to run the collector manually from Connect Hub.

What to do next

To move the data product to production instance, see Move data interfaces and data products to production

Move data interfaces and data products to production

Use a local update set to move data interfaces and data products from a subproduction instance to production.

Before you begin

Before you begin, verify the following:

- A local update set is active in the subproduction instance with the same application scope as your data interfaces and data products.
- All data interfaces and data products you want to move are published in the subproduction instance.
- Zero-copy connectors for all source systems are configured in the production instance. For setup instructions, see Zero copy connectors documentation.
- Role required: Admin

About this task

Data interfaces and data products are captured in the active update set as you create and publish them. Exporting and installing the update set in production recreates the assets, including all data interface tables and column mappings. After installation, you must verify the connections again in production because connector names and credentials differ between instances.

For detailed instructions on update sets, see Working with update sets.

Procedure

1. In the subproduction instance, export the update set that contains your data interfaces and data products.
2. In the production instance, retrieve and install the exported update set.
3. Navigate to **All** > **Workflow Data Fabric** > **Data Workbench** and open each data interface.
4. For each source table, select **Connect and verify**, select the production connector for your source system, and select **Verify**.
   The table shows a **Verified** status when the connection to the production source is verified.

Result

The data interfaces and data products are available in the production instance. After the metadata collector runs, the data interfaces appear in the Data Catalog where consumers can discover and request access to them.

Review and approve data access requests

Review and act on requests from consumers who need access to a data product or data interface.

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Before you begin

You must be a member of the Data Catalog approvers group. An administrator manages group membership.

Roles required: approval_user and dcg_catalog_readable

About this task

When a consumer requests access to a data product or data interface, a task is created. The task is routed to the Data Catalog approvers group. Any member of the group can approve or reject the request — only one approval is required. After approval, the requesting user is automatically granted the role needed to query the data asset and the task closes.

Note: Access requests are only available for data products and data interfaces, not other data asset types.

Procedure

1. Navigate to **All** > **Self-Service** > **My Approvals**.
   The Approval Center opens, listing all pending approvals assigned to you or your group.
2. Find and open the pending Data Catalog access request.

   The short description identifies the requesting user and the data asset they need to access, for example: `User requesting access to resource: Travel Analytics`.
3. Review the request details to verify the user and data asset.

   The request record shows the requesting user, the data product or data interface name, and the current approval state. Use this information to evaluate whether to grant access.
4. Select **Approve** or **Reject**.
   - Approve: The requesting user is automatically granted the role required to query the data asset. The access request task closes.
   - Reject: Access is not granted. The requesting user is notified and the task closes.

Result

After approval, the requesting user can query the data product or data interface through workflows, dashboards, or APIs. No further action is required — role assignment and task closure happen automatically.

Automation Center

Use the ServiceNow® Automation Center application to govern your end-to-end multi-vendor automation life cycles from one place. By using real-time dashboards, you can manage and measure the health of the automation and prevent automation failures across multiple vendors.

In the Automation Center application dashboard, you can view real-time metrics and analytics.

Automation Center integrates with ServiceNow® Robotic Process Automation (RPA) Hub, ServiceNow® flows, and any third-party applications.

Integration with ServiceNow® flows

Automation Center integrates with ServiceNow® flows enabling you to track any ServiceNow® flow as automations. For more information, see Track ServiceNow flows and actions as automations.

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Integration with ServiceNow® Robotic Process Automation (RPA) Hub

Automation Center provides an integration with the ServiceNow® RPA Hub application. This integration enables you to integrate ServiceNow robots and bot processes. For more information about RPA Hub, see Robotic Process Automation (RPA) Hub.

Integration with Document Intelligence

Automation Center integrates with Document Intelligence enabling you to get the Document Intelligence data into ServiceNow® instance. You can analyze the data from Document Intelligence using Automation Center. For more information, see .

Integration with UiPath

Automation Center integrates with UiPath enabling you to get the UiPath data into ServiceNow® instance via UiPath spoke. You can analyze the data from UiPath using Automation Center. For more information, see Configuring UiPath with Automation Center.

Integration with third-party vendors

Automation Center integrates with third-party vendors enabling you to get their data into ServiceNow® instance. You can do that using *Automation Center* API.

Automation Center API

The *Automation Center* API enables you to create and update processes, robots, and execution jobs. For more information, see Automation Center API .

Integration with Task Mining

Automation Center integrates with Task Mining enabling you to create automations from Task Mining workspace. For more information, see Task Mining .

Get started

Explore	Configure
	
Learn about Automation Center concepts and features.	Install and setup Automation Center

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Use	Reference
 Learn how to use Automation Center	 Get details about Automation Center like glossary and troubleshooting information.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Troubleshoot and get help

- Search the Known Error Portal for known error articles
- Ask or answer questions in the community forum
- Developer documentation
- Contact Customer Service and Support

Exploring Automation Center

Learn about the Automation Center application key features, architecture, and workspace.

Key features

- Discover, prioritize, and manage automation requests from different sources through the full life cycle in Automation Center workspace.
- Oversee and optimize automation performance versus business goals across multiple vendors.
- Monitor and manage the health of the automation and prevent automation failures across multiple vendors.

Explore the following topics to learn more about Automation Center architecture and Workspace.

Automation Center architecture

Learn about the Automation Center architecture.

High-level architecture

Various components make up the architecture of the Automation Center application:

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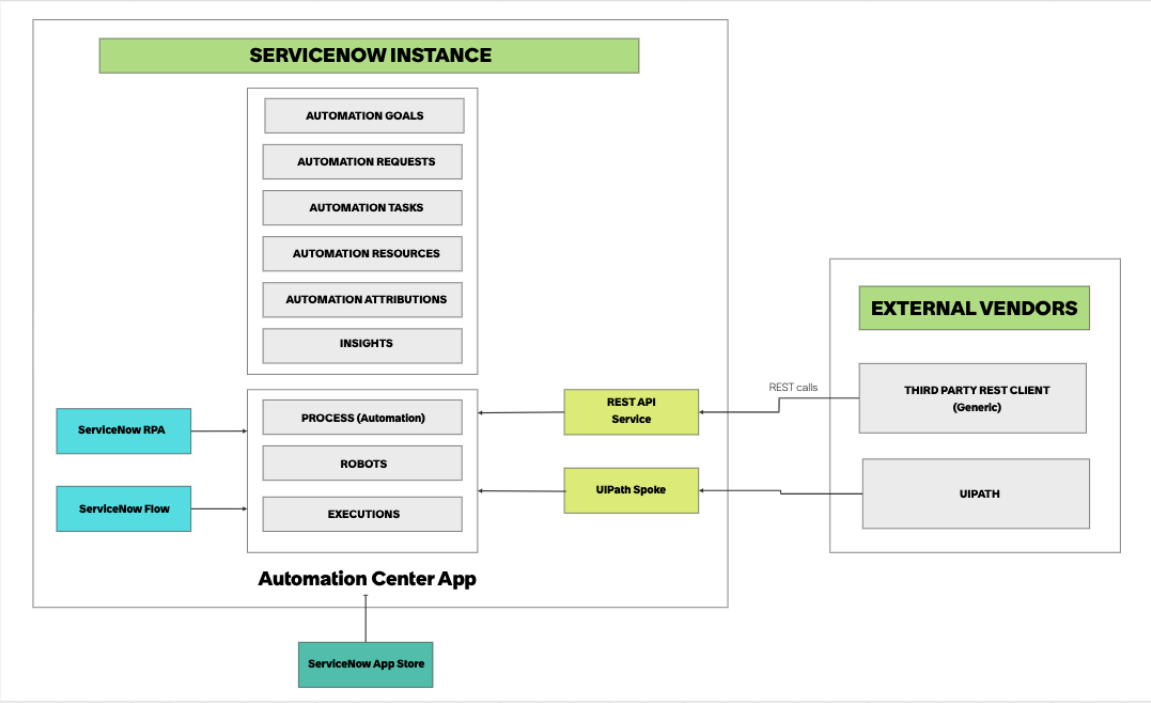
- You install the Automation Center application from the ServiceNow Store.
- Automation Center is a scoped application in the ServiceNow instance. It's the command and control center for managing the automation goals, requests, tasks, resources, attributes, insights, automation, robots, and executions.
- The automations, robots, and executions are populated from various sources such as ServiceNow® RPA Hub via flow and external vendors via REST calls.

The following diagram shows the high-level architecture of the Automation Center application.

High-level architecture of the Automation Center application



Automation Center Workspace

Automation Center Workspace provides an overall view of the performance and value of the KPIs for existing automations, executions, and new automation requests.

ServiceNow® Automation Center Workspace is a web-based platform with three dashboards: Overview, Executions, and Value.

- The Overview dashboard includes the basic score cards, lists, and reports. It's the default landing page of the Automation Center Workspace.
- The Executions dashboard enables you to manage the health of automations in one central place.
- The Value dashboard provides summary information about the states of business goals and automations.

Automation Center Overview dashboard

The Automation Center Workspace landing page is the Overview dashboard, which contains basic score cards, lists, and reports.

You can access the Overview dashboard in either of two ways:

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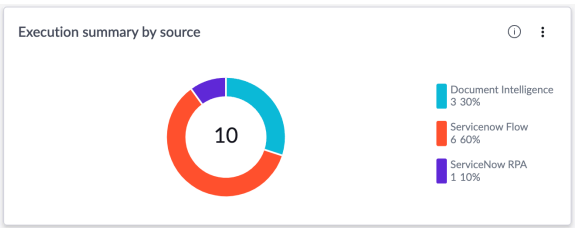
- By navigating to **All** > **Automation Center** > **Automation Center Home** > **Overview**.
- By navigating to **Workspaces** > **Automation Center Workspace** > **Overview**.

Active automations

Active automations provides details of all the active automations from different sources and their business criticality. You can filter the data to view information within a specific date range, for a specific automation, or for a specific department. After you set the filter, the results will be displayed only for the specified filter. If you don't set any filter, then data for all active automations is displayed.

The Active automations section provides reports with the following details in the form of chart.

Active automations

Section	Description
Deployed automations by business criticality	This chart displays data about all active automations. It also provides details about the business criticality of each of the automation. This helps you in understanding how many automations are highly critical and how many aren't. 
Executions summaries by source	Automation Center supports data from several sources, such as ServiceNow Flow, ServiceNow RPA, and other third-party sources. This chart provides execution summary details of all active automations along with their sources. This information helps you in evaluating from which sources you're getting data and how many automations from each of the sources are active. 
Robotic Process Automation (RPA) by source	This chart displays the automations for all RPAs grouped by sources. The graph gives details of the time lines when the RPA data was sent to Automation Center.

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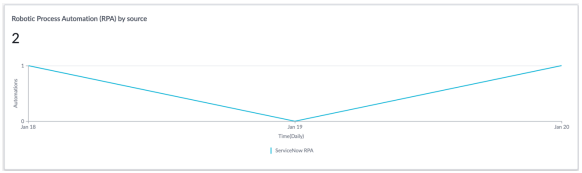
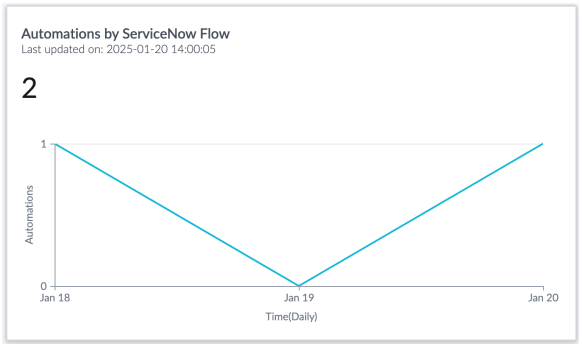
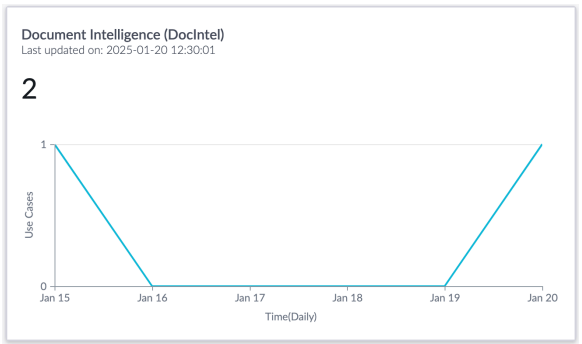
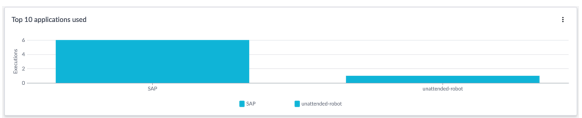
Active automations (continued)

Section	Description
	
Automations by ServiceNow Flow	This chart provides details of the ServiceNow flow automations with the time lines. 
Document Intelligence (DocIntel)	This chart provides details of the Document Intelligence automations with the time lines. 
Top 10 applications used	This graph provides a vertical bar report of the top 10 business applications used. For more information on associating business applications to your automations, see . 

Spokes & Transactions

Spokes & Transactions section provides details about the spokes and the transactions that are available on your instance.

Note: To view the data in the Spokes & Transactions section, you need to have the sn_ac.automation_technical_user or sn_ac.automation_admin role.

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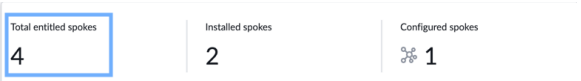
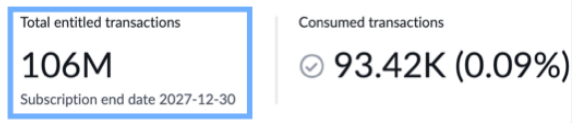
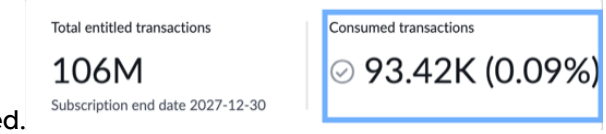
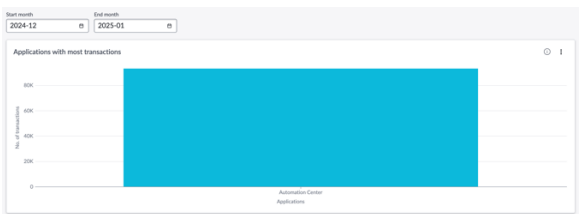
Spokes & Transactions

Section	Description
Total entitled spokes	Displays the number of spokes that you are entitled and installed in your instance. 
Installed spokes	Displays the number of spokes that are installed in your instance. 
Configured spokes	Displays the number of spokes for which connections are configured in your instance. 
Total entitled transactions	Displays the number of transactions that are available for use. 
Consumed transactions	Displays the number of transactions that you have used. 
Applications with most transactions	Displays the applications (scope applications) with most transactions. You can filter the results for specific time period. By default, the last one month's data is displayed. 
Spokes with most transactions	Displays the spokes with most transactions. You can filter the results for specific time period. By default, the last one month's data is displayed.

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Spokes & Transactions (continued)

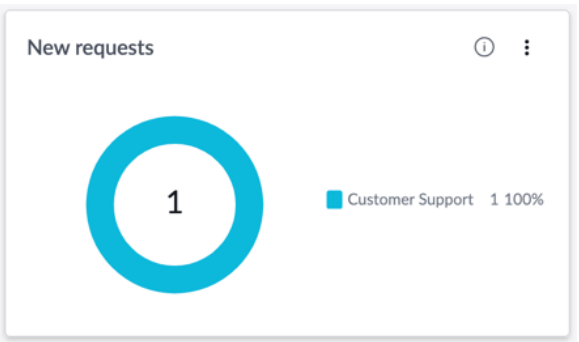
Section	Description
	

Future automations

The Future automations section provides details about all active automations that are planned for the future.

You can filter the data by department. If no department is selected, the data is displayed for all departments.

Future automations

Section	Description
New requests	Displays all automation requests that are in the New state. 
Requests by intake source	Displays all automation requests grouped by intake source, such as Web, Process Mining, or Service Request. 

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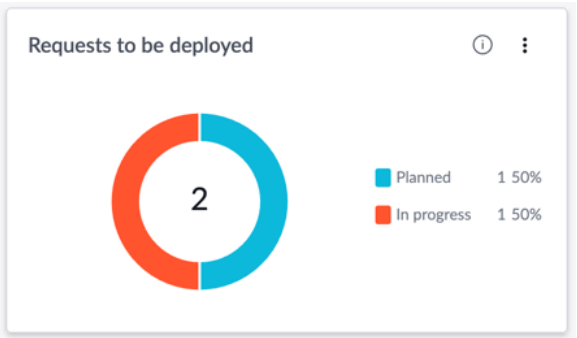
Future automations (continued)

Section	Description
Requests to be deployed	Displays the automation requests ready to be deployed. 
Most recent requests	Lists the automation requests sorted from most recent to oldest. 

Automation Center Executions dashboard

The Automation Center Executions dashboard helps you manage the health of automations in one central place. You can also import automation metrics and data from third-party providers regardless of the technology used.

Executions refer to the times each automation runs.

You can access the Executions dashboard in either of two ways:

- By navigating to **All** > **Automation Center** > **Automation Center Home** and then selecting the **Executions** tab.
- By navigating to **Workspaces** > **Automation Center Workspace** > **Executions**.

Executions dashboard details

The Executions dashboard provides the details about the automation executions in the form of charts and tables. These charts give an overview of the entire execution process.

You can filter all data that is displayed on this page using the four filters available:

- Department
- Automation
- Source
- Application

If you don't specify any filter, then all available data is displayed.

Note: To view the Automation incidents, Automation changes, and Business application changes widgets, in addition to the Automation Center roles you need to have the itil or sn_incident_read and sn_change_read roles.

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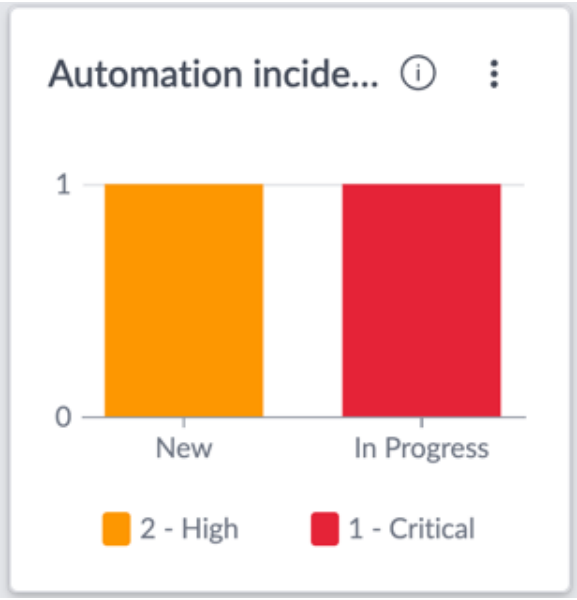
Execution summary

Section	Description
Execution summary by state	This chart displays the execution status of automations in different states. This information helps in understanding the status of the automations. 
Automation incidents	This chart provides information about any incidents that have a direct impact on the automations. For example, if five automations are on hold, this chart lets you know about those five automations. This information enables you to manage the automations better. 
Automation changes	This chart focuses on any change that has a direct impact on the automations.

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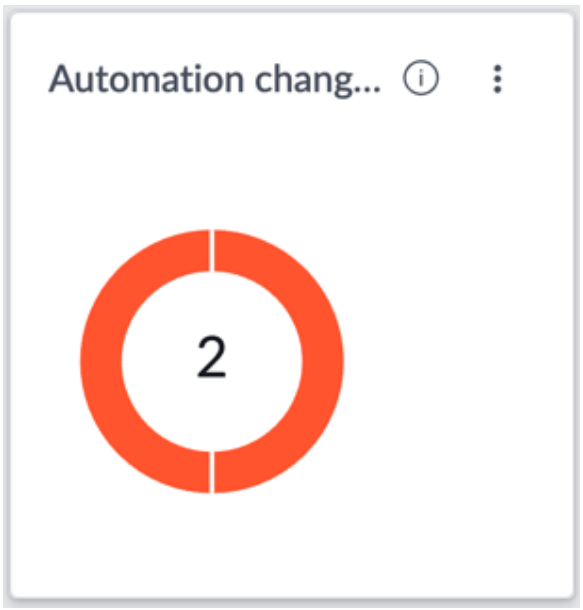
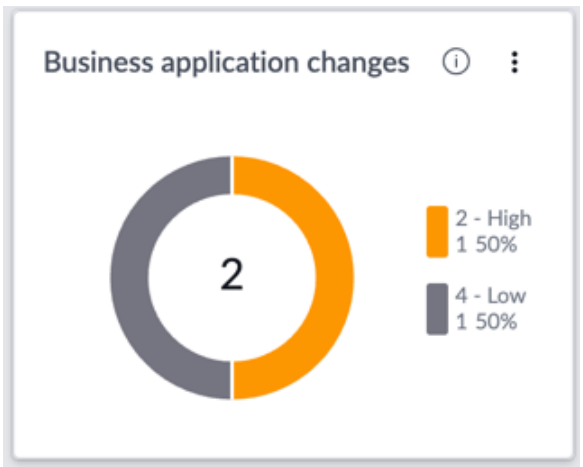
Execution summary (continued)

Section	Description
	
Business application changes	This chart provides information about any change to the business applications that are associated with the automations. 
Execution state over time	This chart provides information about the state of the executions for a time period. There's a date range filter for this chart. If you select a date range, the data is limited to the selected date range, or else the default date range is selected, which is last one week. 

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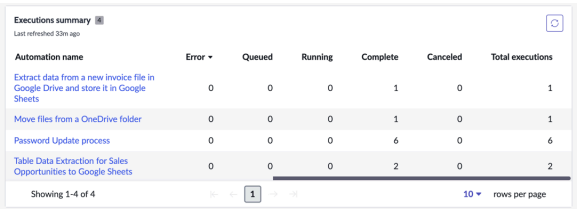
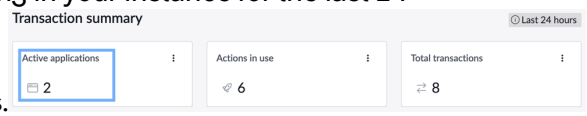
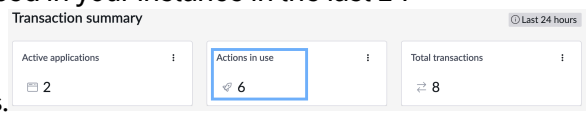
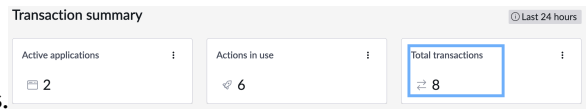
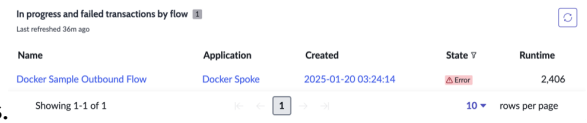
Execution summary (continued)

Section	Description
Execution summary	This chart displays the number of executions and their respective states sorted by automation name. 

Transaction summary

The Transaction summary section displays execution details of the spokes for the last 24 hours.

Execution summary

Section	Description
Active applications	Displays the number of active applications running in your instance for the last 24 hours. 
Actions in use	Displays the number of actions that are used in your instance in the last 24 hours. 
Total transactions	Displays the total number of transactions in your instance in the last 24 hours. 
In progress and failed transactions by flow	Displays all the in progress and failed transactions by flow in your instance in the last 24 hours. 

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Execution summary (continued)

Section	Description
Flow execution status trends	Displays the flow execution trend for all states in your instance in the last 24 hours. 

Insights panel

The Insights panel provides information about insights, which draw your attention to any issues within Automation Center. You can fix the issues or choose to ignore them. If you delay fixing issues, some automations might not behave as expected.

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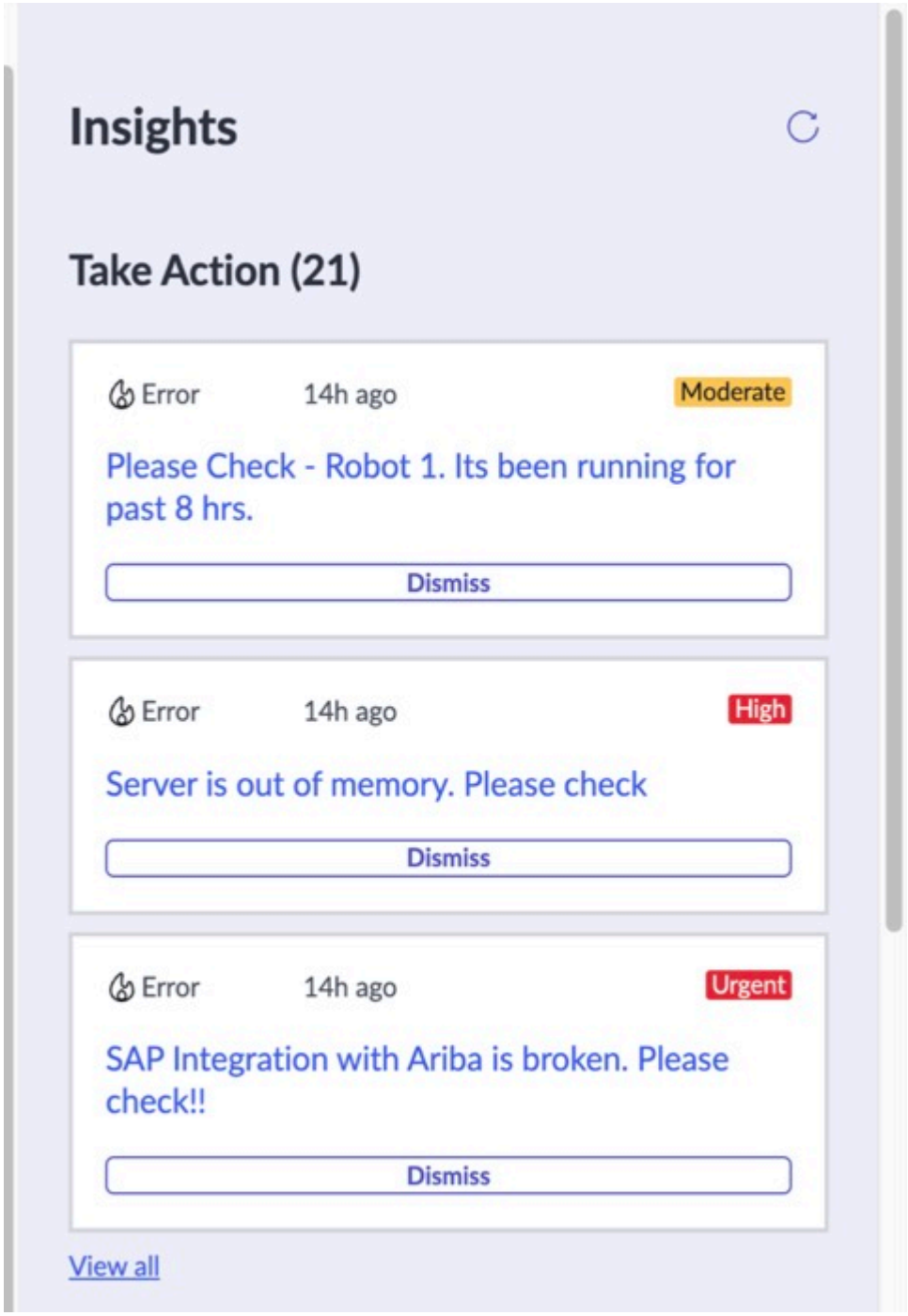
Insights example



Automation Center Value dashboard

The Automation Center Value dashboard provides summary information about the states of goals and automations along with the actual and estimated cost and time saved for all active and future automations.

All widgets under the following sections are available only if the you have the sn_ac.automation_technical_user role:

- Goals chart
- Number of deployed automations under Active automations
- Future automations

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To access all other widgets in the Active automations section, you must associate a domain configuration with a data collection job. For more information see https://www.servicenow.com/docs/bundle/zurich-now-intelligence/page/use/performance-analytics/task/associate-domain-config-dc-job.html.

You can access the Value dashboard in either of two ways:

- By navigating to **All** > **Automation Center** > **Automation Center Home** and then selecting the **Value** tab.
- By navigating to **Workspaces** > **Automation Center Workspace** > **Value**.

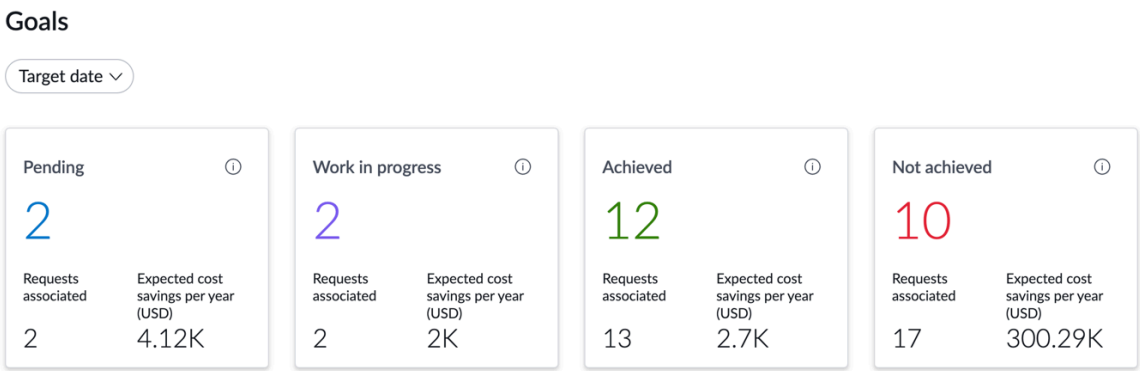
Goals chart

The Goals chart displays the summary of automation goals categorized by their state along with the estimated cost saved per year.

For information about automation goals, see Create an automation goal.

By default, the Goals chart provides details of all automation goals with associated active automation requests for the day you're viewing the data.

Use the **Target date** drop-down list to view goals for a specific period. When you select the **Target date** filter, you can view the calendar of the current and the next month. Date filters are available for Custom range, Last 12 months, Last 6 months, and so on.



Active automations

The Active automations chart displays data for active automations. You can filter the data by date, department, and automation. If no filter is set, the data is displayed for all the data.

Active automations

Section	Description
Total cost saved	This chart displays the total cost saved for the selected date range, department, and automation. **Note:** Selecting the Total cost saved widget opens the Analytics Hub KPI Details widget in a new tab.

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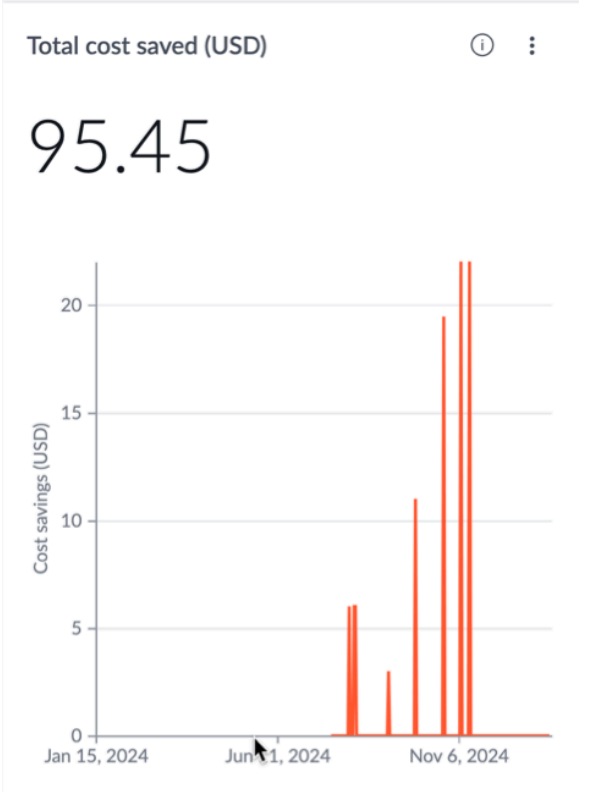
Active automations (continued)

Section	Description
	
Total time saved	his chart displays the total time saved for the selected date range, department, and automation. **Note:** Selecting the Total time saved widget opens the Analytics Hub KPI Details widget in a new tab.

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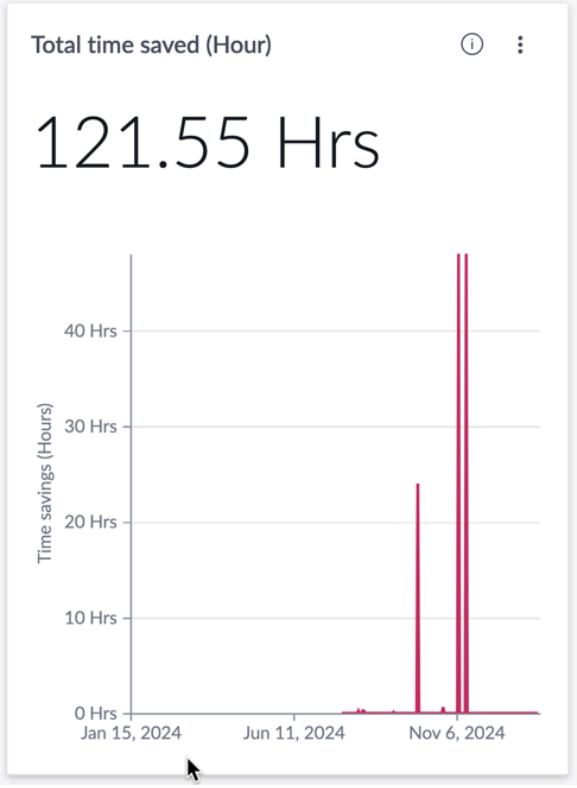
Active automations (continued)

Section	Description
	
Number of deployed automations	This chart displays the total number of deployed automations for the selected date range, department, and automation. It also compares the data with the previous cycle. The previous cycle has the same duration as the current cycle. For example, if the current cycle is January 1, 2021, to March 31, 2021, the previous cycle would be October 1, 2020, to December 31, 2020. 

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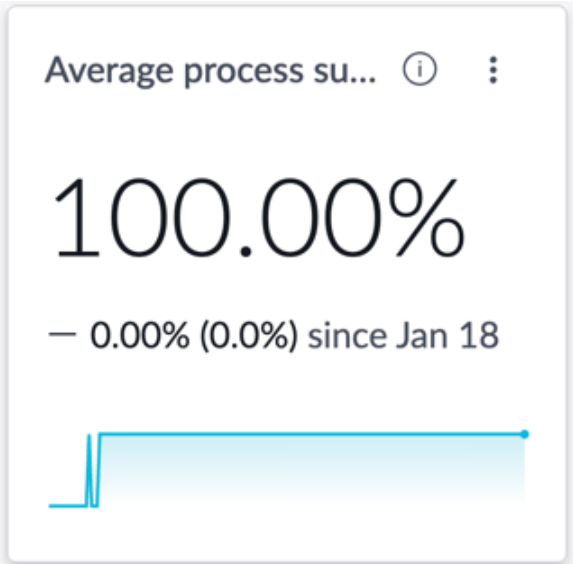
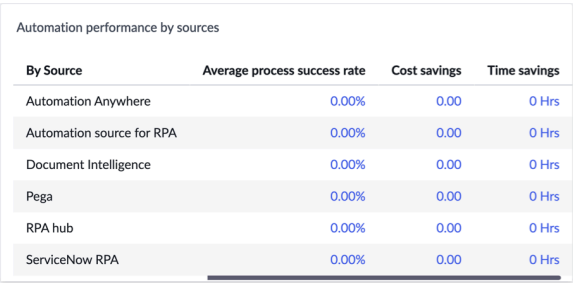
Active automations (continued)

Section	Description
Average process success rate	This chart displays the average process success rate for the selected date range, department, and automation. The success rate is calculated from the total executions within the selected date range that have the states Complete, Error, and canceled divided by the executions that completed with no errors. It also compares the data with the previous cycle. The previous cycle has the same duration as the current cycle. For example, if the current cycle is January 1, 2021, to March 31, 2021, then the previous cycle would be October 1, 2020, to December 31, 2020. 
Automation performance by sources	This chart displays automation performance by sources, such as ServiceNow RPA, flows, and other third-party automation vendors for the selected date range, department, and automation. **Note:** You can get data for a maximum of 20 sources. 

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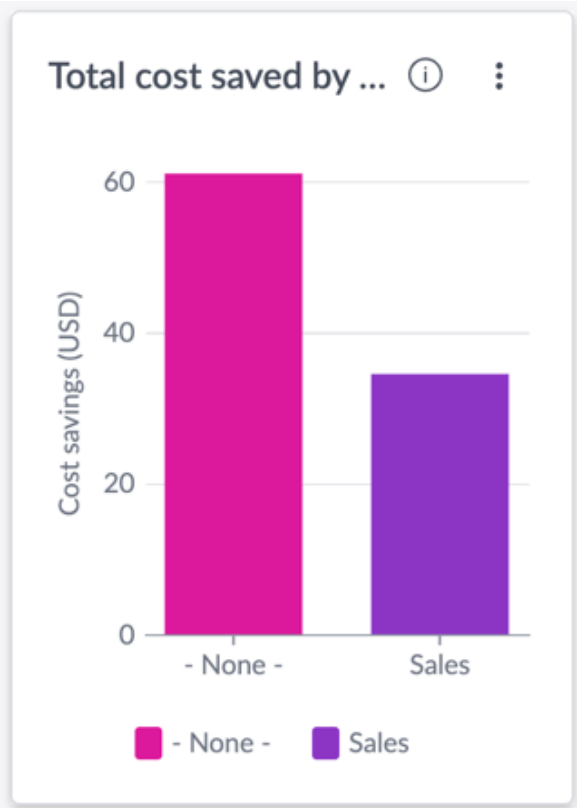
Active automations (continued)

Section	Description
Total cost saved by department	This chart displays the cost savings per run per department for the selected date range. 
Total time saved by department	This chart displays the time savings per run per department for the selected date range.

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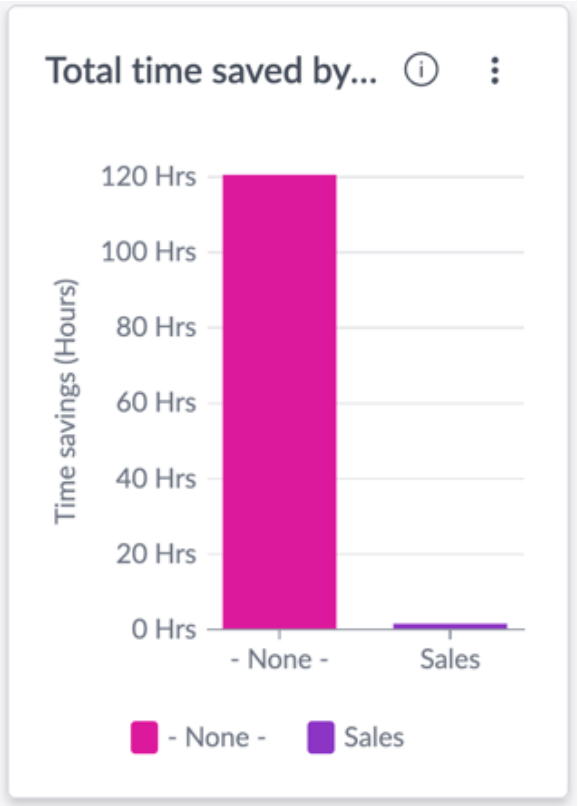
Active automations (continued)

Section	Description
	

Note: A lag in the Performance Analytics data collection could cause a delay in the date that is displayed in the Analytics Hub.

Future automations

The Future automations section displays the estimated cost savings and time savings of future requests per year.

Use the **Intake source** and **Goal** filters to limit your results to a specific intake source or goal.

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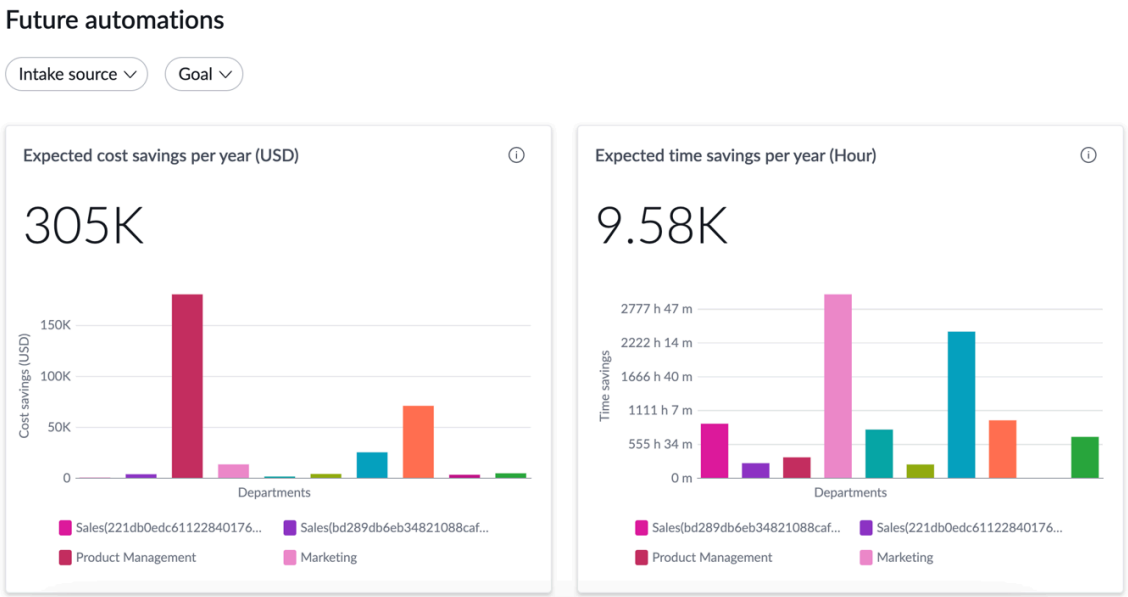

Automation Center Kanban board

The Automation Center Kanban board provides an easy access to view and manage automation requests and automation tasks.

The Automation Center Kanban board provides the following benefits:

- Viewing all automation requests and automation tasks of all states in one place.
- Ease of updating the state of an automation request or automation task.
- Create a task for an automation request.

Manage automation requests

Manage all automation requests from one location from the Request Board in the Automation Center Kanban board.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Note: Kanban board does not display any automation request from demo data. If you want to view the demo data in Kanban board, then you must run the fix script. For more information, see Run fix script to view demo data on Kanban board.

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
   The Automation Center dashboard is displayed.
2. Select the Kanban board icon .
   The Kanban board is displayed with the Request Board in view. You can view all the available automation requests with their states.

   Note: A maximum of 200 automation requests are available on the Request Board. This value can be changed only by someone with the sn_ac.automation_admin or sn_ac.automation_technical_user role.

   Also, anyone with the sn_ac.automation_admin or sn_ac.automation_technical_user role can reorder different states (columns) on the Request Board to set the lifecycle or process flow direction according to their requirement by editing the vtb_board table.

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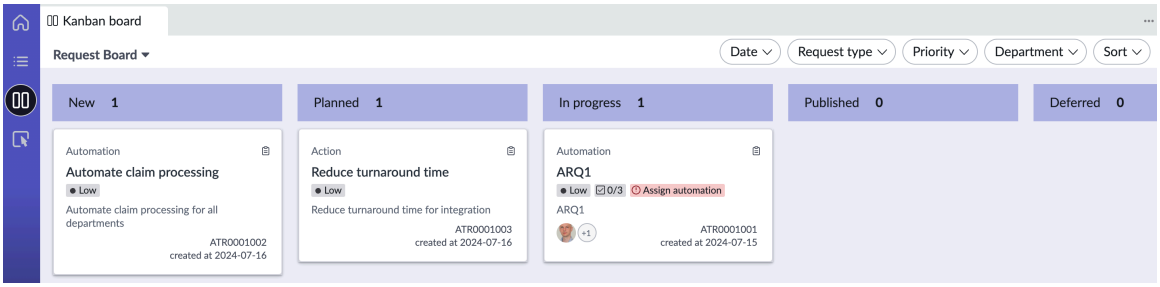


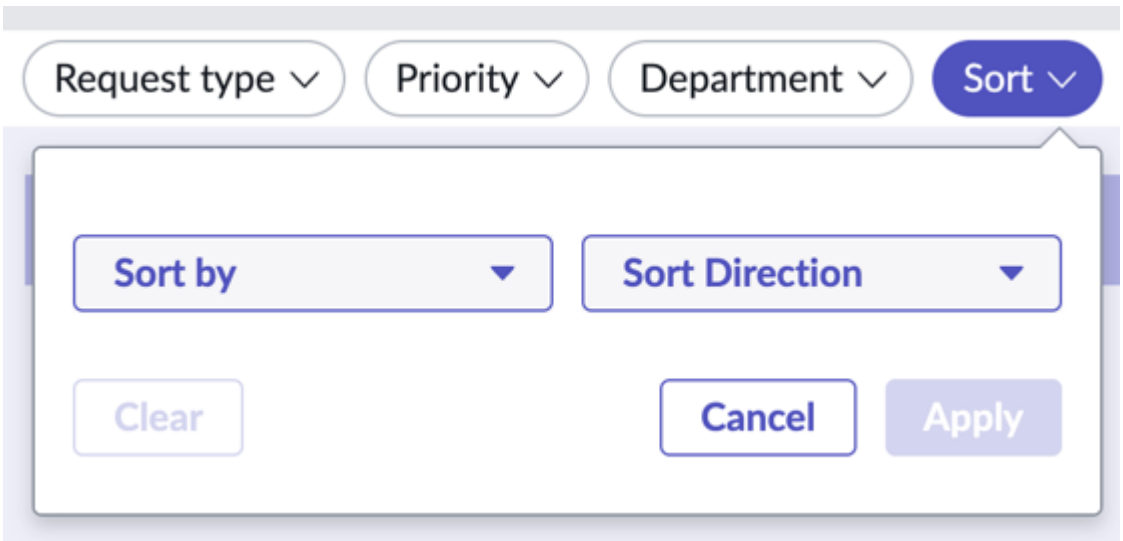
3. You can do multiple actions on the Request Board.

- Filter the automation requests to match your need.

  Filter the automation requests based on the following:

  - **Date**: Select any date range to view automation requests created during that period.
  - **Request type**: Select the type of request you want to view. You can choose to view automation requests, action requests, or review requests.
  - **Priority**: Select one or more priority values to view automation requests with those priority value.
  - **Department**: Select one or more departments to view automation requests that belong to the selected departments.

- Sort the automation requests for ease of use.



  Select **Name**, **Priority**, or **Score** from the **Sort by** field.

  Select **Ascending** or **Descending** from the **Sort Direction** field.

  The automation requests are sorted based on the selected sorting options.

- Change the state of an automation request.

  To move an automation request from one state to another, drag the card to the required state column.

  When you don’t follow the happy path, error messages are displayed and you're guided to fix the issue.

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If a sorting is applied, the automation request card is placed according to the sorting. If no sorting is applied, the automation request card is placed based on the creation date.

- Create a task from the automation request card.

  a. Select the task icon ( ) from the automation task card.

  The Task Board for the automation request is displayed.

  b. Select the **Add Task** icon.

  The **Create New Automation Task** form is displayed. For more information, see Automation task form.

  Verify that the associated automation request is either in the **Planned** or **In Progress** state.

- View if an automation request has a task assigned to it. If yes, then how many tasks have been completed.
- View if an automation request has automations associated with it.
- View details of the automation request and create tasks.

  a. Double-click a request that is in **Planned** state or any state after that.

  The contextual panel opens to the right of the screen.

  b. View any details or comments in the **Details** and **Comments** tab of the contextual panel.

  c. In the **Tasks** tab, select the **Add Task** button.

  The **Create New Automation Task** form is displayed. Provide the details. For more information, see Automation task form.

Run fix script to view demo data on Kanban board

To view automation requests from the demo data in your Kanban board, you must run the fix script.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **System Definition** > **Fix Scripts**.
2. Open the Sync VTB Board.
3. Select **Run Fix Script**.
   You can run the fix script in the background or just proceed. After the fix script is run, you can view the demo data automation requests in the Kanban board.

Manage automation tasks

Manage all tasks associated with the automation requests from one location from the Task Board in the Automation Center Kanban board.

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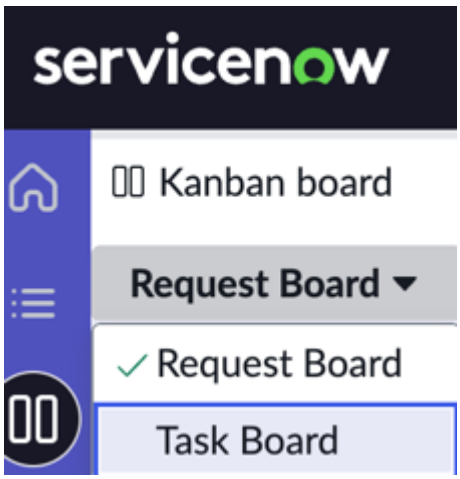
Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Procedure

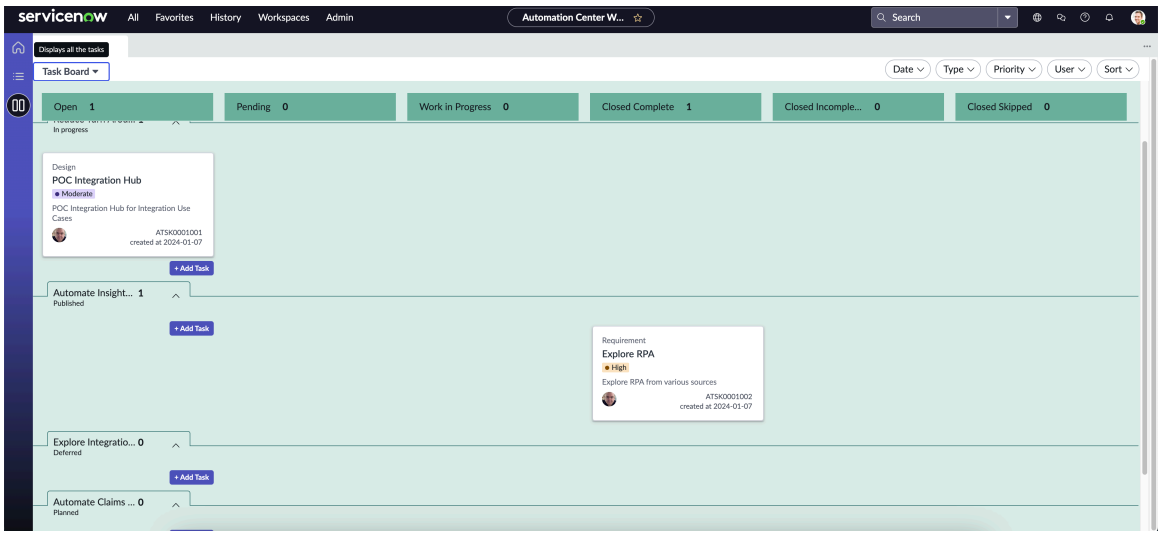
1. Navigate to **Workspaces** > **Automation Center Workspace**.
   The Automation Center dashboard is displayed.
2. Select the Kanban board icon .
   The Kanban board is displayed with the Request Board in view.
3. Select **Task Board** from the list view.



The Task Board is displayed with all available tasks and their states.

Note: A maximum of 2000 tasks are available on the Task Board. This value can be changed only by the System Administrator.

Also, anyone with the sn_ac.automation_admin or sn_ac.automation_technical_user role can reorder different states (columns) on the Task Board to set the lifecycle or process flow direction according to their requirement by editing the vtb_board table.



4. You can do multiple actions on the Task Board.
   - Filter the tasks to match your need.

     Filter the tasks based on the following:

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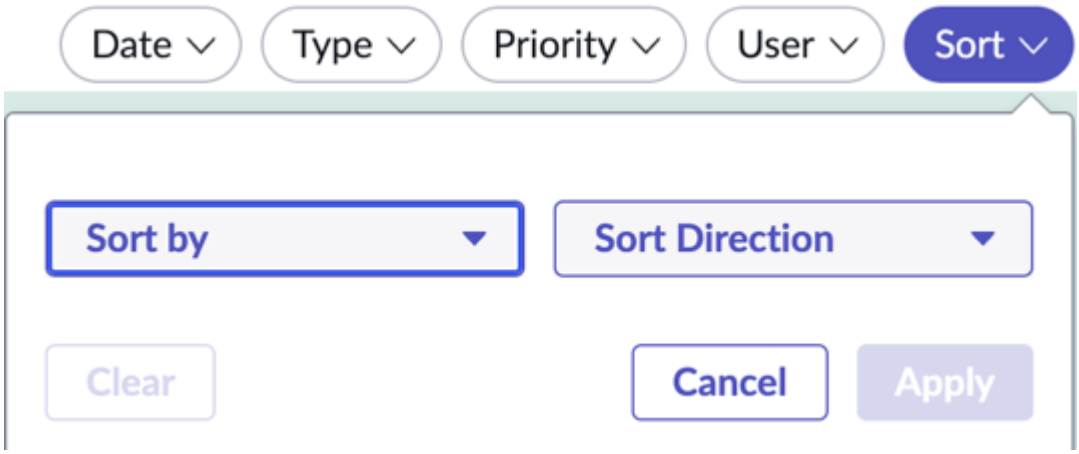
- **Date**: Select any date range to view tasks created during that period.
- **Type**: Select one or more types of tasks to view tasks that belong to the selected types.
- **Priority**: Select one or more priority values to view tasks with those priority values.
- **User**: Select one or more users to view tasks assigned to only those users. Only users who have been assigned a task are available for selection.

- Sort the tasks for ease of use.



  Select **Name**, **Priority**, or **Score** from the **Sort by** field.

  Select **Ascending** or **Descending** from the **Sort Direction** field.

  The tasks are sorted based on the selected sorting options.

- Change the state of a task.

  To move a task from one state to another, drag the card to the required state column.

  If a sorting is applied, the task card is placed according to the sorting. If no sorting is applied, the task card is placed based on the creation date.

- Create a task from the automation task card.

  Select the **Add Task** icon.

  The **Create New Automation Task** form is displayed. Provide the details. For more information, see Automation task form.

  Verify that the associated automation request is either in the **Planned** or **In Progress** state.

Action Center

Action Center provides an easy way to fix repeated issues that cause automations to fail in Automation Center.

Action Center provides the following benefits:

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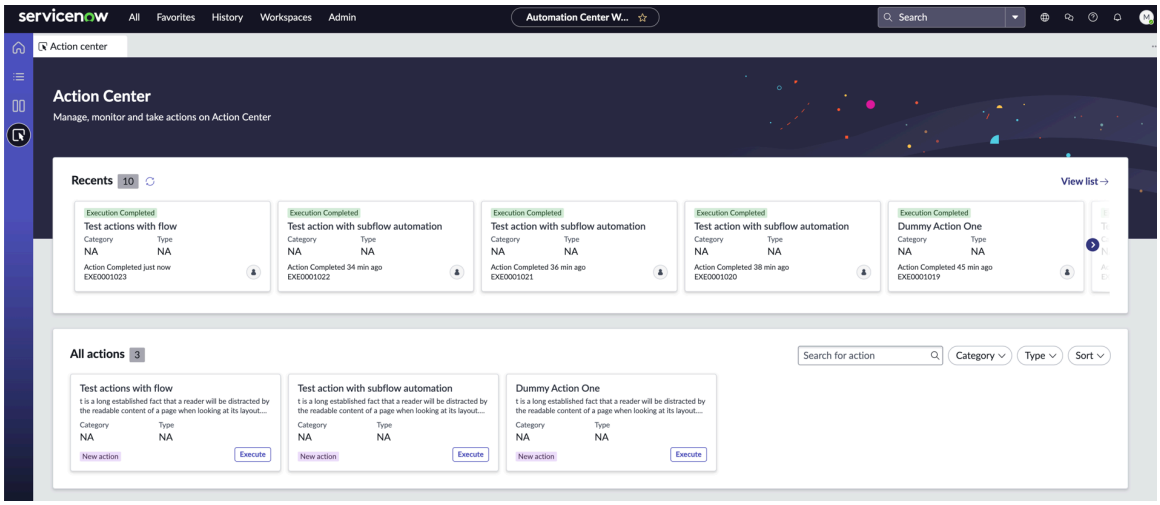
- Manage and execute actions to solve issues that cause automations to fail.
- Fix common repeated issues without any dependence on the administrator.
- Business users can initiate actions to fix issues directly from Action Center without navigating to other technology platforms, such as Workflow Studio, ServiceNow® Robotic Process Automation, or UiPath.



For detailed information, see Working with actions.

Connection Manager

Connection Manager enables you to add data from a third-party tool into Automation Center tables by correctly mapping and testing the data import.

Connection Manager helps you to add data from a third-party tool into Automation Center tables efficiently and in a few clicks.

For detailed information, see Working with Connection Manager.

Migration accelerator

Migration accelerator enables seamless, low-effort, cost-efficient migration of UiPath, Blue Prism, and Automation Anywhere automations to ServiceNow RPA Hub. It's a solution that minimizes downtime, maximizes reuse, and accelerates time-to-value.

For detailed information, see Migrating automations from third-party applications to RPA Hub.

Configuring Automation Center

You can plan and configure an Automation Center implementation in your organization.

Install Automation Center

If you have the admin role, you can install the Automation Center application (sn_ac). The application includes demo data and installs related ServiceNow® Store applications and plugins if they aren't already installed.

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Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the Automation Center application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin

About this task

The following items are installed with Automation Center:

- Plugins
- Store applications
- Roles
- Scheduled jobs
- Tables

For more information, see Components installed with Automation Center.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Automation Center application (sn_ac) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you can't find the application, you might have to request it from the ServiceNow Store.

   In the list next to the **Install** button, the versions that are available to you're displayed.
3. Select a version from the list and select **Install**.

   In the Review Installation Details dialog box, any dependencies installed with your application are listed.
4. If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies.
5. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
6. Select **Install**.

What to do next

The data in Automation Center Value dashboard is derived from the Performance Analytics (PA) tables. The PA jobs are scheduled to run at a specific time in the day. If you want to view the data immediately after the installation and before the scheduled run, then you have to manually run the PA jobs.

Configuring automation summary execution

Configure the execution summary of automation to specify how automation data is aggregated and presented on the Automation Center dashboard.

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You can import and configure data from various sources, such as RPA, ServiceNow flows, Document Intelligence (DocIntel), and others to view in the Automation Center dashboard.

Earlier, for data of different data sources different types of summarization was required. It was time-consuming. However, now there's a generic way to make updates to automation summary execution for data from different sources.

Create automation source type

Define the kind of source type that you want to import and use in Automation Center.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Administration** > **Automation Center** > **Automation Source Type**.
   The Automation source types page is displayed with a list of existing automation source types.
2. Select **New**.
   The Automation source types page is displayed.
3. Provide a name and description.
4. Select **Submit**.
   The Automation source types page is displayed with the newly created automation source type along with the other automation source types.

What to do next

Create automation source

Create automation source

Associate a data source for the selected source type.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Admininstration** > **Automation Center** > **Automation Source Type**.
   The Automation source types page is displayed with a list of existing automation source types.
2. Select the source type for which you want to create a source.
   The Automation source type page is displayed with the details of the source type.
3. Select **New** in the Automation Sources section.
   The Automation Source form is displayed.
4. On the form, fill in the fields.

Automation Source form

Field	Description
Name	Display name of the automation source. This name is displayed in the Automation Center dashboard.
Application	The associated application or the application scope in which the source is being created, such as Automation Center or RPA Hub. This is auto-populated.
Source Type	The source type for which you are creating the source. You can edit this field if required.

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Field	Description
Internal name	Automation source internal name. You can edit this field. Ensure that there are no spaces when you enter a value. This field is auto-generated.
Description	Description of the automation source.

5. Select **Submit**.

Note: One automation source type can have multiple sources associated with it.

What to do next

Configure execution summary

Configure execution summary

Configure the execution summary with the appropriate conditions.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Administration** > **Automation Center** > **Automation Sources**.
   The Automation sources page is displayed with a list of existing automation sources.
2. Select the source for which you want to configure the execution summary.
   The Automation source page is displayed with the details of the source.
3. Select **New** in the Execution Summary Configurations section.
   The Execution summary configuration form is displayed.
4. On the form, fill in the fields.

Execution summary configuration form

Field	Description
Automation source	The automation source that you've selected. This field is auto-populated.
Application	The associated application or the application scope in which the source is being created, such as Automation Center or RPA Hub. This field is auto-populated.
Table	The table from where you must import data.
State	The state of the execution summary configuration. This field is auto-populated.
Automation	The automation field from the selected table.
Group by	A field from the chosen table that you want to use to group the records.
Start date	Start time of the summary configuration.
End date	End time of the summary configuration.
Trigger type	An action that triggers the flow. The following values are available for trigger:

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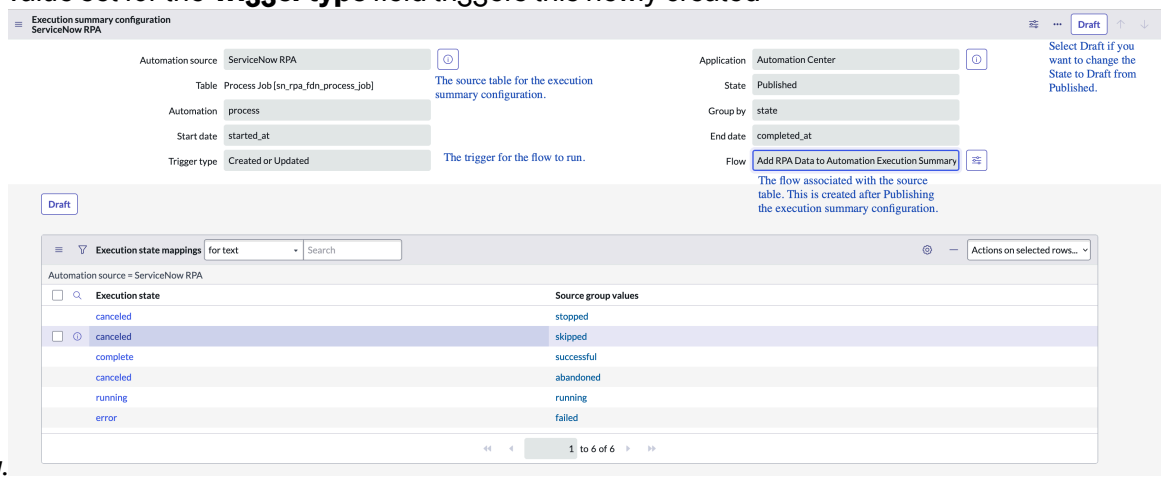
Field	Description
	○ Created: Every time a record in the source table is created. ○ Updated: Every time a record in the source table is updated. ○ Created or Updated: Every time a record in the source table is created or updated. ○ Daily: Scheduled to run daily. ○ Weekly: Scheduled to run weekly. ○ Run once: Scheduled to run only once. ○ Monthly: Scheduled to run monthly. These triggers can be set in the associated flow.

5. Select **Submit**.
   You're taken to the previous page. When an execution summary configuration is created, a flow is automatically created to match the configuration. The value set for the **Trigger type** field triggers this newly created flow.



6. Select the summary configuration in the Execution Summary Configurations section.

   Note: One automation source can have only one execution summary configuration.

7. Select **Update**.

   Note: If you want to change the state of the execution summary from **Published** to **Draft**, select **Draft** at the top right of the page.

What to do next

Create execution state mapping

Create execution state mapping

Define the mapping for the source and target tables for the configuration to work as expected.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

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Procedure

1. Navigate to **All** > **Automation Center** > **Administration** > **Automation Sources**.
   The Automation sources page is displayed with a list of existing automation sources.
2. Select the source for which you want to create the execution state mapping.
3. Select the execution summary configuration for which you want to create the execution state mapping.
4. Select **New** in the Execution state mappings section.
   The Execute state mapping page is displayed.
5. On the form, fill in the fields:

Execute state mapping form

Field	Description
Execution state	Options for the **State** field of the Automation Execution Summary table. The following values are available: ○ Canceled ○ Complete ○ Error ○ Queued ○ Running
Application	The associated application or the application scope in which the source is being created, such as Automation Center or RPA Hub. This field is auto-populated.
Source group values	Options for the "group by" field of the source.
Automation source	Name of the automation source that you've selected for this execution state mapping.

6. Select **Submit**.
   You're taken to the Execution summary configuration page.
7. Select **Publish**.

Result

The automation summary execution configuration is complete.

Track ServiceNow flows and actions as automations

Track ServiceNow flows and actions as automations so you can view summary and detailed information of the flows and actions in the Automation Center Workspace.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

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Procedure

1. Navigate to **All** > **Automation Center** > **Administration** > **Automation Tracker**.
2. On the Automation Tracker page, select **New**.
3. On the form, specify the flow or action that you want to track as automation.
4. Select **Submit**.

Result

Refresh the Automation Trackers list to view the newly created automations.

Configuring UiPath with Automation Center

Easily view and analyze UiPath data from Automation Center.

You can view and analyze UiPath data in Automation Center using the *Automation Center* API and UiPath spoke. However, using UiPath spoke is more efficient and less time-consuming.

Before configuring UiPath with Automation Center, you must install the UiPath spoke on your instance. For more details, see UiPath spoke.

After the UiPath spoke is installed, the following two options are available:

- UiPath Webhook Registries
- UiPath WebHook Routing Policies

If an issue occurs while processing the UiPath data, an error message along with the actual payload is inserted as a record in the Import Error Log [sn_ac_import_error_log] table.

Note: The number of days the error records will be stored in the table is defined in the Automation Center purge system property (sn_ac.purge_automation_data_in_days).

Create UiPath webhook registry

Create UiPath webhook registries to establish a connection between UiPath and Automation Center.

Before you begin

Role required: none

Procedure

1. Navigate to **All** > **UiPath** > **UiPath Webhook Registries**.
2. On the UiPath Webhook Registries form, select **New**.
3. On the form, fill in the fields.
4. Select **Submit**.
   The record is created.
5. Open the record, select **Generate Callback URL** and **Secret**.
6. Copy the URL and secret and paste it in the Webhook section of the UiPath Orchestrator.
7. In the UiPath Orchestrator interface, select the events that you want to track.
   Currently, only **Job**, **Robot**, and **Process** events are supported.
8. Select **Submit**.

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Result
The connection is set between UiPath and Automation Center. Whenever you send UiPath data to the instance, it happens via the URL provided. UiPath spoke validates the secret and accepts the data.

Set UiPath WebHook routing policies

Set the UiPath WebHook routing policies to enable the data to get populated in the ServiceNow tables, and then used by Automation Center.

Before you begin
Role required: none

Procedure

1. Navigate to **All** > **UiPath** > **UiPath WebHook Routing Policies**.
2. Turn the **Active** flag for the routing policy to **True**.
   When UiPath data comes to the ServiceNow instance, these routing policies take care of triggering the corresponding flows to store data in ServiceNow tables. By default, the flag is set to **False**.

Tracking third-party automations

Track any third-party automations in Automation Center.

In Automation Center you can track any third-party automations. You can do that by using the `Automation Center` API.

For more information, see Automation Center API .

Customize the layout for an automation request form

Change the layout of the automation request form from the Service Catalog to meet the requirements of your organization requirements.

Before you begin
Role required: sn_ac.automation_admin

About this task
In this task, you can change the layout of the automation request form generated by navigating to **All** > **Automation Center** > **Build** > **Submit an Automation Request**.

Procedure

1. Navigate to **All** > **Automation Center** > **Administration** > **Modify catalog for Automation Request**.
2. **Optional:** On the form, if Global is the current application, select **here** in **To edit this record click here**.
3. Make the required changes.
   For example, in the Variables related list, if you want to change the **Process Name** field to **Process**, double-click the **Process Name** field, make changes, and then select **Save**.
4. Select **Update**.

Set Automation Center Properties

You must set the properties to define the default settings that are required for Automation Center.

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Before you begin
Role required: admin

You must be in the same scope in which the record exists.

Procedure
1. Navigate to **All** > **Automation Center** > **Administration** > **Automation Properties**.
2. **Optional:** If the form isn't editable, ensure that the Application scope you are in is same as the one where the record is.
   If the form isn't editable, a message is displayed. Follow the message to change the Application scope.
3. On the form, fill in the fields.
   For a description of the field values, see Automation Center properties.
4. Select **Save**.

Configuring the Recommended Actions application with Automation Center

Configuring the Recommended Actions application to work with Automation Center enables you to reuse an existing request or plan your automation request based on an existing request.

Configuring the Recommended Actions application with Automation Center involves the following tasks:

Install Recommended Actions application

Install the Recommended Actions application to use its capabilities.

Before you begin
Role required: admin

Procedure
1. Find the#ServiceNow Recommended Actions application in store.
   Available in store with name - **Recommended Actions** and **Recommended Actions - Advanced**. You must install **Recommended Actions - Advanced** to get ML capabilities.
2. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
3. Select **Install**.

Set the Recommended Actions application system properties

Set the system properties for the Recommended Actions application to view the recommendations in the contextual panel of the Automation Center Workspace.

Before you begin
Note: In the recommendations list, only automations that are in Published and In-maintenance state are displayed and automation requests in all states except Publish state are displayed.

Role required: admin

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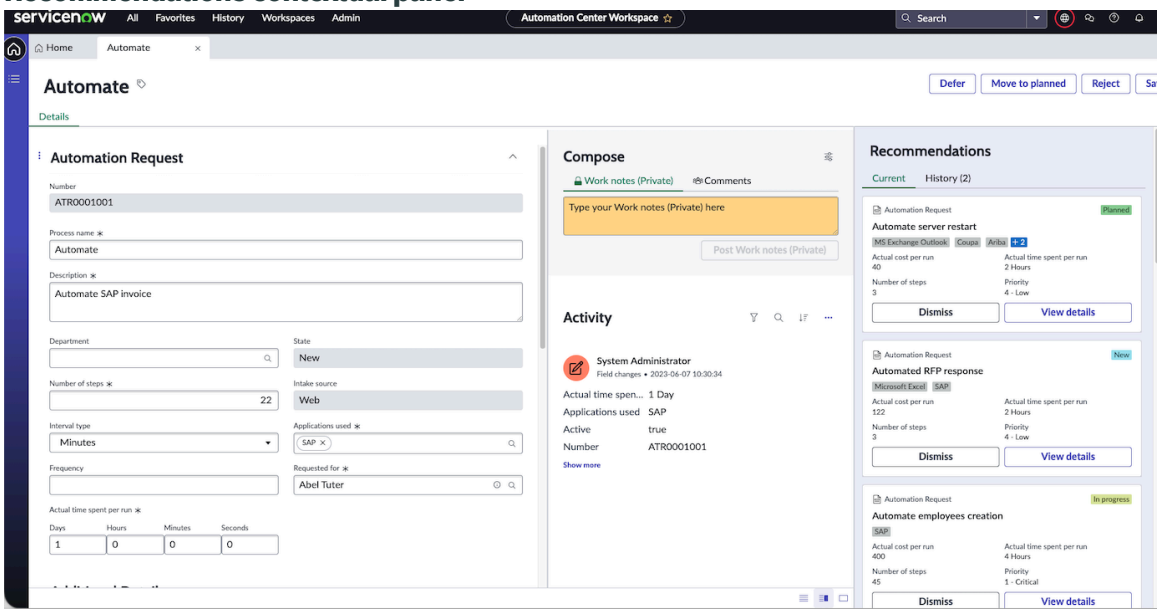
Procedure

Set the system property, **sn_ac.use_recommended_actions**, to **True**.

Result

The Recommendations contextual panel is displayed in the Automation Center Workspace.

Recommendations contextual panel



- Recommendations will be displayed in the contextual panel of the automation request record.
- Select **Dismiss** to remove the recommendation from the list.
- Select **View details** to view the details of the recommendation.
- If more than three applications are used for an automation request, then three are listed, and the rest are displayed as numbers. When you select **View details**, you can see all the applications used.
- All other details of the recommended automations and automation requests, such as state, actual cost, and actual time are also displayed.

Select option for Recommended Actions application

There are two options for the Recommended Actions application: String-based and ML-based. These options decide the kind of data that you get for your search. It displays data about automations in all states except the **Published** state.

Before you begin

Install the Recommended Actions application. For more information, see Install Recommended Actions application.

Recommended Actions searches for matching string in **Process name**, **Description**, and **Applications used** fields of the Automation requests form, and **Automation name**, **Description**, and **Source** in the Automation Attribute table.

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- String-based: Searches for the exact string in the same order as in the search criteria.

  This is a good option if you want to use short phrases or single words as your search criteria. By default, this option is enabled.

- ML-based: This is helpful if you have too much data and your search criteria is long. To use the ML-based recommendations, you need at least 10 records in Automation Center.

Role required: sn_ac.automation_technical_user and sn_nb_action.next_best_action_author

Procedure

1. Navigate to **All** > **Recommended Actions** > **Recommendations**.
2. Mark the **Active** flag to **true** for the required options.

   Note: To identify the options, check the names. The names that have **ML** appended at the end are for ML-based recommendations.

3. If you have chosen ML-based option, then perform the following steps:
   a. Navigate to **All** > **Predictive Intelligence** > **Similarity** > **Solution** > **Definition**.
   b. Open **Automation request process name similarity** and **Automation attribute automation name** separately.
   c. Select **Update & Retrain** for each one of them.
   After selecting **Update & Retrain**, the training will start in the scheduler. After it's complete, it displays **Solution complete**.

Working with ServiceNow Spotlight feature

Use the ServiceNow Spotlight feature to auto-calculate automation request scores. Scores define the execution priority of the automation request. The higher the score, the higher the priority of the automation request.

ServiceNow Spotlight calculates scores when an automation request is created or updated. It's calculated only when the automation request is in the **New** or **Deferred** state.

If there's any special need to have a different score than the auto-computed score, you can manually update the **Score** field. When you do that:

- The flag **Score manually altered** is turned on.
- The Spotlight score is computed and calculated in the **Score auto calculated** field.

You can switch over to using computed score by emptying the **Score** field or setting it to 0. After you save the request record, the system will populate the Spotlight score (if any) in the **Score** field.

Configuration Settings for ServiceNow Spotlight

To use the ServiceNow Spotlight feature, set the configuration settings.

If ServiceNow Spotlight and Automation Center are installed, you get the following system properties, scheduled job, and Spotlight group:

- System properties: sn_ac.use.spotlight.score.for.requests, sn_ac.use.spotlight.group.for.requests

  For detailed description of the system properties, see Automation Center properties.

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- Scheduled job: **Automation Center: Copy spotlight score into request**

  For detailed description, see Components installed with Automation Center.

- Spotlight Group: If ServiceNow Spotlight is enabled, you have the Spotlight group named "Automation request group" with default Spotlight criteria set up.

  ```
  /spotlight_groups.do?sys_id=e037711dc3a11110995486d91840dd03
  ```

  If you need a different criteria than the default criteria to set your execution priority, then you can customize the criteria to meet your requirements and create a new Spotlight group. For more information, see Create a Spotlight group

  For details about the default Spotlight criteria, see Default criteria.

Default criteria

ServiceNow Spotlight is available with default criteria. Each field provides a score based on the default criteria.

The default ServiceNow Spotlight criteria are given in the following tables.

Actual cost per run

Criteria	Score
Greater than 5000	500
Greater than 2500, and less than 5000	150
Greater than 0, and less than 2500	30

Users benefited

Criteria	Score
Greater than 500	500
Greater than 250, and less than 500	60
Greater than 0, and less than 250	25

Priority

Criteria	Score
Critical	1500
High	800
Moderate	45
Low	20

Manual steps (%)

Criteria	Score
76%-100%	150

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Manual steps (%) (continued)

Criteria	Score
51%-75%	100
26%-50%	80
1%-25%	40

Business criticality declared

Criteria	Score
1-most critical	750
2-somewhat critical	450
3-ess critical	80
4-not critical	20

Set up ServiceNow Spotlight

Set up ServiceNow Spotlight to start using and getting the benefits of this feature. The Spotlight feature automatically calculates the execution priority of the automation requests.

Before you begin

Install ServiceNow® Spotlight. For more information, see the ServiceNow Spotlight documentation.

Role required: admin, pa_spotlight

Procedure

1. Turn on the usage of ServiceNow Spotlight by setting the system property, *sn_ac.use.spotlight.score.for.requests*, to **True**.
   /sys_properties.do?sys_id=2df8d6a3c3651110995486d91840dd65
2. If there are existing automation requests, execute the fix script: Initial setup of Automation Request Rank.
   /sys_script_fix_list.do?sysparm_query=nameLIKEsetup%20of%20automation%20request

   Note: At the end of this step, ideally there should be no records in this URL: /sn_ac_automation_request_list.do?sysparm_query=rankISNOTEMPTY%5EstateNOT%20IN3000%2C6000
3. Execute the Spotlight group: **Automation request group**.
   To do so, select the **Execute Now** button in the Spotlight group page. This action populates the Spotlights related list at the bottom of that Spotlight group page. /spotlight_groups.do?sys_id=e037711dc3a11110995486d91840dd03
4. Copy the initially computed scores to the requests using the scheduled script execution: **Automation Center: Copy spotlight score into request**.
   To do so, select the **Execute Now** button in the Scheduled Script Execution page. /sysauto_script.do?sys_id=d361d79dc3a11110995486d91840dd37

Applying Common Service Data Model guidelines to Automation Center

Apply Common Service Data Model (CSDM) to Automation Center.

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CSDM is the data framework that you follow when you set up ServiceNow products and applications. You adhere to the CSDM guidelines when you define configuration items (CIs) and relationships between CIs in the CMDB. This process ensures that your data resides in the appropriate CMDB tables for maximum value from your ServiceNow AI Platform applications.

CSDM is the data model standard for all products that use the Configuration Management Database (CMDB).

- The CSDM guidelines ensure unified data access for ServiceNow AI Platform products.
- The CSDM gives you clear direct prescriptive guidelines for service modeling within the CMDB.
- CSDM terms and definitions ensure consistent and accurate service reporting.
- The CSDM data model supports multiple configuration strategies and includes guidelines for using base-system tables and relationships.
- You can use the CMDB query builder to create reports showing CMDB configuration items (CIs) and their relationships.

For more information, see Common Service Data Model.

Automation Center product view

Use the ServiceNow® Automation Center application to govern your end-to-end multi-vendor automation life cycles from one place. By using real-time dashboards, you can manage and measure the health of the automation and prevent automation failures across multiple vendors.

- Discover, prioritize, and manage automation requests from different sources through the full life cycle in Automation Center workspace.
- Oversee and optimize automation performance versus business goals across multiple vendors.
- Monitor and manage the health of the automation and prevent automation failures across multiple vendors.

Automation Center and CSDM tables

Automation Center uses CSDM tables. Several ServiceNow products benefit from and add value to Automation Center.

CSDM tables used by Automation Center

- cmdb_ci: Stores all automations before they are displayed in the Automation Center dashboard.
- cmdb_ci_automation: Stores automations from cmdb_ci_flow_automation, cmdb_ci_base_rpa_process, and cmdb_ci_rpa_process.
- cmdb_ci_flow_automation: Stores flows that are tracked as automations.
- cmdb_ci_base_rpa_process: Stores third-party Robotic Process Automation data.
- cmdb_ci_rpa_process: Stores ServiceNow Robotic Process Automation data.
- cmdb_ci_base_rpa_robot: Stores third-party robot data.
- cmdb_ci_rpa_robot: Stores ServiceNow robot data.

Products that add value to Automation Center

When you use Automation Center with any of the following ServiceNow products, you increase the value you get from Automation Center:

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- Robotic Process Automation
- Integration Hub
- Document Intelligence

Automation Center use cases

Automation Center enables you to manage your automations from one central place.

You can create automations in the following ways:

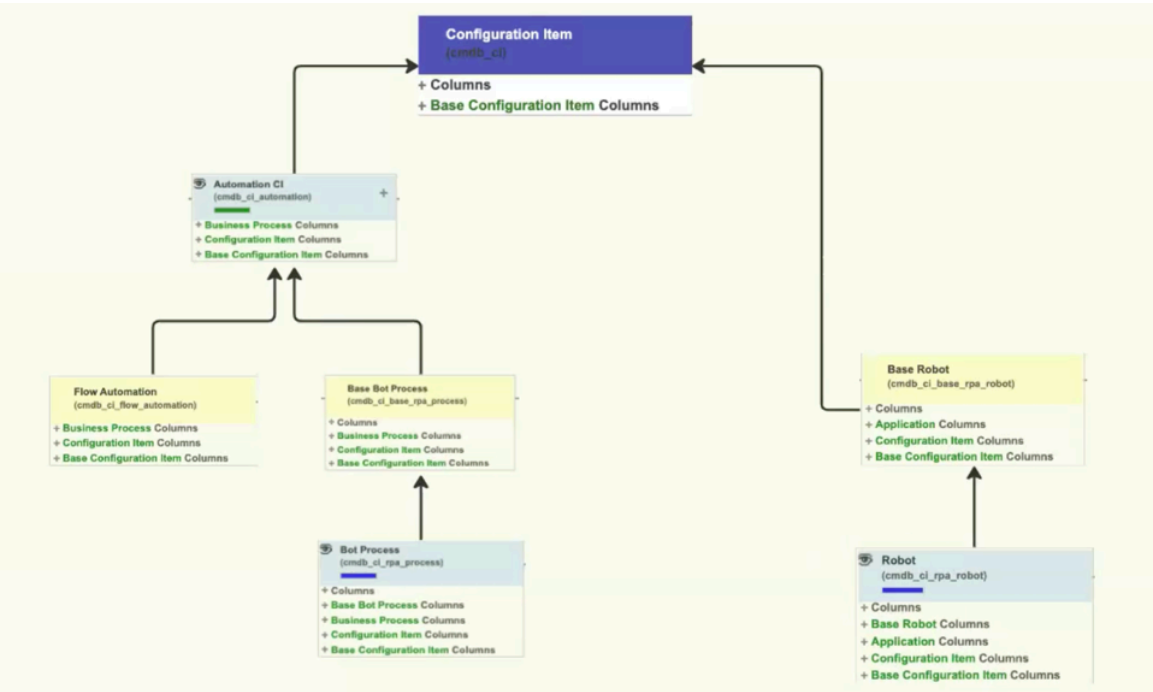
- Using Automation Center.
- Using ServiceNow flows as automations.
- Using third-party automations.

All automations irrespective of where they're created are stored in the cmdb_ci table before being displayed in the Automation Center dashboard.

When flows are tracked as automations, the data is populated in the cmdb_ci_flow_automation table. From the cmdb_ci_flow_automation table, it's reflected in the cmdb_ci_automation table. This data is then reflected in the automation_attribute table. The automation field in the automation_attribute table is referenced in the cmdb_ci table. It is from here that the data is displayed in the Automation Center dashboard.

ServiceNow Robotic Process Automation data is populated in the cmdb_ci_rpa_process table. All third-party Robotic Process Automation data is stored in the cmdb_ci_base_rpa_process table. The data from these two tables is then reflected in the automation_attribute table. The automation field in the automation_attribute table is referenced in the cmdb_ci table. It is from here that the data is displayed in the Automation Center dashboard.

ServiceNow robot data is populated in the cmdb_ci_rpa_robot table. All third-party robot data is stored in the cmdb_ci_base_rpa_robot table. The data from these two tables is then reflected in the automation_attribute table. The automation field in the automation_attribute table is referenced in the cmdb_ci table. It is from here that the data is displayed in the Automation Center dashboard.



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Using Automation Center

If you're an automation business user, technical user, or administrator, you can use the Automation Center application to create an automation task, resource, insight rule, and insight trigger. You can also move an automation request to different life cycle stages.

Working with automations

Create automations to automatically streamline your business processes, reduce the time that you spend on manual activities, and reduce your costs.

You can create automation goals, automation requests, and the tasks associated with them.

Create an automation goal

Create an automation goal to manage the progress and estimate the outcomes of an automation request. One goal can be associated with multiple automation requests. But an automation request can be associated with only one goal.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, catalog_admin, or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Automation Goals**.
4. Select **New**.
5. On the form, fill in the fields.
   For a description of the field values, see Automation goal form.
6. Select **Save**.

Related topics

Creating an automation request

Reinstate an automation goal

Reinstate an already achieved automation goal to restore and alter the scope of the automation.

Before you begin

Create an automation goal. For more information, see Create an automation goal.

Verify that the state of the automation goal is **Achieved**.

Role required: sn_ac.automation_business_user

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Automation Goals**.
4. Open an achieved automation goal that you want to reinstate.
5. Select **Reinstate**.

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6. In the **Target date** field, specify the target date.

   Note: If you don't specify the target date and save the form, then when the goal is moved to the **Achieved** state, the target date is automatically set to one day later than the start date.

7. Select **Save**.

Creating an automation request

An automation request helps you to automatically streamline your business processes, reduce the time that you spend on manual activities, and reduce your costs.

You can create an automation request in three ways. You can create a request by using the ServiceNow® Service Catalog, from Automation Center, or from Process Mining Workspace.

Submit an automation request from Service Catalog

Submit an automation request using the ServiceNow® Service Catalog form to automate your business processes to streamline, reduce time spent on manual activities, and reduce costs.

Before you begin

(Optional) Create an automation goal. For more information, see Create an automation goal.

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, catalog_admin, or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Build** > **Submit an Automation Request**.
2. On the form, fill in the fields.
   For a description of the field values, see Submit an Automation Request form.
3. Select **Submit**.

What to do next

Move the automation request to **Planned** state. For more information, see Move an automation request to the Planned state.

Related topics

- Submit an Automation Request form
- Create an automation request from Automation Center

Create an automation request from Automation Center

Create an automation request from Automation Center to automatically streamline your business processes, reduce how much time is spent on manual activities, and reduce your costs.

Before you begin

(Optional) Create an automation goal. For more information, see Create an automation goal.

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

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Procedure

1. Navigate to **All** > **Automation Center** > **Build** > **All Automation Requests**.
2. Select **New**.
3. On the form, fill in the fields.
4. Select **Submit**.
5. Complete the additional fields on the form, depending on your role.
6. Select **Save**.

> **Note:** If you have the sn_ac.automation_technical_user and sn_ac.automation_admin roles, you can view the Recommendations contextual panel. For more information, see Configuring the Recommended Actions application with Automation Center.

What to do next

Move the automation request to the planned state. For more information, see Move an automation request to the Planned state.

Related topics

- Automation request form from Automation Center
- Submit an automation request from Service Catalog
- Create an automation task
- Create an automation resource

Integration with Process Mining

Create an automation request from the Process Mining Workspace, which is outside of the Automation Center. If you have installed Process Mining and Automation Center, then you can create an automation request from the Process Mining Workspace.

If you have installed Process Mining and Automation Center, then you can create an automation request from the Process Mining Workspace.

You need the following roles:

- sn_ac.automation_business_user
- sn_ac.automation_technical_user
- sn_ac.automation_admin

For more information, see the Submit an automation idea .

Create an automation task

Create an automation task to effectively manage the activities associated with the automation request. However, this is an optional step.

Before you begin

Create an automation request. For more information, see Creating an automation request.

Verify that the associated automation request is either in the **Planned** or **In Progress** state.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task

There are five types of automation tasks:

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- Requirement
- Design
- Development
- Quality engineering
- Sign off

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request that you want to create and associate an automation task to.
5. On the **Automation Task** tab, select **New**.
6. On the form, fill in the fields.
   For a description of the field values, see Automation task form.
7. Select **Save**.
8. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

What to do next

Create an automation resource for the automation task. For more information, see Create an automation resource.

Related topics

Automation task form

Create an automation resource

Create an automation resource

Create an automation resource to associate a resource to an automation task. However, this is an optional step.

Before you begin

Note: From the Washington DC release, this feature is deprecated.

Create an automation task. For more information, see Create an automation task.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task

An automation resource is the person who is assigned to work on the automation task. One automation task can be associated with multiple automation resources.

Automation resource types:

- Development
- Quality engineering
- Product management

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Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Tasks**.
4. Open the automation task that you want to create and associate an automation resource.
5. On the **Automation Resources** tab, select **New**.
6. On the form, fill in the fields.
   For a description of the field values, see Automation resource form.
7. Select **Save**.

What to do next
(Optional) Create an automation goal. For more information, see Create an automation goal.

Related topics

Automation resource form

Move an automation request to the Planned state

After creating an automation request, move it to the **Planned** state before you work on it or create associated automation tasks or resources.

Before you begin
Create an automation request. For more information, see Creating an automation request.

Verify that the state of the automation request is **New**.

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request that you want to move to the Planned state.
5. In the form header, select **Move to Planned**.

Result
After you move an automation request to the Planned state, it's ready for you to work on.

Move an automation request to the In progress state

As you begin the development for the automation request, move it to the **In progress** state. This state notifies anyone using Automation Center that the work for the automation is in progress.

Before you begin
Create an automation request. For more information, see Creating an automation request.

Verify that the state of the automation request is **Planned**.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

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Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request that you want to move to the In-progress state.
5. In the form header, select **Move to In progress**.

What to do next

Update the **Automation** field in the automation request form. This field is visible only when the state of the automation request is **In progress**. For more information, see Automation request form from Automation Center.

Defer an automation request

Defer an automation request from Automation Center if the priority of the request has changed and it is not urgent anymore.

Before you begin

Create an automation request. For more information, see Creating an automation request.

Verify that the state of the automation request is either **New** or **In Progress**.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task

Deferring an automation request is one of the life-cycle stages of an automation request.

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request that you want to defer.
5. In the form header, select **Defer**.

> ⚠ **Warning:** After you move an automation request to the Defer state, you can't change or delete the entries on the Automation request form, associated automation tasks, and resources.

What to do next

You can move the automation request to Planned state or reject the automation request. For more information, see Move an automation request to the Planned state and Reject an automation request.

Reject an automation request

Reject an automation request from Automation Center if it's a duplicate of an existing automation or if it doesn't meet the required criteria.

Before you begin

Create an automation request. For more information, see Creating an automation request.

After you reject an automation request, the life cycle of the automation request ends.

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Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task
Rejecting an automation request is one of the life-cycle stages of an automation request.

Procedure
1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request that you want to reject.
5. In the form header, select **Reject**.

> **Warning:** After you move an automation request to the Rejected state, you can't change or delete the entries on the Automation request form, associated automation tasks, and resources.

Result
The Rejected state is the end state of a request. There are no operations possible after that state.

Publish an automation request

Publish an automation request from Automation Center to make the request ready for execution.

Before you begin
Create an automation request. For more information, see Creating an automation request.

To publish an automation request, the associated automation tasks must be in one of the following states:

- **Closed complete**
- **Closed incomplete**
- **Closed skipped**

Verify that the state of the automation request is **In progress**, and map the required Automation CI records whose life-cycle stage status is **Published**. An automation CI record has details about an automation.

For details about mapping an automation request with automation CI record, see Map automations with automation request.

For all ServiceNow RPAs, an Automation CI record is available. For more details, see the RPA documentation.

For third-party RPAs, there are two scenarios:

- For historical data of process and robot, you must manually create records in the corresponding CMDB Base Process table (cmdb_ci_base-rpa_process) and CMBD Base Robot table (cmdb_ci_base_robot).
- For data of process and robot created after installing Automation Center, you must configure Rest API and send the process, robot, and execution details via Rest API and the records are created in the corresponding tables.

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For further details, contact ServiceNow Customer Support.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request that you want to publish.
5. In the form header, select **Publish**.

> **Warning:** After you publish an automation request, you can't change or delete the entries in the automation request form, associated automation tasks, or resources.

Result

After you publish an automation request, the automation is ready for execution, which is the last stage in the automation request life cycle.

Create an agent for Task Mining requests

Create an automation request agent to efficiently manage the tasks of the Task Mining automation request without manual intervention.

Before you begin

Role required: sn_ac.automation_admin, sn_ac.automation_technical_user

Limitations and requirements

Consider the following when using this feature:

- Only requests created from Task Mining are supported. For more information, see Integration with Automation Center .
- User task step summarization skill must be activated and the automation request must be in **In progress** state. For more information about the skill, see Activate skills for ServiceNow Otto for Automation Center.

Procedure

1. Navigate to **Workspaces** > **Automation Center workspace**.
2. Select the list icon ( ).
3. Open an automation request.

   Verify that you have repeatable steps documented in the **Details Sequence of Steps** section of the form. This confirms that the agent can perform the tasks. If the steps are either missing or not appropriate, then an error message is displayed.

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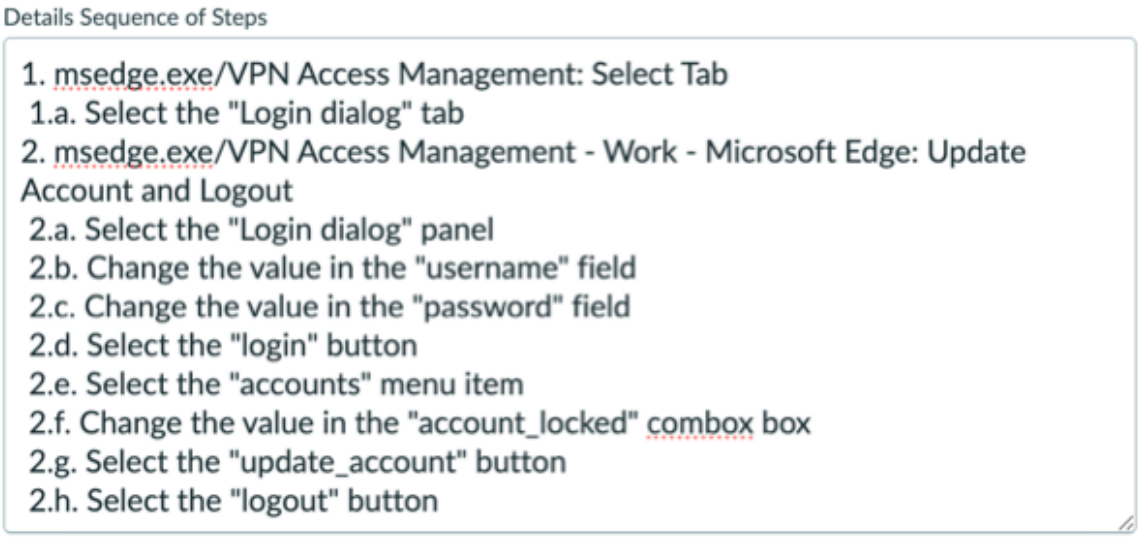
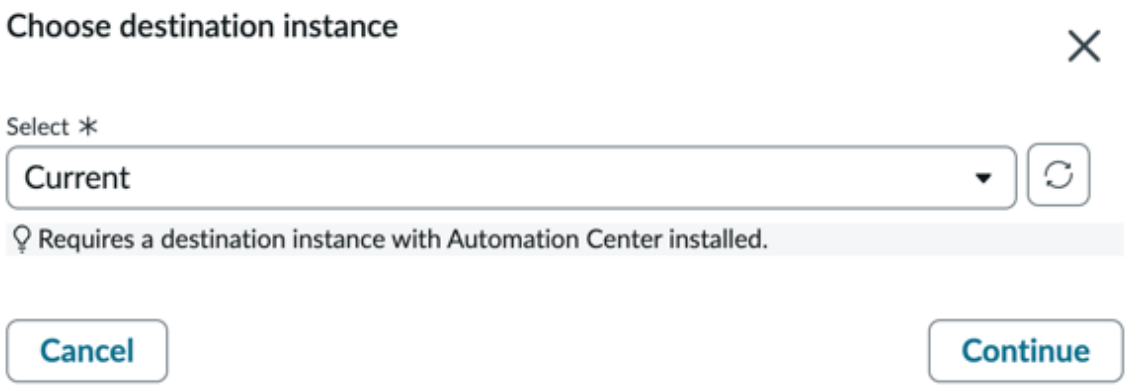


4. Select **Create agent** from the options at the top.

   Note: The **Create agent** option is available only if the User task step summarization skill is activated and the automation request is in **In progress** state.

   The **Choose destination instance** dialog box is displayed.



5. Choose an instance to create the agent in, and select **Continue**.
   You can select the current instance or any other instance. Verify that the instance you choose has Automation Center installed.

   To configure an instance, set the connection alias for the **AC Agent Enablement connection** alias. For information on configuring an instance, see Create a Connection & Credential alias.

   A summary of the agent that is in progress is displayed.

6. Select **Create agent in AI studio** after reviewing the content.
   For the detailed procedure to create an agent in AI Agent Studio, see Create an AI agent.

   The agent is created for the automation request.

Working with golive checklists

Create a golive checklist to automatically track items that must be reviewed before publishing the automation request. Every golive checklist is associated with an automation request.

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This section has the following subsections:

A checklist template is provided with the product. Here are the details.

Checklist Name: Automation Deployment Checklist

Task name	Task description
Business/Validation Sign-off	Confirm that the automation meets all business requirements and acceptance criteria. This involves a formal sign-off from the business owner or process SME, ensuring that the automation behaves as expected in staging/sub-production environments.
Development Sign-off	The development team must confirm that all development tasks are complete, including code review, peer review (if applicable), and all technical requirements have been implemented. The developer also ensures that environment-specific variables and hard-coded test values have been removed or appropriately managed through config files.
Testing/QE Sign-off	QA must validate that functional, regression, and negative testing is complete in sub-production (UAT or staging). A formal sign-off document or ticket must be attached to indicate readiness. Include validation of edge cases and exception scenarios, especially for business-critical automations.
Production Configuration Pre-check	Ensure that all required configuration elements are in place in the production environment: • Application URLs, credentials, and API endpoints are updated • Schedules, triggers, or event rules are properly set • Environment variables, secrets, and certificates are configured correctly
Monitoring, Logging & Alerting Setup in Production	Validate that all operational monitoring hooks are active in production: • Logging destinations (log servers, dashboards) are correctly pointed • Alerts (email/SMS/Slack/etc.) are routed to the correct stakeholders • Health checks are enabled, and baseline performance is captured for comparison
Automation Enablement & Final Readiness Review	A final checklist is completed jointly by Dev, QA, CoE, and Business SMEs. This includes:

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Checklist Name: Automation Deployment Checklist (continued)

Task name	Task description
	• Setting the automation to “active/live” in production • Verifying all preconditions (input data, triggers, service availability) • Communicating go-live to impacted teams. This serves as the “green signal” to activate the automation in the production environment.

Create a checklist

Create a checklist to track the items for an automation request. A checklist is a list of tasks that you must track before publishing an automation request.

Before you begin

Role required: sn_ac.automation_admin

Note: The option to create a checklist is available only when the automation request is in the In progress state. For information about moving an automation request to the In progress state, see Move an automation request to the In progress state.

After the automation request is moved to the following states, the option to create a checklist isn’t available:

- Defer
- Publish
- Reject

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request for which you want to create a checklist.
   Ensure that the automation request is in the In progress state.
5. Select the Golive Checklist icon ( ) from the side panel.
6. Select **Create new** from the **Add checklist** list if you want to create a checklist.
   The Details form is displayed. A checklist is a list of tasks.

   You can create a template by yourself or use an available template. The available templates are listed in the drop-down.
7. Fill details in the Details form.

Field	Description
Name	Provide a name for the checklist.

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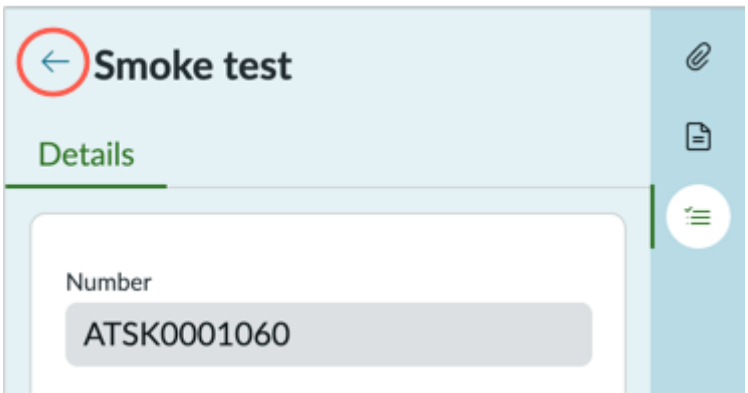
Field	Description
	This is a mandatory field.
Description	Provide a description.
State	Provide a state. When a checklist is first created, the state is New. If you're updating an existing checklist, you can change the state manually.
Assignment group	Select an appropriate assignment group from the list.
Assigned to	Select a user who you want to view and re view the checklist. **Note:** The user must have the sn_ac.automation_technical_user role. Based on your choice in the **Assign ment group** field, this filed is populated.
Due date	Specify a due date in the provided format.

8. Select **Save**.

   On top of the task that you created, there's an arrow. Select the arrow to go to the main checklist window.



   You can also select the available checklist that is provided with the product. For information, see Working with golive checklists.

9. Select the + icon if you want to add more tasks to the checklist.

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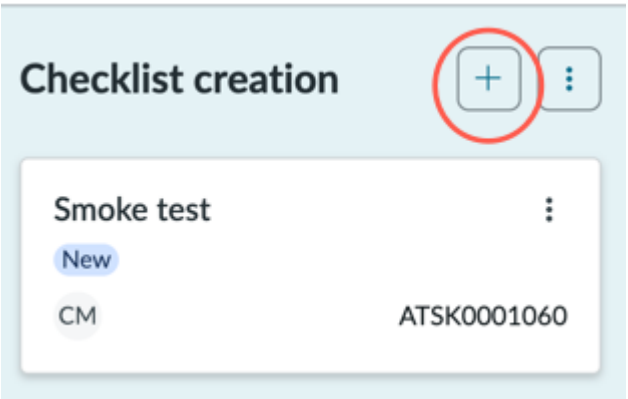

The Details form is displayed. Fill in the details.

Edit a task

Edit a task if you want to update the checklist.

Before you begin

Role required: sn_ac.automation_admin

After the automation request is moved to the following states, the option to edit a task isn't available:

- Defer
- Publish
- Reject

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request for which you want to delete a checklist.
   Ensure that the automation request already has a checklist.
5. Select the Golive Checklist icon ( ) from the side panel.
6. Select **Edit** or **Delete** from the details button for a task.

   If you select **Edit**, the Details form is displayed. Make the updates, and select **Save**.

   If you select **Delete**, select **Delete** on the confirmation window.

Clear a checklist

Clear a checklist if you no longer need the checklist for your automation request.

Before you begin

Role required: sn_ac.automation_admin

After the automation request is moved to the following states, the option to clear a checklist isn't available:

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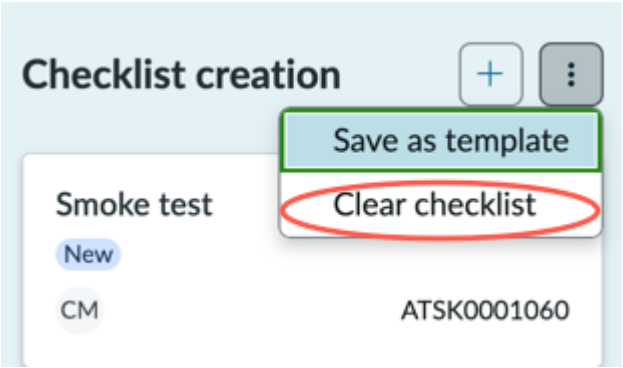
- Defer
- Publish
- Reject

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request for which you want to delete a checklist.
   Ensure that the automation request already has a checklist.
5. Select the Golive Checklist icon ( ) from the side panel.
6. Select **Clear checklist** from the details button.



7. Select **Clear** on the confirmation window.
   The checklist is deleted.

Create a template

Create a template when you think a golive checklist is useful for multiple automation requests.

Before you begin

Role required: sn_ac.automation_admin

After the automation request is moved to the following states, the option to create a template isn't available:

- Defer
- Publish
- Reject

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request for which you want to create a template.
   Ensure that the automation request has a checklist.
5. Select the Golive Checklist icon ( ) from the side panel.

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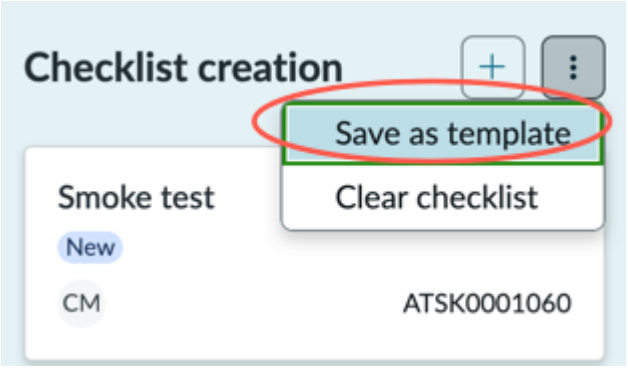
6. Select **Save as template** from the details button.



The **Save checklist as new template** form is displayed.

7. Provide a name.
The name must be unique in your domain.
8. Select **Save**.
The template is created. This template is available for others to add to their golive checklist. Now, this template is associated with the automation request.

Update a template

Update your template if you have changed the checklist and want those changes to reflect in your template.

Before you begin

Role required: sn_ac.automation_admin

After the automation request is moved to the following states, the option to update a template isn't available:

- Defer
- Publish
- Reject

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request for which you want to update a template.
Ensure that the automation request has a template.
5. Select the Golive Checklist icon ( ) from the side panel.
6. Make updates to the checklist.
You can add more tasks to the checklist or edit the existing tasks. To add more tasks, follow the same steps as creating a checklist in Create a checklist. To edit or delete a task, see Edit a task.
7. Select **Update template** from the details button to ensure that your changes are reflected in your template.

Note: The **Update template** option is available only for the templates that are created by you.

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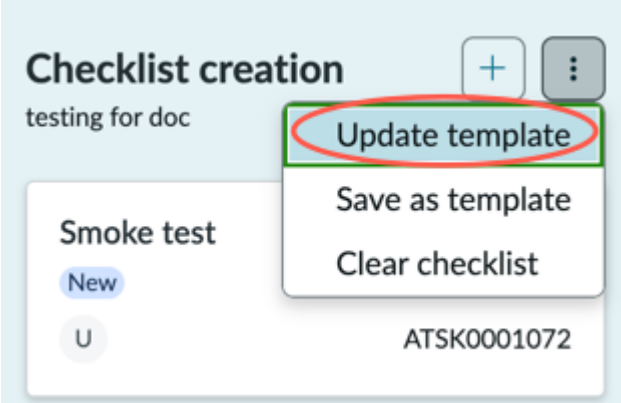

The template is updated with your changes.

Update task status

Update the status of a task so that it's the latest and helps in the publishing of the automation request.

Before you begin

Role required: sn_ac.automation_admin or sn_ac.automation_technical_user

After the automation request is moved to the following states, the option to update a task isn't available:

- Defer
- Publish
- Reject

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.
4. Open the automation request for which you want to create a template.
   Ensure that the automation request has a checklist.
5. Select the Golive Checklist icon ( ) from the side panel.
6. Follow the steps in the Edit a task section to update the status of the task.

Map automations with automation request

Map automations in Published state with an automation request to publish the automation request.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Note: The cost saved and time saved values for an automation are calculated by moving average method. The moving average is controlled by the *sn_ac.savings_averaging_window* system property. For more information, see Automation Center properties.

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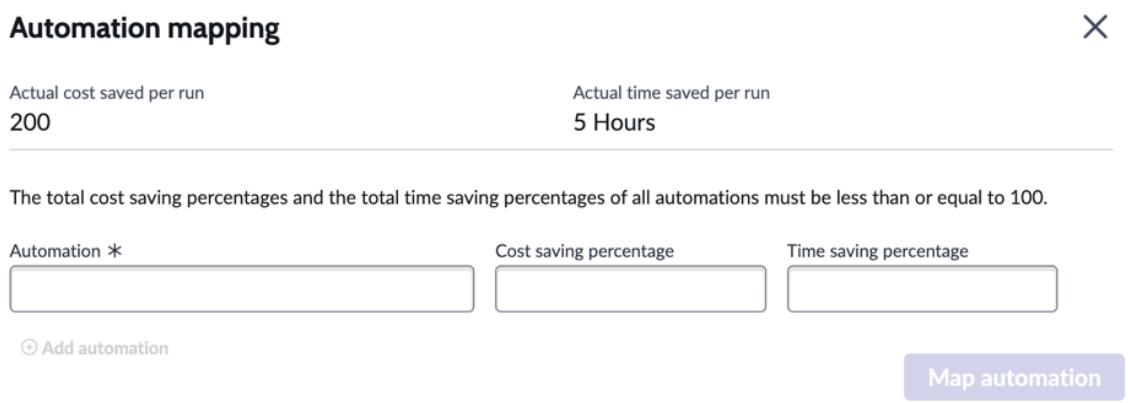
Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **All Automation Requests**.

   Note: Ensure that the automation request is in In Progress state.

4. Select the **Automation Mappings** tab.
5. Select **Map automation**.
   The Automation mapping window is displayed.



6. Provide the details.

Field	Description
Automation	Double-click to select an automation from the available list. For publishing an automation request, you must have at least one automation mapped to the request. Also, the mapped automations must be in the Published state.
Cost saving percentage	Specify the percentage of the cost that this automation saves for the automation request. If the actual cost saved per run is $200, and this automation saves 50%, then this automation saves $100.
Time saving percentage	Specify the percentage of the time that this automation saves for the automation request. If the actual time saved per run is 4 hours, and this automation saves 50%, then this automation saves 2 hours.

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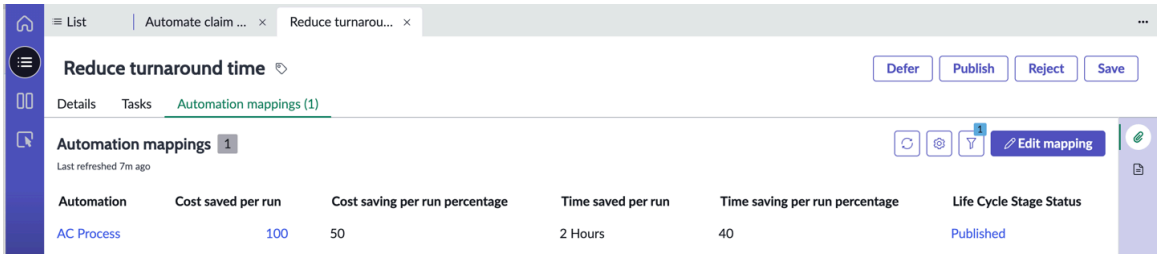
Note:

The total cost saving percentages and the total time saving percentages of all automations must be less than or equal to 100.

You can edit the cost and time savings percentage manually from the form view of the automation attribute record.

However, if the cost and time saved per run are manually updated, the **Cost saving percentage** and **Time saving percentage** fields in the Automation Mapping form are empty and non-editable. Also, the moving average is not calculated for the edited automation.



Example:

In the automation request, the actual cost saved per run was specified as $200 and the actual time saved per run was specified as 5 hours.

In the mapping, the Cost saving percentage was specified as 50% and the Time saving percentage was specified as 40%.

The values for the mapping are auto-calculated based on the input provided as shown in the Automation mappings screenshot.

7. **Optional:** Select **Add automation** to add multiple automations.
8. Select **Map automation**.
   The automation is mapped.
9. **Optional:** Select – beside a row, and select **Map automation** to delete the mapped automation.

   Note: You can't delete the first automation that you have mapped.

10. **Optional:** After creating the mapping, select **Edit mapping** to edit the existing mappings or add new mappings.

Update an automation attribute

Update an automation attribute to include the automation source and time savings information. This information is available in the Automation Center Value dashboard for analysis.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin.

About this task

When you create an automation request from Automation Center, you already provide the cost-saved and time-saved values. That information is displayed in the Automation Center Value dashboard. If required, you can update the values.

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When data is sent from ServiceNow RPA and flows or any third-party vendor, the cost-saved and time-saved fields must be updated manually.

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Automation Attributes**.
4. Select an automation attribute that you want to update, and then select **Edit**.
5. On the form, fill in the fields.

> **Note:** Only **Cost saved per run** and **Time saved per run** fields can be updated. The other fields are auto-generated.

Automation attribute form

Field	Description
Automation	Associated automation.
Cost saved per run	Cost saved after each run of the automation.
Published Date	Published date of the associated automation. You can edit this auto-generated field.
Source	Associated automation source.
Time saved per run	Time saved after each run of the automation.

6. Select **Update**.

Enable granular integration for automations

Enable granular integration for automations to capture cost saved and time saved at the transaction level. This feature makes the total cost-saved and total time-saved data analysis effective.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin.

> **Important:** This feature is available only for those automations that have ServiceNow® Robotic Process Automation version 10.0.0 and later.

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Automation Attributes**.
4. Select the link on the **Class** column for an automation with the source name as **ServiceNow RPA**.
   The details section is displayed.
5. From the ellipses on the right top, select **Enable Granular Integration**.

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A confirmation message is displayed.

6. Select **Enable Granular Integration** on the confirmation window.
   You're automatically taken to the **Granular Integration** tab.
7. Select **Add queues**.
   A window is displayed enabling you to add queues.



8. Provide the details.

Field	Description
RPA Work Queue	Select a queue from the list. If you don't see any queue in the list, you must add queues to the Bot Process. **a.** Navigate to **All** > **Automation center** > **Monitor** > **All Bot Processes**. **b.** Select the automation for which you're enabling the granular integration. **c.** Add queues from the **Related Links** section.
Cost saved per item	Specify the cost that is saved per work item.
Time saved per item	Specify the time that is saved per work item.

9. **Optional:** Select **Add queues** to add multiple queues.
10. Select **Map queues**.

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The queues are mapped for the automation and the granular integration is enabled. From the next execution after 24 hours, the data is displayed in the **Active automations** widget in the **Overview** dashboard. Granular data ensures that the cost-saved and time-saved data is displayed at item level making it more accurate.

The data of the granular integration can be seen in the Automation Transaction Summary table.

11. **Optional:** Select – beside a row to delete the mapped queue.

    Note: You can't delete the first queue that you have mapped.

12. **Optional:** To disable granular integration, from the ellipses on the right top, select **Disable Granular Integration**.
    The queue remains, however, granular data integration isn't used to calculate the time and cost saved.

Manage and review automation executions

Manage and review your automation executions, including their states, so that you can make sure that they are on track.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Monitor**, select **Automation Executions**.
4. Open the automation execution that you want to view.
5. Review the information on the Automation Executions page.

Related topics

Automation execution form

Review the bot processes

Review a list of available bot processes in Automation Center, so that you can make sure that they are on track.

Before you begin

Roles required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin.

In addition to the Automation Center roles, you will also need the Robotic Process Automation (RPA) roles. For more information on RPA roles, see Components installed with RPA Hub.

About this task

A bot process is a configuration of the robot.

You can't create a bot process.

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Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Monitor**, select **All Bot Processes**.
4. Open the bot process that you want to view.
5. Review the information on the bot process page.

View the available robots

View a list of available robots in Automation Center for reference purpose.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

In addition to the Automation Center roles, you will also need the Robotic Process Automation (RPA) roles. For more information on RPA roles, see Components installed with RPA Hub.

About this task

A robot is a software agent that runs a bot process.

You can't create a robot.

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Monitor**, select **All Robots**.
4. Open the robot that you want to view.
5. Review the information on the robot page.

Create an insight rule

Create an insight rule to generate custom insights for an automation business process.

Before you begin

This task must be performed in the classic environment.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task

When an insight rule is processed, it generates an insight. Insights appear on the Insights widget in the Executions dashboard of Automation Center Workspace.

Procedure

1. Navigate to **All** > **Automation Center** > **Administration** > **Insight Rules**.
2. Select **New**.
3. On the form, fill in the fields.
4. Select **Submit**.

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Related topics

Insight rule form

Create an insight trigger

Create an active insight trigger so that you can run the related insight rule.

Before you begin

This task must be performed in the classic environment.

Create an insight rule. For more information, see Create an insight rule.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task

When an insight rule is processed, it generates an insight. Insights appear on the Insights widget in the Executions dashboard of Automation Center Workspace.

An insight trigger activates the associated insight rule to run.

An insight rule doesn't run unless it's mapped to an insight trigger.

Procedure

1. Navigate to **All** > **Automation Center** > **Administration** > **Insight Rules**.
2. Open the insight rule for which you want to create and associate an insight trigger to.
3. On the **Automation Insight Triggers** tab, select **New**.
4. **Optional:** If the **New** button is unavailable, ensure that the Application scope you are in is same as the one where the record is.
   A message is displayed if the **New** button is unavailable. Follow the message to change the Application scope.
5. Select the appropriate type of insight trigger that you want to create:
   - Map to an existing business rule
   - Map to a new scheduled script
   - Map to an existing scheduled job

Map an insight rule to an existing business rule

Map an insight rule to an existing business rule to define the type of insight trigger. This insight trigger activates the associated insight rule to run.

Before you begin

This task must be performed in the classic environment.

Create an insight rule. For more information, see Create an insight rule.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task

When an insight rule is processed, it generates an insight. Insights appear on the Insights widget in the Executions dashboard of Automation Center Workspace.

An insight trigger activates the associated insight rule to run.

An insight rule does not run unless it is mapped to an insight trigger.

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Procedure

1. Navigate to **All** > **Automation Center** > **Administration** > **Insight Rules**.
2. Open the insight rule that you want to create and associate an insight trigger to.
3. On the **Automation Insight Triggers** tab, select **New**.
4. Select **Map to an existing business rule**.
5. On the form, fill in the fields.

Automation CRUD Trigger form

Field	Description
Name	Name of the insight trigger.
Active	Option for ensuring the use of the insight trigger.
Business rule	Applicable business rule that is required to trigger the insight rule. The mapped business rule script field must contain the `new sn_ac.ACInsightTriggerUtil(current, previous).raiseInsightByBR(<Business Rule SysId>);` API to trigger the insight rule.
Application	Application that is associated with the insight trigger.
Automation insight rule	Associated automation insight rule.

6. Select **Submit**.

Map an insight rule to a new scheduled script

Map an insight rule to a new scheduled script to define the type of insight trigger. This insight trigger activates the associated insight rule to run.

Before you begin

This task must be performed in the classic environment.

Create an insight rule. For more information, see Create an insight rule.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task

When an insight rule is processed, it generates an insight. Insights appear on the Insights widget in the Executions dashboard of Automation Center Workspace.

An insight trigger activates the associated insight rule to run.

An insight rule does not run unless it is mapped to an insight trigger.

Procedure

1. Navigate to **All** > **Automation Center** > **Administration** > **Insight Rules**.
2. Open the insight rule that you want to create and associate an insight trigger to.

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3. On the **Automation Insight Triggers** tab, select **New**.
4. Select **Map to a new scheduled script**.
5. On the form, fill in the fields.
6. Select **Submit**.

Related topics

Automation Scheduled Trigger Execution form

Map an insight rule to an existing scheduled job

Map an insight rule to an existing scheduled job to define the type of insight trigger. This insight trigger activates the associated insight rule to run.

Before you begin

This task must be performed in the classic environment.

Create an insight rule. For more information, see Create an insight rule.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task

When an insight rule is processed, it generates an insight. Insights appear on the Insights widget in the Executions dashboard of Automation Center Workspace.

An insight trigger activates the associated insight rule to run.

An insight rule does not run unless it is mapped to an insight trigger.

Procedure

1. Navigate to **All** > **Automation Center** > **Administration** > **Insight Rules**.
2. Open the insight rule that you want to create and associate an insight trigger to.
3. On the **Automation Insight Triggers** tab, select **New**.
4. Select **Map to an existing scheduled job**.
5. On the form, fill in the fields.

Automation Scheduled Trigger form

Field	Description
Name	Name of the insight trigger.
Active	Option for ensuring the use of the insight trigger.
Scheduled	Associated scheduled script to trigger the insight rule.
Application	Application that is associated with the insight trigger.
Automation insight rule	Associated automation insight rule.

6. Select **Submit**.

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Write a script for an automation message variable

Write JavaScript code input for variables that are added in the message of an insight rule.

Before you begin

This task must be performed in the classic environment.

Create an insight rule. For more information, see Create an insight rule.

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

About this task

When an insight rule is processed, it generates an insight. Insights appear on the Insights widget in the Executions dashboard of Automation Center Workspace.

An insight trigger activates the associated insight rule to run.

An insight rule doesn't run unless it's mapped to an insight trigger.

Procedure

1. Navigate to **All** > **Automation Center** > **Administration** > **Insight Rules**.
2. Open an insight rule that you want to write JavaScript code for the associated message variable.
3. On the **Automation Message Variables** tab, select a variable.
4. On the form, fill in the fields.

Automation message variable form

Field	Description
Name	Name of the automation message variable. This field is auto-generated.
Field	Qualifier for message variable. Values in this list appear depending on the entry that is selected in the **Applies to** field while you're creating an insight rule. This field appears only when the **Applies to** field is selected and when the **Threshold type** field is empty, while you're creating an insight rule. For more information, see Insight rule form.
Application	Name of the associated application. This field is auto-generated.
Automation insight rule	Name of the associated insight rule. This field is auto-generated.
Advanced	Advanced script. This field is auto-generated.

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Field	Description
Script	Text field that accepts JavaScript code input and provides controls, such as syntax checking and formatting. For example, to return a value, enter `return 100;`. This field doesn't appear when the **Applies to** field is selected and when the **Threshold type** field is empty, while you're creating an insight rule. For more information, see Insight rule form.

5. Select **Update**.

View automation insights

View automation insights to view the generated insights from the insight rules in Automation Center Executions dashboard.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Automation Center Home**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Monitor**, select **Insights**.
4. Open the insight that you want to view.
5. Review the information on the Automation insight page.

Related topics

Insight rule form

Working with actions

Create actions to fix issues that cause automations to fail.

You can create action requests and actions.

Creating an action request

An action request helps you to automatically solve issues that cause automations to fail, improving efficiency and saving time and cost.

You can create an action request in two ways. You can create a request by using the ServiceNow® Service Catalog or from Automation Center.

Submit an action request from Service Catalog

Submit an action request using the ServiceNow® Service Catalog form to request for actions to resolve issues causing your automations to fail.

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Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, catalog_admin, or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Build** > **Submit an Automation Request**.
2. On the form, fill in the fields.
   For a description of the field values, see Submit an Automation Request form.
3. Select **Submit**.

Create an action request from Automation Center

Create an action request from Automation Center to request for actions to resolve issues causing your automations to fail.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Build** > **All Automation Requests**.
2. Select **New**.
3. On the form, fill in the fields.
   For a description of the field values, see Automation request form from Automation Center.
4. Select **Submit**.
5. Complete the additional fields on the form, depending on your role.
6. Select **Update**.

Creating an action

Create an action to empower users to fix issues automatically.

As a technical user or system administrator, you must create actions based on user requests.

If a user faces an issue due to which an automation is frequently failing, the user will create an action request. Based on the action request, you need to create an action.

Create a flow, subflow, or action in Workflow Studio

Create a flow in Workflow Studio to automate fixing repeated issues that cause automations to fail in Automation Center.

Before you begin

Role required: sn_ac.automation_technical_user and sn_ac.automation_admin

Procedure

Navigate to **All** > **Process Automation** > **Workflow Studio**.
For detailed information, see Create a flow in Workflow Studio.

Important: The flow, subflow, or action that you create must be client-callible. Create an ACL that can call this flow. This flow must be published.

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What to do next
Create an action category

Create an action category

Create an action category to associate with an action. Action categories help users to categorize the actions into different categories, which would make selecting categories easier.

Before you begin
Role required: sn_ac.automation_technical_user and sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Build** > **Action Categories**.
2. Select **New**.
3. On the Action Categories form, fill in the fields.

Action Categories form

Field	Description
Name	An intuitive name for the action category.
Application	Scope of the action category. This is auto-populated. Do not edit this field.
Description	Description of the action category.
Parent	Select an action category if you want to attach the new category with another one.

4. Select **Submit**.

Result
The action category is created.

What to do next
Create an action type

Create an action type

Create an action type to associate with an action category. Action types are a sub-set of action category. They are used for easier identification based on need.

Before you begin
Role required: sn_ac.automation_technical_user and sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation center** > **Build** > **Action Categories**.
2. From the list of action categories, select an action category for which you want to create an action type.
3. Select **New** from the **Action Type** area.
4. On the form, fill in the details.

Field	Description
Name	An intuitive name for the action type.

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Field	Description
Application	Scope of the action type. This is auto-populated. Do not edit this field.
Description	Description of the action type.
Parent	The action category that you have selected is automatically populated. Do not edit this field.

5. Select **Submit**.

What to do next
Create an action

Create an action

Create an action to view and execute in Action Center to fix issues that cause automations to fail in Automation Center.

Before you begin
Role required: sn_ac.automation_technical_user and sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Build** > **Actions**.
2. Select **New**.
3. On the Action Details form, fill in the fields.

Action Details form

Field	Description
Number	Unique number that is auto-populated.
Application	Scope of the action.
Name	Intuitive name for the action.
Category	Select an action category that you want to associate with the action.
Type	Select the type of action category that you want to associate with the action.
Action Type	The type of action that is created in Flow designer. The available values are **Flow/Subflow** and **Action**.
Action	The action that you have created in Flow Designer. **Note:** You cannot map one flow, subflow, or action created in Flow Designer to multiple actions in Automation Center.
Active	This is a non-editable field.
Enable concurrent executions	Select this option if you want to execute the same action concurrently in Action Center.
Description	Description of the action.
Execution instructions	Any execution instructions that you want to provide.

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4. Select **Submit** to save the action.
5. Select **Activate** only if there are no more changes expected for the associated action.
   If you select **Activate**, you cannot make any other changes to the action configuration, that is the **Action Type** and **Action** fields. The other fields can be updated.

Execute actions in Automation Center

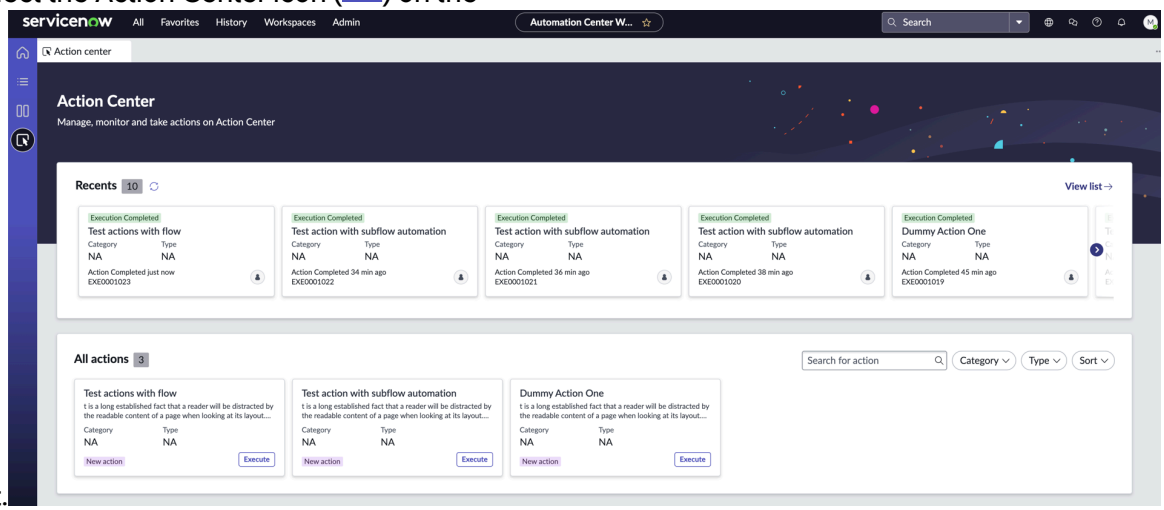
Execute an action to fix common repeated issues efficiently.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, catalog_admin, or sn_ac.automation_admin

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
   The Automation Center dashboard is displayed.
2. Select the Action Center icon ( ) on the left.



   - In the **Recents** section, all actions that have been executed are displayed.
   - You can view all the actions that have been executed by selecting the **View list** button in the **Recents** section.
   - In the **All actions** section, all available actions are displayed. You can search for any action or filter and sort your results.
3. In the **All actions** section, select **Execute** for any available action that you want to run.
   A new page is displayed with additional information.
4. Provide all required information, and select **Run**.
   The action is run and displayed in the **Recents** section.

Manage actions

Manage the actions to set permissions of who can access the actions and view any details or logs of the executed actions.

As an administrator or technical user, you must set permissions of who can access the actions available in Action Center. Setting permissions for actions makes Action Center less cluttered for users. Secondly, it ensures that users have only those actions that they require.

After the actions are executed, you can view the logs to understand details of the executions.

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Create assigned groups

Create assigned groups to limit the availability of the action to a specific group.

Before you begin

Role required: sn_ac.automation_technical_user and sn_ac.automation_admin

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the Action Center icon () on the left.
3. Select an action.
   The details are displayed
4. Select the **Assigned Groups** tab.
5. Select **New**.
6. Specify the group to which you want to assign permissions to view and execute the action.
7. Select **Save**.

View action logs

View action logs to see details of actions that are executed.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, catalog_admin, or sn_ac.automation_admin

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the Lists icon () on the left.
3. Select **Monitor** > **Action Logs**.
4. The logs of all executed actions is displayed.

Working with reviews

Reviews enable you to evaluate automations that have been created.

Create a review request when you want the COE team to review an automation and analyze if the automation is required.

Creating a review request

Review request enable you to review the automations.

You can create an action request in two ways. You can create a request by using the ServiceNow® Service Catalog or from Automation Center.

Submit a review request from Service Catalog

Submit a review request using the ServiceNow® Service Catalog form to request for reviews to review automations.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, catalog_admin, or sn_ac.automation_admin

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Procedure

1. Navigate to **All** > **Automation Center** > **Build** > **Submit an Automation Request**.
2. On the form, fill in the fields.
   For a description of the field values, see Submit an Automation Request form.
3. Select **Submit**.

Create a review request from Automation Center

Create a review request from Automation Center to request for reviews to review automations.

Before you begin
Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Automation Center** > **Build** > **All Automation Requests**.
2. Select **New**.
3. On the form, fill in the fields.
   For a description of the field values, see Automation request form from Automation Center.
4. Select **Submit**.
5. Complete the additional fields on the form, depending on your role.
6. Select **Update**.

Working with Connection Manager

Connection Manager enables you to add data from a third-party tool into Automation Center tables by correctly mapping and testing the data import.

Create an automation source

Create an automation source to start importing data from any third-party tool.

Before you begin
Role required: flow_designer, delegated_developer, sn_ac.automation_technical_user, or sn_ac.automation_admin

About this task
The following steps must be followed in the same order to create an automation source in Automation Center.

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
   The Automation Center dashboard is displayed.
2. Select the Connection Manager icon () on the left.
3. Select **New source**.
   The Add automation source page is displayed. Perform the following steps in the same order.

Define source for automation

Define the source that you want to add for your automations.

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Before you begin
Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Procedure

1. Provide details on the **Define source** form.

Define source form

Field	Description
Source name	Provide a unique and intuitive name for your automation source. **Note:** Source name can contain only underscores and alphanumeric characters.
Description	Provide a description that details the purpose of the automation source.
Source type	Provide the name of the source from where you want to import data. For example, ServiceNow® Robotic Process Automation. If you want to create your own source type, select Add source type. On the form, provide a name, select an icon, and then select **Add**. The source type is now available in the list of source types. Select it from the list.

2. Select **Save and continue**.
The **Configure data import** section is displayed with the **Schedule import** section made available to schedule the import of automation data.

Configuring data import

Configure the details of the data import, such as the kind of data, the schedule of the import, and so on.

Perform the following tasks in the same order to configure importing your automation data.

Schedule data import

Schedule the frequency for the data import to ensure that the automation data is updated as required.

Before you begin
Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Proceed from the **Define source** tab. For information on defining source, see Define source for automation.

Procedure

1. Provide the details on the form.

- **Daily**: Schedules the data import daily.

  Enter a time when the data must be imported daily.

  You can provide the time in 12-hour format or 24-hour format.

- **Weekly**: Schedules the data import weekly.

  a. Select a day of the week when the data must be imported from the **Select Day** list.

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b. Enter a time when the data must be imported.

You can provide the time in 12-hour format or 24-hour format.

- **Monthly**: Schedules the data import monthly.

a. Select a specific date of the month when the data must be imported from the **Select Date** list.

b. Enter a time when the data must be imported daily.

You can provide the time in 12-hour format or 24-hour format.

- **Run once**: Schedules the data import only once.

Select the calendar icon on the Select Date field, and select a specific date and time when the data must be imported.

- **Repeat**: Schedules the data import at a custom frequency.

Select a custom frequency for your data import. Use this option if you want to import data in a frequency that does not match to any other frequency provided here, such as weekly, monthly, and so on. For example, you could set the frequency to bi-weekly or once in three months.

a. Provide a value in the **Days** field.

If you provide 20, the data import will happen once every 20 days.

b. Enter a time when the data must be imported.

You can provide the time in 12-hour format or 24-hour format.

2. Select **Save and continue**.
The **Select spoke** section is displayed.

Select a spoke

Choose a spoke to set up a connection. This is an optional step.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

If your spoke isn't already installed, ensure to install it first.

Proceed from the **Schedule data import** section. For information on scheduling data import, see Schedule data import.

Procedure

1. Select a spoke.
You can sort the available spokes alphabetically using the Sort by field. You can search a spoke by name in the Search field.
2. Select **Save and continue**.
If you want to skip this section, select **Skip**.

The **Select action** section is displayed.

Select an action

Select an action suitable for your data import into ServiceNow instance.

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Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Proceed from the **Select a spoke** section. For information on selecting a spoke, see Select a spoke.

Important:

- Only actions that include a REST step and that are active and published are listed.
- Select an action that has the output type as "array.output". Else, the data is not available for import.

Procedure

1. Select an action.
   If you want to create a new action, select **Create action**. For detailed information, see Creating an action.
   - Select a spoke from the **Spoke** list to view only those actions that are associated with the selected spoke.
   - Sort the list alphabetically using the **Sort** field.
   - Search an action by its name from the **Search** field.
2. Select **Save and continue**.
   The **Configure batch import** section is displayed.

Configure batch import for data

Configure batch import of data to specify the pagination method for importing large data sets.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Proceed from the **Select an action** section. For information on selecting a spoke, see Select an action.

Procedure

1. Provide the details on the form.

Define source form

Field	Description
Action details	Review input and output details to customize the data flow for your specific needs.
Select output type	Select the output type value from the list. Only actions that have the output type as "array.output" have a value displayed here.
Select batch import method	Select a batch import method. The right batch import method helps to manage data efficiently. Batching can help improve performance, handle errors, and ensure data freshness in large imports. The following batch import methods are available:

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Field	Description
	○ **None**: Import data in a single request. Select this if you do not want to use the pagination method provided in Automation Center. ○ **Offset**: Import data in batches using an offset value. ○ **Time based**: Import data in batches based on time intervals. ○ **Token based**: Import data in batches using a continuation token.
Generate flow template	Select this button to generate a flow. After the flow is generated, edit it to set up input parameters and pagination for large imports. ○ Establish the necessary input parameters (static or dynamic): For example, when you import automation records from a third-party tool, send a dynamic value such as Automation Status, or a static value such as "Retry Limit = 3". ○ Link pagination for large data sets: For example, if you have 1,000 or more automation records, setup the pagination to process 100 records per page by indicating both the page number and page size.

The flow is generated and you are guided to edit the flow.

2. Select **Continue to edit flow**.

   The Workflow Studio page is displayed.

   Note: Edit the flow as per your requirement. For information on editing a flow, see Edit flow in Workflow Studio.

   Do not activate the flow at this point.

3. Select **Verify flow** to verify if the flow is correct.
   This step verifies if the selected action is available in the flow.
4. Select **Save and continue**.
   The **Verify and test** section is displayed.

Edit flow in Workflow Studio

Edit the flow to confirm that the pagination is implemented correctly. This confirms that the data is imported correctly.

There are four batch import methods:

- None
- Offset
- Time based
- Token based

None batch import

Select the none batch import method if you do not want to use the pagination method provided in Automation Center. There is no step required here.

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Offset-based batch import

Select the offset-based batch import method (pagination method) if you want to import data using a specific start point (offset) and a batch size (limit).

https://player.vimeo.com/video/1089874880?h=dc53f7fea9&badge=0&autopause=0&player_id=0&app_id=58479

- **Offset**: The starting point for importing data.
- **Total items**: The total number of records that you want to import.
- **Limit**: The number of records to import in each batch.

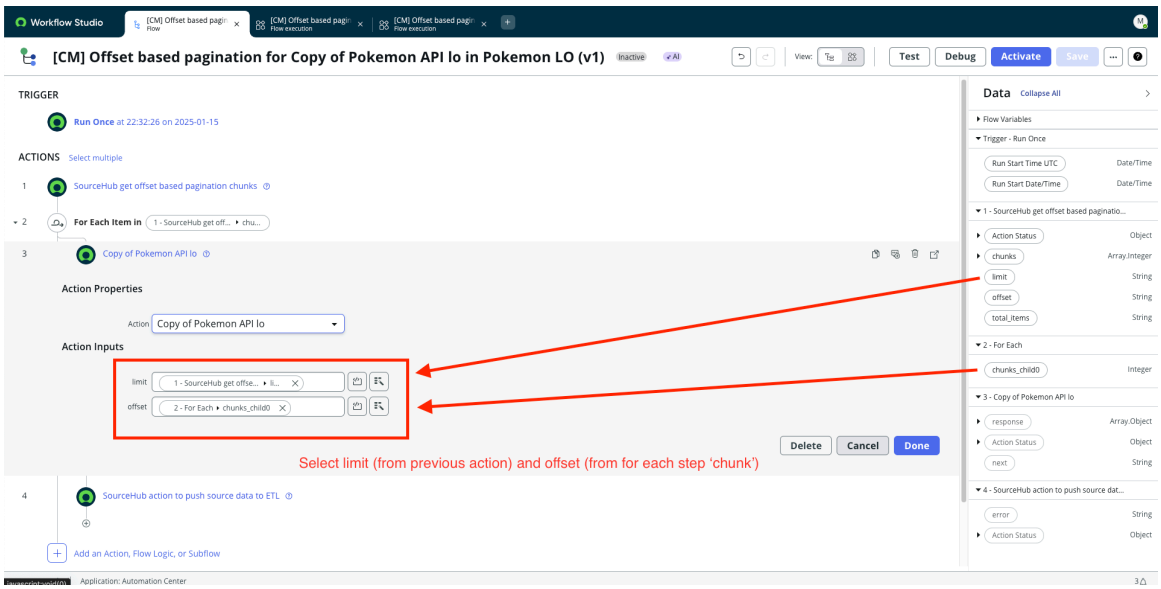
For example: If you set the offset to 20, total items to 200, and limit to 10, then the system will import data in batches of 10 records starting from record 20 and continuing until all 200 records are imported.

Steps to configure

1. In the **SourceHub get offset based pagination chunks** action, specify values for the offset, total items, and limit fields, and then select **Done**.

   After the values are defined, the **chunks_child0** field will be available in the right-hand panel (under **For Each**).

2. For the action you selected during the **Select Action** step, map the limit from **SourceHub get offset based pagination chunks** action and offset values using the **chunks_child0** field output generated by the **SourceHub get offset based pagination chunks** action.



Handling actions that don't support limit and offset

Map the limit and offset values in your action using the output returned by the SourceHub get offset based pagination chunks action.

If your selected action doesn't have predefined parameters for offset-based pagination but includes a filter that can accommodate these parameters, you can do one of the following:

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- **Option 1**: Add an action just before your selected action to handle the limit and offset. This action should generate a query that the primary action can use to fetch data.
- **Option 2**: Copy your primary action, modify it to include inputs for limit and offset, and process these inputs to create a query. Pass this query to the filter of your original action.

Note: If you choose Option 2, ensure that you create a copy of the original action first. After copying, reselect the copied action in the **Select Action** step and regenerate the flow. For information about selecting an action, see Select an action.

3. Select **Done** and **Test**.
4. Follow steps 3 onwards in Configure batch import for data.

Time-based batch import

Select the time-based batch import method if you want to import data for a specific date range.

https://player.vimeo.com/video/1089874860?h=192adc6f16&badge=0&autopause=0&player_id=0&app_id=58479

Steps to configure

1. In the **SourceHub get date based pagination chunks** action, specify the start date and end date, then click **Done**.

   After you values are defined, the **range** field in your right panel is available.

2. For the action you selected during the **Select Action** step, map the start date and end date values using the **range** field output generated by the **SourceHub get date based pagination chunks** action.

   Date format

   The Connection Manager uses and returns dates in the format: YYYY:MM:DD:HH:MM:SS. If your Action supports date ranges, the format is automatically applied.

   Handling actions that don't support date ranges

   If your action doesn't automatically support date ranges but includes a filter for custom parameters, you can follow one of these approaches.

   - **Option 1**: Add an action before your selected action to handle the start date and end date. This action should generate a query that your primary action can use to fetch data.
   - **Option 2**: Copy your primary action and modify it to include inputs for start date and end date. Process these inputs within the action to create a query and pass it to the filter of your original action.

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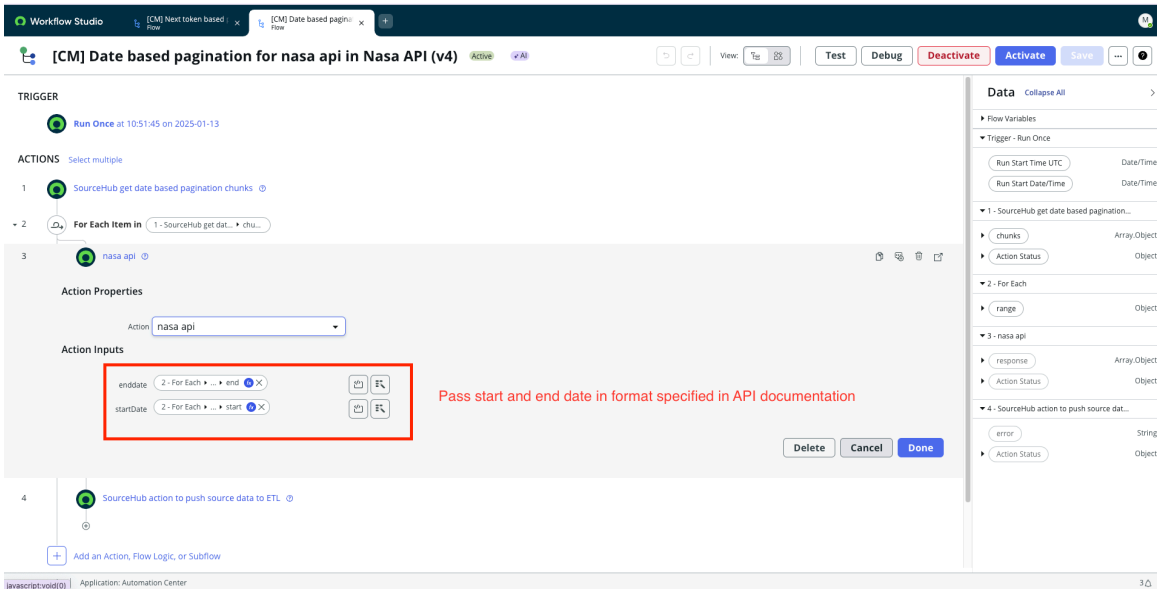


Note: If you choose Option 2, ensure that you create a copy of the original action first. After copying, reselect the copied action in the **Select Action** step and regenerate the flow. For information about selecting an action, see Select an action.

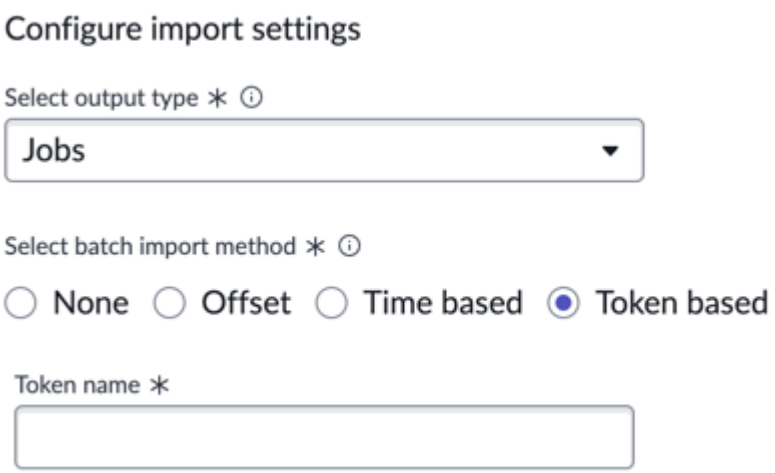
3. Select **Done** and **Test**.
4. Follow steps 3 onwards in Configure batch import for data.

Token-based batch import

Select the token-based batch import method if you want to import data using a continuation token.

https://player.vimeo.com/video/1089874895?h=7277577e12&badge=0&autopause=0&player_id=0&app_id=58479

When you select the token-based batch import method on the **Configure batch import** page, you must provide a name for the token. This token represents the continuation value returned by your action (such as, next_url, next_token, or next). Ensure that the token name matches exactly as it is returned from the action, including spelling and capitalization.



Steps to configure

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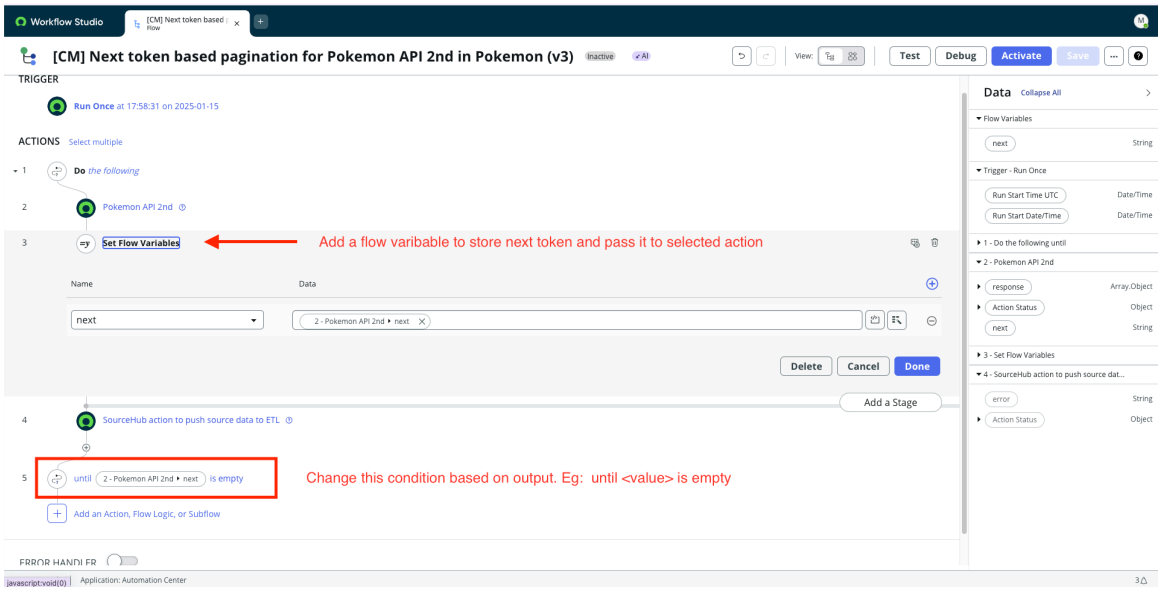
1. If the provided token name is correct, the do-while condition will automatically map it. If it remains blank, manually drag the continuation token from your action's output into the condition field of the do-while logic.
2. Add a **Flow Variable** of type string to store the updated value of the token.
3. Save your changes, and click **Done**.
4. Insert a **Set Flow Variable** logic step after your selected action. In this step, set the value of the newly created flow variable to the continuation token returned by your action. Ensure this token matches the one mapped to the do-while condition.



5. Select **Done** and **Test**.
6. Follow steps 3 onwards in Configure batch import for data.

Verify and test

Verify and test all configuration details to ensure that the flow is generated correctly.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Proceed from the **Configure batch import for data** section. For information on configuring batch import for data, see Configure batch import for data.

Procedure

1. Review all the details that you have configured for data import, such as scheduling data import, selecting a spoke, selecting an action, and configuring batch import.
   - If you want to change the data import schedule, then from the **Schedule import** section, you must open the flow and make changes in the flow.
   - If you make any changes to the selected spoke or action, you must redo the subsequent tasks.
2. Select **Test connection**.
   If any updates are required for the connection to be valid, you will be guided to do it. If there are any errors in the connection, you can view the log file, fix the issues, and run the test again.
3. Select **Save and continue**.
   The **Align fields** section is displayed.

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Align source and destination fields

Align the source and destination fields to ensure that the selected output from the selected action align correctly with ServiceNow tables enabling accurate integration of automation data.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin with ihub_import

Proceed from the **Verify and test** section. For information on verifying and testing configuration settings, see Verify and test.

Procedure

1. Drag each source field to map with the destination field.
2. Select **Save and continue**.
   The **Add source values** sub-section of **Align values** section is displayed.

Aligning source and destination values

Align source and destination values for precise data representation in Automation Center.

Add source values

Manually add the status or state values of your automation from the source system.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Proceed from the **Align source and destination fields** section. For information on aligning source and destination fields, see Align source and destination fields.

Procedure

1. Provide source values in the **Enter value** field.
2. Select **Add**.
   After one value is added, another field appears for the next value. You can remove a value by select the delete icon (-) beside the value field.
3. Select **Save and continue**.
   The **Map values** section is displayed.

Map source values

Map the source state values with the destination state values.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Proceed from the **Add source values** section. For information on aligning source and destination fields, see Add source values.

Procedure

1. Drag each source value to map with the destination value.

   Note: Values can only be dragged and dropped. Hard coded values are not allowed. Also, one value cannot be mapped to multiple columns.

2. Select **Save and continue**.
   The **Review and activate** section is displayed.

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Review and activate automation source

Review all configurations for the automation source, and then activate the automation source.

Before you begin

Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Proceed from the **Map source values** section. For information on aligning source and destination values, see Map source values.

Procedure

1. Review all details and make any edits required.
   If you change the spoke or action, you will need to redo all the subsequent tasks.
2. Select **Activate**.
   The **Automation sources** list is displayed with the newly created automation source.

Manage automation source

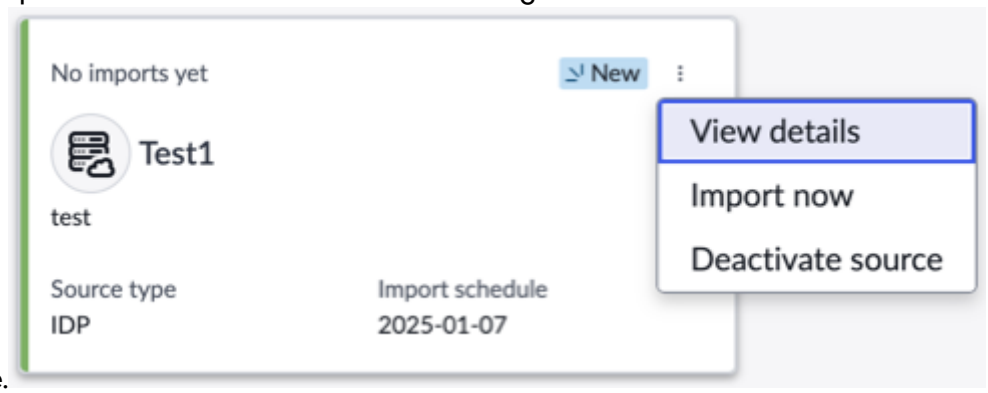
You can perform other actions for an automation source after creating it.

Before you begin

Role required: admin

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
   The Automation Center dashboard is displayed.
2. Select the Connection Manager icon ( ) on the left.
   A list of available automation sources is displayed.
3. Select options for an automation source to manage the automation source.



   - Select **View details**. A new tab with the automation source is displayed.
   - Select **Import now**. The data is imported immediately.
   - Select **Deactivate source**. The automation source is deactivated.
   - Select **Activate source**. The automation source is activated.
4. Edit an automation source.
   a. Open an automation source.
   b. Select **Edit details**.

      You can edit the automation source.

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Migrating automations from third-party applications to RPA Hub

Migrate UiPath, Blue Prism, Automation Anywhere automations to ServiceNow RPA Hub using Automation Center.

Generate report

Generate a report to view all the automations that you want to import.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the Migration Accelerator icon () on the sidebar.
3. Select **Generate migration report**.
   The Generate a migration report dialog is displayed.
4. Provide the details in the dialog box:
   - Provide a report name.
   - Select source details:
     - Select **UiPath**, **Blue Prism**, or **Automation Anywhere**.

       Note: Repository URL is available only for UiPath. For Blue Prism and Automation Anywhere you must upload a ZIP file.

     - **Repository URL** (only if you select UiPath as the source): This option enables you to get data from UiPath Orchestration. For information on using this option, see Generate report using repository URL.
     - **Upload ZIP (with XAML files)**: This option enables you to upload a local ZIP with .xaml files and automations. For information on using this option, see Generate a report using a ZIP file.

   Note: If the report generation takes longer than 300 seconds (5 minutes), it is marked as failed. This is controlled by a system property, `sn_ac.polling_timeout_migration_report`. A technical user (with the role sn_ac.automation_technical_user) can make changes to the value of the system property.

Generate report using repository URL

Generate a migration report using the repository URL that has all the automation files saved.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin, and connection_admin role

Note: This option is available only for connections connecting to cloud.uipath. You need the UiPath spoke to perform this task.

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Procedure

1. Follow steps 1 through 4 in the Generate report section.
2. On step 4, select the **Repository URL** option.
3. Provide the following details in the Select repository connection section:
   a. **Connection alias**: Select a saved connection alias form the list.
   b. (Optional) Select **Create connection** to create a connection.

      For more information, see Configure an instance for migration.

   c. **Base URL**: This field auto-populates with the corresponding value when an alias is selected. This field is provided by the `sn_ac.rpamigration.base.url` system property. For more information about the system property, see Automation Center properties.
4. Select **Generate report**.
   A dialog box is displayed with details of the migration. You can choose to run it in the background.

   The report is generated.

Generate a report using a ZIP file

Generate a migration report using all the files that you have on your local system in a zip file.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

Procedure

1. Follow steps 1 through 4 in the Generate report section.
2. On step 4, select the **Upload ZIP (with XAML file)** option.
3. Select **Add file**.
   You can upload only one ZIP file at a time, and the maximum file size is 100 MB.

   Note: Select the ZIP file exported from the respective applications. If you use an UIPath orchestrator data for Blue Prism, it will show an error.

4. Select **Generate report**.
   A dialog box is displayed with details of the migration. You can choose to run it in the background.

   The report is generated.

View insights of the report

View the details of the reports generated by you.

Before you begin

Role required: sn_ac.automation_business_user, sn_ac.automation_technical_user, or sn_ac.automation_admin

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the Migration accelerator icon () on the sidebar.

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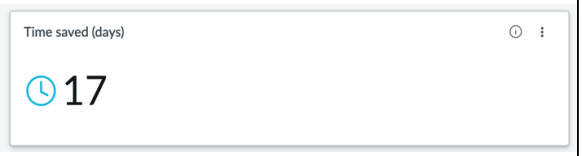
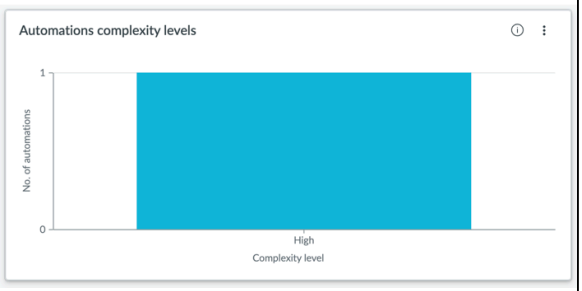
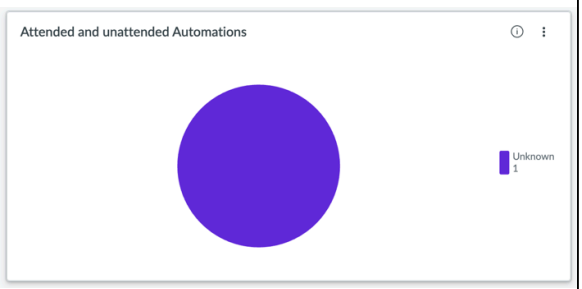
3. Select the report whose details you want to view.
4. The dashboard is displayed with insights and a list of automations.

Insights section

Description	Illustration
Time saved (days): The estimated time saved by automating the migration.	
Cost saved: The estimated cost saved by automating the migration.	
Automations complexity levels: Displays the complexity levels of the automations. The higher the complexity, the lower the migration rate.	
Attended and unattended Automations: The number of automations that require user input (attended) versus the automations that run independently (unattended). This information helps to plan deployment and testing.	
Conversion rate (%): The percentage of automations that are ready for migration without significant changes. A higher rate means fewer manual adjustments.	
Conversion breakdown: Details about how each automation converts—from fully compatible to needing manual adjustments—so you can identify where additional effort is required. This field has two values. Total conversion % as 78%.	

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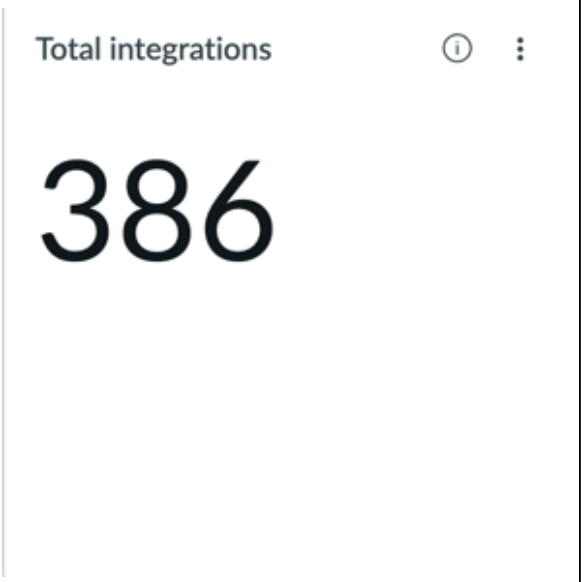
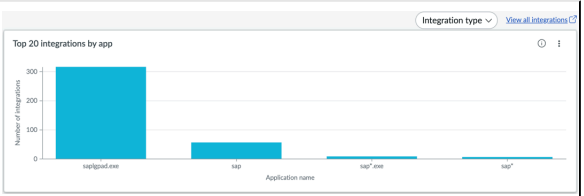
Description	Illustration
In Conversion breakdown area, you see two values for fully convertible. First is 60 and the other 76.92%. The first value means that out of 78, 60 were fully converted. The second value (%) is derived out of the box from UIB showing 60/78 *100 = 76.92%. 78 here came from two values in graph 60 (full convertible) + 18 (partially convertible) although that is the total value, but it isn't provided explicitly. There's no configuration available to show the value and not the %.	
Total integrations: The total number of integrations found in the automations. Useful for identifying potential migration challenges tied to external systems.	
Top 20 integrations by app: Details about how integrations are distributed across different apps. Helps you to see which third-party platforms require additional planning or validation. You can select the type of integration in the **Integration type**. Select **View all integrations** to view the list of integrations.	

On the **All automations** tab, you can view the list of automations that you want to migrate with all the details.

You can select the automation that you want to migrate from this list.

Migrate automations to ServiceNow RPA Hub

Migrate automations to ServiceNow RPA Hub with reduced cost and effort of your migration and improving your enterprise's efficiency.

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Before you begin
Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

When a technical user tries to either upload a ZIP file or provide a URL when generating the migration report, an error message is displayed in the **All automations** tab. You can ignore this error message and proceed further.

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the Migration accelerator icon () on the side bar.
3. Select the report that has the automations you want to migrate.
4. From the **All automations** tab, select the automations that you want to migrate.
5. Select **Migrate**.
   The **Choose destination instance** dialog box is displayed.
6. Select an instance where you want to migrate the automations.

   You have two options:

   - Current Instance (shows by default): The logged-in user must have the rpa_developer role, and the current instance must have app-rpa-foundation version 15.0.0 or later.
   - Remote Instance (Configured via Connection and Credentials alias): The user with whom the credentials are associated must have the rpa_developer role and the remote instance must have app-rpa-foundation version 15.0.0 or later.

   For information on how to configure an instance, see Configure an instance for migration.
7. Select **Continue**.
8. Select **Start Migration** on the confirmation dialog box.

Result
The automations are migrated. If the automations are being migrated multiple times, multiple versions of the automations are created. The previous versions aren't overwritten.

The output from the migrated automations is attached to the migrated automation as a .zip file. It has two files: An excel file and an ibot file.

For every migrated automation, an automation request is created.

The automation conversion depends on the complexity of the automation. The more complex the automation, the lower the conversion rate. All manual tasks that are required to convert the automation completely must be done on the target instance.

Configure an instance for migration

Configure an instance to migrate your automations.

Before you begin
Role required: sn_ac.automation_technical_user or sn_ac.automation_admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & credential aliases**.
2. Select `RPA Migrations` from the lists.
3. Edit the record.

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Select the link that is displayed at the top of the page stating "To edit this record click here."

4. Select `OAuth Authorization Code Demo Configuration` in the **Configuration Template** field.
5. Select **Create New Connection & Credentials**.

For more information about OAuth authorization in connections and credentials, see Set up OAuth integration via MID Server.

ServiceNow Otto for Automation Center

Use ServiceNow Otto for Automation Center helps you use AI features in your ServiceNow instance using Automation Center.

Important:

- Some ServiceNow Otto products/features are currently unavailable for customers in the FedRAMP, NSC DOD IL5, or Australia IRAP-Protected data centers, self-hosted customers, or in other restricted environments. For more information, see the KB0743854 article in the Now Support Knowledge Base . Be sure to check for availability updates in future releases.
- Some ServiceNow Otto products/features are currently available only for customers in some regions. For more information, see the KB1699552 article in the Now Support Knowledge Base. Be sure to check for availability updates in future releases.

Get started

Explore Learn about ServiceNow Otto for Automation Center concepts and features.	**Configure** Install and setup ServiceNow Otto for Automation Center
Use Learn how to use ServiceNow Otto for Automation Center	**Reference** Get details about ServiceNow Otto for Automation Center.

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Furthermore, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

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Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. In addition, this application will collect information about work notes in Process Mining. Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

Exploring ServiceNow Otto for Automation Center

Explore the benefits of ServiceNow Otto for Automation Center.

ServiceNow Otto for Automation Center

ServiceNow Otto for Automation Center helps you use AI to ease your tasks in Automation Center.

Saving Estimator skill

ServiceNow Otto for Automation Center includes the Saving Estimator skill, which must be activated to explore and discover automations from your ServiceNow® instance. For information about activating the skill, see Activate skills for ServiceNow Otto for Automation Center. For information about how to explore automations, see Explore automations.

User task step summarization skill

ServiceNow Otto for Automation Center includes the User task step summarization skill. The User task step summarization skill uses the user interaction steps from Task Mining and produces a targeted summary of the intended business outcome, and a set of detailed steps derived from the original interactions. For more information about activating the skill, see Activate skills for ServiceNow Otto for Automation Center. For information about creating an automation request from Task Mining workspace, see Integration with Automation Center.

Configuring ServiceNow Otto for Automation Center

Configure ServiceNow Otto for Automation Center to use all the features.

ServiceNow Otto for Automation Center plugin

To work with generative AI capabilities, you need ServiceNow Otto for Automation Center plugin. You can install this plugin from the ServiceNow Store website.

The ServiceNow Otto for Automation Center plugin helps you to:

- Create an agent for your automation requests
- Explore all automations in your instance
- Automatically create automation requests from Task Mining Workspace
- Automate Task Mining recording to desktop actions

Activate skills for ServiceNow Otto for Automation Center

Activate the skills available for ServiceNow Otto for Automation Center to work with ease and reduce manual effort in creating automation requests and exploring automations.

Before you begin

Role required: sn_generative_ai.nsa_admin

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Procedure

1. Navigate to **All** > **AI Admin Hub** > **Skills**.
2. Select **Other** under **Platform**.
3. Turn on the skill from the list.
   The skill is activated on your instance.
   - User task step summarization skill: Creates automation requests from the Task Mining Workspace and generate automations from Task Mining recordings. For more information, see Create an agent for Task Mining requests and .
   - Saving Estimator skill: Explores automations from your ServiceNow instance. For more information, see Explore automations.

Using ServiceNow Otto for Automation Center

Use ServiceNow Otto for Automation Center to explore available automations in your ServiceNow instance. You can also create an automation request from the Task Mining workspace.

Creating automation request from Task Mining

Use ServiceNow Otto for Automation Center to create an automation request from the Task Mining workspace.

With the ServiceNow Otto for Automation Center plugin, you can create automation requests directly from the Task Mining Workspace. To use this feature, you must also activate the User task step summarization skill. For information about creating an automation request from Task Mining workspace, see Integration with Automation Center .

Explore automations

Automation explorer enables you to scan your entire ServiceNow® instance and discover relevant automations based on a targeted query. You can filter by automation type, execution time period, and application scope, then onboard high-value automations directly to Automation Center for ROI tracking.

Before you begin

Role required: sn_ac.automation_technical_user

Run the fix script to be able to view the results of the Automation explorer. For information, see Run fix script to view results.

Note: You can control how catalog items are onboarded as automations using the sn_ac.auto_onboarding_catalog_items system property. Users with sn_ac.automation_admin can edit the system property.

- True (default): New catalog items are onboarded automatically and appear on the automation dashboard immediately. However, the time and cost savings aren't displayed.
- False: New catalog items are onboarded manually using the Automation Explorer feature. Generating this data takes longer, but the dashboard shows an expanded summary with time and cost savings for each catalog item.

Procedure

1. Navigate to **Workspaces** > **Automation Center Workspace**.
2. Select the **Automation explorer** tab.

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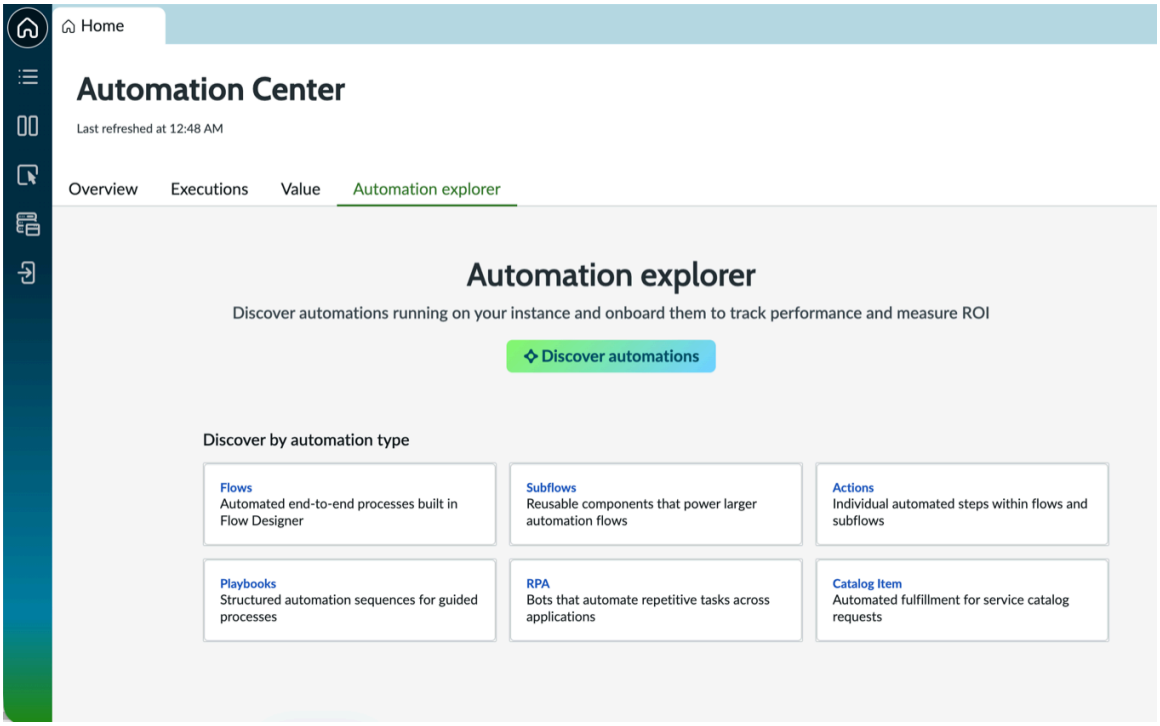

You can select the automation type card at the outset or select **Discover automations** button. Both actions launch an agent-driven conversation via the ServiceNow Otto panel, which guides you through defining your search criteria step by step

3. Select your search method.

Option	Description
If you know the automation type	Select the relevant automation type card to begin a focused search.
If you don't know the automation type	Select the open-ended search button to launch the ServiceNow Otto panel and start an agent-guided conversation.

4. In the ServiceNow Otto panel, respond to the agent prompts to define your search criteria.

   The agent asks three questions to scope your search:

   a. Select the automation type you want to search for (for example, Flows).

   b. Select the time period in which the automations were executed (for example, Last 30 days).

      You can also enter a custom time value if the predefined options don't meet your requirements.

   c. Select the application scope for the search (for example, All).

   The agent scans your instance within the defined scope and retrieves matching automations. This process may take a few minutes depending on the instance size and search scope.

5. Select **Show** to view the search results.

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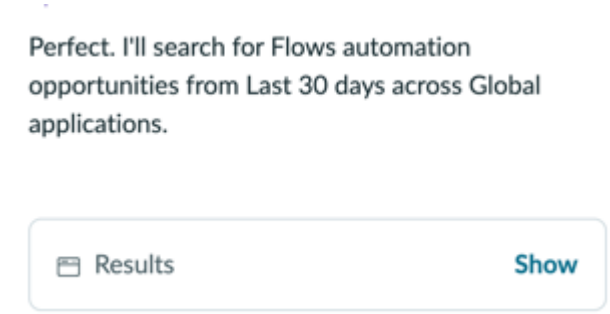
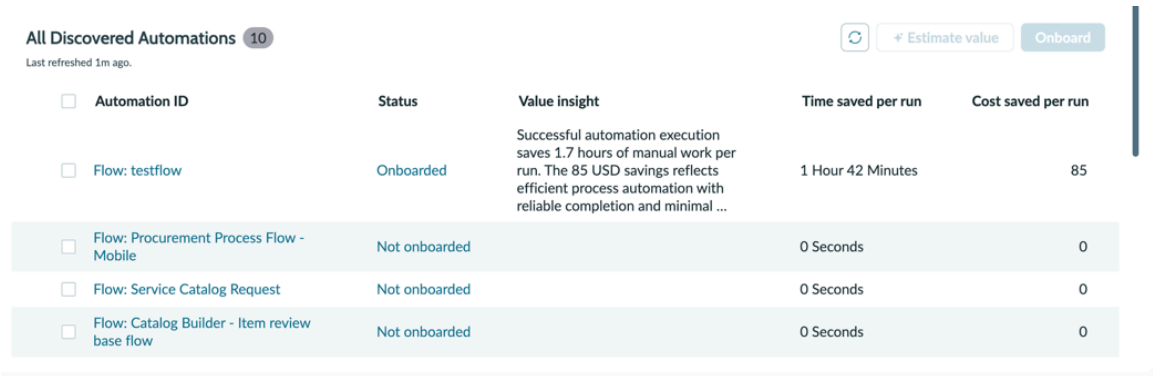


The results display all relevant automations on the instance against the search query, including:

- AI-estimated cost saving per run.
- AI-estimated time saving per run.
- An explanation for the AI-generated estimates.

6. Select one or more automations to estimate the value (time and cost saved) and then onboard.

   Use the check-boxes next to each automation, and select **Estimate value**, and **Onboard**. Review the cost and time saving estimates and the accompanying AI explanation to make your decision.



Result

The selected automations are onboarded to Automation Center. Their cost savings and time savings are now tracked and visible in the Automation Center Value dashboard.

What to do next

After onboarding, monitor the ROI of your automations in the Automation Center Value dashboard. You can return to Automation explorer at any time to discover additional automations or refine your search criteria.

Run fix script to view results

Run a fix script in ServiceNow to view the results of the automation explorer.

Before you begin

Role required: admin

Procedure

1. Navigate to **System Definition** > **Fix Scripts**.
2. Locate the fix script with the following sys_id:

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```
21a11b363ba4321037da9f7e53e45a50
```

Use the list filter or the search bar to find the record by sys_id if it is not immediately visible.

3. Open the fix script record, and select **Run Fix Script**.
4. Review the output logs that appear after the execution completes.

   Confirm the following statistics are present in the output:

   - Total Processed — the total number of records evaluated by the script.
   - Records Created — the number of new records generated during processing.
   - Records Skipped — the number of records that did not meet processing criteria.
   - Errors — any errors encountered during execution. Investigate and resolve before re-running the script if errors are present.

Reference

Reference topics provide additional information about the lists and forms that you use to configure and administer Now Assist for Automation Center.

Now Assist for Automation Center properties

You can access system properties for Now Assist for Automation Center by navigating to **All** > **System properties** > **All properties**. Then, filter the results by Now Assist for Automation Center.

Now Assist for Automation Center properties

Property	Description
sn_ac_assist.auto_calculate_savings	Defines the number of automations for which the time and cost savings will be automatically calculated. • Feature: **Automation Explorer** • Type: **integer** • Default value: **2**
sn_ac_assist.enterprise_dev_hourly_rate	Defines the value of development hourly rate for enterprise. • Feature: **Automation Explorer** • Type: **integer** • Default value: **50**
sn_ac_assist.max_calculate_savings	Defines the maximum number of automations that can be selected at once for calculation of the time and cost savings. • Feature: **Automation Explorer** • Type: **integer** • Default value: **10**

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Automation Center reference

Reference topics provide additional information about the lists and forms that you use to configure and administer Automation Center.

Components installed with Automation Center

Several types of components are installed with the activation of Automation Center, including tables, user roles, and scheduled jobs.

Note: The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this plugin.

Roles installed

Note: To view the Robotic Process Automation (RPA) data, RPA roles are required. For more information about RPA roles, see Components installed with RPA Hub .

Role title	Description	Contains roles
Automation admin [sn_ac.automation_admin]	Sets up Automation Center application configurations. Performs all the actions in the Automation Center application. Possesses CRUD access for all tables.	• sn_ac.automation_business_user • sn_ac.automation_technical_user • sn_ac.automation_admin
Automation technical user [sn_ac.automation_technical_user]	Creates automation requests, automation sources, automation tasks, automation resources, automation goals, insight rules, and insight triggers. Modifies automation attributes.	sn_ac.automation_techincal_user
Automation business user [sn_ac.automation_business_user]	Creates automation requests, automation goals, and updates the automation request life-cycle stages.	sn_ac.automation_business_user

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Scheduled jobs installed

Scheduled job	Description
Automation Center: Purge Executions Data	Deletes the data in the Automation Execution table only when the following conditions are met: • Records that were created 'X' days ago. X represents the value defined by the *sn_ac.purge_automation_data_in_days* system property. Users with the automation admin role can modify this property value. The default value of this property is **14**. • Records with a state of **Cancelled**, **Complete**, or **Error**.
Automation Center: Purge Insights Data	Deletes the data in the *sn_ac_insight* system property that was created 'X' days ago. X represents the value defined by the *sn_ac.purge_automation_data_in_days* system property. Users with the automation admin role can modify this property value. The default value provided of this property is **14**.
Automation Center: Copy spotlight score into request	**Note:** Available only if Spotlight is installed and enabled. Copies the spotlight score into the automation request's Score field. The **Schedule | Run to** is set to **On Demand**. It is recommended not to change this setting. **Note:** If you change the default spotlight criteria, then after saving the changes made, you must select the **Execute Now** button in this Spotlight group record to recompute the Spotlight score for the automation request records. And, then you must select the **Execute Now** button on the scheduled job to copy the score.

Tables installed

Table	Description
Automation Request [sn_ac_automation_request]	Contains the details of the automation request.
Automation Task [sn_ac_automation_task]	Contains information of tasks linked to a request.
Automation Goal [sn_sc_automation_goal]	Contains details of goals that can be mapped to multiple requests.
Base Robot [cmdb_ci_base_rpa_robot]	Contains the details of a software agent that runs a bot process.
Base Bot Process	Contains the configuration details of a robot.

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Table	Description
[cmdb_ci_base_rpa_process]	
Automation Execution [sn_ac_automation_execution]	Stores all execution processes information.
Automation Insight [sn_ac_insight]	Contains alerts data across Automation Center.
Automation Insight rule [sn_ac_insight_rule]	Contains rules that configure insights.
Automation Source [sn_ac_automation_source]	Stores vendor data.
Automation Attribute [sn_ac_ci_attribute]	Stores cost, time, source, and associated automation for processes and robot.
Automation Import [sn_ac_rpa_import]	Temporarily stores data that is imported from the REST API.

Automation Center properties

You can access system properties for Automation Center by navigating to **All** > **Automation Center** > **Administration** > **Automation Properties**.

Automation Center properties

Property	Description
sn_ac.workspace.date.default_num_of_days	Defines the default number of days that data is shown in the Automation Center workspace. • Type: **integer** • Default value: **7**
sn_ac.purge_automation_data_in_days	Defines the number of days the automation execution data, import error logs, action logs data, and automation insights information is retained. • Type: **integer** • Default value: **14**
sn_ac.reporting_currency	Defines the currency that is used in the Automation Center dashboards and reports.

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Automation Center properties (continued)

Property	Description
	• Type: **integer** • Default value: **USD**
sn_ac.savings_averaging_window	Calculates the moving average for cost and time saved per run. • Type: **integer** • Default value: **4**

ServiceNow® Spotlight properties

Property	Description
sn_ac.use.spotlight.score.for.requests	When turned on (by setting the value to **True**), Spotlight feature is enabled in the Automation Center workspace. • Type: **True/False** • Default value: **True**
sn_ac.use.spotlight.group.for.requests	Stores the spotlight group sys_id to let the system know which spotlight group to use. • Type: **string** • Default value: **e037711dc3a11110995486d91840dd03**

ServiceNow® Recommended Actions properties

Property	Description
sn_ac.use_recommended_actions	When turned on (by setting the value to **True**), Recommended Actions application is enabled in the Automation Center workspace. • Type: **True | False** • Default value: **False**

Automation Explorer properties

Property	Description
sn_ac.auto_onboarding_catalog_items	Controls how catalog items are onboarded as automations. Users with sn_ac.automation_admin can edit the system property.

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Automation Explorer properties (continued)

Property	Description

	• Type: **True | False**
	• Default value: **True**
	  ○ **True (default)**: New catalog items are onboarded automatically and appear on the automation dashboard immediately. However, the time and cost savings aren't displayed.
	  ○ **False**: New catalog items are onboarded manually using the Automation Explorer feature. Generating this data takes longer, but the dashboard shows an expanded summary with time and cost savings for each catalog item.

Action Properties

Property	Description
sn_ac.max_number_of_actions	Sets the maximum number of actions to show in all actions section in action center. • Type: **True|False** • Default value: **False**
sn_ac.max_number_of_recent_executions	Controls the number of action log cards we want to show in the recent section in action center. • Type: **Integer** • Default value: **12**
sn_ac.new_action_threshold	Controls the number of days the "New action" tag should appear for the newly created actions. • Type: **Integer** • Default value: **12**

Migration accelerator properties

Property	Description
sn_ac.rpamigration.base.url	When you migrate UiPath automations to RPA Hub using Automation Center, this URL is used. When you generate a report using repository URL, in the **Base URL** field this value is populated.

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Migration accelerator properties (continued)

Property	Description
	• Type: **string** • Default value: **https://rpamigration-prod-default/**
sn_ac.polling_timeout_migration_report	Defines the maximum duration (in milliseconds/seconds) to wait while polling for the migration report status before the request times out. This ensures that long-running or stalled migration status checks do not block the process indefinitely. • Type: **Integer** • Default value: **300**

ServiceNow Otto for Automation Center properties

Property	Description
sn_ac_assist.auto_calculate_savings	Defines the number of automations for which the time and cost savings will be automatically calculated. • Feature: **Automation Explorer** • Type: **integer** • Default value: **2**
sn_ac_assist.enterprise_dev_hourly_rate	Defines the value of development hourly rate for enterprise. • Feature: **Automation Explorer** • Type: **integer** • Default value: **50**
sn_ac_assist.max_calculate_savings	Defines the maximum number of automations that can be selected at once for calculation of the time and cost savings. • Feature: **Automation Explorer** • Type: **integer** • Default value: **10**
sn_ac.pdi_instance_types	Controls which instance types are PDI (Personal Developer Instances). When creating an agent, you need an instance. When you create an instance, this property is used to decide which instance types are PDI.

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ServiceNow Otto for Automation Center properties (continued)

Property	Description
	• Type: **string** • Default value: **Demonstration, Shared-Demo, Developer, Subproduction**
sn_ac.lens_image_batch_size	Number of images sent per call to the lens skill for image processing. Suggested range is from 5 to 10. • Type: **integer** • Default value: **8**

Submit an Automation Request form

Use the Submit an Automation Request form to create an automation request in Service Catalog.

Submit an Automation Request form

Field	Description
What is the request type?	Select the type of request you want to create. • If you are creating an automation request, select **Automation**. Create automation requests when you want to automatically streamline your business processes, reduce the time that you spend on manual activities, and reduce your costs. • If you are creating an action request, select **Action**. Create action requests when you want an automated solution to repeated issues that are causing the automations to fail. • If you are creating a review request, select **Review**. Create a review request when you want the COE team to review an automation and analyze if the automation is required.
Process name	Name of the process.
Provide a brief description of the process	Description of the automation process.
Department	Associated department of the automation request.
How many steps are involved in this process?	A step is considered any individual activity, action, or decision that contributes to the completion of the process.
What is the interval type of the business process execution?	Field that describes if the cadence of the business process execution is by minutes, hourly, daily, weekly, or monthly.

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Submit an Automation Request form (continued)

Field	Description
How frequently is the business process executed (for example every 90 minutes or every 2 hours)?	Number of times that the automation process is executed per interval.
Identify all applications/ systems involved in the process	Field used to edit all applications and systems involved in the automation process.
What is the actual time spent per run?	The time that the manual run takes to complete.
Do you perform this process?	Field that shows if the execution is performed by the person submitting this request.
Identify the process owner	Person responsible for designing an effective and efficient process.
Attach relevant files	Relevant documents that you attach to support the automation process.

Automation request form from Automation Center

Use the Automation request form to create an automation request, action request, or review request from Automation Center.

Automation request form

Field	Description
Request Type	Select the type of request you want to create. • If you are creating an automation request, select **Automation**. Create automation requests when you want to automatically streamline your business processes, reduce the time that you spend on manual activities, and reduce your costs. • If you are creating an action request, select **Action**. Create action requests when you want an automated solution to repeated issues that are causing the automations to fail. • If you are creating a review request, select **Review**. Create a review request when you want the COE team to review an automation and analyze if the automation is required.

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Automation request form (continued)

Field	Description
Number	Auto-generated number of the request.
Process name	Name of the process.
Description	Description about the process.
Department	Associated department of the process.
Number of steps	Steps that are involved in the process. A step is an individual activity, action, or decision that contributes to the completion of the process.
Interval type	Interval type of the manual business process execution: • **Minutes**: The process executes every n minutes that you specify in the **Frequency** field. • **Hours**: The process executes every n hours that you specify in the **Frequency** field. • **Days**: The process executes every n days that you specify in the **Frequency** field. • **Weeks**: The process executes every n weeks that you specify in the **Frequency** field. • **Months**: The process executes every n months that you specify in the **Frequency** field.
Frequency	Number of times that the manual process must be executed per interval. For example, every 90 minutes or every 2 hours.
Actual time spent per run	Time that the manual process run takes to complete.
State	State of the automation request: • New • Deferred • Rejected • Planned • In progress • Published

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Automation request form (continued)

Field	Description
	For more information about these states, see Life-cycle stages of an automation request.
Intake source	Source type of the automation request, which refers to how the automation request is submitted: • **Web** • **Integration** • **Process Mining** **Note:** The default intake source type is **Web**. This field is visible only when you submit the form.
Applications used	Associated business applications of the process. For example, Ariba, Microsoft Excel, or Google Chrome.
Requested for	Person responsible for designing an effective and efficient process.
Additional Details	
Actual cost per run	Cost per process execution.
Goal	Desired goal of automating the process.
Priority	Complexity of the business process. Complexity is based on number of processes and applications involved, number of steps required, and human involvement.
Business criticality declared	Criticality of the business process. Criticality is based on your subjective assessment.
Number of users benefited	Number of users who would benefit with this process.
Number of transactions	Expected volume of transactions across the applications or systems.
Score	Execution priority of the request. The higher the score, the higher the priority of the request.
Process managers	Person responsible for the end-to-end execution of the process.
Assignment group	Name of the process group.
Manual steps %	Estimated percentage of steps that require human action to complete the process.

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Automation request form (continued)

Field	Description
Expected cost savings per year	Cost saved per process at the end of a year.
Expected time savings per year	Time saved per process at the end of a year.
Work notes	Work notes for the process.
Additional comments (Customer visible)	Notes that are visible to the customer.

Automation task form

Use the Automation task form to create an automation task in Automation Center.

Automation task form

Field	Description
Number	Number of the automation task. This number is auto-generated.
Automation request	Associated automation request. This request is auto-generated.
Name	Name of the automation task.
State	State of the automation task: • **Open** • **Pending** • **Work in progress** • **Closed complete** • **Closed incomplete** • **Closed skipped**
Description	Description of the automation task.
Due date	Date when the task is due.
Priority	Sequence in which an incident or problem must be resolved, based on impact and urgency.
Type	Type of automation task: • **Requirement** • **Design** • **Development** • **Quality engineering** • **Sign off**
Assignment group	Name of the automation task group.
Assigned to	Name of the user assigned to the automation task.

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Automation resource form

Use the Automation resource form to create an automation resource to associate a resource to an automation task.

Automation resource form

Field	Description
Number	Number of the automation resource. This field is auto-generated.
User	Name of the user assigned for the automation task.
Active	Option for ensuring the use of the automation resource.
Resource type	Role of the automation resource: • **Development** • **Quality engineering** • **Product management**
Automation task	Associated automation task. This field is auto-generated.
Automation request	Associated automation request. This field is auto-generated.

Automation execution form

Use the Automation execution form to view an automation execution from Automation Center.

Automation execution form

Field	Description
Number	Number of the automation execution.
Automation execution ID	Identification number of the automation execution.
Automation	Associated automation name.
Robot	Assigned robot that is running this automation.
Triggered by	Trigger mode of the assigned robot.
Start time	Start date and time of the automation execution.
End time	End date and time of the automation execution.
Duration	Time taken to complete the automation.
Cost saved per run	Cost saved after each run of the automation.
Time saved per run	Time saved after each run of the automation.
Source	Associated automation source.
Priority	Priority of the automation execution:

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Automation execution form (continued)

Field	Description
	• Low • Moderate • Critical
State	State of the automation execution: • Running • Error • Queued • Canceled • Complete
Department	Associated department name.
Message	Any information or error message returned by the robot.

Insight rule form

Use the Insight rule form to create an insight rule from Automation Center.

Insight rule form

Field	Description
Name	Name of the insight rule.
Active	Option to verify the usability of the insight rule. On clearing this option, the notifications won't be generated from this insight rule.
Application	Field that indicates which applications can use this insight rule.
Severity	Priority of the insight rule: • **Urgent** • **High** • **Moderate** • **Low** The default value is set to **Moderate**.
Type	Level of insight rule: • **Info** • **Warning** • **Error**
Message	Custom message that describes the insight.

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Insight rule form (continued)

Field	Description
	For example, `Time to Cleanup Automation Tasks. The count is {0}.` To configure the variable, such as {0}, see Write a script for an automation message variable. **Note:** To enable localization of this message string, create the sys_ui_message update record. For more information, see Custom translations.
Applies to	Table that the insight rule is applied on. For example, Automation Request [sn_ac_automation_request].
When	Conditions at which the insights are triggered. Select a table from the Applies to list before modifying this field. This field appears only when an entry is selected from the Threshold type list. Select the **Set Condition** field to add a trigger condition. For example, you might want to generate an insight rule when the state of an automation request isn't published. In that case, select **State** from the field list, **is not** from the operator list, and **Published** from the value list. You can use **or** or **and** next to the condition. To add more conditions, select **New condition set**.
Threshold type	Type of threshold: • **Count** • **Percentage**
Threshold Count **Note:** This tab appears only when **Count** is selected from the Threshold type list.	
Operator	Qualifier to trigger insights: • **is** • **less than** • **greater than** • **less than or is** • **greater than or is** This field appears only when **Count** is selected from the Threshold type list.
Value	Value to determine if an insight rule must be triggered based on the qualifier that is selected in the **Operator** field.

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Insight rule form (continued)

Field	Description
	For example, an insight rule is triggered if a few automation requests get rejected in a day. To set a condition, select **Count** in the Threshold type list, **greater than** in the Operator list, and **10** in the Value list. This field appears only when **Count** is selected from the Threshold type list.
Threshold Percentage **Note:** This tab appears only when **Percentage** is selected from the Threshold type list.	
Percentage of	Denominator value for the resulted rule value.
Operator	Qualifier to trigger insights: • **is** • **less than** • **greater than** • **less than or is** • **greater than or is** This field appears only when **Percentage** is selected from the Threshold type list.
Value	Value to determine if an insight rule must be triggered based on the qualifier that is selected in the **Operator** field. For example, an insight rule is triggered if a few automation requests get rejected in a day. To set a condition, select **Percentage** in the Threshold type list, **greater than** in the Operator list, and **10%** in the Value list. This field appears only when **Percentage** is selected from the Threshold type list.

Automation Scheduled Trigger Execution form

Use the Automation Scheduled Trigger Execution form to define the type of insight trigger and map an insight rule to a new scheduled script in Automation Center.

Automation Scheduled Trigger Execution

Field	Description
Name	Name of the insight trigger.
Active	Option for ensuring the use of the insight trigger.
Application	The associated application or the application scope in which the trigger is being created, such as Automation Center or RPA Hub.
Run	Time interval to use for running the scheduled job: • **Daily**: Runs daily, at a designated time. • **Day and Month in Year**: Runs yearly on a specific day and month (for example, July 14), at a designated time.

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Automation Scheduled Trigger Execution (continued)

Field	Description
	• **Day in Week in Month in Year**: Runs yearly on a specific day of the week in a specific week of a specific month (for example, the second Monday in October), at a designated time. • **Week in Month**: Runs monthly during a specific week of the month (for example, the third week of each month), on designated days and at a designated time. • **Weekly**: Runs on a weekly basis, at a designated time and day of the week. • **Monthly**: Runs on a monthly basis, at a designated time and day of the month. • **Periodically**: Runs on a designated repeating interval. • **Once**: Runs for a single occurrence only. • **On Demand**: Runs immediately on demand. • **Business Calendar: Entry Start**: Runs on the starting entry dates for the business calendar that you select in the **Business Calendar** field. A scheduled job runs for the starting date of each of the business entries that you defined for the business calendar. For example, if the business calendar represents a fiscal year, and the starting date of each entry is a fiscal month, the scheduled job runs on the first day of each month. • **Business Calendar: Entry End**: Runs for the ending date for the business calendar that you select in the **Business Calendar** field. This selection runs in the same manner as **Business Calendar: Entry Start**, but for the end dates of the associated business calendar entries. **Note:** When you select **Business Calendar: Entry Start** or **Business Calendar: Entry End**, you can apply an offset factor to schedule the job to run before or after the time span of the selected business calendar. If you select a business calendar and all its business calendar spans are in the past, the job would never run since that is an invalid configuration. To learn more, see the **Offset type** and **Offset** fields. To learn more about creating and using business calendars and defining business calendar entries, see Creating business calendars and Define business calendar entries.
Day	Day on which the scheduled job should run. • If **Run** is set to **Weekly**, select the day of the week. For example, select Wednesday. • If **Run** is set to **Monthly**, select the day of the month. For example, select 25 for the 25th day of the month. This field appears only if you select **Monthly** or **Weekly** in the **Run** field.
Repeat Interval	This field appears only if you select **Periodically** in the **Run** field. Duration of the repeat interval for each scheduled job execution. Enter the duration in the number of days, hours, or minutes. For example:

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Automation Scheduled Trigger Execution (continued)

Field	Description
	• To run the scheduled job every four days, enter `04` in the **Days** field. • To run it every 26 hours, enter `26` in the **Hours** field. • If it should repeat at an interval of 13:30:25, enter `13` in the **Hours** field, and then enter `30` and `25` in the two unlabeled fields after it.
Time zone	Time zone to use with the **Time** field entry when you specify the time at which the scheduled job should run. Select a time zone entry: • **-None-**: Use the default time zone for the logged-in user who is creating the scheduled job. For example, the scheduled job runs at 04:45 p.m. US/Pacific time if it's the user's assigned time zone, and you enter `16 : 45` into the **Time** field. • **Use System Time Zone**: Use the default system time zone that is specified for the instance in which it runs. For example, the scheduled job runs at 10:15 p.m. London time if Europe/London is the default system time zone for the instance, and you enter `22 : 15` in the **Time** field. • Actual time zone. For example, the scheduled job runs at 1:30 p.m. in the US Eastern time zone if you select **US/Eastern**, and enter `13 : 30` in the **Time** field.
Time	Time of day at which the scheduled job should run, expressed in hours, minutes, and seconds on a 24-hour clock. The selection that you make in the **Time zone** field determines the time zone for this entry.
Starting	Allows you to define the beginning window of time when you would like your job to start running. The job will actually run at the time specified in **Run time**. Select the calendar date and time. The **Starting** field appears only if you select one of the following **Run** types in the **Run** field:
Business Calendar	Business calendar entry that you're using to determine the business calendar start or end date for the scheduled job. This field appears only if you select **Business Entry: Start Date** or **Business Entry: End Date** in the **Time** field.

Automation goal form

Use the Automation goal form to create an automation goal in Automation Center.

Automation goal form

Field	Description
Name	Name of the automation goal.
Start date	Start date of the automation goal.
Target date	Target date of the automation goal.
State	State of the automation goal:

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Automation goal form (continued)

Field	Description
	• **Pending**: The associated requests are in "New", "Deferred", or "Rejected" state, or there are no associated requests. • **Work in progress**: The associated requests are in "Planned", "In progress", or "Published" state. • **Achieved**: The associated requests are in "Published" or "Rejected" state with at least one request in "Published" state. • **Not achieved**: The target date isn't met for the associated requests, and they are in "New", "Planned", "In progress", or "Published" state.
Owner	Owner of the automation goal.

Life-cycle stages of an automation request

The State transition of an automation request guides you through the stages of its life cycle.

Automation request life-cycle stages

Life-cycle stage status	Description
New	Default value for a new automation request.
Planned	Automation request that is moved to a planned state.
In Progress	Automation request that is picked up and work is in progress.
Published	Automation request that is ready to be active.
Deferred	Automation request that is postponed for a later date.
Rejected	Automation request that is rejected.

Domain separation and Automation Center

Domain separation is supported for Automation Center. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

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- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

Overview of domain separation in Automation Center

The goal of Automation Center is to govern the end-to-end multi-vendor life cycle from one place. Domain separation is enabled in all the features.

You should have either a flat hierarchy or a single-tier hierarchy and at least one primary or top-level domain.

To support domain separation for particular widgets in Automation Center, you must install and configure com.snc.pa.domain_support.

Note: Action Center and Connection Manager encounter challenges due to process separation in flows. In Action Center, the domain data from both global and current session domains is displayed. In Connection Manager, only current session's domain data is displayed.

Related topics

Domain separation for service providers

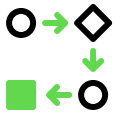
Integration Hub

Automate integration tasks using ServiceNow components for ServiceNow® Workflow Studio, or develop custom integrations. A separate subscription is required.

Watch this video for an overview of Integration Hub.

https://player.vimeo.com/video/1064838270?h=87976f09a6&badge=0&autopause=0&player_id=0&app_id=58479

Get started

Explore	Configure	Build
		
Learn about Integration Hub concepts and features	Activate plugins and review usage details	Build integrations with spokes and solutions or create your own custom integrations

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Manage	Import	Reference
		
Manage connections and credentials in Integration Hub	Import and stream data with Integration Hub - Import and Stream Connect	Get details about Integration Hub and domain separation

Troubleshoot and get help

- Ask or answer questions in the ServiceNow AI Platform community forum
- Search the Known Error Portal for known error articles
- Learn how to build apps on the developer site.
- Contact Customer Service and Support

Important:

- Not all model providers are available for customers with in-country SKUs, and some AI products/features are currently unavailable for in-country customers. For more information, see the KB1584492 article in the Now Support Knowledge Base. Be sure to check for model provider availability updates in future releases.
- Some AI products/features are currently unavailable for customers in the FedRAMP, NSC DOD IL5, or Australia IRAP-Protected data centers, self-hosted customers, or in other restricted environments. For more information, see the KB0743854 article in the Now Support Knowledge Base. Be sure to check for availability updates in future releases.
- Some AI products/features are currently available only for customers in some regions. Be sure to check for availability updates in future releases.
- Some AI products and skills are not available in Regulated Markets. For more information, see KB2593939: Regulated Markets AI Products/Skills Not Available. Be sure to check for availability updates in future releases.

Exploring Integration Hub

ServiceNow® Integration Hub enables you to build reusable integrations with third-party systems and call them from anywhere in the ServiceNow AI Platform. For example, you can request Integration Hub to call external systems using integration APIs from the Action Designer Script step, run the Script step on the ServiceNow® MID Server, and activate protocol steps like REST, SOAP, and PowerShell.

Inbound and outbound integration

The Integration Hub provides both inbound and outbound integration with third-party applications.

Inbound integration occurs when a flow that you set up on Workflow Studio responds to a conditional and event-driven external webhook from a third-party system and executes. For example, when you create a P1 issue on an issue-tracking application, its external webhook

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triggers a flow in the ServiceNow instance and an incidence database table is updated in the ServiceNow instance. Here, the webhook is conditional and event-driven.

Outbound integration occurs when the Integration Hub enables execution of third-party APIs as a part of a flow when a specific event occurs in ServiceNow. These integrations, referred to as spokes, are easy to configure and enable you to quickly add powerful actions without the need to write a script. For example, you can post a message and incident details in a Slack channel when a high priority incident is created.

Building integrations

Build reusable integrations with third-party systems and call them from anywhere in the ServiceNow AI Platform.

Create spokes

Build spokes using Spoke Generator to automate integration tasks by creating a sequence of reusable actions to develop custom integrations. For more information, see Building spokes using Spoke Generator.

Use spokes for base system integrations

Using Integration Hub actions in Workflow Studio, you can:

- Post messages and ServiceNow incident, problem, and change record details to Slack Spoke, or Microsoft Teams Spoke communications channels.
- Synchronize data across multiple production instances using Integration Hub Remote Process Sync.

Create custom integrations

Build custom integrations with Workflow Studio using a REST step or a Script step.

Automate inbound integrations with third-party applications

Set up a flow with external trigger definition on Workflow Studio by selecting base system external trigger definitions, and actions from the spokes or core actions. Then, Set up external trigger endpoints that the third-party application webhooks use to trigger the flow you had set up. Your ServiceNow instance authenticates the webhook before it triggers the flow.

Automate the administration of servers and applications in your network

Use custom actions to delegate Workflow Studio processes to a MID Server in your network. For example, actions that use the PowerShell step or REST step.

Import and stream data

Import data with Integration Hub - Import. Integration Hub - Import enables you to configure, run, and schedule your data imports all through a single simplified interface. It consolidates multiple data integration capabilities into a single environment, eliminating the need to create and manage several forms throughout the platform. Its step-by-step experience guides you through the configuration of data sources, target tables, and data mapping. You can schedule your data imports or run them on demand.

Stream data with Stream Connect for Apache Kafka. Stream Connect links your Kafka environment to your ServiceNow® instance, enabling you to stream data between your instance and your external systems. Stream Connect is integrated with Workflow Studio, so you can build flows that produce and consume Kafka events. Stream Connect also provides several consumers that enable you to stream and process data with scripts or by using your existing RTE or transform map configurations.

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Manage connections

Integration Hub takes advantage of aliases to manage connection information and credentials when integrating with external systems. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. Integration Hub only requires an alias, which then resolves to use the correct credentials and connection information during runtime. Learn more about credentials, connections, and aliases.

View and configure your connection and credential aliases with the Connections dashboard. The Connections dashboard enables you to manage multiple connections through a single interface, and provides simplified processes for adding, editing, and configuring connections. With the Connections dashboard, you can view details about an alias and all associated child connections in a single location.

Integration Hub supports multiple connections to a single integration provider. For example, you can have connections to several different Jira environments. In Workflow Studio, you can select which connection you want to use in a flow, and override preset connections for flows, subflows, and actions. When a flow is promoted to production, you can reestablish a connection to each account without needing to modify the flow.

Use your personal credentials to connect to third-party integrations with the Personal Authentication dashboard. View, authenticate, revoke, and renew your personal authentications through a simplified, consolidated interface.

Make outbound REST and SOAP calls through a MID Server using mTLS. Store mTLS credential and certificate information on the instance, in a configuration file, or in an external vault. The MID Server retrieves the credential and certificate information and makes outbound REST and SOAP calls using the mTLS protocol.

Benefits

Integration Hub provides process owners and developers these benefits.

- Consolidates multiple ServiceNow AI Platform automation capabilities into a single environment so process owners and developers can build and visualize business processes and integrations from a single interface.
- Extends Workflow Studio content to integrate business processes with external systems.
- Promotes business process automation by enabling subject matter experts to develop and share spokes with flow designers.
- Provides natural-language-descriptions of integration logic to help non-technical users understand triggers, actions, inputs, and outputs.

Development process

When developing a custom integration, develop all actions for the integration within a scoped application. When deployed to a target instance, these actions are grouped as a spoke in Workflow Studio. Brand the spoke by adding a custom icon to the application record. To learn more about application development, see Build applications.

When developing spokes, flow and action designers typically perform these application development tasks.

1. Create a scoped application on a development instance to build spokes.
2. Publish a test version of the scoped application to the application repository.
3. Deploy the scoped application to a test instance from the application repository.

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4. Test the scoped application on the test instance.
5. When working as expected, publish the scoped application in one of the following ways.
   - Publish to the application repository for deployment on production instances.
   - Publish to the ServiceNow Store as an application that customers can request for their environments.
   - Publish to ServiceNow Share to provide content to other customers in the ServiceNow community.

Review Workflow Studio design considerations in the Architecture Overview.

Configuring Integration Hub

Review and select an Integration Hub subscription package. Activate Integration Hub plugins and review usage and transaction details.

Request Integration Hub

ServiceNow® Integration Hub enables you to build reusable integrations with third-party systems and call them from anywhere in the ServiceNow AI Platform. For example, you can request Integration Hub to call external systems using integration APIs from the Action Designer Script step, run the Script step on the ServiceNow® MID Server, and activate protocol steps like REST, SOAP, and PowerShell.

Integration Hub is available as part of Workflow Data Fabric. For more information, see https://www.servicenow.com/now-platform/workflow-data-fabric.html.

Workflow Studio is a ServiceNow AI Platform feature that enables you to automate processes within a single instance. Without an Integration Hub subscription, you can use base system actions or steps, including the Script step, to manipulate records, send emails, trigger notifications, and perform operations within the instance. Request Integration Hub to automate and create integrations with external systems from the Workflow Studio interface.

You can preview Integration Hub on a Personal Development Instance (PDI).

Integration Hub usage and subscription

Choose a subscription package to build reusable integrations with third-party systems. Review the usage dashboard to determine the number of transactions used within your current subscription, and to view transaction details.

Entitlement to use spokes

The entitlement to download and use ServiceNow developed integrations (or spokes) requires an Integration Hub subscription (Integration Hub overview) or Subscription Product that includes spoke(s).

This spoke entitlement allows customers to download certain spokes from the ServiceNow Store and use the spoke in the production environment.

Protocols and spokes that are available in the Subscription Product are set forth in the then-current applicable Product Documentation. Use of protocols and spokes may consume Integration Hub transactions that may require purchase of Integration Hub or Workflow Data Fabric subscription at an additional fee. Customer may use the spoke(s) included in Subscription Product for use cases even beyond the Subscription Product. Integration Hub Transactions are not included in the Subscription Product.

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Link to KB article for the actual overview of Spokes in BU products

We have documented the Spoke entitlements available with the specific Subscription Product in a KB Article on Now Support: Spoke entitlement per Subscription Product.

Integration Hub subscription notifications

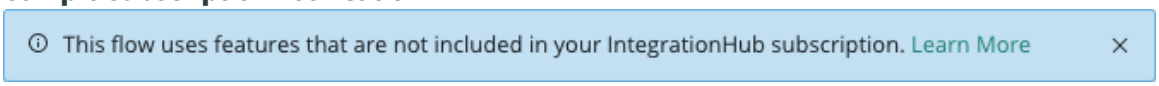
Integration Hub displays an information message whenever you use a spoke, protocol, entitlement, or feature that requires an Integration Hub subscription. You can use this information to identify possible gaps between your planned Integration Hub usage and your current subscription entitlements.

Subscription notifications do not restrict you from using any Integration Hub spoke, protocol, entitlement, or feature. Unlicensed features may be unavailable on your production instance.

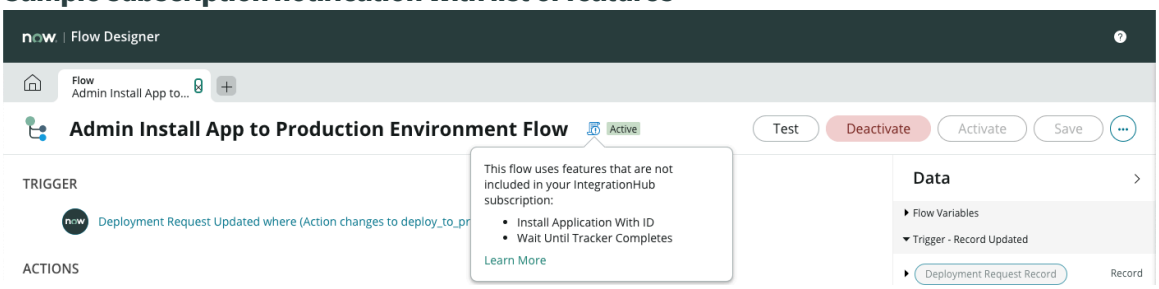
Subscription information available

Your instance attempts to access your Integration Hub subscription information online. When this information is available, the system displays an information message whenever you use a feature not included in your subscription. Flows and action titles also display an information icon for further details. Select the information icon to see a list of features not included in your subscription.

Sample subscription notification



Sample subscription notification with list of features



Subscription information unknown

When your instance cannot access your subscription information, it displays generic information messages. Whenever you use a feature that requires an Integration Hub subscription, the system displays a reminder information message. Verify that you have an appropriate Integration Hub subscription for the features you want to use.

Request an Integration Hub plugin

Integration Hub plugins require a separate subscription and must be activated by ServiceNow personnel.

Before you begin
Role required: admin.

About this task
To purchase a subscription, contact your ServiceNow account manager. The account manager can arrange to have the plugin activated on your organization's production and subproduction instances, generally within a few days.

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If you don't have an account manager, decide to delay activation after purchase, or want to evaluate the product on a subproduction instance without charge, follow these steps.

For a list of Integration Hub plugins, see Integration Hub plugins.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Related topics

List of plugins (Brazil)

Integration Hub plugins

Request Integration Hub plugins included in your subscription.

Integration Hub Installer plugins

The following Integration Hub Installer plugins are the main plugins for the Starter, Professional, and Enterprise Integration Hub subscriptions. For a list of what's included in each subscription level, see Legal schedules - IntegrationHub overview.

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- ServiceNow IntegrationHub Starter Pack Installer [com.glide.hub.integrations]
- ServiceNow IntegrationHub Standard Pack Installer [com.glide.hub.integrations.standard]
- ServiceNow IntegrationHub Professional Pack Installer [com.glide.hub.integrations.professional]
- ServiceNow IntegrationHub Enterprise Pack Installer [com.glide.hub.integrations.enterprise]

Other ServiceNow Integration Hub plugins

Plugin	Description
ServiceNow IntegrationHub Content - Deprecated [com.glide.hub.integration.content]	Workflow Studio actions to integrate with Slack, HipChat, Microsoft AD, Microsoft Azure, Microsoft Teams, and ServiceNow eBonding
Flow Designer Action Step - Payload Builder [com.glide.hub.action_step.payload]	Enable action designers to easily create name-value pairs in JSON and XML payloads using dynamic data.
ServiceNow IntegrationHub Action Step - JDBC [com.glide.hub.action_step.jdbc]	Create a reusable action to send SQL commands to a relational database.
ServiceNow IntegrationHub Action Step - REST [com.glide.hub.action_step.rest]	Enables the REST action step in Workflow Studio.
ServiceNow IntegrationHub Action Step - PowerShell [com.glide.hub.action_step.powershell]	Enables the PowerShell action step in Workflow Studio.
ServiceNow IntegrationHub Action Step - SOAP [com.glide.hub.action_step.soap]	Enables the SOAP action step in Workflow Studio.
ServiceNow IntegrationHub Action Step - SSH [com.glide.hub.action_step.ssh]	The SSH step executes SSH commands on an external *nix system through a ServiceNow® MID Server. The step also stores scripts and commands for the *nix systems.
ServiceNow IntegrationHub Action Step - XML Parser [com.glide.hub.action_step.xmlparser]	Enables the XML parser action step in Workflow Studio.
ServiceNow IntegrationHub Action Template - Data Stream [com.glide.hub.action_type.datastream]	Send REST, SOAP, or JDBC requests from Workflow Studio to APIs that return a stream of response data larger than 10 MB, or that return paginated results. Parse stream data into a series of complex object outputs and use the data pills in other actions in a flow.
HipChat Spoke for ServiceNow IntegrationHub [com.sn.hipchat.ah]	The HipChat Spoke for ServiceNow IntegrationHub provides actions that a process analyst can use when designing flows. The actions allow them to automate the creation of conversations, add users to a conversation, and send messages to a conversation. **Note:** This integration is deprecated.

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Other ServiceNow Integration Hub plugins (continued)

Plugin	Description
Slack Spoke for ServiceNow IntegrationHub [com.sn.slack.ahv2]	The Slack Spoke for ServiceNow IntegrationHub provides actions that a process analyst can use when designing flows. Send messages about incidents and problems to a channel.
Slack Webhooks Spoke for ServiceNow IntegrationHub [com.sn.slack.ah]	Use Slack webhooks to post messages and record details for ServiceNow incidents, problems, and changes to Slack channels.
Microsoft SCCM Spoke for IntegrationHub [com.sn.sccm.spoke]	Provides actions that a process analyst can use to automate the management of user collections, device collections, and application deployments.
Microsoft Teams Spoke for ServiceNow IntegrationHub [com.sn.ms_teams.ah]	Provides actions that a process analyst can use when designing flows to automate sending messages about ServiceNow incident and problem records to a Microsoft Teams channel.
Microsoft Azure AD Spoke for IntegrationHub [com.sn.azure_ad.spoke]	Manage users, security groups, and office groups. Apply licenses and provision users in Office 365.
ServiceNow eBonding Spoke for ServiceNow IntegrationHub [com.glide.sn.ebonding.ah]	The ServiceNow ebonding Spoke for the ServiceNow IntegrationHub provides Actions that enable process analysts to compose flows that help in ebonding with remote ServiceNow instances.
Integration Hub Designer Core [com.glide.ihub.designer.core]	Enables automation of data imports through the Integration Hub - Import environment. Installs with the ServiceNow Integration Hub Action Template - Data Stream [com.glide.hub.action_type.datastream] plugin.
ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer]	Enables the licensed components for working with message-based streaming data in Stream Connect for Apache Kafka. Activating this plugin activates the following plugins. • ServiceNow IntegrationHub Flow Trigger - Kafka [com.glide.hub.flow_trigger.kafka]: Enables the ability to consume a Kafka message for a topic within a flow. • ServiceNow IntegrationHub Action Step - Kafka Producer [com.glide.hub.action_step.kafka]: Enables the ability to produce a Kafka message for a topic within a flow. • ServiceNow Integration Hub Kafka Consumer [com.glide.hub.kafka_consumer]: Provides IntegrationHub components for working with Kafka.

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Other ServiceNow Integration Hub plugins (continued)

Plugin	Description
	• ServiceNow IntegrationHub ETL Consumer - Kafka [com.glide.hub.etl_consumer.kafka]: Enables the ability to consume Kafka messages from a topic using RTE, a transform map, or a script. • ServiceNow Stream Connect Replication - Kafka [com.glide.hub.stream_connect.replication.kafka]: Enables support for replicating Stream Connect topics via a MID Server with a customer Kafka cluster. • ServiceNow Integration Hub Stream Connect Schema [com.glide.hub.stream_connect.schema]: Enables importing and creating schemas to send and receive messages in an Apache Avro format. • ServiceNow Stream Producer [com.glide.hub.stream_connect.stream_producer]: Enables Stream Producer to automatically stream changes from ServiceNow tables to Kafka topics.
ServiceNow Stream Connect Common Core [com.glide.hub.stream_connect.common.core]	Provides the general Stream Connect capabilities across Hermes and Direct Kafka.
ServiceNow Stream Connect Direct Kafka [com.glide.hub.stream_connect.direct_kafka]	Adds the capability to connect the ServiceNow instance to Apache Kafka directly (not using Hermes Messaging Service).
ServiceNow Stream Connect Hermes [com.glide.hub.stream_connect.hermes]	Adds the capability for Stream Connect to connect to the Hermes Messaging Service.
ServiceNow Stream Connect Installer (Direct Kafka) [com.glide.hub.stream_connect.onprem_installer]	Installs the required plugins for Direct Kafka.
ServiceNow Stream Connect Kafka Connection [com.glide.hub.stream_connect.kafka_connection]	Adds the ability to use Kafka credentials for Direct Kafka and Message Replication.
ServiceNow Stream Connect Replication Certificates [com.sn_stream_connect.replication.cert]	Adds the capability to handle certificates to connect to the Hermes Messaging Service from the MID Server.
ServiceNow Stream Connect Replication Core [com.glide.hub.stream_connect.replication.core]	Adds capabilities to replicate data between a topic in the Hermes Messaging Service and a topic in a local Apache Kafka environment.
Stream Connect MID Hermes API [com.glide.mid.hermes_api]	Provides the capability to produce messages from the MID Server to a topic in the Hermes Messaging Service.

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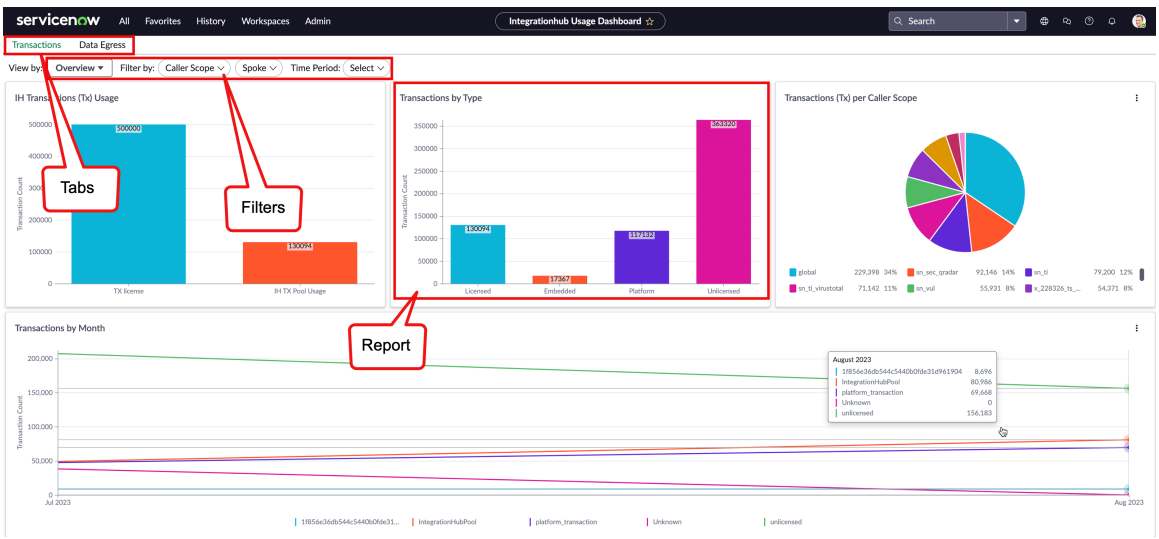
Integration Hub Usage Dashboard

Get insights on the usage of Integration Hub data from the Integration Hub Usage Dashboard. For example, view the average number of monthly transactions in the last year or the data egress from Integration Hub via REST and SOAP API protocols.

The Integration Hub Usage Dashboard gives insights in the form of reports. Access to the dashboard is role-based. The reports are available under various sections in the **Transactions** and **Data Egress** tabs. You can customize the data that you want to view by using filters or drilling down reports.

Note: The Integration Hub Usage Dashboard provides reports of usage by protocol. For more information about the service accounts contributing to each protocol, see Monitor inbound API integration usage.



Integration Hub Usage Dashboard version

Integration Hub Usage Dashboard v3.0.0 is the latest version.

Sections in the Transactions tab of the Integration Hub Usage Dashboard

The dashboard has these sections:

- Overview: View the usage data on the transactions from various perspectives and, if needed, drill down to view more details. For example, you could view the monthly transactions in the last year.
- Spokes: View the data on the transactions that were performed by the spokes and, if needed, drill down to view more details. For example, you can view the information on which spoke performed the highest number of transactions in the last year.
- Protocols and Features: View the usage data on the various protocols and features that were used to and, if needed, drill down to view more details. For example, you can view the number of transactions that were performed with the REST protocol in the last year.

Sections in the Data Egress tab of the Integration Hub Usage Dashboard

The dashboard has these sections. All sections have three common reports: Data Egress, Data Egress by source (API protocols or exports), and Data Egress Trends.

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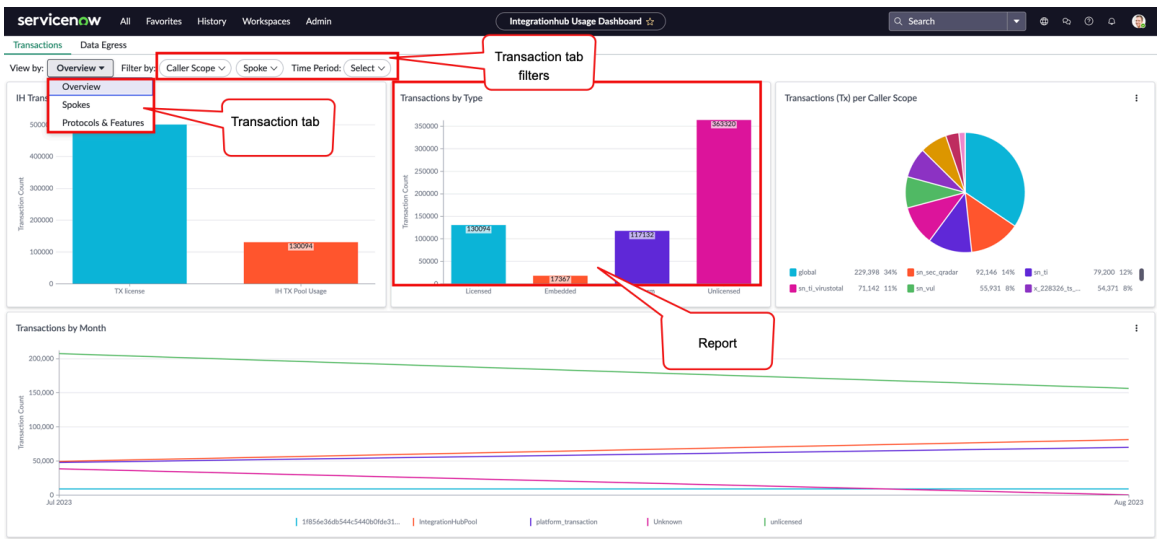
- Overview section: Gives an overview of the total data egress volume, data egress by REST and SOAP protocols, JSON, Export set, and URI from the ServiceNow instance, and the data egress across time periods.
- API section: Gives an overview of the total data egress volume by all sources, data egress by REST or SOAP protocols or JSON data from the ServiceNow instance, and the data egress across time periods.
- Export section: Gives an overview of the total data egress volume by all data export formats, data egress by export formats from the ServiceNow instance, and the data egress across time periods.

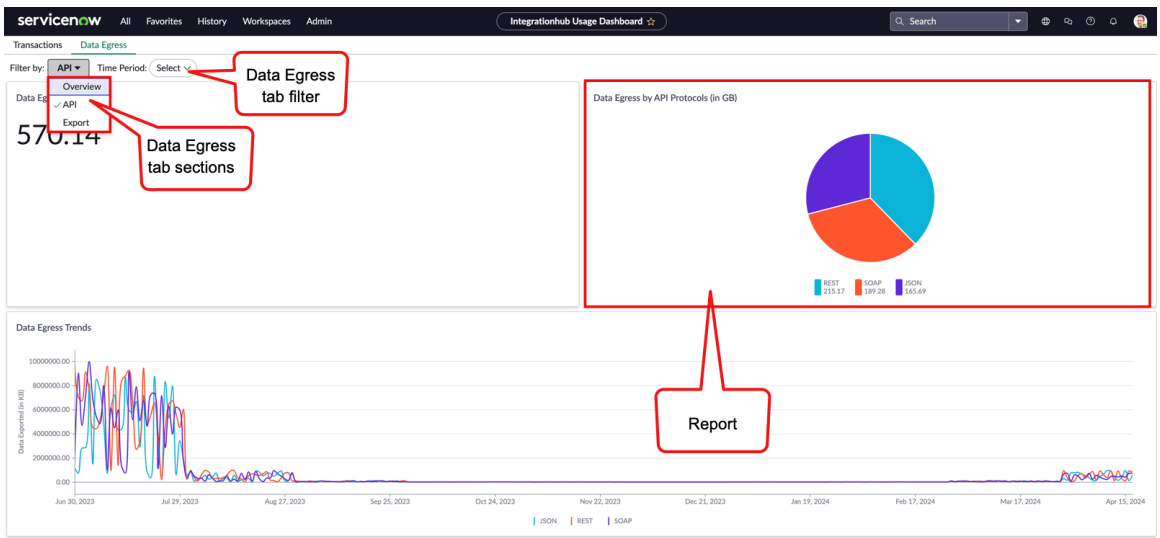
Note:

- There's no order in which you must view the reports, set the filters, or customize the columns in the report tables.
- All charts are adjusted to the nearest data metric starting with Bytes.

Data organization in the dashboard

The following images show how data is organized in the dashboard.





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Get insights from the Integration Hub Usage Dashboard

Use the Integration Hub Usage Dashboard to get insights on the Integration Hub transactions. For example, you can view which protocol was the most used in the transactions in the last year. You can also use filters and customize the layout and arrangement of the columns in the reports.

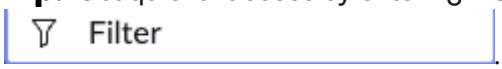
Before you begin

Role required: admin, flow designer, action_designer, usage_admin, or flow_operator

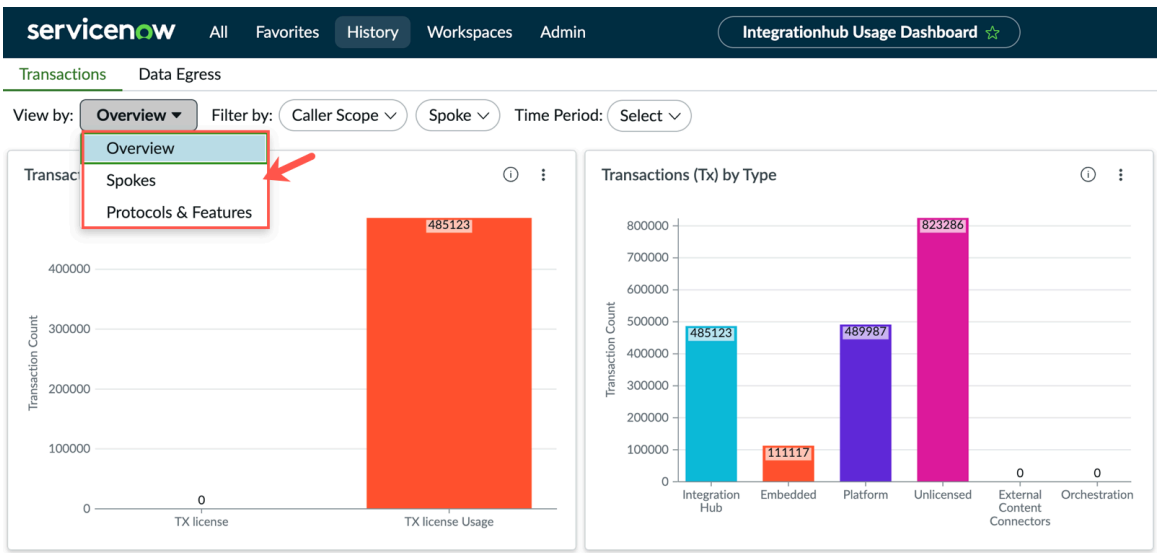
Procedure

1. To access the dashboard, navigate to **All** > **IntegrationHub** > **IntegrationHub Usage**.

   Tip: Get quicker access by entering **Integrationhub usage** in the filter search field

2. To view the reports, select **Spokes** or **Protocols & Features** in the **View by** list.

   Note: There's no order in which you must view the reports, set the filters, or customize the columns in the report tables. So, you can complete one or more of the following steps in any order. The Transactions tab is selected by default.

3. **Optional:** To drill down and view more details in a report, select the graph or chart.
4. **Optional:** To group transactions under a common parameter, do the following actions:

   a. Drill down the report.

   b. In the desired column, move the mouse device to the row that contains the parameter and click the group transactions by parameter icon ( ) for the parameter under which you want to group the transactions.

   c. Click **Show Matching**.

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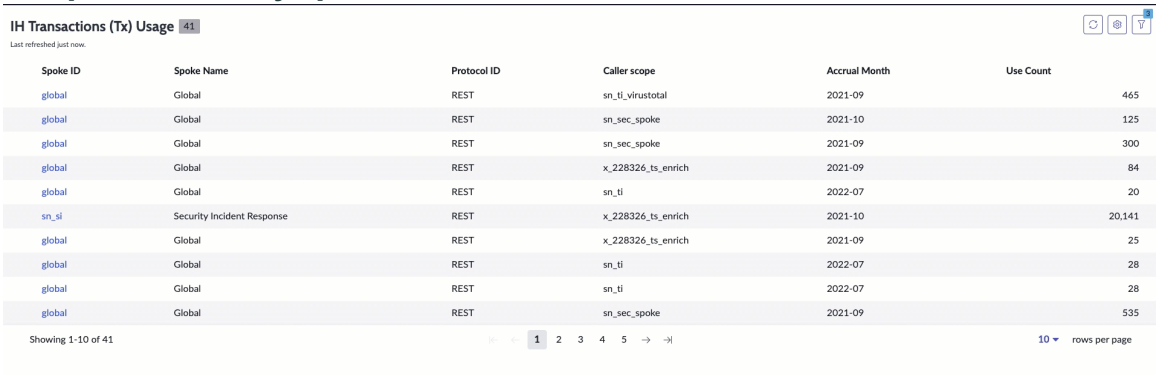
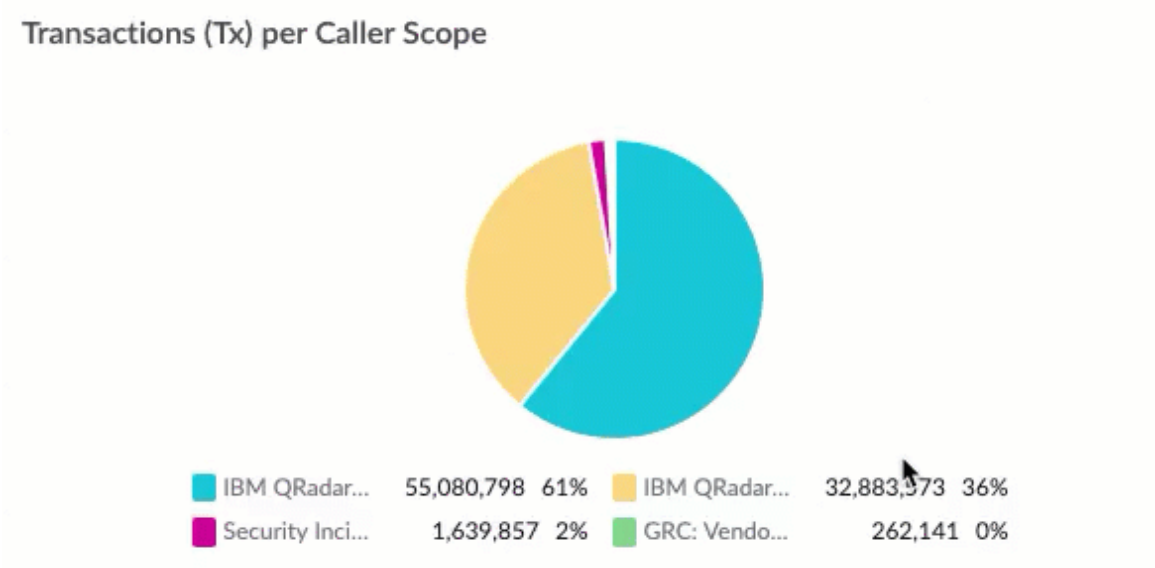
Alternatively, you can view the following animation by opening this topic on a browser.

Group transactions by a parameter



5. **Optional:** To hide or reveal the slices in a pie chart, do the following actions:
   Each slice in a pie chart represents a transaction usage insight. However, it might be difficult to view certain slices because they're obscured by fairly bigger slices.
   a. To hide a slice, click its colored legend.
   b. To reveal the slice back, click the colored legend again.
   Alternatively, you can view the following animation by opening this topic on a browser.

Hide or reveal pie chart slices



6. **Optional:** To customize the columns in the report table, do the following actions:
   a. Drill down the report.
   b. Click the column settings icon ( ).
   c. Click **Edit columns**.
   d. In the Available columns section, click the column name.
   e. To include a column, click the include column icon ( ).
   f. To exclude a column from the table, in the Selected columns section, click the remove column icon ( ).

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g. To change the positions of the columns in the report table, in the Selected columns section, click and drag the drag column icon (⠿).

h. To apply the changes, click **OK**.

7. **Optional:** Filter the data in the reports by caller scopes, spokes, and date by doing the following steps:

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a. To filter by caller scope or spoke, click **Caller Scope** or **Spoke** and then select one or more values.

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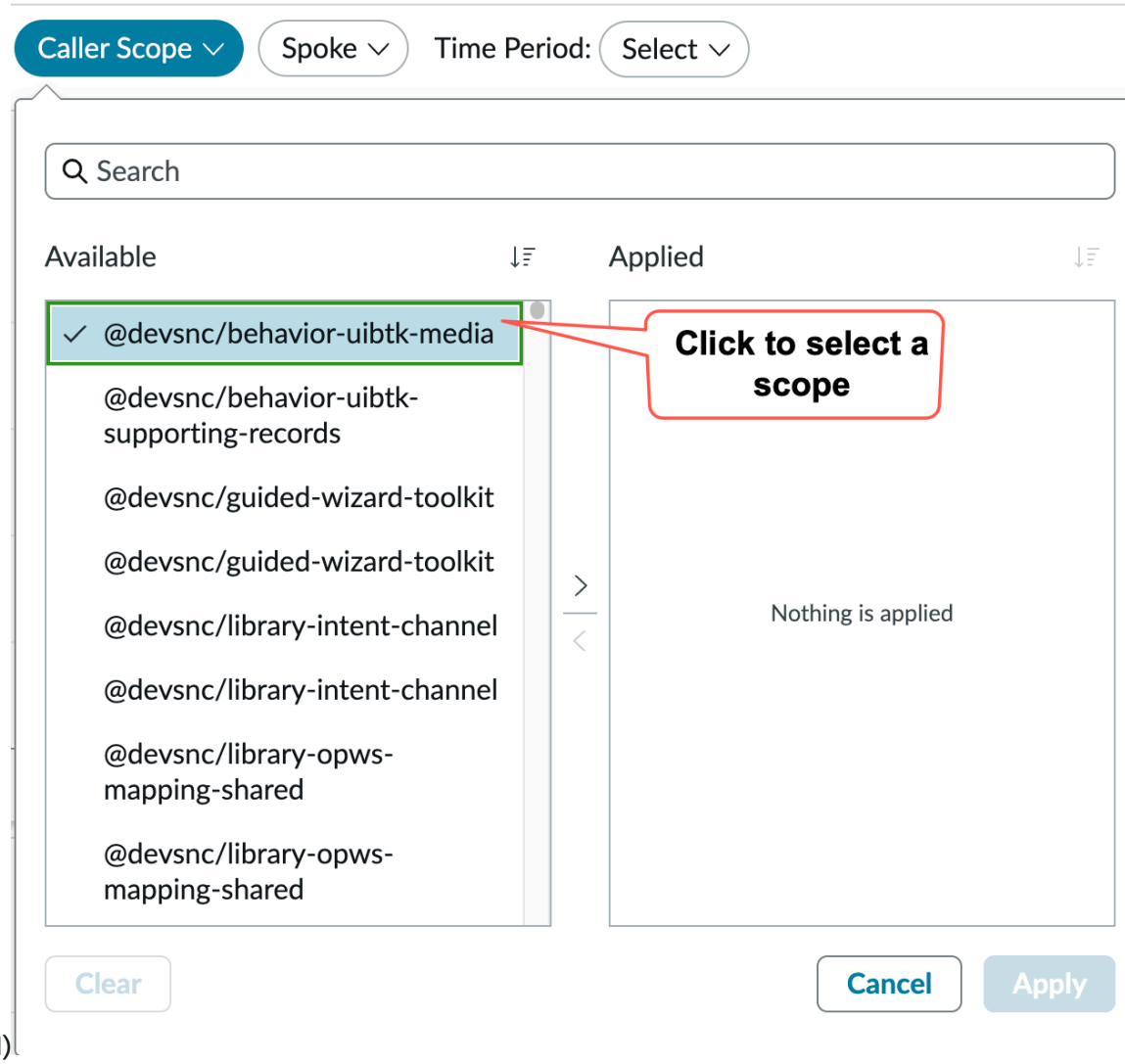
Tip: Select multiple caller scopes or spoke values by doing the following steps.

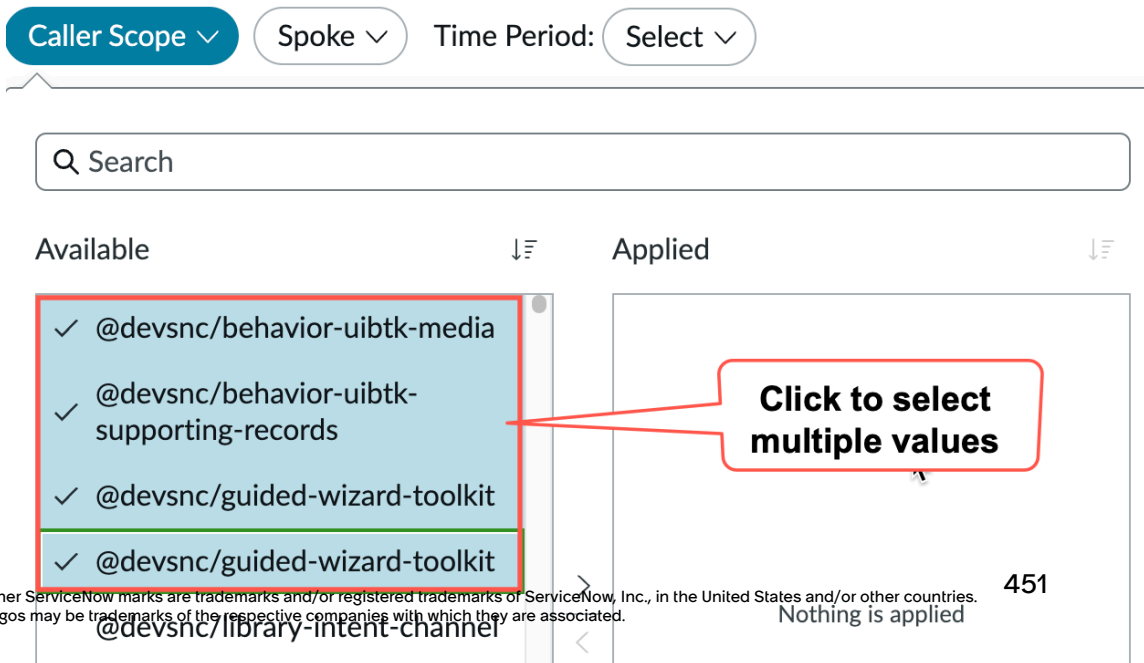
i. Select the **Caller Scope** or **Spoke** filter.

ii. Click to select the first value in the Available list.



(Optional)

iii. Click to select more values.



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b. Click the Move selected items to the To be Applied list icon >

c. Click **Apply**.
The filter is applied.

d. To filter the report data by time period, select the Time Period filter.

e. Select the time period by which you want to filter the data.

f. Click **Apply**.

Transaction reports in Integration Hub Usage Dashboard

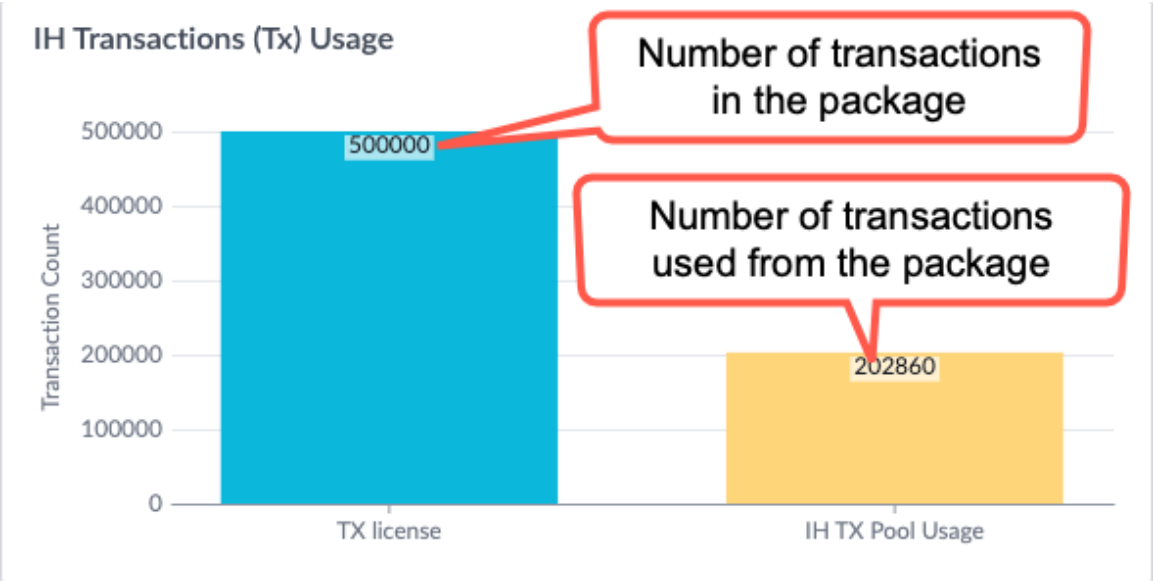
The transaction reports in Integration Hub Usage Dashboard help you to understand the Integration Hub usage transactions.

Overview section reports

IH Transactions (Tx) Usage report

Depending on the package that your organization subscribes to, the Integration Hub subscription packages offer a certain number of transactions per year. See the details about the packages in Integration Hub usage and subscription. With this report, you can learn about the total usage of the Integration Hub transactions versus the subscribed package of transactions in the last year. The following diagram shows what you can learn from viewing the Integration Hub transactions usage.

Integration Hub Transactions (Tx) Usage report



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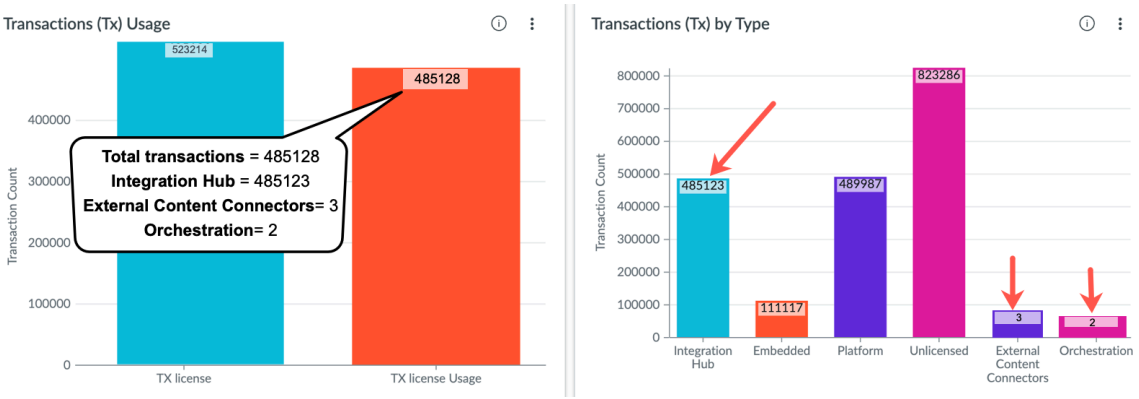
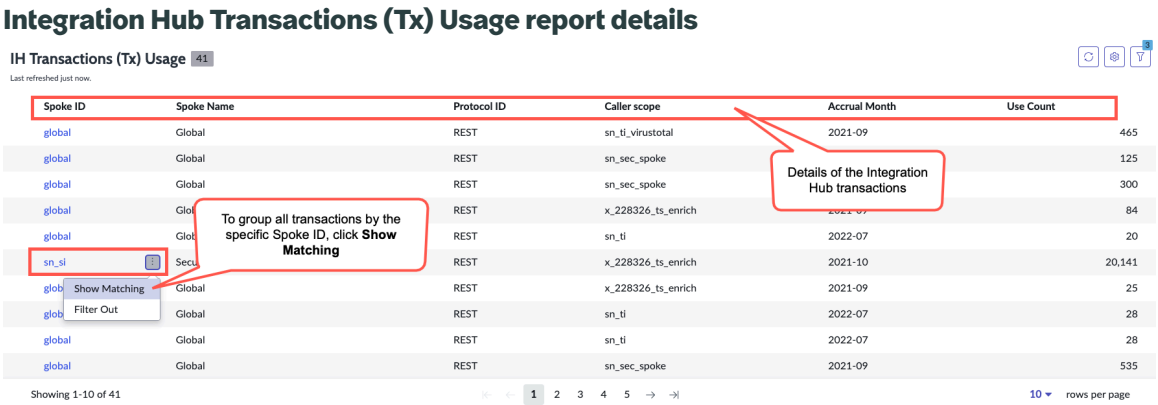
Note: The number of transactions you have used from the package is the sum of the transactions that you have performed in Integration Hub, External Content Connectors, and Orchestration. The Transactions (Tx) by Type report shows the transactions that you have performed in Integration Hub, External Content Connectors, and Orchestration. See the image.



As shown in the following example, you can click a graph to view more details about the transactions.



Transactions by Type report

As shown in the following diagram, you can use the Transactions by Type report to view the total transactions by their types.

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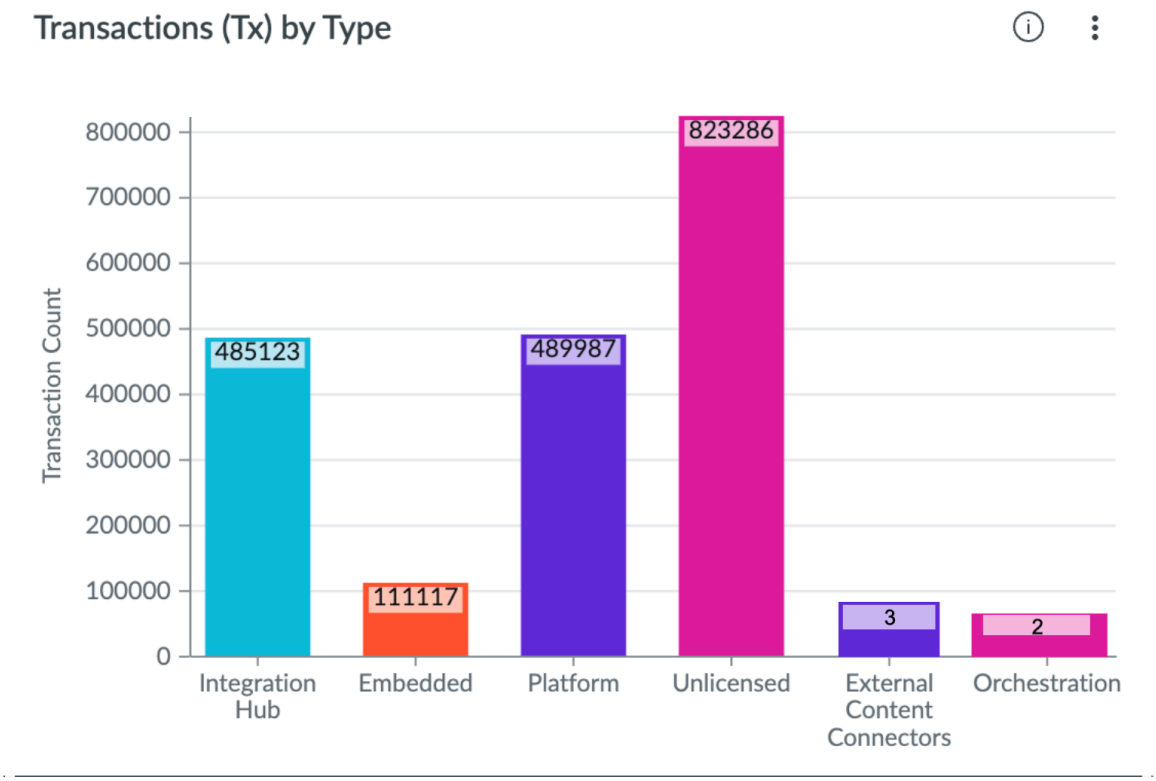
Transactions by Type report



Transactions (Tx) per Caller Scope report

The applications that perform the transactions are known as caller scopes. The Transactions (Tx) per Caller Scope report enables you to view the transactions per caller scope. As shown in the following diagram, you can also drill down and view the transactions that are performed by the spokes that are under different caller scopes.

Transactions (Tx) per Caller Scope report



As shown in the following example, you can click a graph to view more details such as the spoke transactions, what the caller scope of the spoke is, the total transaction count, and more. You can also group the transactions under a specific parameter in the table.

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Transactions (Tx) per Caller Scope report details

Transactions (Tx) per Caller Scope 117

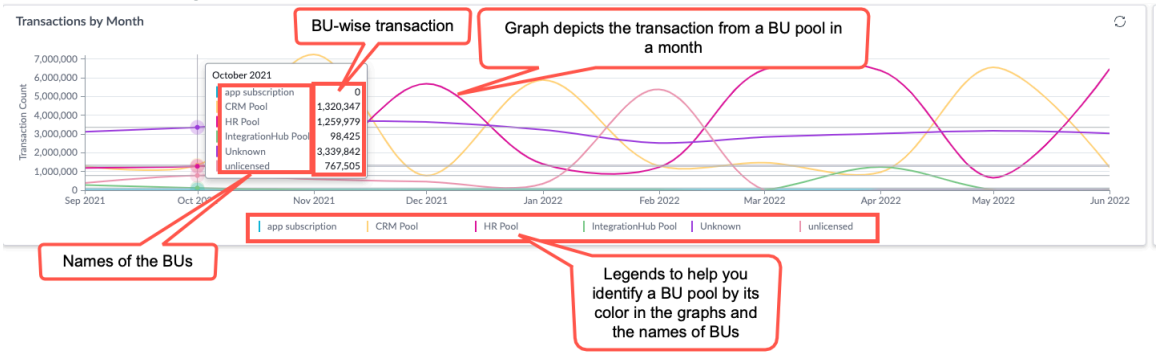
Last refreshed just now.

Spoke ID	Spoke Name	Protocol ID	Caller scope	Accrual Month	Use Count
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-04	23,342
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-05	2,522
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-03	2,465
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-04	5,780,642
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-04	1,221,301
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-05	17,051
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-03	2,904
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-04	1,302
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-05	1,411
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-05	3,041
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-04	2,165
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-04	17
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-05	42
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-05	64,762
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-05	12,430
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-05	10
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-03	2,803

Transactions by Month report

As shown in the following diagram, the Transactions by Month report enables you to view the total transactions that are performed from each business unit and the Integration Hub subscription pool per month.

Transactions by Month report



Tip: To view the pop-up window that shows the business unit transactions, on the Y-axis, click just above the month that you want to view the report for.

As shown in the following diagram, you can drill down and view more details of the transactions of a business unit pool. On the graph, click the small colored circle that indicates the business unit. For example, you can click the colored circle representing the HR business unit pool icon to see the details of the HR business unit pool.

Transactions by Month report details

Transactions by Month 4

Last refreshed 4m ago.

Spoke ID	Spoke Name	Protocol ID	Caller scope	Accrual Month	Use Count	Subscription ID
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-01	5,861,264	crm pool
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-01	2	crm pool
sn_sec_qradar	IBM QRadar Offense Ingestion for Security Operations	REST	sn_sec_qradar	2022-01	3,156	crm pool
sn_sec_z	Security Incident Response Integration with Zscaler	REST	sn_sec_z	2022-01	5	crm pool

Showing 1-4 of 4 1 20 rows per page

Spokes section reports

Top Spokes report

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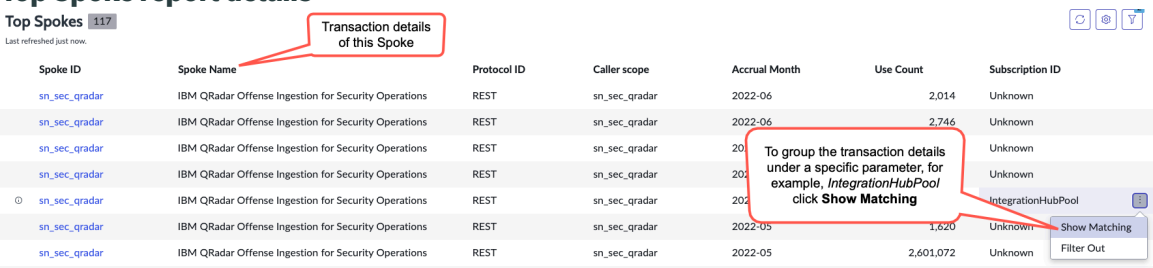
With the Top Spokes report that is shown in the following diagram, you can view the top 10 spokes that performed the largest number of transactions.

Top Spokes report



As shown in the following example, you can drill down and view more details about the transactions that are performed by a specific spoke by clicking the graph that represents the spoke.

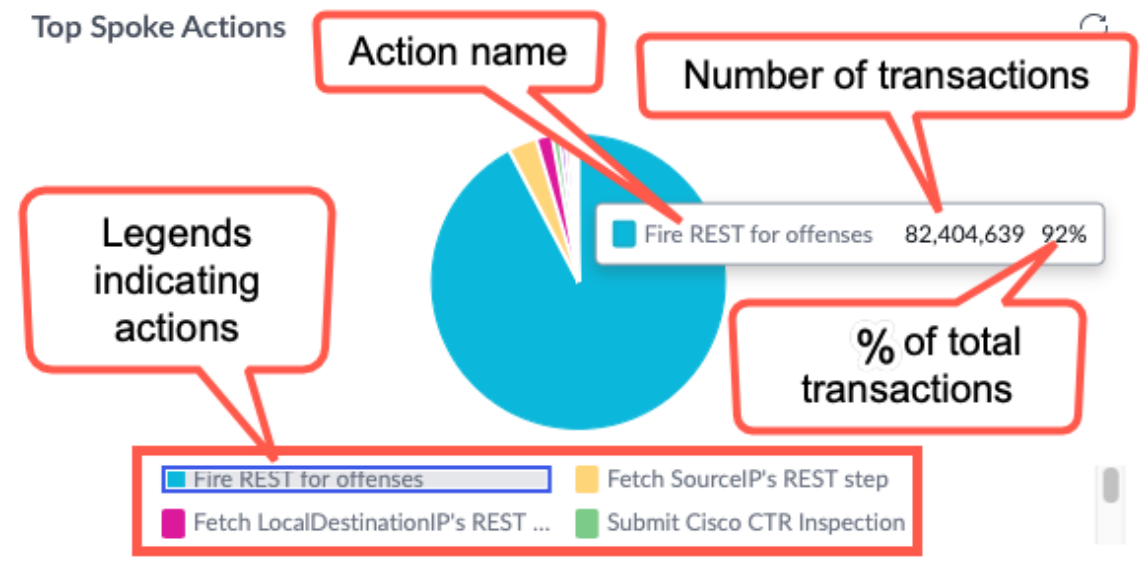
Top Spoke report details



Top Spoke Actions report

As shown in the following diagram, this report displays the names of the top actions that are performed by spokes. You can also drill down to view more details.

Top Spoke Actions report



As shown in the following example, you can drill down and view more details of a specific action by clicking the slice.

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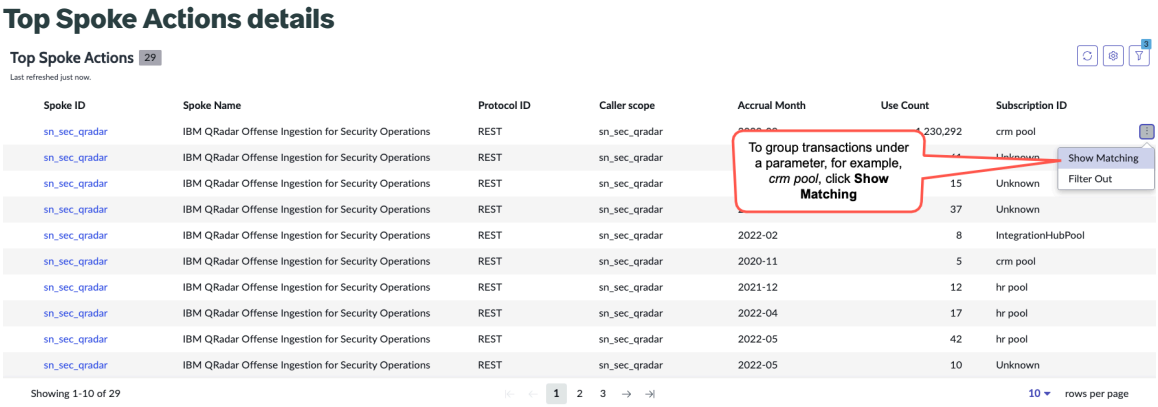
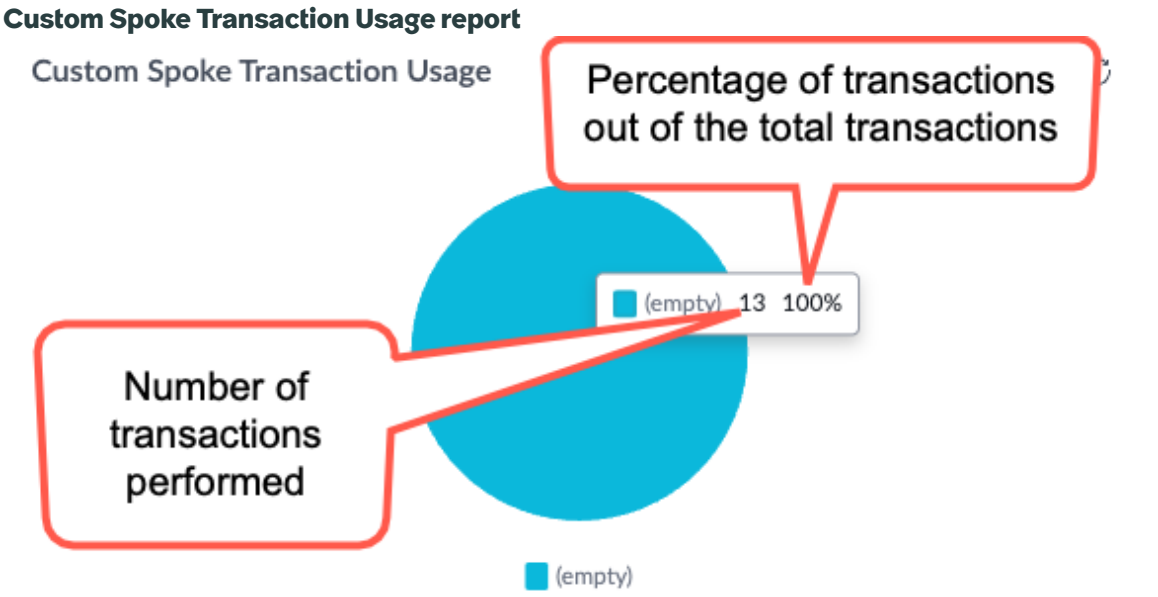
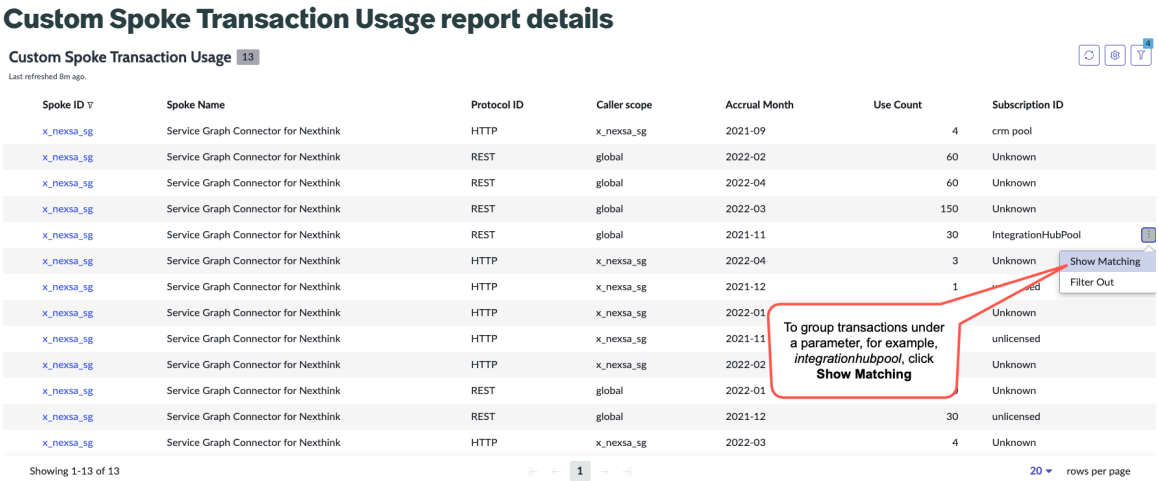


Custom Spoke Transaction Usage report

As shown in the following diagram, you can view the transaction usage by the custom spokes in the Custom Spoke Transaction Usage report. You can also drill down and view the details of the report.



As shown in the following example, you can drill down by clicking the slice.



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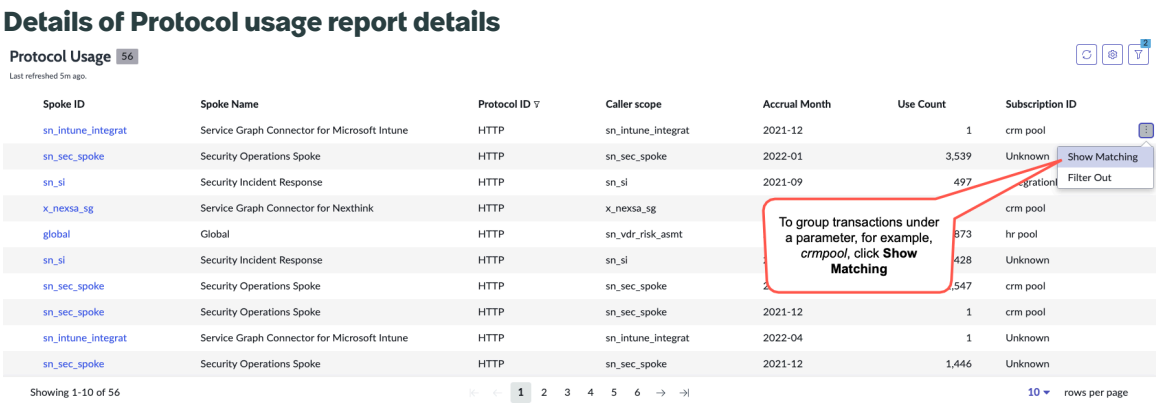
Protocols and Features reports

Protocol Usage report

Spokes use different protocols while performing transactions. As shown in the following diagram, you can use the Protocol Usage report to view the usage of the various protocols. You can drill down to view more details.

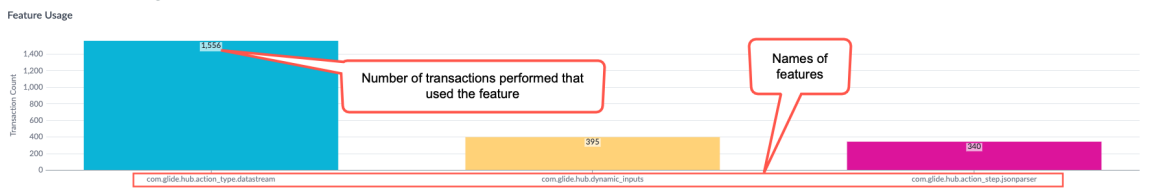


As shown in the following example, you can drill down and view the details of transactions with a protocol by clicking the graph that represents a protocol.

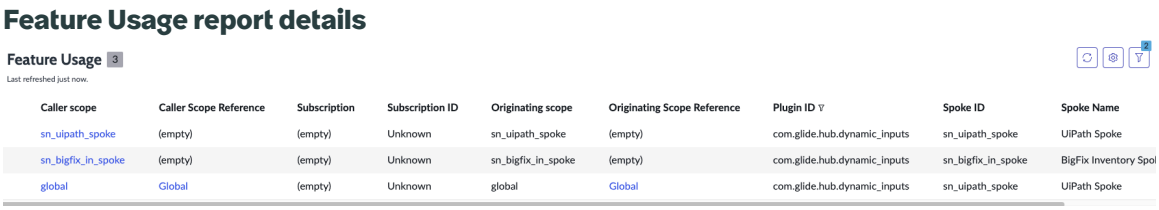


Feature Usage

The Spokes use different features while performing transactions. This report gives the usage of the various features. You can drill down to view more details.



To drill down, click the graph representing a feature.



Data egress reports in the Integration Hub Usage Dashboard

The Data egress reports give insights on data egress from the ServiceNow instance through API protocols or export sets. You can view more information when you select specific records.

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Access the reports

Do the following steps.

1. Select the **Data Egress** tab.
2. Select the API or Export section that you want to view from the **Filter by** list.

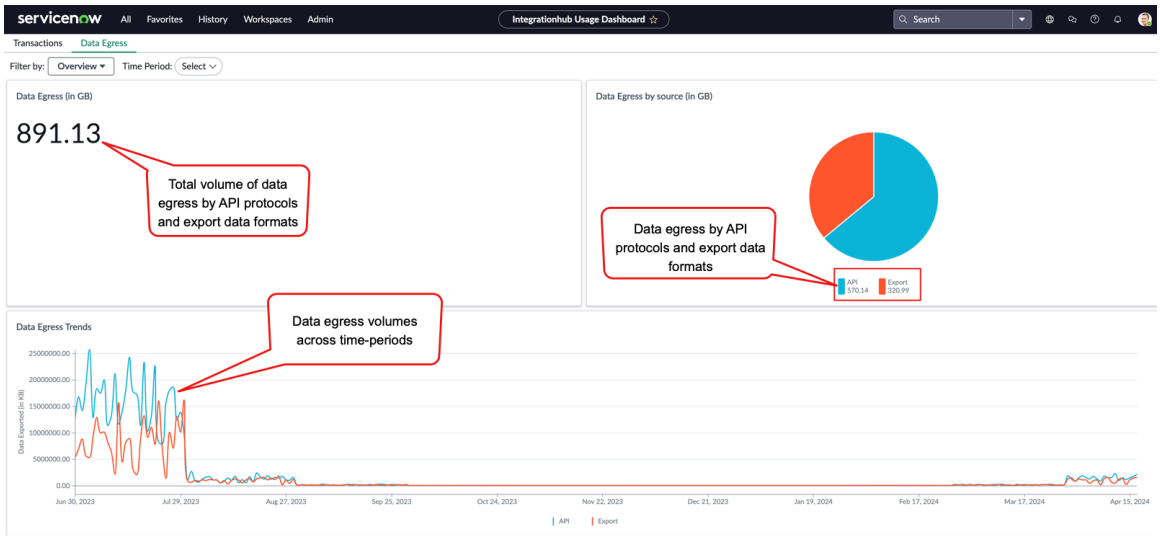
Note: The Overview section is selected by default.

Overview section reports

Data Egress: Total volume of data egress by all sources.

Data Egress by source: Data egress volume by API protocols and export.

Data Egress Trends: Trends in data egress across the time period.



Note: All charts are adjusted to the nearest data metric starting with Bytes.

API section reports

Data Egress: Total volume of data egress by all API protocols.

Data Egress by API Protocols: Data egress volume by API protocols.

Data Egress Trends: Trends in data egress across the time period.

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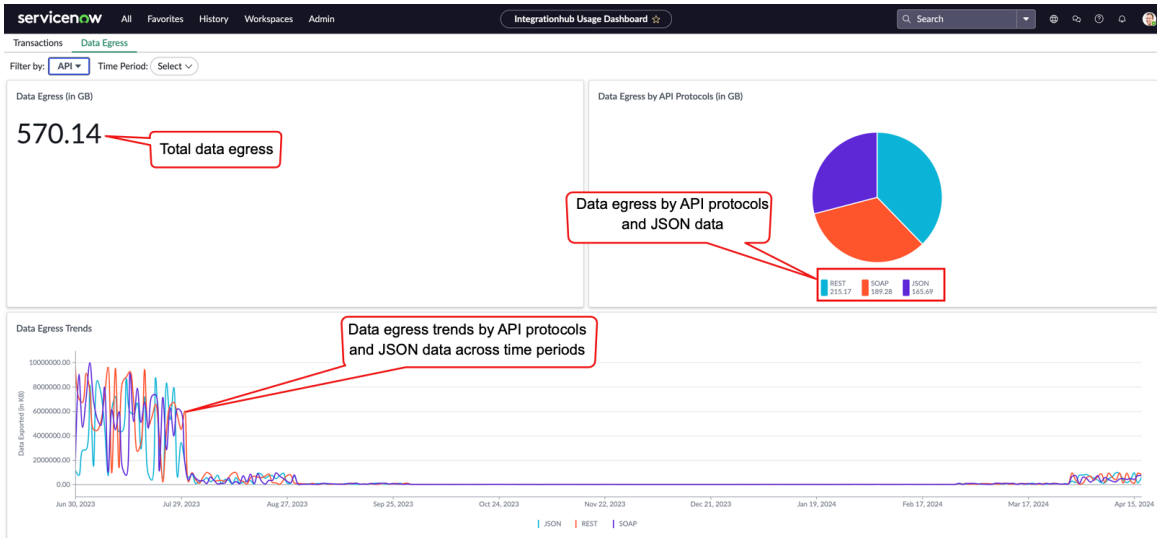

Note: All charts are adjusted to the nearest data metric starting with Bytes.

Export section reports

Data Egress: Total volume of data egress by both the export sets and URI.

Data Egress by Exports: Data egress volume by URI.

Data Egress Trends: Trends in data egress across the time period.

Note: All charts are adjusted to the nearest data metric starting with Bytes.

Important: The amount of data is mentioned in bytes and the abbreviations are as described in the following table.

Orders of magnitude

Abbreviation	Number	Value
K	Thousand	10^3
M	Million	10^6
B	Billion	10^9
T	Trillion	10^12

That is, if the value displayed is **4.01M**, the amount of data transferred is 4.01 million bytes. In the preceding sample API Data Egress, the data amount of data transferred is 2.01 billion bytes.

Select the number to access details of the individual data transfers.

View data insights

View different insights on data going out of the ServiceNow instance. For example, view the data egress volume between a period that you specify. Do the actions given in the image.

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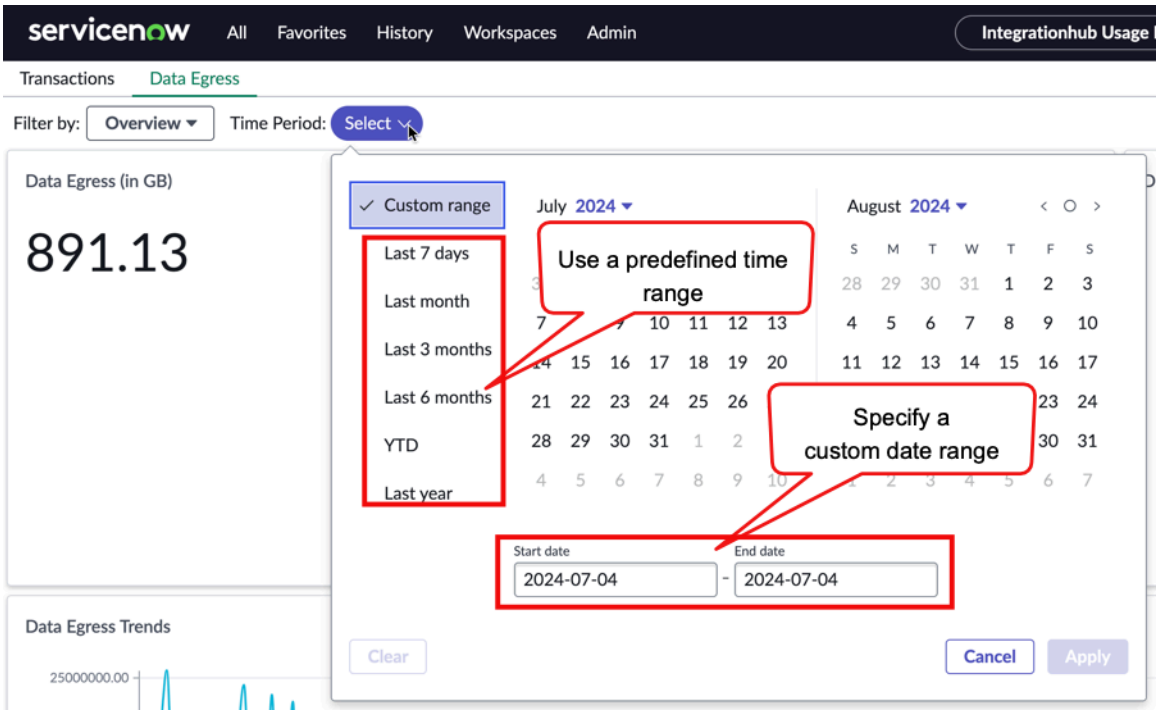
View egress data for a specified time period



Overview of data egress

View the total data egress, and the data egress by API protocols or exports.

Do the steps.

1. Select the **Data Egress** tab.

   Confirm that in the Filter by list, Overview is selected.

2. Select the data egress volume in the Data Egress report.

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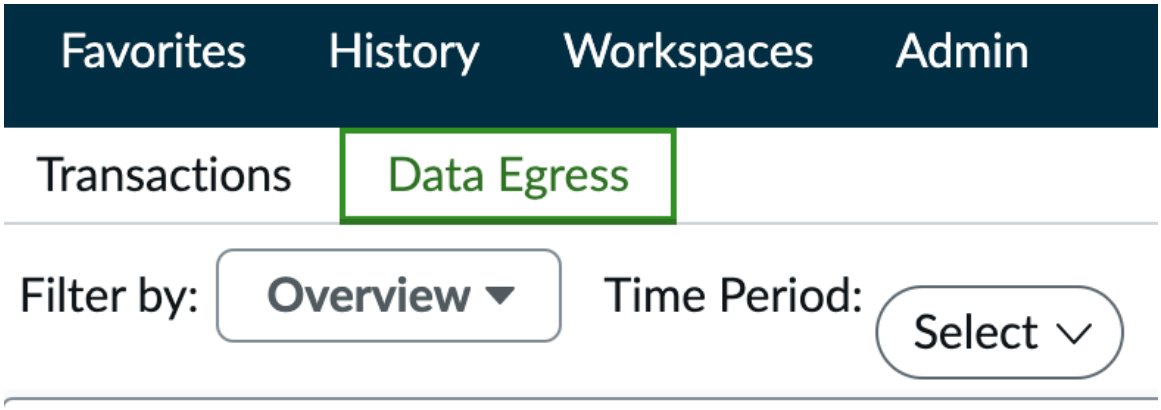
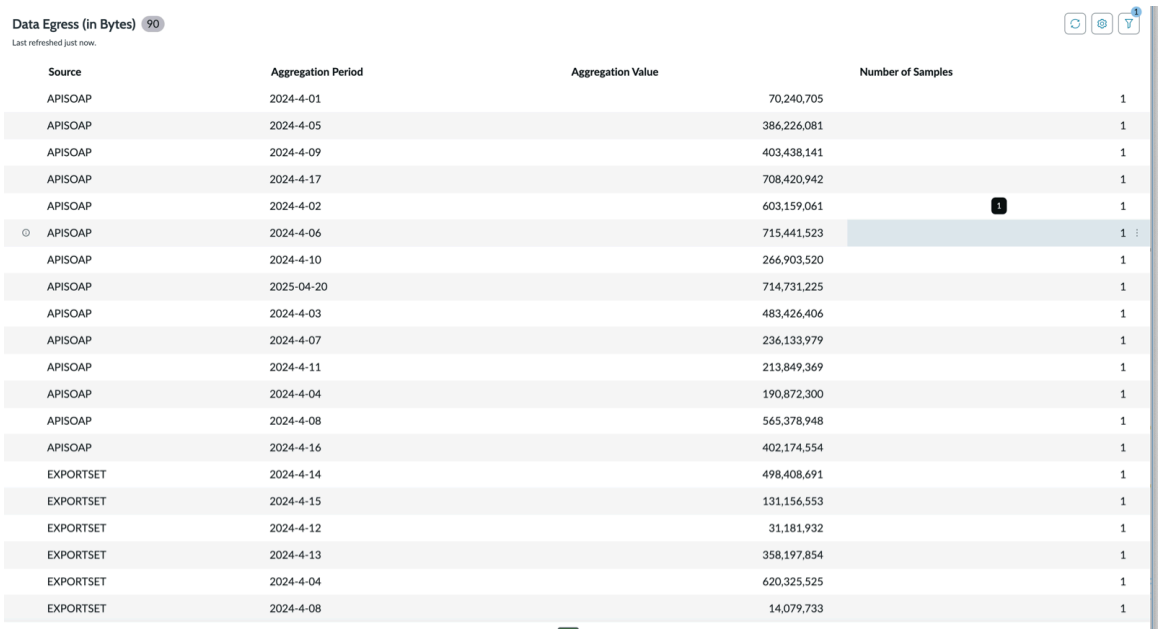




The data egress by API protocols and exports appear.



Data Egress (in Bytes) 90

Last refreshed just now.

Source	Aggregation Period	Aggregation Value	Number of Samples
APISOAP	2024-4-01	70,240,705	1
APISOAP	2024-4-05	386,226,081	1
APISOAP	2024-4-09	403,438,141	1
APISOAP	2024-4-17	708,420,942	1
APISOAP	2024-4-02	603,159,061	1
APISOAP	2024-4-06	715,441,523	1
APISOAP	2024-4-10	266,903,520	1
APISOAP	2025-04-20	714,731,225	1
APISOAP	2024-4-03	483,426,406	1
APISOAP	2024-4-07	236,133,979	1
APISOAP	2024-4-11	213,849,369	1
APISOAP	2024-4-04	190,872,300	1
APISOAP	2024-4-08	565,378,948	1
APISOAP	2024-4-16	402,174,554	1
EXPORTSET	2024-4-14	498,408,691	1
EXPORTSET	2024-4-15	131,156,553	1
EXPORTSET	2024-4-12	31,181,932	1
EXPORTSET	2024-4-13	358,197,854	1
EXPORTSET	2024-4-04	620,325,525	1
EXPORTSET	2024-4-08	14,079,733	1

Data egress by API protocols or exports

View data egress by various API protocols or exports.

Do the steps.

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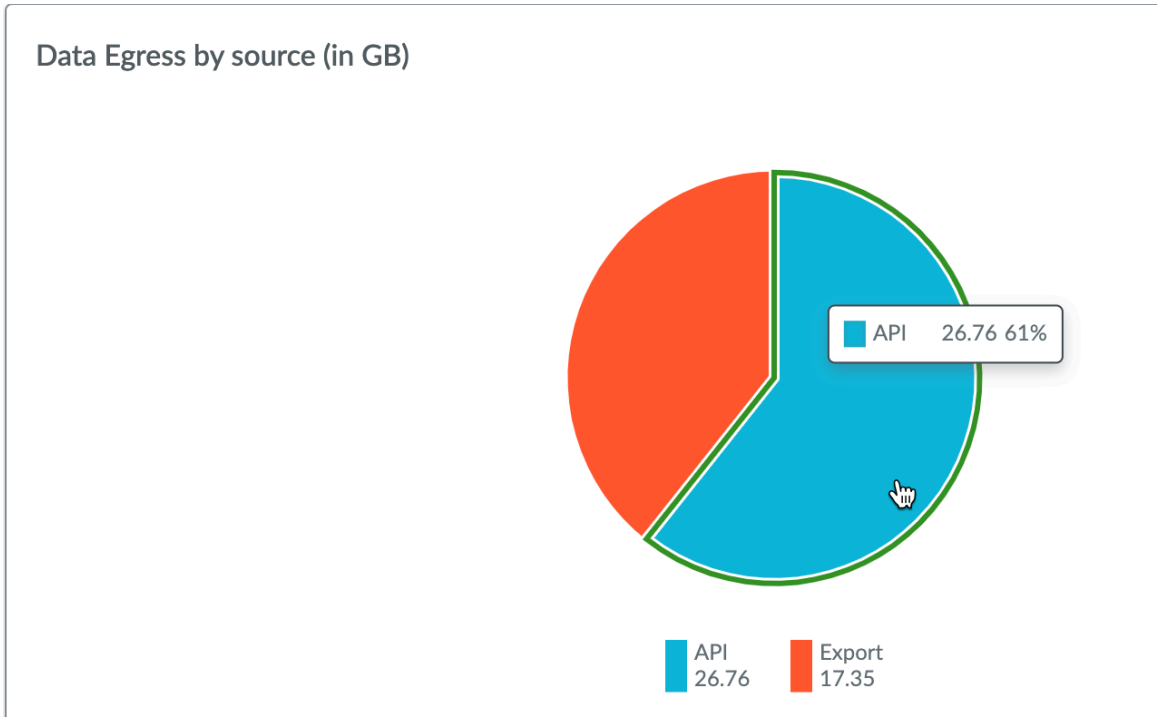
1. Select the **Data Egress** tab.

   Confirm that in the Filter by list, Overview is selected.

2. On the Data Egress by source report, select a source.



   For example, select API.

   The data egress by API protocols such as REST and SOAP appears.

Source	Aggregation Period	Aggregation Value	Number of Samples
Operator starts with	Operator contains	Operator is	Operator is
Filter Value	Value	Value	Value
APIREST	2024-4-14	918,707,427	1
APIREST	2024-4-15	297,942,729	1
APIREST	2024-4-02	113,487,098	1
APIREST	2024-4-06	642,468,219	1
APIREST	2024-4-10	600,168,821	1
APIREST	2025-04-20	817,153,169	1
APIREST	2024-4-03	556,392,828	1
APIREST	2024-4-07	866,848,767	1
APIREST	2024-4-11	367,630,706	1
APIREST	2024-4-04	683,699,998	1
APIREST	2024-4-08	166,454,120	1
APIREST	2024-4-16	85,601,131	1
APIREST	2024-4-01	13,777,338	1
APIREST	2024-4-05	341,469,258	1
APIREST	2024-4-09	923,327,774	1
APIREST	2024-4-17	916,246,264	1
APISOAP	2024-4-15	488,592,031	1
APISOAP	2024-4-12	443,479,132	1
APISOAP	2024-4-13	479,465,015	1
APISOAP	2024-4-14	408,226,898	1

Page 2

View data egress by API protocols or exports on a specified date

Select a date and API protocol or exports and view the data egress by the source you specified on that date.

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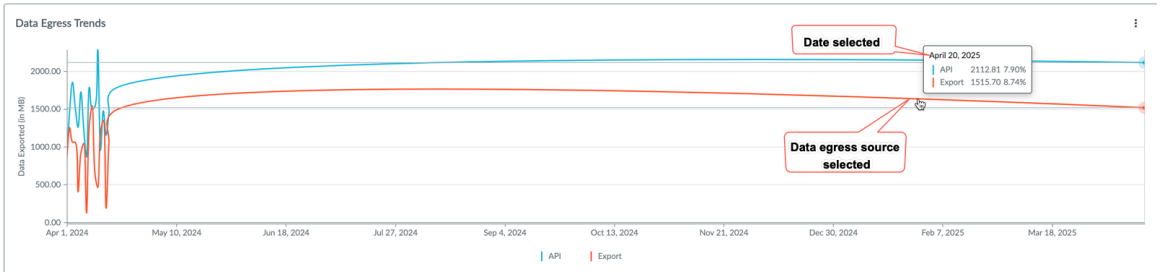
Do the following steps.

1. Select the **Data Egress** tab.

   Confirm that in the Filter by list, Overview is selected.

2. On the Data Egress Trends report, move the pointer to a date and then select the source.



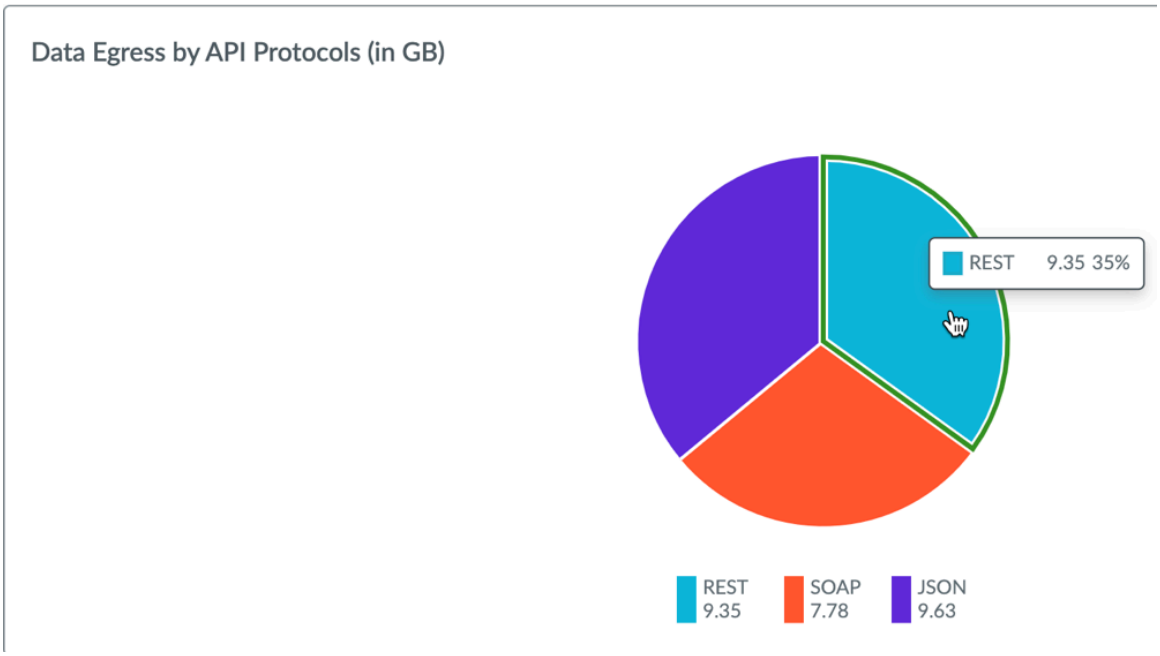
   All records of data egress by the date and source that you specified appears.

View data egress by API protocols

View data egress by JSON, REST, or SOAP protocols, and then select a record from the data to view more information.

Do the steps.

1. Select the **Data Egress** tab.
2. From the Filter by list, select **API**.
3. In the Data Egress by API Protocols report, select an API protocol, for example, REST.



   All records of data egress by the API protocol that you specified appears.

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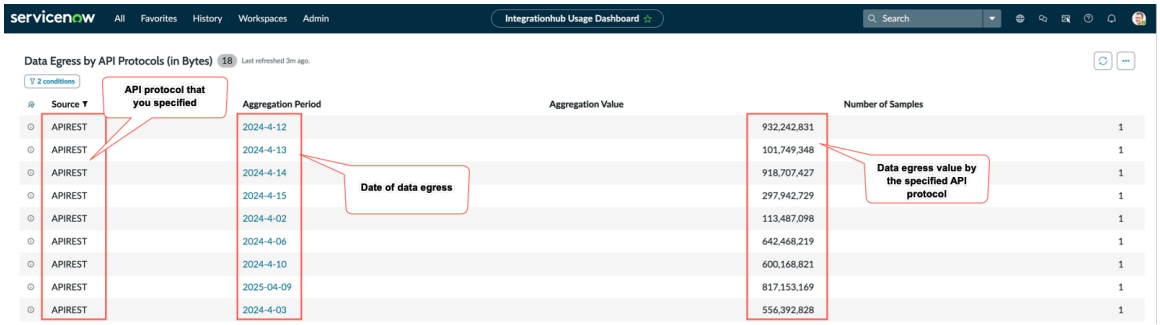
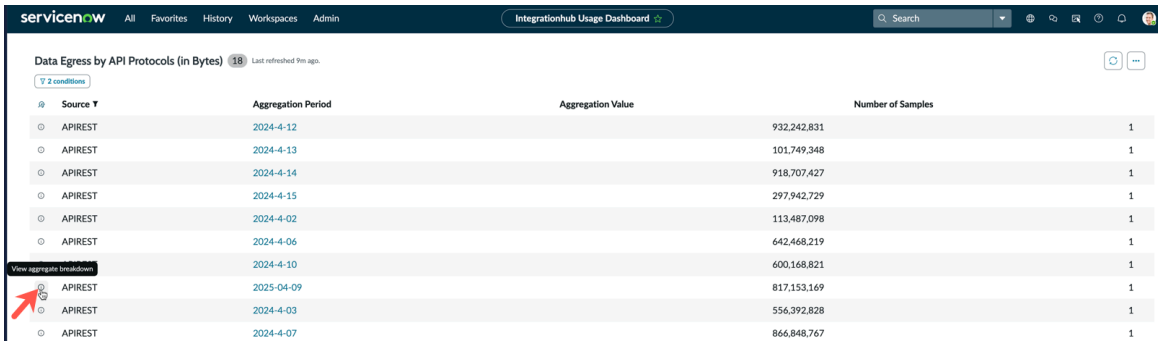
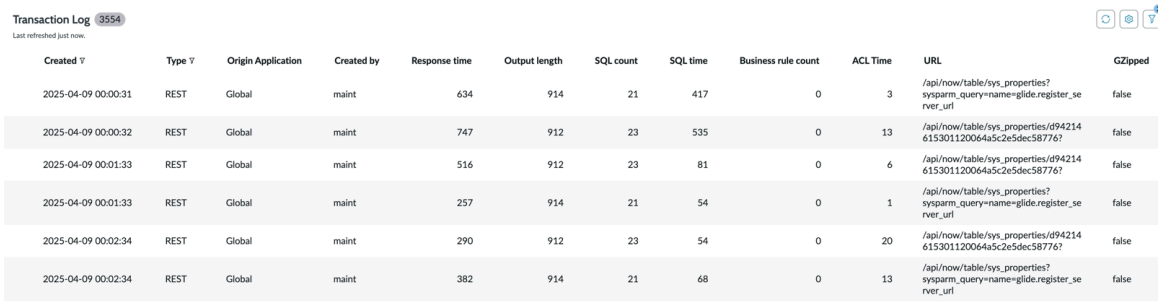


4. To view more data on a specific record, select the View Aggregate Breakdown icon .



The transaction log appears.



View data egress by API protocols on a specified date

Specify a date and view the data egress by JSON, REST, or SOAP protocols on that date. You can select a record from the data to view more information.

Do the steps.

1. Select the **Data Egress** tab.
2. From the Filter by list, select **API**.
3. Move the pointer to a date on the graph, and select an API protocol.



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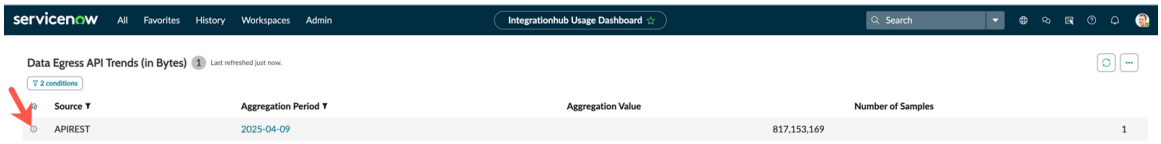
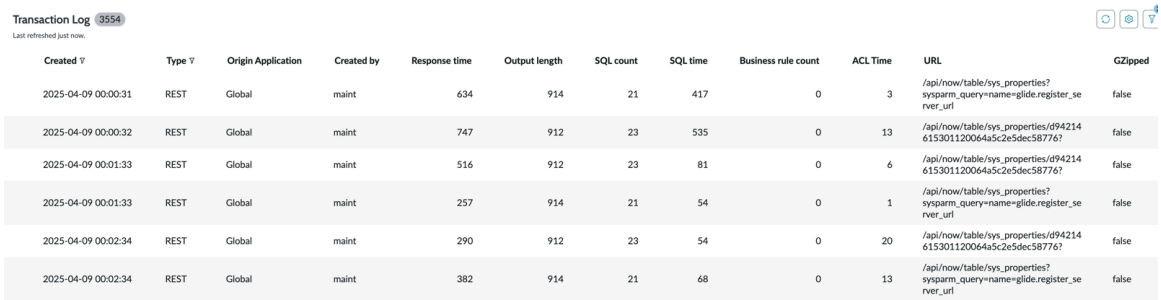
The data egress by the selected API protocol on the selected date appears.



4. To view more data on a specific record, select the View Aggregate Breakdown icon .



The transaction log appears.



Reports on data egress by export

View information on the data egress from the ServiceNow instance by URI and export sets.

To access the reports, do the steps.

1. Select the **Data Egress** tab.
2. From the Filter by list, select **Export**.

Reports on data egress by export sets or URI

To access the reports on data egress by export sets or URI, do the steps.

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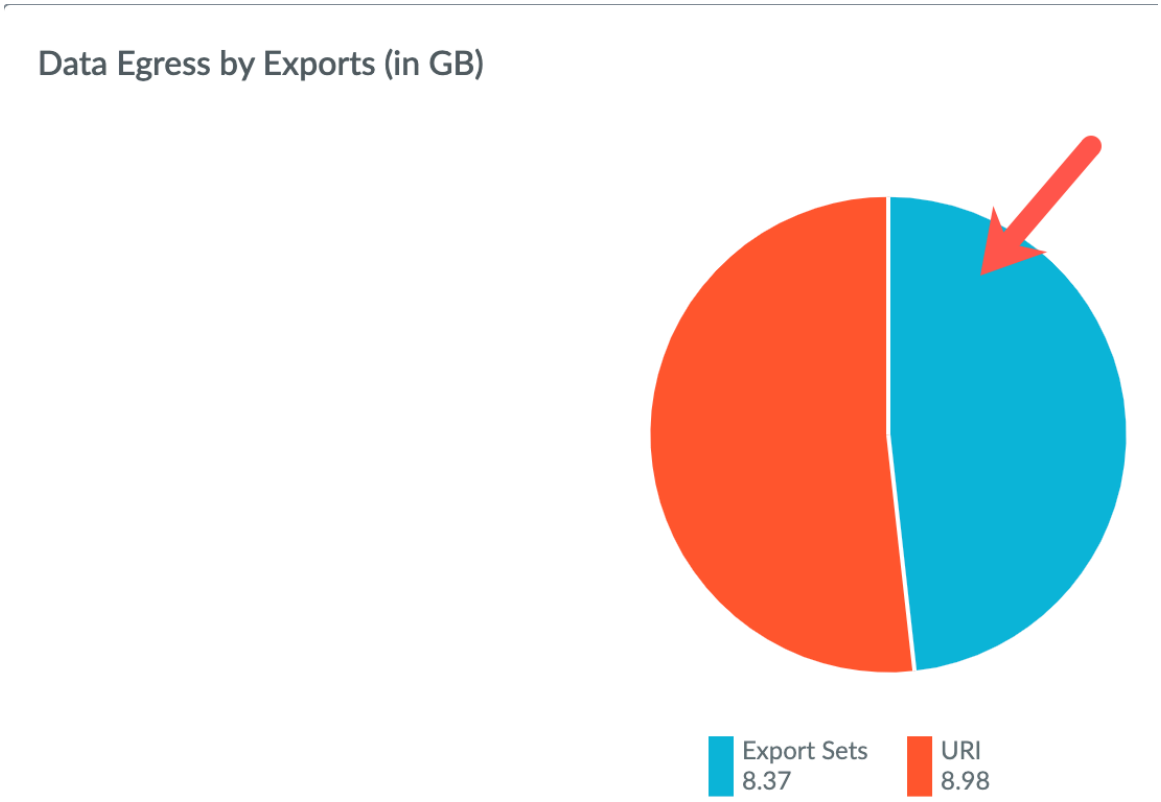
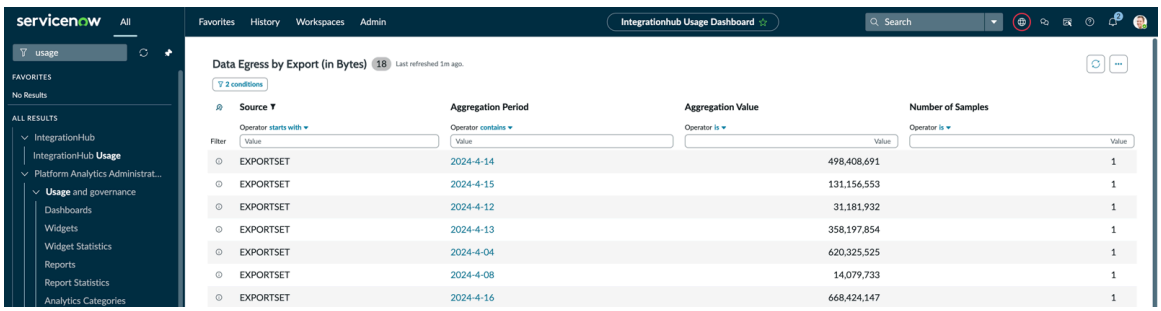
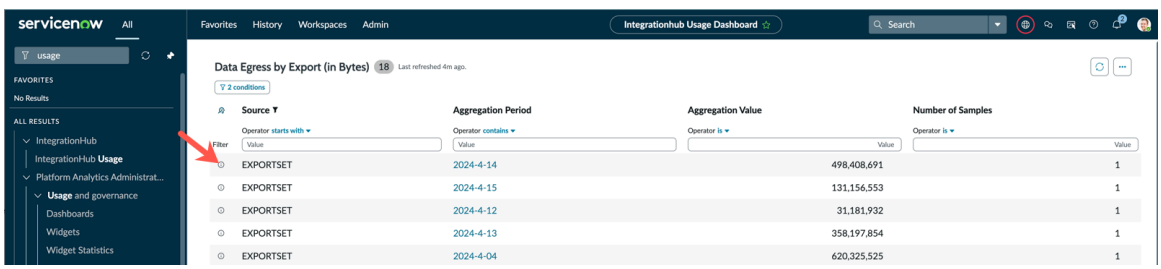
1. On the Data Egress by Exports report pie-chart, select the data export type. For example, export sets.



The date-wise data exports by the source you specified appears.



2. To view more information on an export set on a date, select the View Aggregate Breakdown icon .



The data appears.

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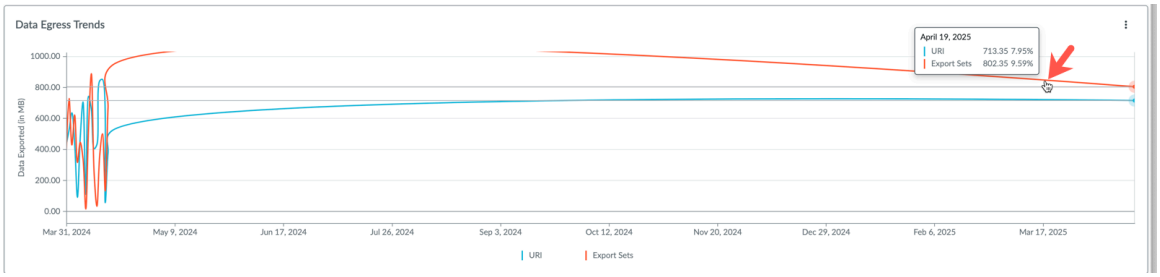
Date-wise data egress by exports

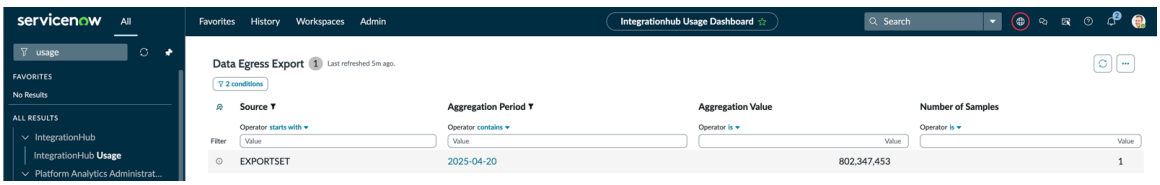
View data egress by exports on a date that you specify.

Do the following steps.

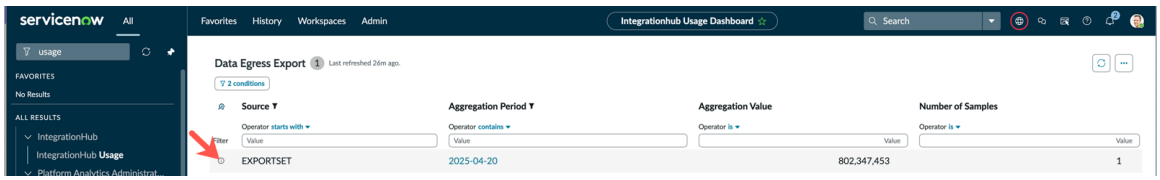
1. On the Data Egress Trends report, move the pointer to a date and then select the export type. For example, move the pointer to April 19, and then select Export Sets.



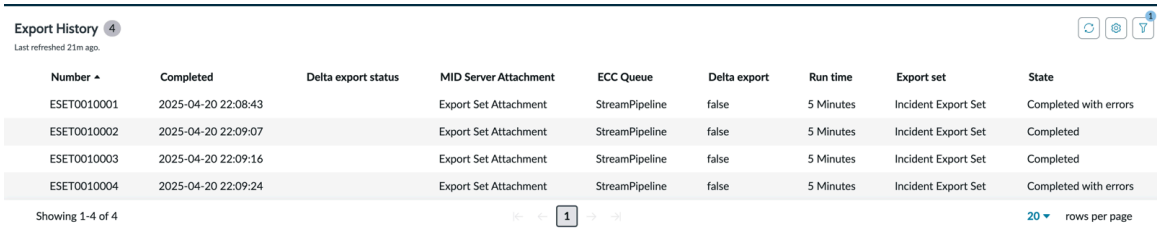
The egress data on the export type and date that you specified appears.



2. To view more data on a specific record, select the View Aggregate Breakdown icon .



The data appears.



Data generation in the reports

Data in the reports are generated from the `data_egress_count` table. View how data is populated in the `data_egress_count`.

Building integrations in Integration Hub

Create integrations with Integration Hub.

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Integration Hub spokes

Activate spokes to enhance your Workflow Studio experience with integration-specific content. Use prebuilt flows and actions to automate your integrations or create your own integration automation.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Note: For information about which spokes are included with different Integration Hub subscriptions, see Legal schedules - IntegrationHub overview.

Note:

ServiceNow has partnered with Boomi to deliver Boomi API Management, a cloud-based platform that enables customers to discover, manage, secure, and monetize their APIs. Boomi supports full lifecycle API management, including governance, analytics, and API security.

Boomi provides documentation though their own portal, and customers requesting support with Boomi API Management will contact the Boomi support through their standard channels.

To get started, see the Boomi API Management listing on the ServiceNow® Store, which includes information about entitlements and required plugins, as well as a link to the Boomi API Management documentation.

Spokes list and compatibility

Spoke name	Spoke version	Compatibility
Adobe Experience Platform Spoke	2.1.1	Brazil, Australia, Zurich, Yokohama
Adobe Sign Spoke	2.11.0	Brazil, Australia, Zurich, Yokohama
Agent Client Collector Spoke	1.2.0	Brazil, Australia, Zurich, Yokohama
Aha! Spoke	1.9.1	Brazil, Australia, Zurich, Yokohama
AI Search Spoke	2.0.3	Brazil, Australia, Zurich, Yokohama
Amazon Alexa Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
Amazon CloudWatch Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Amazon Connect Spoke	1.2.0	Brazil, Australia, Zurich, Yokohama
Amazon DynamoDB Spoke	1.0.1	Brazil, Australia, Zurich, Yokohama

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
Amazon EBS Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Amazon EC2 Spoke	1.4.1	Brazil, Australia, Zurich, Yokohama
Amazon Elastic Container Service Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Amazon RDS Spoke	1.0.5	Brazil, Australia, Zurich, Yokohama
Amazon Route 53 Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Amazon S3 Spoke	1.3.2	Brazil, Australia, Zurich, Yokohama
Amazon SNS Spoke	1.1.4	Brazil, Australia, Zurich, Yokohama
Amazon SQS Spoke	1.0.1	Brazil, Australia, Zurich, Yokohama
Amazon VPC Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
Ansible Spoke	2.4.0	Brazil, Australia, Zurich, Yokohama
Asana Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Atlassian Administration Spoke	1.0.0	Brazil, Yokohama, Australia, Zurich, Yokohama
Automation Anywhere Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
AWS Certificate Manager Spoke	1.0.1	Brazil, Australia, Zurich, Yokohama
AWS CloudFormation Spoke	1.1.4	Brazil, Australia, Zurich, Yokohama
AWS Elastic Beanstalk Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
AWS Elastic Load Balancing Spoke	1.0.1	Brazil, Australia, Zurich, Yokohama
AWS IAM Spoke	1.2.0	Brazil, Australia, Zurich, Yokohama
AWS Lambda Spoke	1.1.3	Brazil, Australia, Zurich, Yokohama
AWS OpsWorks Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
AWS Translate Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
BigFix Inventory Spoke	1.6.0	Brazil, Australia, Zurich, Yokohama
Blue Prism Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
BMC Remedy Spoke	1.5.0	Brazil, Australia, Zurich, Yokohama
Box Spoke	3.7.0	Brazil, Australia, Zurich, Yokohama
Calendly Spoke	1.3.1	Brazil, Australia, Zurich, Yokohama
Cisco Webex Meetings Spoke	2.3.3	Brazil, Australia, Zurich, Yokohama
Cisco Webex Teams Spoke	2.3.6	Brazil, Australia, Zurich, Yokohama
Confluence Cloud Spoke	2.1.1	Brazil, Australia, Zurich, Yokohama
Confluent Kafka REST Proxy Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Continuous Integration and Continuous Delivery (CICD) Spoke	1.0.11	
Cornerstone Spoke	1.4	Brazil, Australia, Zurich, Yokohama
Coupa Spoke	4.17.0	Brazil, Australia, Zurich, Yokohama
Craft spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Credly spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
CrowdStrike Spoke	1.1.0	Brazil, Australia, Zurich, Yokohama
Databricks Spoke	1.0.1	Brazil, Australia, Zurich, Yokohama
Docker Spoke	2.4.3	Brazil, Australia, Zurich, Yokohama
Docusign eSignature Spoke	4.5.1	Brazil, Australia, Zurich, Yokohama
Dropbox Business Spoke	1.1.0	Brazil, Australia, Zurich, Yokohama

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
Dun and Bradstreet DirectPlus Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Ethoca spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Equifax Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
F5 BIG-IP Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
First Advantage Spoke	1.9.0	Brazil, Australia, Zurich, Yokohama
FRISS Spoke	1.2.0	Brazil, Australia, Zurich, Yokohama
GitHub Spoke	3.6.4	Brazil, Australia, Zurich, Yokohama
GitLab Spoke	2.5.3	Brazil, Australia, Zurich, Yokohama
Gmail Spoke	1.3.3	Brazil, Australia, Zurich, Yokohama
Google Calendar Spoke	2.7.0	Brazil, Australia, Zurich, Yokohama
Google Chat spoke	1.2.0	Brazil, Australia, Zurich, Yokohama
Google Cloud Datastore Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Google Cloud DNS Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Google Cloud Functions Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
Google Cloud Load Balancer Spoke	1.0.1	Brazil, Australia, Zurich, Yokohama
Google Cloud Pub Sub Spoke	1.0.4	Brazil, Australia, Zurich, Yokohama
Google Cloud SQL Spoke	1.0.1	Brazil, Australia, Zurich, Yokohama
Google Cloud Storage Spoke	1.1.1	Brazil, Australia, Zurich, Yokohama
Google Cloud Translator Service Spoke	3.2.8	Brazil, Australia, Zurich, Yokohama
Google Cloud Virtual Network Spoke	1.0.4	Brazil, Australia, Zurich, Yokohama

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
Google Cloud VPC Access Spoke	1.0.1	Brazil, Australia, Zurich, Yokohama
Google Compute Engine Spoke	1.0.5	Brazil, Australia, Zurich, Yokohama
Google Directory Spoke	1.6.0	Brazil, Australia, Zurich, Yokohama
Google Docs Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
Google Drive Spoke	2.3.0	Brazil, Australia, Zurich, Yokohama
Google Identity and Access Spoke	1.1.1	Brazil, Australia, Zurich, Yokohama
Google Meet Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Google Persistent Disk Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Google Sheets Spoke	1.0.7	Brazil, Australia, Zurich, Yokohama
Google Tasks Spoke	1.4.0	Brazil, Australia, Zurich, Yokohama
GoTo Spoke	2.0.1	Brazil, Australia, Zurich, Yokohama
GovNotify Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
Gremlin Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
Guidewire Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
iManage Spoke	1.1.0	Brazil, Australia, Zurich, Yokohama
Infoblox Spoke	2.1.0	Brazil, Australia, Zurich, Yokohama
Jack Henry jXchange Spoke	3.0.2	Brazil, Australia, Zurich, Yokohama
Jamf Spoke		Brazil, Australia, Zurich, Yokohama
Jenkins Spoke	2.3.1	Brazil, Australia, Zurich, Yokohama
Jenkins v2 Spoke	1.4.1	Brazil, Australia, Zurich, Yokohama

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
Jira Service Management Spoke	2.0.1	Brazil, Australia, Zurich, Yokohama
Jira Spoke	6.1.3	Brazil, Australia, Zurich, Yokohama
Kubernetes Spoke	1.4.0	Brazil, Australia, Zurich, Yokohama
Legal Tracker Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Lenovo Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Looker Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Lucidchart Diagramming Spoke	1.1.1	Brazil, Australia, Zurich, Yokohama
Metrikus spoke	1.0.1	Brazil, Australia, Zurich, Yokohama
Magnit Spoke	1.1.0	Brazil, Australia, Zurich, Yokohama
Mastercard Spoke	3.0.1	Brazil, Australia, Zurich, Yokohama
Microsoft 365 Excel Spoke	1.0.4	Brazil, Australia, Zurich, Yokohama
Microsoft Dynamics 365 Spoke	1.0.8	Brazil, Australia, Zurich, Yokohama
Microsoft Active Directory v2 Spoke	2.5.3	Brazil, Australia, Zurich, Yokohama
Microsoft Active Directory Spoke	3.1.5	
Microsoft Azure Application Insights Spoke	1.0.1	Brazil, Australia, Zurich, Yokohama
Microsoft Azure Artifacts Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
Microsoft Azure Automation Spoke	2.0.2	Brazil, Australia, Zurich, Yokohama
Microsoft Azure Blob Storage Spoke	2.0.0	Brazil, Australia, Zurich, Yokohama
Microsoft Azure Cosmos DB Spoke	2.0.0	Brazil, Australia, Zurich, Yokohama
Microsoft Azure DevOps Boards Spoke	3.1.3	Brazil, Australia, Zurich, Yokohama
Microsoft Azure DevOps Pipelines Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
Microsoft Azure Managed Storage Spoke	2.0.0	Brazil, Australia, Zurich, Yokohama
Microsoft Azure Notification Hub Spoke	2.0.0	Brazil, Australia, Zurich, Yokohama
Microsoft Azure RBAC Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Microsoft Azure Resource Management Spoke	2.1.0	Brazil, Australia, Zurich, Yokohama
Microsoft Azure SQL Database Spoke	2.0.0	Brazil, Australia, Zurich, Yokohama
Microsoft Azure Traffic Manager Spoke	2.0.0	Brazil, Australia, Zurich, Yokohama
Microsoft Azure Virtual Machine Spoke	2.0.0	Brazil, Australia, Zurich, Yokohama
Microsoft Azure Virtual Network Spoke	2.0.0	Brazil, Australia, Zurich, Yokohama
Microsoft Dynamics 365 for Finance and Operations Spoke	2.5.0	Brazil, Australia, Zurich, Yokohama
Microsoft Dynamics CRM Spoke	1.10.1	Brazil, Australia, Zurich, Yokohama
Microsoft Endpoint Configuration Manager Spoke	1.10.2	Brazil, Australia, Zurich, Yokohama
Microsoft Entra Entitlement Management Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Microsoft Entra ID Spoke (formerly Microsoft Azure Active Directory spoke)	4.7.5	Brazil, Australia, Zurich, Yokohama
Microsoft Exchange Online Spoke	4.1.2	Brazil, Australia, Zurich, Yokohama
Microsoft Exchange Server Spoke	2.6.0	Brazil, Australia, Zurich, Yokohama
Microsoft Intune Spoke	2.0.1	Brazil, Australia, Zurich, Yokohama
Microsoft OneDrive Spoke	2.9.1	Brazil, Australia, Zurich, Yokohama
Microsoft SCCM Spoke	1.1.2	
Microsoft Security Response Center Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
Microsoft SharePoint Online Spoke	2.11.5	Brazil, Australia, Zurich, Yokohama
Microsoft Teams Spoke	1.1.3	

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
Microsoft Teams Communications Spoke	1.6.2	Brazil, Australia, Zurich, Yokohama
Microsoft Teams Graph Spoke	4.5.2	Brazil, Australia, Zurich, Yokohama
Miro Spoke	3.4.0	Brazil, Australia, Zurich, Yokohama
monday.com Spoke	1.2.3	Brazil, Australia, Zurich, Yokohama
Metrikus spoke	Beta v1.0	Brazil
Navex EthicsPoint Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
Okta Spoke	4.8.3	Brazil, Australia, Zurich, Yokohama
OneLogin Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
Oracle Autonomous DB Spoke	1.0.6	Brazil, Australia, Zurich, Yokohama
Oracle Block Storage Spoke	1.0.4	Brazil, Australia, Zurich, Yokohama
Oracle Boot Volume Spoke	1.0.6	Brazil, Australia, Zurich, Yokohama
Oracle Cloud IAM Spoke	1.1.4	Brazil, Australia, Zurich, Yokohama
Oracle Compute Engine Spoke	1.0.4	Brazil, Australia, Zurich, Yokohama
Oracle EBS Spoke	1.15.0	Brazil, Australia, Zurich, Yokohama
Oracle Financial Cloud Spoke	1.7.1	Brazil, Australia, Zurich, Yokohama
Oracle HCM Cloud Spoke	4.5.0	Brazil, Australia, Zurich, Yokohama
Oracle NetSuite Spoke	1.2.0	Brazil, Australia, Zurich, Yokohama
Oracle Object Storage Management Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
Oracle Peoplesoft Financial Spoke	1.2.1	Brazil, Australia, Zurich, Yokohama
Oracle Virtual Cloud Network Spoke	1.0.4	Brazil, Australia, Zurich, Yokohama
PagerDuty Spoke	1.5.1	Brazil, Australia, Zurich, Yokohama

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
Plivo Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
Pluralsight Spoke	1.2.0	Brazil, Australia, Zurich, Yokohama
Qualtrics Spoke	1.4.2	Brazil, Australia, Zurich, Yokohama
Rally Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
Redox Electronic Health Record Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
Roadmunk Spoke	1.7.1	Brazil, Australia, Zurich, Yokohama
Saba Spoke	1.1.0	Brazil, Australia, Zurich, Yokohama
Salesforce Marketing Cloud Spoke	1.6.2	Brazil, Australia, Zurich, Yokohama
Salesforce Spoke	2.6.1	Brazil, Australia, Zurich, Yokohama
SAP Ariba Spoke	1.15.1	Brazil, Australia, Zurich, Yokohama
SAP Commerce Cloud Spoke	1.1.0	Brazil, Australia, Zurich, Yokohama
SAP Concur Spoke	2.3.3	Brazil, Australia, Zurich, Yokohama
SAP ECC IDoc Spoke	1.5.1	Brazil, Australia, Zurich, Yokohama
SAP ECC RFC Spoke	2.12.0	Brazil, Australia, Zurich, Yokohama
SAP Fieldglass Spoke	1.3.1	Brazil, Australia, Zurich, Yokohama
SAP S4 HANA IDoc Spoke	1.2.0	Brazil, Australia, Zurich, Yokohama
SAP S4 HANA OData spoke	1.13.0	Brazil, Australia, Zurich, Yokohama
SAP S4 HANA Public Cloud Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
SAP S4 HANA RFC Spoke	2.7.0	Brazil, Australia, Zurich, Yokohama
SCCM Usage Metering Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
Secureworks CTP Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
ServiceNow Remote Instance Spoke	2.3.2	Brazil, Australia, Zurich, Yokohama
ServiceNow University Spoke		Brazil, Australia, Zurich, Yokohama
Shodan Spoke	1.1.0	Brazil, Australia, Zurich, Yokohama
Slack Spoke	1.9.3	Brazil, Australia, Zurich, Yokohama
SmartRecruiters Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Smartsheet Spoke	2.8.0	Brazil, Australia, Zurich, Yokohama
Snowflake Spoke	1.0.3	Brazil, Australia, Zurich, Yokohama
Socure Spoke	1.1.0	Brazil, Australia, Zurich, Yokohama
SuccessFactors Learning Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
SuccessFactors spoke	4.12.0	Brazil, Australia, Zurich, Yokohama
SumTotal Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
SurveyMonkey Spoke	2.0.6	Brazil, Australia, Zurich, Yokohama
Tableau spoke		Brazil, Australia, Zurich, Yokohama
Trello Spoke	1.5.1	Brazil, Australia, Zurich, Yokohama
Twilio Spoke	1.2.0	Brazil, Australia, Zurich, Yokohama
UCF Spoke	1.1.0	Brazil, Australia, Zurich, Yokohama
Udemy Spoke	1.0.2	Brazil, Australia, Zurich, Yokohama
UiPath Spoke	2.6.0	Brazil, Australia, Zurich, Yokohama
UKG Spoke	3.6.1	Brazil, Australia, Zurich, Yokohama

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Spokes list and compatibility (continued)

Spoke name	Spoke version	Compatibility
Utility Actions Spoke	1.4.1	Brazil, Australia, Zurich, Yokohama
Verifi Spoke	1.0.0	Brazil, Australia, Zurich, Yokohama
Visa Spoke	2.5.2	Brazil, Australia, Zurich, Yokohama
Vonage Spoke	2.1.0	Brazil, Australia, Zurich, Yokohama
Workday Financials Spoke	2.2.0	Brazil, Australia, Zurich, Yokohama
Workday HR Spoke	3.1.1	Brazil, Australia, Zurich, Yokohama
Workday Learning Spoke	1.1.4	Brazil, Australia, Zurich, Yokohama
Workfront Spoke	1.4.3	Brazil, Australia, Zurich, Yokohama
Workplace from Facebook Spoke	4.2.0	Brazil, Australia, Zurich, Yokohama
Wrike Spoke	1.3.0	Brazil, Australia, Zurich, Yokohama
X Spoke (formerly Twitter Spoke)	2.4.0	Brazil, Australia, Zurich, Yokohama
YouTube Spoke	1.0.5	Brazil, Australia, Zurich, Yokohama
Zendesk Spoke	1.9.2	Brazil, Australia, Zurich, Yokohama
Zoom Spoke	5.0.0	Brazil, Australia, Zurich, Yokohama

Adobe Experience Platform Spoke

Automate the process of managing datasets and entities in Adobe Experience Platform from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Adobe Experience Platform spoke v2.1.1 is the latest version. For version history of the spoke, see Adobe Experience Platform release notes.

Supported versions

This spoke was built for Adobe Experience Platform released on September 10, 2019, but may be compatible with later versions.

Spoke requirements

- Registered Adobe ID account
- User with developer access
- Details such as API key and client secret

See the Adobe Experience Platform documentation for instructions on creating Adobe ID and adding developer.

Spoke actions

The Adobe Experience Platform spoke provides actions manage datasets and entities when events occur in ServiceNow. Available actions include:

Category	Action	Description
Dataset Management	Get All Data Inlets	Retrieves the details of all data inlets.
	Get All Datasets	Retrieves the details of all datasets.
	Get All Union Schemas	Retrieves the list of all schemas that are part of unions.
Entity Management	Get Entity Information	Retrieves the information of an entity as a dynamic object.
	Load Entity Data	Ingest the information of an entity to Adobe Experience Platform.
Metadata Retrieval	Get Metadata For All Attributes In A Schema	Retrieves all attributes for the selected union schema.
	Get All Sandboxes	Retrieves information about all active sandboxes.
	Get Metadata For All Data Inlets	Retrieves the metadata of all data inlets.
	Get Metadata For All Datasets	Retrieves the metadata of all datasets.
	Get Metadata For All Fields In A Union	Retrieves the metadata of all fields in the selected union.
	Get Metadata For All Identity Fields	Retrieves the metadata of all identity fields or namespaces.
	Get Metadata For All Union Schemas	Retrieves the list of all schemas that are part of unions.
	Get Metadata For All Unions	Retrieves the metadata of all union views.

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Category	Action	Description
	Get Metadata For Union Schema	Retrieves schema for the selected fields of a union.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Note: Two connection and credential alias records are needed for the Adobe Experience Platform spoke; one for data inlet management and batch ingestion, and other for data collection. Each alias should be associated with the respective Adobe Experience Platform API.

For information about setting up the spoke, see Set up Adobe Experience Platform spoke.

Set up Adobe Experience Platform spoke

Integrate your Adobe Experience Platform account with your ServiceNow instance. Create a custom OAuth application in Adobe Experience Platform and authenticate requests from ServiceNow.

Before you begin

- Request Integration Hub subscription
- Activate Adobe Experience Platform spoke
- Role required: admin

About this task

The Adobe Experience Platform spoke can also be set up using the Connection & Credential configuration templates. However, using templates, only one set of alias records can be used at a time.

Attach a Java Key Store certificate to the Adobe Experience Platform spoke

Enable the JWT Bearer Grant token authentication by attaching a valid Java KeyStore (JKS) certificate to the Adobe Experience Platform spoke.

Before you begin

- Valid Java KeyStore certificate
- Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Certificates**.
2. Click **New**.
3. On the form, fill in the fields.

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X.509 Certificate form fields

Field	Description
Name	Name to uniquely identify the record. For example, `AEP Certificate`.
Expiration notification	Option to send a notification when the certificate is about to expire.
Notify on expiration	Users to be notified when the certificate expires.
Warn in days to expire	Number of days to send a notification before the certificate expires.
Active	Option to actively use the certificate.
Format	Certificate format. The instance supports the PEM and DER formats.
Type	Type of certificate. Select **Java Key Store**.
Valid from	Date from which the certificate is valid.
Expires	Date on which the certificate expires.
Expires in days	Number of days until the certificate expires.
Key store password	Password associated with the certificate.
Short description	Summary about the certificate.
PEM Certificate	Contents of the X509 certificate.

4. Click the attachments icon ( ) and attach a JKS certificate.
5. Click **Validate Stores/Certificates**.

Result
The JKS certificate is created and attached to the Adobe Experience Platform spoke.

Create a JWT signing key for the Adobe Experience Platform spoke

Create a JSON Web Token (JWT) signing key to assign to your Java KeyStore certificate.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **System OAuth** > **JWT Keys**.
2. Click **New**.
3. On the form, fill in the fields.

JWT Keys form fields

Field	Description
Name	Name to uniquely identify the JWT signing key. For example, `AEP JWT Keys`.
Signing Keystore	Valid JKS certificate attached in the previous task. For example, `AEP Certificate`.

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Field	Description
Key Id	Key ID to identify which key is used when multiple keys are used to sign tokens.
Application	Application scope that contains this record. Select Adobe Experience Platform spoke.
Signing Algorithm	Algorithm to sign with the JWT key.
Signing Key Password	Password associated with the signing key.
Active	Option to actively use the certificate.

4. Click **Submit**.

Result
The JWT key is created and assigned to the JKS certificate.

Create a JWT provider for the Adobe Experience Platform spoke

Add a JSON Web Token (JWT) provider to your ServiceNow instance.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **System OAuth** > **JWT Providers**.
2. Click **New**.
3. On the form, fill in the fields.

JWT Provider form fields

Field	Description
Name	Nname to uniquely identify the JWT provider. For example, `AEP JWT Provider`.
Expiry Interval (sec)	Number in seconds to set the lifespan of JWT provider tokens.
Signing Configuration	JWT signing key from the previous step. For example, `AEP JWT Keys`.

4. Right-click the form header, and click **Save**.
   The Standard Claims and Custom Claims related lists are displayed.
5. Enter values for **iss**, **sub**, and **aud** in the Standard Claims related list.
   See the Adobe Experience Platform documentation for instructions.
6. Enter these values in the Custom Claims related list.

Field	Value
Claim Name	https://ims-na1.adobelogin com/s/entdataservices_sdk
Claim Value Type	true|false

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Field	Value
Claim Value	true

7. Click **Update**.

Result
The JWT provider is added to your ServiceNow instance.

Register Adobe Experience Platform as OAuth Provider

Use the information generated during Adobe ID account creation and configuration to register Adobe Experience Platform as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Click **New**.
   The system displays the message **What kind of OAuth application?**
3. Select **Connect to a third party OAuth Provider**.
   The system displays a blank Application Registries form.
4. On the form, fill in the fields.

Field	Value required
Name	Name to uniquely identify the record. For example, enter `AEP OAuth`.
Client ID	Consumer key you generated during the Adobe ID account configuration.
Client Secret	Consumer secret you generated during the Adobe ID account configuration.
OAuth API Script	Script to customize the request and response. Select **OAuthUtilAEP**.
Default Grant type	Grant type used to establish the token. Select **JWT Bearer**.
Refresh Token Lifespan	Time, in seconds, that the refresh token is valid. The default time is 8,640,0000 seconds.
PKCE required	Option to enable public clients to require PKCE for an authorization. **Note:** You can use only **Authorization Code** as the **Default Grant type** when **PKCE** is enabled.
Application	Application scope that contains this record. Select Adobe Experience Platform.

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Field	Value required
Accessible from	Application scope that this registry is accessible from.
Active	Option to actively use the application registry.
Authorization URL	This field should be left blank.
Token URL	OAuth server token endpoint. Enter `https://ims-na1.adobelogin.com/ims/exchange/jwt/`.
Token Revocation URL	This field should be left blank.
Redirect URL	This field should be left blank.
Use mutual authentication	Option to use mutual authentication for token request and revocation. This option requires a mutual authentication profile to be specified.
Send Credentials	Client credentials in the request.

5. Right-click the form header, and click **Save**.
   - The system validates the OAuth credentials and populates the **Redirect URL**.
   - The system populates **OAuth Entity Profile** with **Grant Type** as **JWT Bearer**. For example, **OAuth Entity Profile** is created with default **Name**, **AEP default_profile**
6. Open the record of OAuth Entity Profile.
7. Select the JWT Provider record for **JWT Provider**, for example, `AEP JWT Provider`.
8. Click **Update**.

Result
The instance can request OAuth 2.0 tokens for the spoke.

Note: When an OAuth token expires, the spoke automatically regenerates a new token in most cases. If a token expires and is not regenerated, an administrator can regenerate the spoke OAuth token.

Create Credential records for the Adobe Experience Platform

Create Credential records to the Adobe ID account you created. The Adobe Experience Platform spoke connection and credential alias uses these credentials to authorize actions.

Before you begin
Role required: admin

About this task
You must create two credential records; one for data inlet management and batch ingestion, and other for data collection.

Procedure
1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **OAuth 2.0 Credentials**.
   The pop-up window displays a blank OAuth 2.0 Credentials form.

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4. On the form, fill in the fields.

Field	Value required
Name	Name to uniquely identify the record. For example, enter `AEP` for data inlet management and batch ingestion, and `AEP_Ingestion` for data collection.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile you created when you registered the Salesforce connected app as an OAuth provider. For example, select **AEP OAuth default_profile**.
Applies to	This field isn't applicable.
Order	Order to apply this credential. For example, enter `100`.

5. Save the record.
6. Click the **Get OAuth Token** related link to generate the OAuth token.

Result
The credential records for the Adobe Experience Platform spoke is created.

Create Connection records for the Adobe Experience Platform spoke

Create Connection records to your Adobe ID account. The Adobe Experience Platform spoke connection and credential alias uses these connections to perform actions in Adobe Experience Platform.

Before you begin
Role required: admin

About this task
Two connection and credential alias records are available by default; one for data inlet management and batch ingestion, and other for data collection. Perform these steps to associate each alias with the respective Adobe Experience Platform API.

Procedure
1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the required Adobe Experience Platform spoke record.

> **Note:** There are two connection and credential records; **AEP** and **AEP_Ingestion**. The **AEP** record is for data inlet management and batch ingestion, and **AEP_Ingestion** is for data collection.

3. From the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.
4. Enter these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `AEP Platform` for data inlet management and batch ingestion, and `AEP dcs` for data collection.

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Field	Value required
Credential	Credential record you created for Adobe Experience Platform. For example, select **AEP** and **AEP_Ingestion**.
Connection alias	Alias record associated with this connection.
URL builder	**Note:** Do not select the check box.
Connection URL	Base URL to connect to Adobe Experience Platform. ○ If the connection record is for data inlet management and batch ingestion, enter `https://platform.adobe.io/`. ○ If the connection record is for data collection, enter `https://dcs.adobedc.net`.
Use MID server	This field isn't applicable.
Active	Option to actively use the connection.
Domain	Domain that the action or activity runs in.

5. In the**Attributes** tab enter these values.
   - Internal name of the sandbox in **Sandbox**.

     Note: Ensure that you provide the internal name of the required sandbox and not its label in **Sandbox**. To obtain the internal name of the required sandbox, use the Get All Sandboxes action.

   - If the connection record is for data inlet management and batch ingestion, enter **API Key** and **Organization ID**.
   - If the connection record is for streaming ingestion, enter **Organization ID**.
6. Right-click the form header and click **Save**.

Result
The Adobe Experience Platform spoke is set up and integrated with the ServiceNow instance.

Adobe Sign Spoke

Automate the process of sending a legal document to an individual or list of recipients for digital signature using Adobe Sign. For example, automate employee onboarding and offboarding, or sending non-disclosure agreements, legal agreements, and statements of work for digital signature. Use ServiceNow data in document templates and enable users to upload documents for signature as needed.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Adobe Sign spoke v2.11.0 is the latest version. For version history of the spoke, see Adobe Acrobat Sign spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for Adobe Sign API version v6, but may be compatible with later versions.

Key features

Adobe Sign spoke enables a flow designer to:

- Automate the process of sending a legal document to an individual or list of recipients for digital signature.
- Copy and customize sample flows for sending transient documents or Adobe Sign library documents for digital signature.
- Discover and synchronize the Adobe Sign documents.
- Pause a flow until an agreement or document is signed. A scripted REST API webhook waits for the recipient to sign the document.
- Use values from a signed document in a flow.
- Manage the life cycle of documents in Adobe Sign from the ServiceNow instance.

Spoke requirements

- Adobe Sign account
- Adobe Sign account admin credentials to perform the required account specific tasks in Adobe Sign
- Adobe Sign group admin credentials to perform the required group specific tasks in Adobe Sign.

  Note: Account admin or group admin can add users to the groups. These users can access information specific to their group only.

- Adobe Sign application configured to integrate with ServiceNow
- Adobe Sign application details such as application ID and client secret.

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- ServiceNow admin credentials to create and synchronise the required Adobe Sign groups with ServiceNow.

  Note:

  - This is the default admin role that is created when the Adobe Sign spoke is activated.
  - ServiceNow admin has access to information about all Adobe Sign groups synchronized with ServiceNow and all tables part of the Adobe Sign spoke.
  - User role specific to the group is created in ServiceNow, when the group is created in the ServiceNow instance. Group users have access to information specific to their Adobe Sign groups only and can view only the group-specific data from the tables that are part of the Adobe Sign spoke.

- Integration Hub subscription

See the Adobe Sign development documentation for instructions on creating and configuring custom applications.

Spoke flows

The Adobe Sign spoke provides sample flows to demonstrate automating the Adobe Sign tasks. To customize a sample flow, copy it to the required application scope. Available sample flows include:

Flow	Description
Adobe Sign - Send NDA Demo	Sends a statement of work for digital signature using a Adobe Sign library document when a Service Catalog request is created by the **Adobe Sign - Statement of Work Demo** item. Before using this flow, activate the **Adobe Sign - Statement of Work Demo** catalog item.
Adobe Sign - Statement of Work Demo	Sends a non-disclosure agreement for digital signature using a Adobe Sign library document when a Service Catalog request is created by the **Adobe Sign - Statement of Work Demo** item. Before using this flow, activate the **Adobe Sign - Statement of Work Demo** catalog item.

The Adobe Sign spoke adds catalog items for use with the Adobe Sign spoke sample flows. Before triggering an Adobe Sign spoke sample flow, activate these catalog items.

Catalog item	Description
Adobe Sign - Statement of Work Demo	Sends a statement of work for digital signature using a Adobe Sign library document.
Adobe Sign - Send NDA Demo	Sends a non-disclosure agreement for digital signature using a Adobe Sign library document.

Spoke subflows

The Adobe Sign spoke provides a sample subflow to demonstrate automating Adobe Sign tasks. To customize the sample subflow, copy it to a new application scope. Available sample subflow is, Get Documents Per Group. The subflow retrieves documents relevant to an Adobe Sign group and stores them in the AdobeSign Documents table.

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Spoke actions

The Adobe Sign spoke provides actions to automate Adobe Sign tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Document Management	Attach Agreement Audit Trail to ServiceNow Record	Downloads the agreement audit trail for the specified agreement from Adobe Sign and attaches it to a ServiceNow record.
	Attach Agreement Document to ServiceNow Record	Downloads the agreement document for the specified agreement from Adobe Sign and attaches it to a ServiceNow record.
	Attach Signed Agreement to a ServiceNow Record	Downloads an Adobe Sign document and attaches it to the relevant ServiceNow agreement record.
	Convert Transient to Library Document	Converts a transient document to a library document. Ensures that the document is available in the library for more than the stipulated transient 7-day purging period.
	Look up Agreement Documents	Retrieves the agreement documents for the specified agreement.
	Look up Agreement ID	Retrieves the agreement ID from the ServiceNow Agreement table.
	Look up Agreements Stream	Retrieves the list of agreements.
	Look up Library Document ID	Retrieves the library document ID from the ServiceNow Documents table.
	Look up Library Documents Stream	Retrieves the list of library documents.
	Set Agreement Field	Creates a list of fields for a draft agreement.
	Upload Attachment as Transient Document	Uploads an attachment to Adobe Sign as a transient document. The transient document is available for a period of 7 days.
MegaSigns Management	Cancel MegaSigns	Cancels a MegaSigns that are already out for signature.

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Category	Action	Description
	Check MegaSigns Status	Checks the status of a MegaSigns record.
	Create Draft MegaSigns	Creates a MegaSigns record in the draft state.
	Download Participants and Merge Fields for Document	Downloads a sample CSV file for a given library document that contains information about the MegaSigns participants and form fields.
	Look up MegaSigns Stream	Retrieves the list of all MegaSigns records.
	Send MegaSigns	Finalises the draft and sends the MegaSigns attachment out for signature.
	Wait for Signature of MegaSigns from Adobe Sign	Waits for the Adobe Sign webhook till all the participants sign or cancel the document.
Signature Management	Add Participant to Agreement	Builds a participant list iteratively over time and adds a participants to the local ServiceNow agreement record.
	Add Participant to Agreement with Email OTP Authentication	Adds a new participant to an agreement and verify their identity using an email one-time password (OTP). The participants will get the OTP in an email and need to enter it before they can sign or approve the document. This extra step keeps your agreements secure by making sure only the right people can access them.
	Add Participant to Agreement with Password Authentication	Adds a new participant to an agreement and verify their identity using a predefined password. The participant must enter the correct password before they can view, sign, or approve the document. This extra step keeps your agreements secure by making sure that only the person who knows the password can proceed with the agreement.

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Category	Action	Description
		Note: The Scheduler To Remove Participant Password scheduled job when activated will automatically delete the passwords that are stored for the last 30 days. For more information, see Spoke scheduled job section.
	Add Participant to Agreement with Phone Authentication	Adds a new participant to an agreement and verify their identity using a one-time password (OTP) in an SMS. The participants will get the OTP in an SMS to the specified phone number and need to enter it before they can sign or approve the document. This extra step keeps your agreements secure by making sure only the right people can access them.
	Add Participant Reminders to Agreement	Creates one or more reminders for the specified participants associated with the specified agreement.
	Cancel Agreement	Cancels an agreement that has been sent for signature.
	Check Agreement Status	Retrieves the status of an agreement.
	Create Draft Agreement	Creates an agreement in the draft state in Adobe Sign and draft record in the ServiceNow Agreement table.
	Finalize Draft and Send Agreement	Sends a draft agreement to the participant list for a signature. **Note:** You need to use the **Create Draft Agreement** and **Set Agreement Field** actions before using this action.
	Generate Embedded Sending URL	Generates a URL that enables you to embed the agreement sender view on Adobe Sign.

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Category	Action	Description
	Look up Agreement Events	Retrieves the events information for the specified agreement.
	Look up Draft Agreement	Retrieves the draft agreement's information and Etag details, which are required while finalising the draft agreement.
	Look up Form Field Value from an Agreement	Retrieves value of the required field from an existing agreement in Adobe Sign.
	Look up Signing URL	Retrieves an embedded signing URL. This is useful for scenarios involving in-person signing.
	Send Agreement	Sends one or more documents, along with its sequence, for signature to one or more participants.
	Update Form Fields and Send Agreement	Allows participants to update or modify the form fields on an agreement before sending it for signature.
	Wait for Signature from Adobe Sign	Waits for the participant to sign or reject the document in Adobe Sign. Then updates the signing status in ServiceNow.
	Wait for Signature from Adobe Sign	Waits for the Adobe Sign webhook until the participant has either signed or rejected the document. Updates the status in the ServiceNow Agreement table.
User Management	Activate a User	Activates an existing user in Adobe Sign.
	Deactivate a User	Deactivates an existing user in Adobe Sign.
	Look up User ID by Email	Retrieves the user ID of an existing user in Adobe Sign.
	Look up Users Stream	Retrieves the list of all users.
Webhook Management	Create Webhook	Creates a webhook to notify the signing events in Adobe Sign.
	Look up Webhooks Stream	Retrieves the list of webhooks.
	Remove Webhook	Removes a webhook from Adobe Sign.

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Spoke module

The Adobe Sign spoke adds a Adobe Sign module to your ServiceNow instance. The Adobe Sign spoke synchronizes and stores information about groups, documents, and agreements in ServiceNow. The Adobe Sign spoke includes the these tables.

- Agreements [sn_adobesign_spoke_agreement]
- Documents [sn_adobesign_spoke_adobe_sign_documents]
- Groups [sn_adobesign_spoke_adobesign_group_details]
- Client Details [sn_adobesign_spoke_client_details]

Table	Description	Fields
Agreements	Adobe Sign agreements from the synchronized Adobe Sign groups and accounts. Records in the Agreements table are updated with the signing status only when webhook is configured for the Adobe Sign account.	• Name • Agreement ID • Declined Reason • Status • Participants Info • Form Fields Info • Next Signer • Group Name
Documents	Adobe Sign documents from the synchronized Adobe Sign groups and accounts. To synchronize accounts, see Synchronize Adobe Sign with ServiceNow. The Get Documents Per Group subflow retrieves a list of documents in each Adobe Sign group. **Note:** Access to the documents is based on the group user roles.	• Document ID • Document Owner • Document Last Modified • Group • Document Name • Document Type
Groups	Adobe Sign groups that are synchronized with ServiceNow. Administrator creates groups in the ServiceNow instance and provides the required details to synchronize with Adobe Sign.	• Group Name • Group ID • Connection Alias

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Table	Description	Fields
	Note: User role is created when an Adobe Sign group is created in the ServiceNow instance. Users with the group-specific role can access the documents and agreements relevant to the Adobe Sign group.	
Client Details	Credentials of the Adobe Sign groups that are synchronized with ServiceNow.	• Client ID • Name • Authentication Key
MegaSigns	Adobe Sign MegaSigns from the synchronized Adobe Sign groups and accounts. Records in the MegaSigns table are updated with the signing status only when webhook is configured for the Adobe Sign account.	• Status • Signed Participants • Number of Pending Signatures • Name • MegaSigns ID • Group Name

Spoke scheduled job

To delete the passwords related to Add Participant to Agreement with Password Authentication action which are stored over the last 30 days, you can use the Scheduler To Remove Participant Password scheduled job. You can also change when the scheduler runs.

To set this up, navigate to **All** > **System Definition** > **Scheduled Jobs** > **Scheduler To Remove Participant Password** and activate the scheduled job.

Groups and user roles

Create a group in your ServiceNow instance to synchronize the group with the corresponding group in Adobe Sign.

User role specific to the group is created in ServiceNow, when the group is created in the ServiceNow instance. For example, a HR group user role, sn_adobesign_spoke.HR, is created when the HR group is created in ServiceNow. ServiceNow admin can assign these group user roles to users and control access to the group-specific information such as:

- Documents and agreements
- Connection and credential aliases
- Credential records
- Application registries
- Data in tables of the Adobe Sign spoke

To run flows and subflows, group users must also have these roles:

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- connection_admin
- credential_admin
- flow_designer
- oauth_admin
- script_debugger
- view_changer

Only ServiceNow admin has access to information about all Adobe Sign groups that are synchronised with the ServiceNow instance.

Adobe Acrobat Sign account requirements

The Adobe Sign spoke requires creating a custom app on your Adobe Sign account to generate OAuth 2.0 tokens.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Note: A connection and credential alias is specific to a group in Adobe Sign.

A sample connection and credential alias is provided for demonstration purpose. ServiceNow admin must create an alias for each Adobe Sign group to synchronize that group with the ServiceNow instance. For example, you can have different connection and credential alias records one for each BU in your organization such as HR, Legal, Finance and so on. For information about setting up the spoke, see Synchronize Adobe Sign group with ServiceNow.

Synchronize Adobe Sign group with ServiceNow

Synchronize ServiceNow with the required group in Adobe Sign to access the group specific documents, and agreements from the Adobe Sign spoke.

Before you begin

- Request Integration Hub subscription
- Activate the Adobe Sign spoke
- Role required: admin

About this task

These steps are performed to synchronize only one Adobe Sign group. To synchronize another Adobe Sign group, repeat this process.

Create custom OAuth application in Adobe Sign account

Create a custom OAuth application from your Adobe Sign account to enable OAuth 2.0 authentication with the Adobe Sign spoke.

Before you begin

- Adobe Sign account
- Role required: Adobe Sign admin credentials

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About this task
Complete these steps from your Adobe Sign account. See the Adobe Sign development documentation for instructions on creating and configuring custom applications.

Procedure
1. From your Adobe Sign account, create an application.
2. Copy and record the Application ID and Application Secret for later use.
   These details are required to register the application as a third-party OAuth provider on your ServiceNow instance.

Result
The custom OAuth application from your Adobe Sign account is created and can be integrated with the ServiceNow instance.

Configure the webhook

Configure the webhook in your Adobe Sign application to enable Adobe Sign to send data to ServiceNow when a participant signs an agreement or document.

Before you begin
Role required: admin

About this task
If the scope of the Adobe Sign application is Account, use the same webhook for all the groups defined within the account scope. If the scope of the Adobe Sign application is Group, you must configure for each group.

Procedure
1. From your Adobe Sign account, create a webhook with these configurations.
   a. Enter the target URL in **URL** in this format: `https://<instance-name>.service-now.com/api/sn_adobesign_spoke/adobesign_webhook`.
   b. Enter `Agreement all events` and `Mega Sign all events` in **Events**.
   c. Select all the required agreement events in **Notification Parameters**.
   See the Adobe Sign development documentation for more information about creating webhooks in your Adobe Sign account.
2. In your ServiceNow instance, add the client details.
   a. Navigate to **Adobe Sign Spoke** > **Client Details**.
   b. Open the record, **Adobe Sign Client ID**.
   c. On the form, fill these values.

Field	Description
Authentication Key	Key to authenticate. Enter UB7E5BXCXY.

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Field	Description
Client ID	Application ID created during the Adobe Sign account configuration.

d. Click **Update**.

Result

Webhook is created in your Adobe Sign account and signing events in Adobe Sign are updated in the tables of the Adobe Sign spoke.

Configure a connection for the Adobe Sign spoke

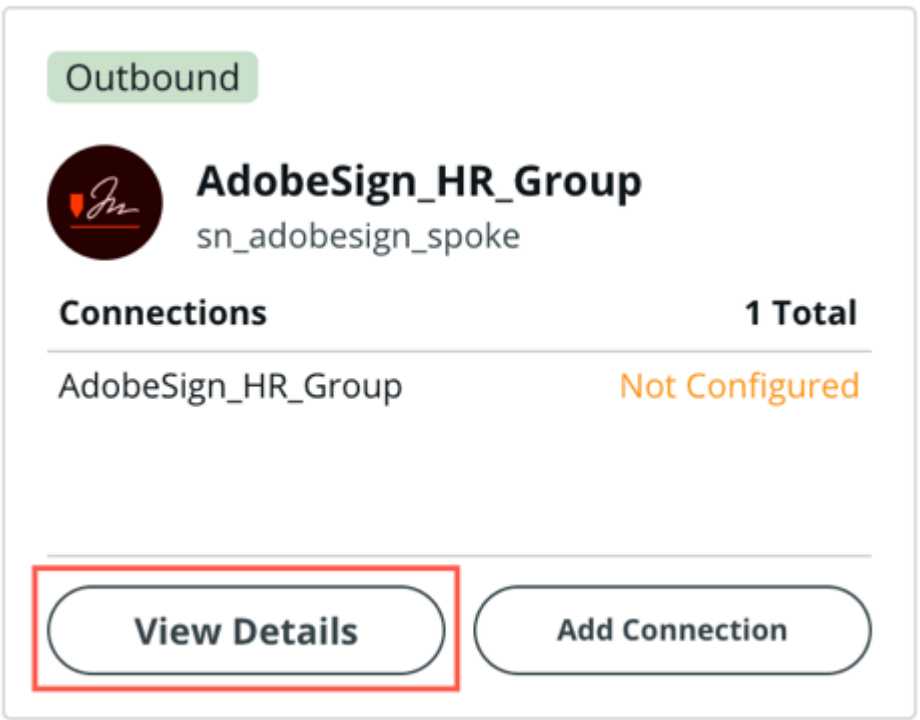
Add and configure a Adobe Sign spoke connection to authenticate ServiceNow requests.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **AdobeSign_HR_Group** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Adobe Sign spoke, click **View Details**.



   - To manage more than one Adobe Sign spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.

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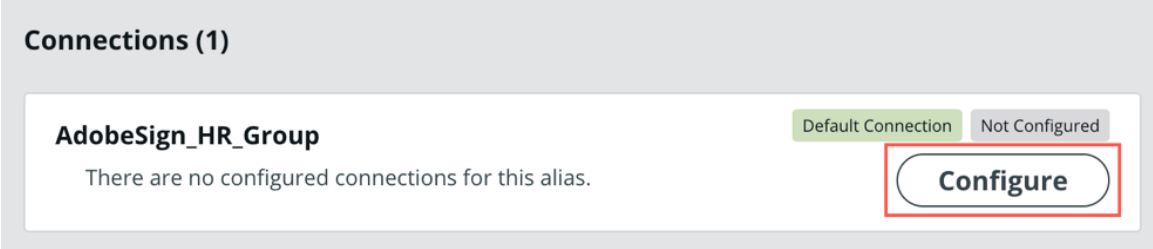

5. On the **Configure Connection** form, fill in the fields:

Field	Description
Connection Information	
Name	Name to uniquely identify the connection record. This is auto-populated.
Connection URL	URL to connection to the Adobe Sign account in this format: `https://api.<region>.echosign.com`.
Credential Information	
Auth URL	OAuth authorization code endpoint. For example, `https://secure.<region>.echosign.com/public/oauth/v2`.
Token URL	OAuth server token endpoint. For example, `https://secure.<region>.echosign.com/oauth/v2/token`.
Refresh Token URL	URL to refresh a token. For example, `https://secure.<region>.echosign.com/oauth/v2/refresh`.
OAuth Client ID	Application ID created during the Adobe Sign account configuration.
OAuth Client Secret	Application Secret created during the Adobe Sign account configuration.
OAuth Redirect URL	OAuth callback endpoint in this format: `https://<ServiceNow-instance-name>.service-now.com/oauth_redirect.do`

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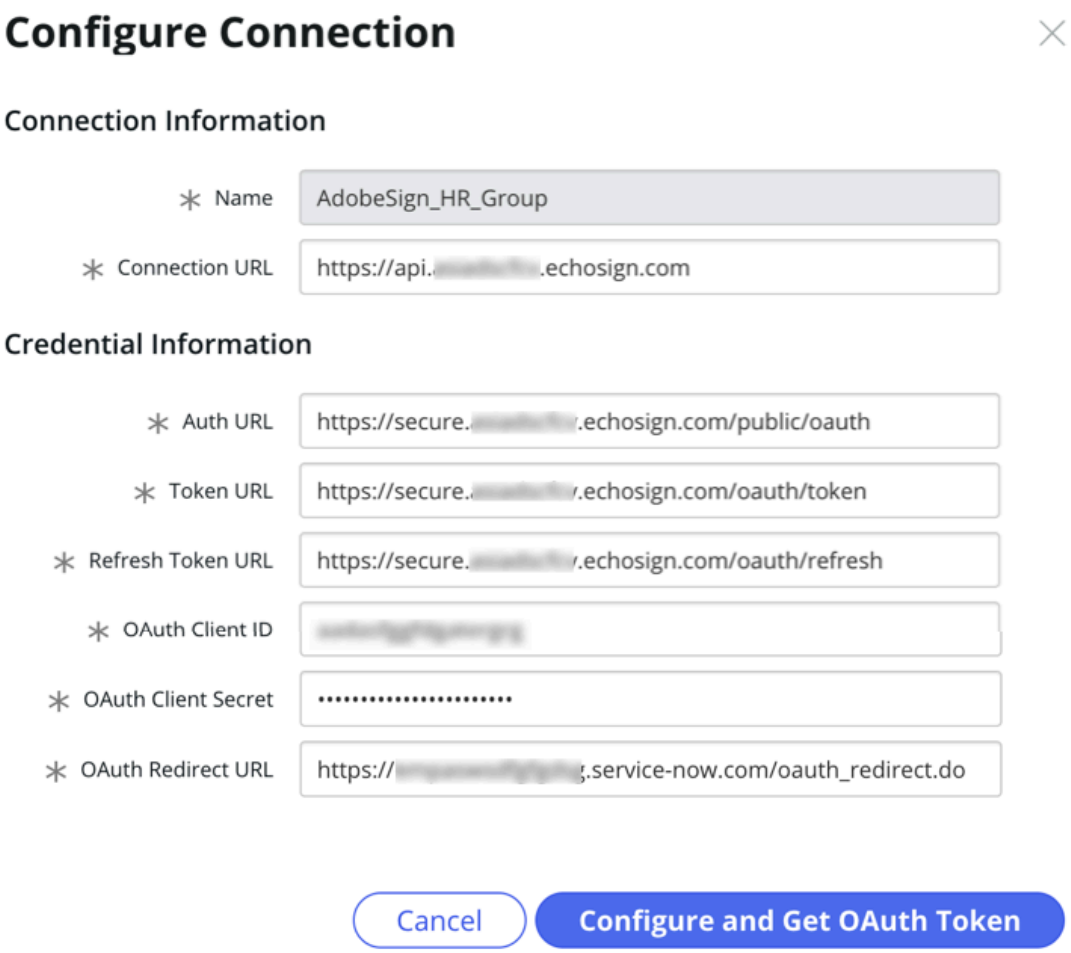

6. Click **Configure and Get OAuth Token**.
   The spoke connection is configured.

Configure Application Access to ServiceNow tables

Allow Adobe Sign spoke to create group admin user role when an Adobe Sign group is synchronized with ServiceNow tables by configuring the application access of the required ServiceNow tables.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Tables**.
2. For each of the following tables, ensure that the **Can read**,**Can create**, and **Can update** options are selected in the Application Access related list.

Label	Name
Role	sys_user_role
Access Control	sys_security_acl
Access Roles	sys_security_acl_role

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Label	Name
Application Menu	sys_app_application
Module	sys_app_module

3. Click **Update**.

Result
Application access of the required ServiceNow tables is configured.

Create Adobe Sign group in ServiceNow

Synchronize ServiceNow with the required group in Adobe Sign by creating a record in the AdobeSign Group Details [sn_adobesign_spoke_adobesign_group_details] table.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Adobe Sign Spoke** > **Groups**.
2. Click **New**.
3. On the form, fill in the fields.

AdobeSign Group Details form

Group Name	Name to uniquely identify the Adobe Sign group. For example, `Legal`.
Group ID	Unique ID associated with the record.
Connection Alias	Connection alias created to synchronize the Adobe Sign group with ServiceNow.

Result
The required Adobe Sign group is created in ServiceNow and can be managed from the Adobe Sign spoke.

User role specific to the group is created in ServiceNow, when the group is created in the ServiceNow instance. For example, a HR group user role, sn_adobesign_spoke.HR, is created when the HR group is created in ServiceNow. ServiceNow admin can assign these group user roles to users and control access to the group-specific information such as:

- Documents and agreements
- Connection and credential aliases
- Credential records
- Application registries
- Data in tables of the Adobe Sign spoke

Only ServiceNow admin has access to information about all Adobe Sign groups that are synchronised with the ServiceNow instance.

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Synchronize documents in Adobe Sign group with ServiceNow

Synchronize ServiceNow with the required group in Adobe Sign to access the documents and agreements that are specific to the group, from the Adobe Sign spoke.

Before you begin
Role required: admin

About this task
Ensure that the groups are setup and configured with their respective connection and credential aliases before synchronizing the group documents.

Procedure

1. Navigate to **All** > **Adobe Sign Spoke** > **Documents**.
   The AdobeSign Documents [sn_adobesign_spoke_adobe_sign_documents] table opens.
2. Click the Get Documents related list.

Note:

- If you have logged in as an admin, you can synchronize the documents of all Adobe Sign groups.
- If you have logged in as a group admin, you can synchronize only those documents that are specific to your Adobe Sign groups.

Result
Details of all documents specific to the required Adobe Sign groups are synchronized with ServiceNow.

Activate Adobe Sign spoke catalog items

Trigger events in Adobe Sign when an item is requested in Service Catalog. For example, the Adobe Sign - Statement of Work Demo catalog item triggers a sample flow that sends a Adobe Sign document to a designated recipient.

Before you begin

- Synchronize Adobe Sign group with ServiceNow
- Role required: admin

About this task
The Adobe Sign spoke adds catalog items for use with the Adobe Sign spoke sample flows. Before triggering a sample flow, activate these catalog items.

Catalog item	Description
Adobe Sign - Statement of Work Demo	Sends a statement of work for digital signature using a Adobe Sign library document.
Adobe Sign - Send NDA Demo	Sends a non-disclosure agreement for digital signature using a Adobe Sign library document.

Procedure

1. Navigate to **All** > **Self-Service** > **Service Catalog**.
2. Click the add content icon .
3. Search for and select **Adobe Sign - Statement of Work Demo**.

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4. Click **Add here**.
5. Search for and select **Adobe Sign - Send NDA Demo**.
6. Click **Add here**.

Result

When one of these items is requested in the Service Catalog, the associated Adobe Sign spoke sample flow is triggered and necessary actions are performed in Adobe Sign.

Agent Client Collector Spoke

Automate the process of executing commands on agents or configuration items (CI) using the ServiceNow Agent Client Collector spoke. Agent Client Collector framework allows you to execute commands on the systems where it is installed and sends output data to the ServiceNow® instance through the MID Server.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Agent Client Collector spoke v1.2.0 is the latest version. For version history of the spoke, see Agent Client Collector Spoke release notes.

Supported versions

This spoke was built for Agent Client Collector framework v2.2.0, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ITOM Visibility License (com.snc.itom.vis.license)
- Agent Client Collector Framework v2.2.0 (sn_agent)

Note: To enable Agent Client Collector to execute commands, ensure that `ACC_ALLOW_LIST=0` for Linux environments or `ACC_ALLOW_LIST=False` for Windows environments.

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke subflows

The Agent Client Collector spoke provides sample subflows to demonstrate automating Agent Client Collector framework tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Managing Compliance for Remote Workers	Manages compliance for remote workers and sends an email to the system administrator when one or more specified compliance conditions are violated.
Restart Agent	Verifies the status of an agent and restarts the agent if the status is down.
SNH CyberAttack Detection	Applies SigHealth CyberAttack Detection for Windows server and send an email to the system administrator when a threat is detected.
Install Agent on Linux	Installs Agent Client Collector on a Linux hosts.
Install Agent on Windows	Installs Agent Client Collector framework on multiple windows hosts.

Spoke actions

The Agent Client Collector spoke provides actions to automate Agent Client Collector tasks when events occurs in your ServiceNow instance. Available actions include:

Action	Description
Get Agent Status	Get the status of an agent.
Get Logged on Users	Retrieves the list of all logged-in users and the related metadata for the specified host system.
Get Network Statistics	Retrieves the list of all network interfaces and the related metadata for the specified host system.
Get Running Processes	Retrieves the list of all running processes and the related metadata for the specified host system.
Get Running Services	Retrieves the list of all running services in Windows OS and the related data for the specified host system.
Get System Details	Retrieves the hardware and software details of the specified agent.
Restart Agent	Restarts an agent.
Run Command on Agent	Runs a command on a given agent host. **Note:** Use caution while executing commands.
Run Osquery on Agent	Runs the specified Osquery on the specified agent host.
Install Agent on Linux	Installs Agent Client Collector framework on a Linux host.

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Action	Description
Install Agent on Windows	Installs Agent Client Collector framework on windows host.

Note: To use the Install Agent on Linux and Install Agent on Windows spoke actions, navigate to **Agent Client Collector Spoke** > **CIDR Ranges**, create a record to specify the required IP address or range of IP addresses.

For information about setting up the spoke, see Set up the Agent Client Collector spoke.

MID Server requirements

To use these actions, your instance must have a MID Server set up and configured to use PowerShell. For more information about running actions on the MID Server, see Integration steps. For more information about the MID Server, see MID Server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Agent Client Collector spoke

Integrate the ServiceNow Agent Client Collector framework and Agent Client Collector spoke.

Before you begin

- Request an Integration Hub subscription.
- Activate the Agent Client Collector spoke.
- Role required: admin

About this task

1. Install the Agent Client Collector Framework v2.2.0 (sn_agent) plugin and the other dependant plugins. For more information, see Agent Client Collector installation.

   Note: To enable Agent Client Collector to execute commands, ensure that `ACC_ALLOW_LIST=0` for Linux environments or `ACC_ALLOW_LIST=False` for Windows environments. If you are using Windows guided installation, clear the **Enable executing command allow list** check-box. Otherwise, you cannot execute commands using the Agent Client Collector spoke.

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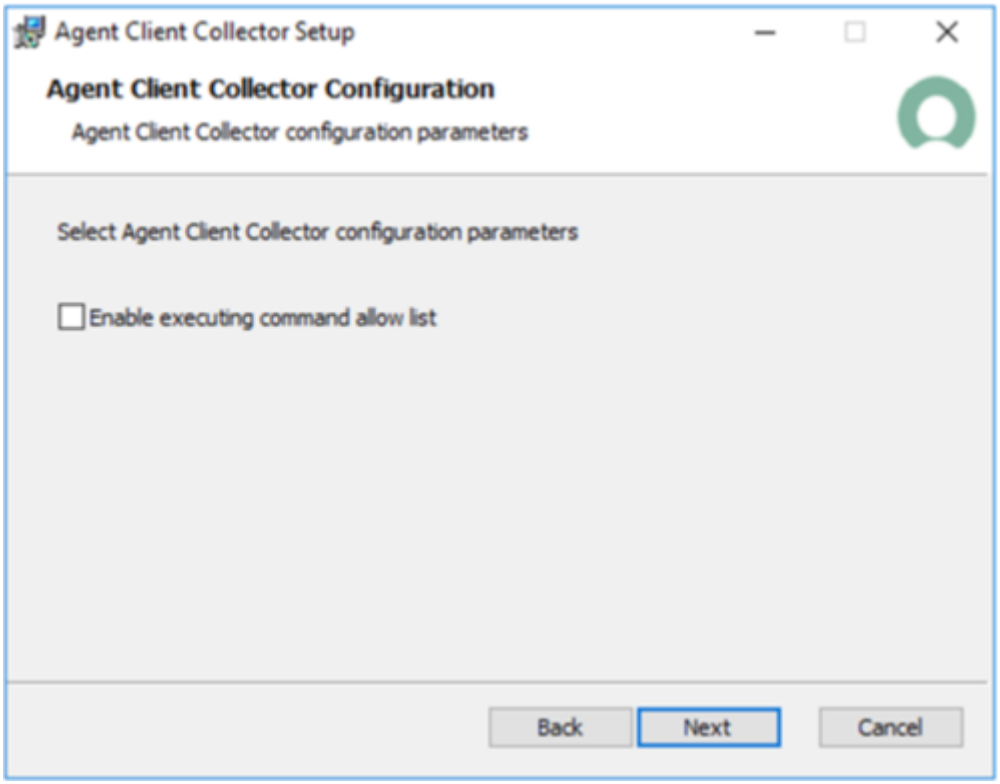

2. Installing the MID Server.
3. Configure the websocket server on the MID server.

Aha! Spoke

Manage Aha! accounts using your ServiceNow instance. Analyze data usage for Aha! and reclaim idle accounts.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Aha! spoke v1.9.1 is the latest version. For version history of the spoke, see Aha! spoke release notes.

Spoke requirements

Aha! admin role

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Aha! spoke provides a sample flow, Upsert Aha Ideas to:

- Check if an idea is created in the Aha Ideas [sn_aha_spoke_aha_ideas] table in ServiceNow instance. If an idea record is created, the flow creates the idea record in Aha! and updates the value of auto-generated ID ServiceNow instance.
- Check if an existing idea has been updated and synchronizes the details updates in Aha!.

You can also create a copy of the flow and customize it according to your requirement.

Spoke subflows

The Aha! spoke provides a sample subflow, Process Aha webhooks to create and update records in Aha!, and save the records' information in the Aha Feature [sn_aha_spoke_feature_aha] table.

Spoke actions

The Aha! spoke provides actions to automate Aha! tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Feature Management	Create Feature	Creates features in the specified release.
	Look up Features Associated with Objects Stream	Retrieves information about features within the specified objects.
	Look up Features Stream	Retrieves information about the required features.
	Update Feature	Updates details of the required feature.
Idea Management	Create Idea Vote	Creates an idea vote with the provided details.
	Create Idea	Creates an idea with the provided details.
	Look up Idea by ID	Retrieves information about the required idea.
	Look up Ideas Associated with Product Stream	Retrieves information about ideas in the specified product.
	Look up Ideas Stream	Retrieves information about the required ideas.
	Look up Ideas Votes Stream	Retrieves information about the required idea endorsements.
	Look up Ideas with String Stream	Retrieves information about the required ideas.
	Update Idea Vote	Updates details of the required idea vote.

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Category	Action	Description
	Update Idea	Updates details of the required idea.
Product Management	Create Product	Creates a product.
	Create Task	Creates a task.
	Look up Personas Stream	Retrieves information about the required personas.
	Look up Product by ID	Retrieves information about the specified product.
	Look up Products Stream	Retrieves information about the required products.
	Look up Tasks Associated with Object Stream	Retrieves information about the tasks that are associated with the specified API.
	Look up Tasks Stream	Retrieves information about the tasks.
	Update Product	Updates details of the specified product.
	Update Task	Updates details of the required task.
Release Management	Create Epic	Creates epics in the required release.
	Create Release	Creates a release with the provided details.
	Create Release Phase	Creates a release phase in the specified release.
	Look up Epic Associated with Objects Stream	Retrieves information about the epics that are associated with the specified API.
	Look up Epics Stream	Retrieves information about the required epics.
	Look up Release Phases Stream	Retrieves information about the required release phases.
	Look up Release Phases With Releases Stream	Retrieves information about the releases phases in the specified release.
	Look up Releases Associated with Objects Stream	Retrieves information about the releases that are associated with the specified API.
	Update Epic	Updates details of the required epic.
	Update Release	Updates details of the required release.
	Update Release Phase	Updates details of the required release phase.
Strategy Management	Create Goal	Creates a goal with the provided details.
	Create Initiative	Creates an initiative with the provided details.
	Create Persona	Creates a persona with the provided details.
	Look up Goals Associated with Objects Stream	Retrieves information about the goals that are associated with the specified API.
	Look up Goals Stream	Retrieves information about the required goals.
	Look up Initiatives Associated with Objects Stream	Retrieves information about the initiatives that are associated with the specified API.

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Category	Action	Description
	Look up Initiatives Stream	Retrieves information about the required initiatives.
	Update Goal	Updates details of the required goal.
	Update Initiative	Updates details of the required initiative.
	Update Persona	Updates details of the required persona.
User Management	Create Users	Creates a user in the specified product.
	Deactivate User	Deactivates the specified user account.
	Look up User Associated with Product Stream	Retrieves information about the users that are associated with the specified product.
	Look up Users Stream	Retrieves details of all members in an account.
	Update Users	Updates details of the specified user.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Spoke modules

The Aha! spoke adds the Aha! Spoke application to your ServiceNow instance. The Aha! Spoke application includes these modules:

Module	Description
Ideas	Contains details of the idea records and enables users to create ideas. When an idea is created here, the Upsert Aha Ideas flow is triggered. This flow creates an idea record with the provided details in Aha! and updates the value of auto-generated ID in ServiceNow instance. To create ideas from ServiceNow instance: **1.** Navigate to **Aha! Spoke** > **Ideas**. **2.** Click **New**. **3.** On the form, provide all the required details except **ID**. Value of **ID** is populated after this record in Aha!. **4.** Click **Submit**.
Webhook	
Feature Records	Contains details of the feature records in the Aha Remote Feature [sn_aha_spoke_st_aha_features_remote] table. Once the webhook is set up and configured, the feature records are retrieved from Aha! and saved in the Aha Remote Feature

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Module	Description
	[sn_aha_spoke_st_aha_features_remote] table.
Webhook Registries	Contains details about the webhook registry records.
Webhook Routing Policies	Contains details about the webhook routing policy records. One routing policy is available with the spoke to create and update records in Aha!, and save the records' information in the Aha Feature [sn_aha_spoke_feature_aha] table.
Remote Table	
Features	Contains records about the Aha! features. Data displayed here is retrieved from the Aha Remote Feature [sn_aha_spoke_st_aha_features_remote] table.

Spoke triggers

Use triggers in the Aha! spoke to subscribe to the required events. The endpoint enables webhooks to connect with your ServiceNow instance. You can configure the flows to execute only when the specified trigger conditions are met. The supported events are:

Category	Trigger	Description
Default	Comment Added	Trigger initiates when a comment is added to a feature in Aha! workspace.
	Field Change	Trigger initiates when a field is changed in Aha! workspace.
Feature Management	Feature Created	Trigger initiates when a feature is created in Aha! Workspace.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Create an Aha! OAuth2 application and Set up ServiceNow instance for Aha!.

Create an Aha! OAuth2 application

Create an OAuth2 application in the Aha! account so that the application can authenticate access requests to the Aha! server from your ServiceNow instance.

Before you begin
Role required: admin

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Ensure that you've signed up as an admin in the Aha! account.

Ensure that you've installed the Aha! spoke plugin.

Procedure

1. Go to OAuth2 Authentication.
2. Log in to the Aha! site using your admin credentials.
3. On the Features board page, click the settings icon ( ).
4. On the Personal settings page, click **Developer**.
5. Click the **OAuth applications** tab.
6. Click **Register OAuth application**.
7. On the Register new OAuth application form, enter `https://instance/oauth_redirect.do` as the Redirect URI, where *instance* is the name of your ServiceNow instance.
8. Click **Create**.
   The **OAuth applications** tab shows Client ID and Client Secret keys.
9. Note down the values in the Client ID and Client Secret fields.

Set up ServiceNow instance for Aha!

Set up your ServiceNow instance to add the Aha! Client ID and Client Secret keys.

Before you begin

- Request an Integration Hub subscription.
- Activate the Aha! spoke.
- ServiceNow Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Aha!** and select **View Details**.

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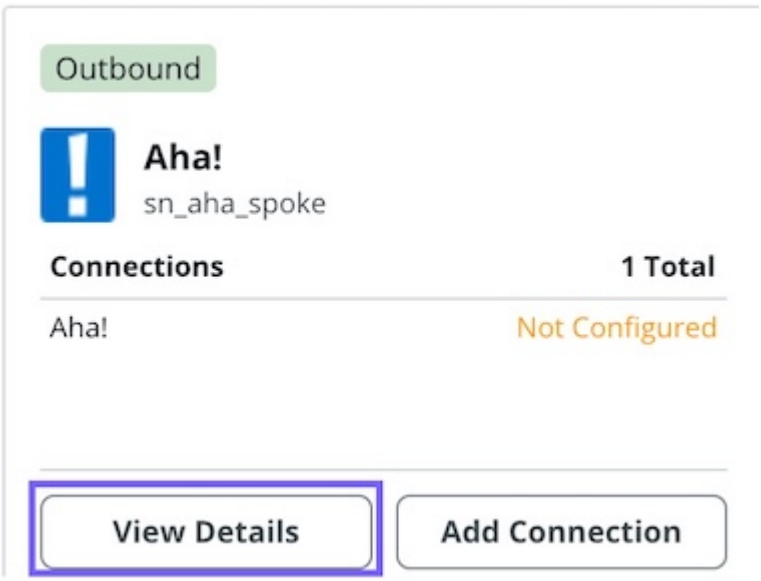
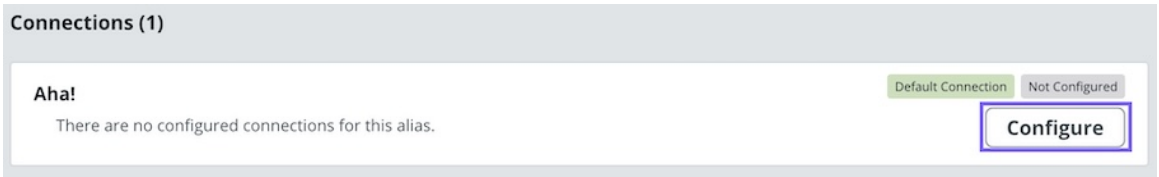
- To configure the default connection and credential alias record that is shipped along with the Aha! spoke, select **View Details**.



- To manage more than one Aha! spoke connection records, you should create child alias record by selecting **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you're configuring the spoke for the first time, select **Configure**. Otherwise, select **Edit**.



5. On the form, fill in the details.

Fields	Descriptions
Connection Name	Name of the integration profile.
Connection URL	Connection URL for Aha!.
OAuth Client ID	OAuth2 key that you received while creating an OAuth2 authentication from the Aha! site.
OAuth Client Secret	OAuth Client Secret key that you received while creating an OAuth2 authentication from the Aha! site.
OAuth Redirect URL	ServiceNow redirect URL.

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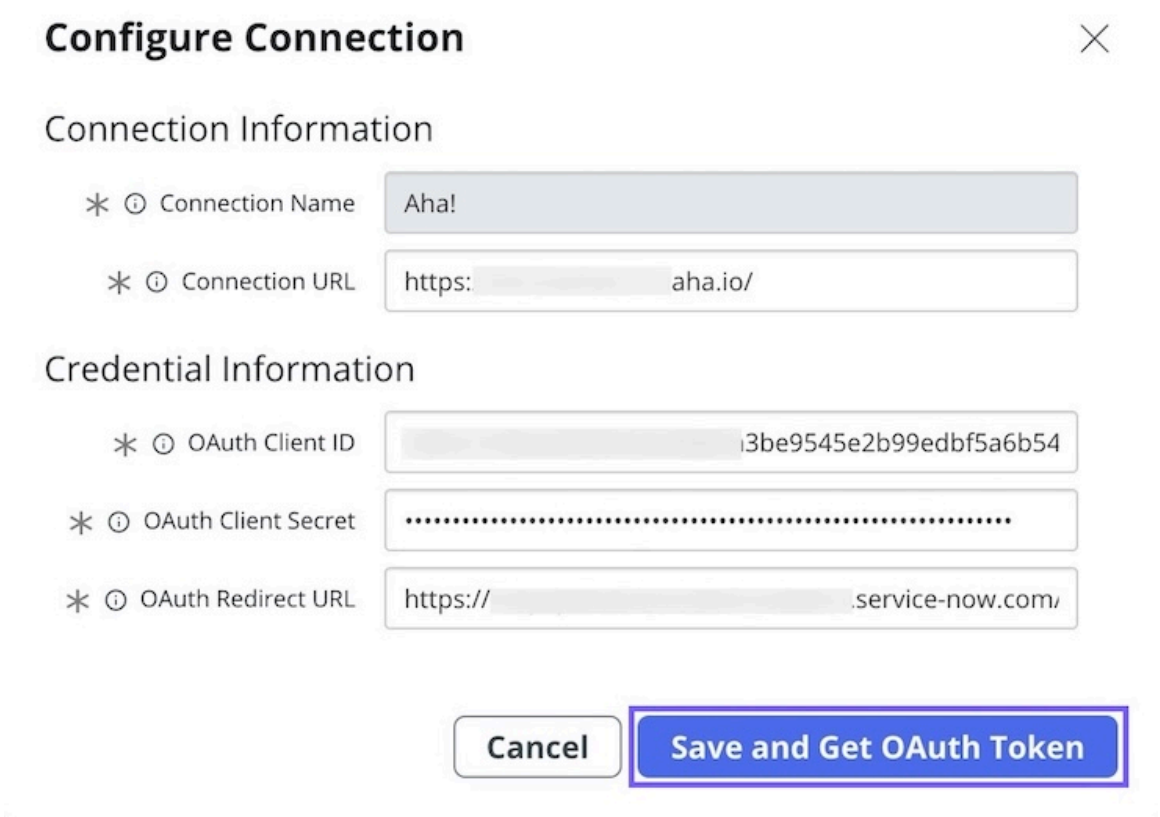

6. Select **Save and Get OAuth Token** and then select **Authorize**.

Result
The Aha! spoke is set up and Aha! account is integrated with your ServiceNow instance.

Set up a bi-directional webhook for the Aha! spoke

Configure a webhook to subscribe to events in the Aha! account with a ServiceNow callback URL.

Before you begin
Role required: admin

Create a Token

Create a token that will be embedded in the callback URL to Aha!.

Before you begin
Role required: admin

Procedure

1. In the navigation filter, enter `token_verification.list`.
   The system displays records in the Token Verifications table.
2. Select **New**.
3. On the form, fill the fields.

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Token Verification form

Field	Description
Name	Option to provide a unique name to identify the token. For example, `Aha! Callback URL token`.
Description	Option to provide a description of the token.
Token	Option to provide a unique authentication token. This token is encrypted and embedded in the URL.

4. Select **Submit**.

Create an Aha! Webhook in ServiceNow

Register an Aha! webhook in to notify the app when certain events occur in Aha!.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Aha! Spoke** > **Webhook** > **Webhook Registries.**
2. Select **New**.
3. Fill the form.

Aha! Webhook Registry

Field	Description
Name	Option to uniquely identify the record.
Path	Option to provide the webhook path. Enter `api/sn_aha_spoke/aha_webhook`.
Token	Option to specify the token you had created. See Create a Token.

4. Right-click the form header and click **Save**.
5. Select **Callback URL**.
   The system displays the webhook callback URL.
6. Copy and record the webhook callback URL.

Add callback URL to Aha!

Register the webhook callback URL to the Aha! account.

Before you begin
Role required: admin

Procedure

1. Log in to your Aha! account as an admin.
2. Navigate to **Settings** > **Account**.

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3. Create an activity webhook by clicking **+** beside **Integrations**.
4. Click **+ Activity webhook** in the **Activity webhook** tile.
5. On the form, fill these values.

Field	Description
Hook URL	Webhook callback URL you had copied from the ServiceNow instance.
Selected Activities	Activities or events for which you want to subscribe.

6. Click **Add activity**.

Set webhook routing policy

Create a webhook routing policy and subflow as per your requirement.

Before you begin

Role required: admin

About this task

The default routing policy in the Aha Webhook Decision Policy module triggers the Process Aha webhooks subflow and notifies the ServiceNow app when certain events occur in Aha!. See Aha! Spoke for information about the fields that the default routing policy and subflows support. To use any other fields in your custom subflow and customize conditions in the routing policy, perform these steps.

Procedure

1. Navigate to **All** > **Aha! Spoke** > **Webhook** > **Webhook Routing Policies.**
2. Select **New**.
3. Fill the form.

Decision form

Field	Description
Label	Unique label to identify the routing policy.
Default answer	Option to specify if this is the default answer. The default answer is applicable when the conditions are not met.
Condition	Conditions to be met when the required events occur in Aha!.
Answer	Subflow that must be triggered when the specified conditions are met. **a.** Click the lookup icon ( ). **b.** Select the required subflow from the **Document** list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow]`.

4. Select **Submit**.

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Set up triggers for the Aha! spoke

Set up triggers for the Aha! spoke for the required events. The endpoint enables webhooks to connect with your ServiceNow instance.

Before you begin
Role required: admin

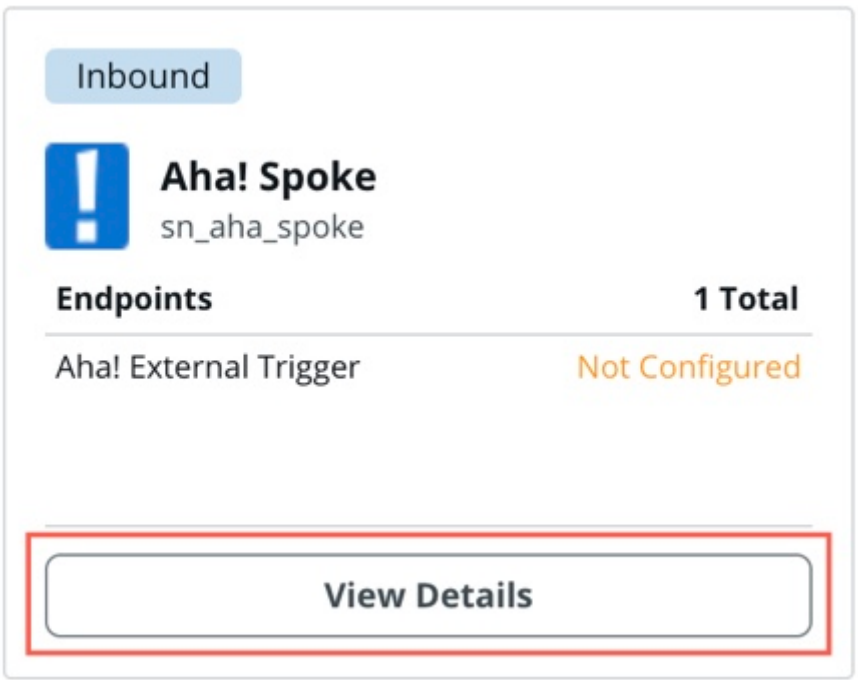
Configure triggers in ServiceNow instance

Configure endpoint for webhooks in the Aha! that support the token authentication.

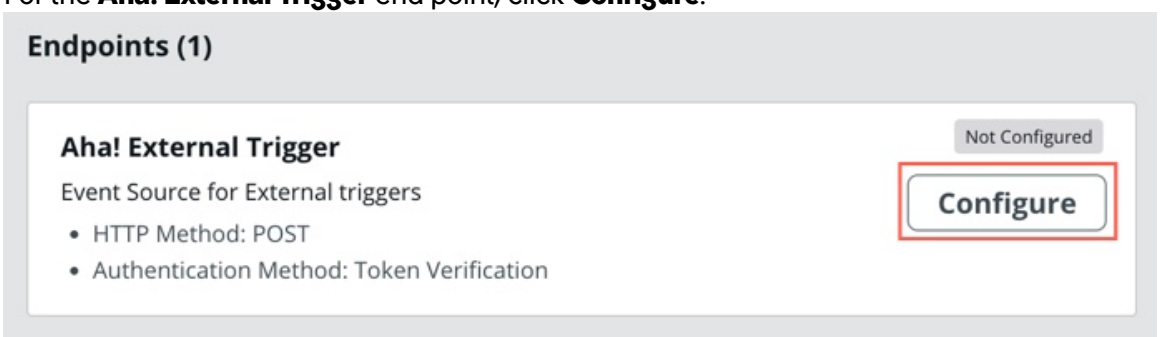
Before you begin
Role required: flow_designer and connection_admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Toggle and enable the **Inbound** connections.
4. Locate the **Aha! Spoke** endpoint and click **View Details**.



5. For the **Aha! External Trigger** end point, click **Configure**.



6. Select the user who can trigger the endpoint and click **Activate**.

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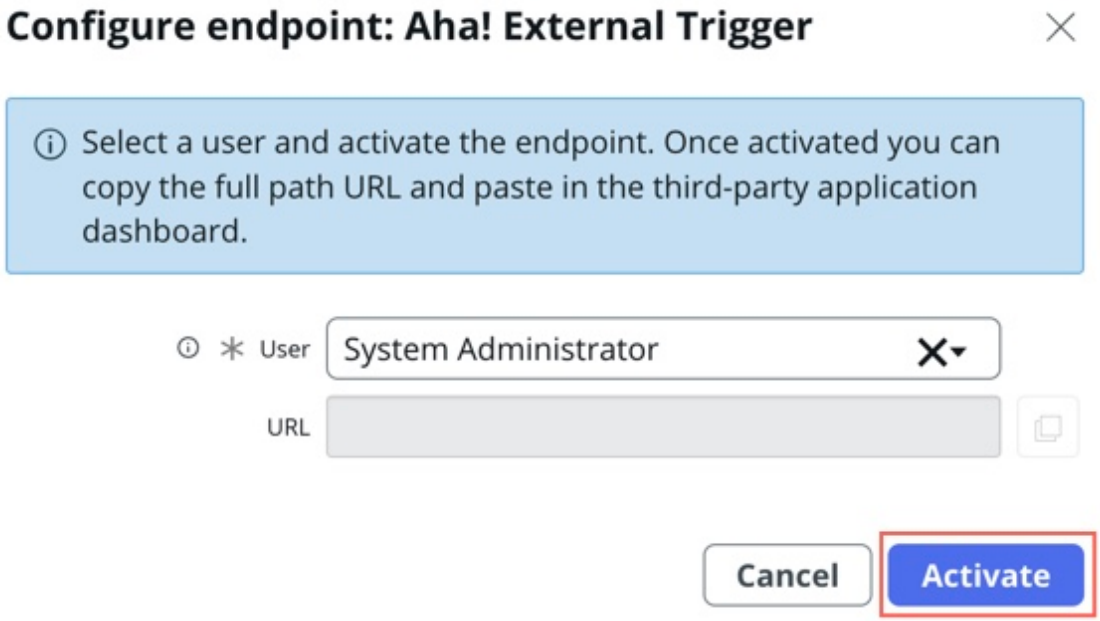
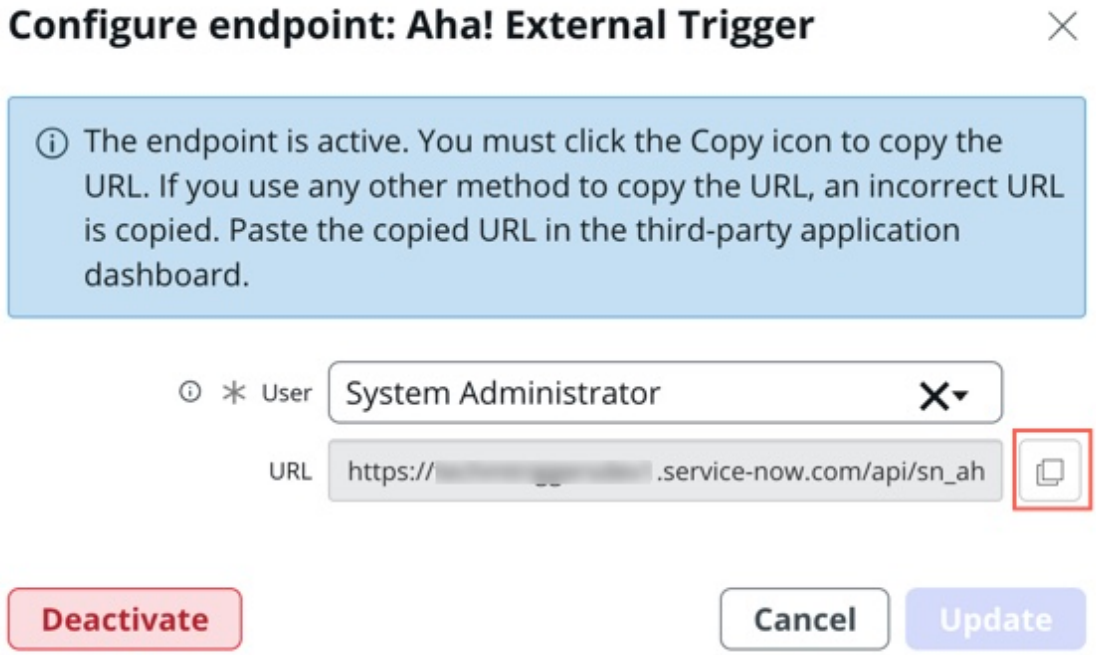


7. Copy the generated endpoint URL.



Add the endpoint URL in Aha!

Add the endpoint URL that is generated in your ServiceNow instance in the Aha! account to enable webhooks to connect with your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Log in to Aha! Workspace as an admin.

2. Click user profile and navigate to **SETTINGS** > **Workspace**.

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3. Under **Integrations**, click **+** to add an integration.
4. Under **API**, click **+ Activity webhook**.
5. On the form, for **Hook URL** paste the generated endpoint URL that was generated after you configured triggers in the ServiceNow instance.

   For more information, see Configure triggers in ServiceNow instance.
6. Select the activities and users as per your requirement.

   For the list supported events, see the Spoke triggers section.
7. Select the **Valid certificate**, **Reduce webhook delay**, and **Enable** check boxes.
8. Click **Add activity**.

AI Search Spoke

Store data from the required third-party application in the AI Search server through Workflow Studio. Access data through the AI Search portal.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

AI Search spoke v2.0.3 is the latest version. For version history of the spoke, see AI Search spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are activated:

- AI Search (com.glide.ais)
- External Content for AI Search (com.glide.ais.external_content)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The AI Search spoke provides actions to automate tasks when events occur in your ServiceNow instance. Available actions include:

Action	Description
Commit Index	Commits queued documents in the batcher and indexes them. Synchronously returns feedback about the indexed content.

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Action	Description
Delete Document	Deletes a record from the AI Search content index.
Delete Documents	Deletes all records that use a specified external content schema table from the AI Search content index. You can optionally specify a Glide query to limit the set of documents deleted from the specified schema table.
Get Max File Size	Retrieves the maximum file size which can be ingested into AI Search.

Ingest Document	Ingests properties of the specified document into the batcher. In releases starting with Rome, you can optionally specify security principal access permissions for the document.
	
	Specify the document's properties as name-value pairs in a JSON object formatted as in the following example:
	
	`{ "title": "Report 2021-02-26", "author": "Abel Tuter", "url": "http://example.com/reports/2021/02/26/" }`
	
	You can specify the document's security principal access permissions as name-value pairs in a JSON object formatted as in the following example:
	
	`{ "everyone": false, "groups.deny": [ "report-users", "hr-users" ], "groups.read": [ "report-admins", "hr-admins" ], "none": false, "users.deny": [ "ad\bow-ruggeri", "don_goodliffe" ], "users.read": [ "ad\beth-anglin", "ad\abel-tuter", "carol.coughlin@sharepoint" ] }`
	
	For more details on security principal access permissions, see External content access permissions.

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Action	Description

Ingest Document Using Download URL	Downloads a document from a URL and ingests it into the batcher. In releases starting with Rome, you can optionally specify security principal access permissions for the document.
	
	Add the URL's domain to the AI Search spoke's list of trusted domains before you specify this action's **Download URL** input. For details on modifying the spoke's list of trusted domains, see Set up the AI Search spoke.
	
	This action doesn't support authentication session IDs or cookies, so the document URL must allow unauthenticated access.
	
	Specify the document's properties as name-value pairs in a JSON object formatted as in the following example:
	
	`{ "title": "Report 2021-02-26", "author": "Abel Tuter" }`
	
	The document's *url* property is automatically populated with the value of the **Download URL** input.
	
	You can specify the document's security principal access permissions as name-value pairs in a JSON object formatted as in the following example:
	
	`{ "everyone": false, "groups.deny": [ "report-users", "hr-users" ], "groups.read": [ "report-admins", "hr-admins" ], "none": false, "users.deny": [ "ad\bow-ruggeri", "don_goodliffe" ], "users.read": [ "ad\beth-anglin", "ad\abel-tuter", "carol.coughlin@sharepoint" ] }`
	
	For more details on security principal access permissions, see External content access permissions.

Initialize Batcher	Initializes a new batcher to queue documents for indexing.
Is AIS Available For Ingestion	Checks whether AI Search is available for ingestion.

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Action	Description
Look up Supported File Extensions	Retrieves file extensions supported by AI Search.
Release Batcher	Releases a used batcher from pool.
Update By Query	Updates all the records in the AI Search content index that match the specified query.

See Set up the AI Search spoke for information about setting up the AI Search spoke.

Set up the AI Search spoke

Configure the AI Search spoke to index content from a third-party application.

Before you begin

- Request an Integration Hub subscription
- Activate the AI Search spoke
- Role required: admin

Procedure

1. Create an external content schema table.
   To learn more about external content schema tables, see Indexing and searching external content in AI Search.

   a. Navigate to *AI Search* > **Create Schema**.

   b. In the field, provide the name of your schema table.
   For example, `My application schema table`.

   c. Select **Submit**.

2. Create an indexed source for content from your third-party application.
   To learn more about indexed sources, see Indexed sources in AI Search.

   a. Navigate to *AI Search* > **Indexed Sources**.

   b. Select **New**.

   c. On the form, fill these values.

Field	Description
Name	Name to identify the indexed source. For example, `My application indexed source`.
Source	External content schema table that you created for the third-party application. For

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Field	Description
	example, `My application schema table`.
Active	Option to enable the indexed source.

d. Select **Submit**.

Note: Ensure that the **Type** of the indexed source is **external**.

You can now use the AI Search spoke actions.

3. Add the third-party application's domain URL to the list of trusted domains.

a. Navigate to *AI Search* **Spoke** > **Trusted Domains**.

b. Select **New**.

c. On the form, fill these values.

Field	Description
Name	Name to identify the trusted domain record. For example, `My sample application's trusted domain`.
Domain	URL of the trusted domain. For example, `https://example.com`.

4. Create a search source for your new indexed source.
To learn more about search sources, see Search sources in AI Search.

a. Navigate to *AI Search* > **Search Experience** > **Search Sources**.

b. Select **New**.

c. On the form, fill these values.

Field	Description
Name	Name to identify the search source. For example, `My application search source`.
Application	Application scope. Select *AI Search* **Spoke**.
Indexed Source	Indexed source that you created for the third-party application. For example, `My application indexed source`.

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Field	Description
Conditions	Filter conditions that records must satisfy to be searchable.

d. Select **Submit**.

5. Create a search profile that includes your new search source.
   For more information about configuring and publishing search profiles, see Search profiles in AI Search.

   a. Navigate to *AI Search* > **Search Experience** > **Search Profiles**.

   b. Select **New**.

   c. Fill in a **Label** value to identify the search profile.
   For example, `My application search profile`.

   d. Right-click the form header and select **Save**.

   e. In the **Search Sources** tab, select **Link Existing**.

   f. In **Search Source**, select the search source that you created for the third-party application.
   For example, **My application search source**.

   g. Select **Submit**.

   h. Select **Publish**.

Result
You can now use the AI Search spoke actions to indexed content from the third-party application. To view the indexed content, you can use the Search Preview UI from the Advanced AI Search Management Tools application.

For details on the Search Preview UI, see Search Preview UI for *AI Search*. To learn more about the Advanced AI Search Management Tools application, see Analytics and Reporting Solution for Advanced *AI Search* Management Tools.

Amazon Alexa Spoke

Manage intents, skills, vendors, and slots in your Amazon Alexa account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Supported versions

This spoke was built for Amazon Alexa API version v1, but may be compatible with later versions.

Spoke version

Amazon Alexa v1.3.0 is the latest version. For version history of the spoke, see Amazon Alexa spoke release notes.

Spoke requirements

Admin access to Amazon Developer Portal and AWS Lambda.

Important security considerations

Be aware of these considerations to securely use Amazon Alexa:

- Amazon stores voice recordings of the Amazon Alexa smart assistant customers forever unless the Amazon Alexa account is configured to delete the recordings. For more information about deleting the voice recordings, see Delete Alexa Voice Recordings Automatically.
- To stop recording conversations, turn the microphone off on the Alexa enabled devices.
- To ensure safety and protect privacy when using Alexa devices, take measures such as, choosing a strong password and using a pin for voice purchases.
- Install or activate only the legitimate skills.
- Ensure proper credential management in AWS Lambda when invoking the ServiceNow Rest API.
- Ensure that your AWS Lambda function is accessible to only the required skills by adding the Alexa Skills Kit trigger to the required AWS Lambda function. Using these triggers, you can allow only the required skills to access your AWS Lambda function. For more information, see Configure the trigger for a Lambda function.

  Note: Use the AWS Lambda function as an endpoint of your skill. If your are using custom web service, validate the skills. For more information, see Host a Custom Skill as a Web Service.

- You can securely store your sensitive data in the AWS Lambda function using environment variables. For more information, see Using AWS Lambda environment variables.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke actions

The Amazon Alexa spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Intent Management	Create Intent	Creates an intent for the specified skill and locale.
	Delete Intent	Deletes the specified intent from the specified skill.
	Look up Intents	Lists available intents for the specified skill and locale.
	Update Intent	Updates an intent for the specified skill and locale.
Interaction Model Management	Get Interaction Model	Gets the interaction model schema for the specified skill.
	Look up Interaction Model Versions	Lists the available versions of the interaction model for the specified skill.
	Update Interaction Model	Updates the interaction model for the specified skill and locale.
Skill Management	Create Skill	Submits a skill creation request for the specified Vendor ID.
	Delete Skill	Deletes the specified skill.
	Get Skill	Gets the details for the specified skill.
	Get Skill Status	Gets the status for the specified skill.
	Look up Skills	Lists the skills for the specified Vendor ID.
	Update Skill	Submits a request to update a skill for the specified Vendor ID.
Slot Type Management	Create Slot Type	Creates a slot type for the specified skill in the specified locale.
	Look up Slot Types	Lists available slot types for the specified skill and locale.
	Update Slot Type	Updates the specified slot type for the specified skill and locale.
Vendor Management	Look up Vendors	Lists details of all the available vendors.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon Alexa spoke.

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Set up the Amazon Alexa spoke

Integrate the ServiceNow instance and Amazon Alexa account by creating a custom OAuth application in Amazon Alexa to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Amazon Alexa spoke.
- Role required: admin

Create a security profile

Create and register a security profile through the Developer Console to use Login with Amazon on your ServiceNow instance.

Before you begin

Role required: admin.

Procedure

1. Log in to Amazon Developer Portal with admin credentials.
2. Create a security profile.
   For information about creating a security profile, see Create an LwA Security Profile in Amazon Developer Documentation.
3. Copy and record the values of Client ID and Client Secret for later use.
4. Configure the security profile and specify these values in **Web Settings**:

Field	Value
Allowed Origins	ServiceNow instance URL.
Allowed Return URLs	ServiceNow instance redirect URL in this format: `https://<Instance-Name>.com/oauth_redirect.do`

For more information about configuring the security policy, see Add your Website to your Security Profile in Amazon Developer Documentation.

Configure a connection for Amazon Alexa spoke

Add and configure a Amazon Alexa connection to authenticate ServiceNow requests in the Amazon Alexa spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, the **Outbound** connections are displayed by default.
4. Locate the **AmazonAlexa** connection alias and click **View Details**.
5. On the **Connection** form, fill in the fields.

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Field	Description
Connection Information	
Connection Name	Name to uniquely identify the record. By default, the name is `AmazonAlexa`.
Connection URL	Base URL to connect to Amazon Alexa. Enter: `https://api.amazonalexa.com`
API Version	Required API version of Amazon Alexa. Enter `v1`.
Credential Information	
OAuth Entity Name	Name to identify the OAuth entity record. For example, `Amazon Alexa OAuth`.
OAuth Client ID	Client ID created during the configuration of the security profile.
OAuth Client Secret	Client Secret created during the configuration of the security profile.
OAuth Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`. Replace `<instance>` with the ServiceNow instance name.

6. Click **Configure and Get OAuth Token**.

Setup webhook for the Amazon Alexa spoke

Authenticate the inbound requests from Amazon Alexa account to your ServiceNow instance by creating a webhook registry.

Before you begin

Role required: admin.

Procedure

1. In the filter navigator, enter `token_verification.list`.
   Records in the Token Verifications [token_verification] table are displayed.
2. Click **New**.
3. On the form, fill these values.

Token Verification form

Field	Description
Name	Name to identify the token record. For example, `Alexa token`.
Description	Brief description of the token.
Token	Value of token. This value is encrypted before it is used.

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4. Click **Submit**.
5. Navigate to **Alexa Webhooks** > **Alexa Webhook Registries**.
6. Click **New**.
7. On the form, fill these values.

Alexa Webhook Registry form

Field	Description
Name	Name to identify the webhook registry record. For example, `Alexa token`.
Description	Brief description of the webhook registry record.
Token	Token you have created. For example, `Alexa token`.
Path	Scripted REST endpoint. A default endpoint is available. You can change the default value as per your requirement.

8. Right-click the form header and click **Save**.
9. Click **Callback URL**.
   Webhook Callback URL is displayed in the confirmation message. Copy and record this value.
10. Log in to AWS Management Console.
11. In the AWS Lambda function, specify the Webhook Callback URL and save the changes.



12. Log in to Alexa Developer Console.

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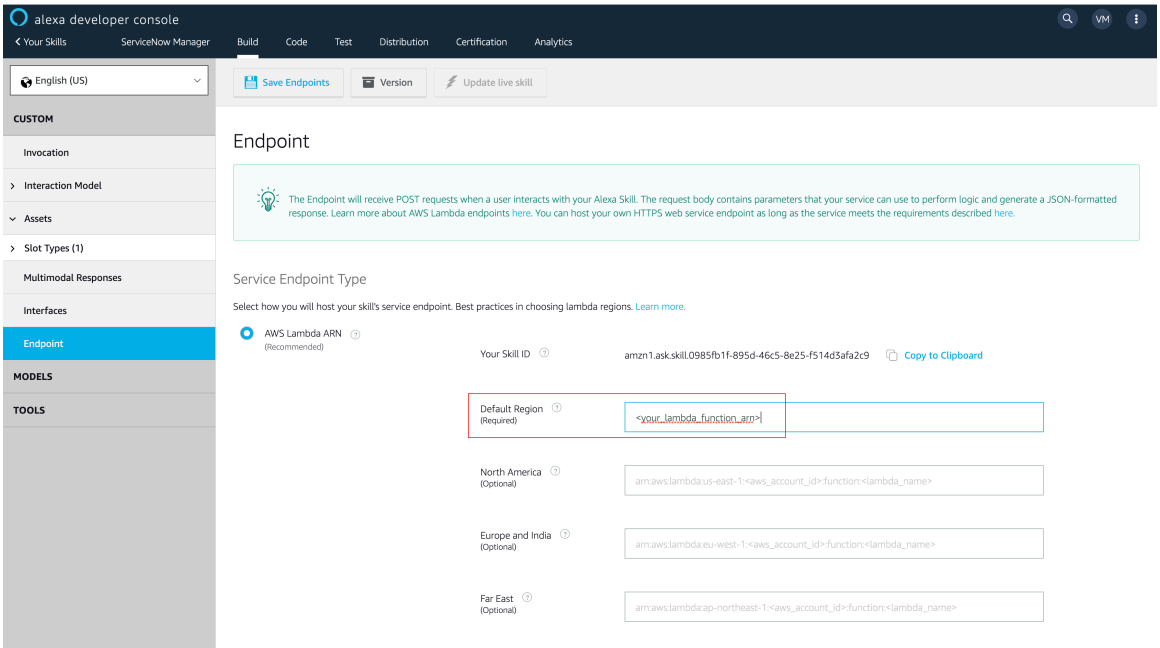
13. Navigate to **Build** > **CUSTOM** > **Endpoint** and specify ARN of the AWS Lambda function you had configured.



Amazon CloudWatch Spoke

Integrate ServiceNow instance with Amazon CloudWatch. Manage and monitor your Amazon Web Services (AWS) resources and applications from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for Amazon CloudWatch version 2010-08-01, but may be compatible with later versions.

Spoke version

Amazon CloudWatch spoke v1.0.2 is the latest version. For version history of the spoke, see Amazon CloudWatch spoke release notes.

Spoke requirements

User with full access to Amazon CloudWatch account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Amazon CloudWatch Spoke provides actions to automate Amazon Web Services (AWS) resource and application monitoring tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Alarm Management	Create Composite Alarm	Creates a composite alarm.
	Delete Composite Alarm	Deletes the specified alarms.
	Look Up Alarm	Retrieves a list of specified alarms.
	Set Alarm State	Assigns a temporary state to an alarm for testing.
Anomaly Management	Create Anomaly Detector	Creates an anomaly detection model for a CloudWatch metric.
	Delete Anomaly Detector	Deletes the specified anomaly detection model from an account.
Metric Management	Delete Metric Alarm	Deletes the specified alarms.
	Look up Metric Data	Retrieves different metrics in a single request.
	Upsert Metrics Alarm	Create a new alarm or updates an alarm and associates the alarm with the specified metric, metric math expression, or an anomaly detection model.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

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For information about setting up the spoke, see Set up the Amazon CloudWatch spoke.

Set up the Amazon CloudWatch spoke

Integrate the ServiceNow instance and Amazon CloudWatch by using the AWS credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Amazon CloudWatch spoke.
- Role required: admin

Create a credential record for the Amazon CloudWatch spoke

Create a credential record for the Amazon CloudWatch account. The Amazon CloudWatch Spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **AWS Credentials**.
4. On the form, fill these values.

AWS Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, Amazon CloudWatch Cred.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of your AWS account. Access Key ID of the user with full access to Amazon CloudWatch.
Secret Access Key	Secret Access Key of your AWS account. Secret Access Key of the user with full access to Amazon CloudWatch.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AmazonCloudWatchAlgo**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

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Field	Description
Credential alias	Credential alias associated with the spoke. `AWS_Cloud_Watch`

5. Right-click the form header and click **Submit**.

Amazon Connect Spoke

Manage and provide customer service across voice, chat, and tasks using your Amazon Connect account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Amazon Connect spoke v1.2.0 is the latest version. For version history of the spoke, see Amazon Connect spoke release notes.

Supported versions

This spoke was built for Amazon Connect API Version 2017-08-08, but may be compatible with later versions.

Spoke requirements

- User with full access to Amazon Connect.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke actions

The Amazon Connect spoke provides actions to automate Amazon Connect tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Contact Flow Management	Create Contact Flow	Creates a contact flow for the specified Amazon Connect instance.
	Get Contact Flow Details	Retrieves details of the specified contact flow.
	Look up Contact Flows	Retrieves a list of contact flows.
	Update Contact Flow Content	Updates content of the specified contact flow.
	Update Contact Flow Name	Updates name of the specified contact flow.
Contact Management	Resume Contact Recording	Resumes recording the call when a contact is being recorded and the recording has been suspended using suspend contact recording. Only voice recordings are supported at this time.
	Start Contact Recording	Starts recording the contact when an agent joins the call. Only voice recordings are supported at this time.
	Start Outbound Voice Contact	Places an outbound call to a contact and initiates the contact flow.
	Stop Contact	Ends the specified contact.
	Stop Contact Recording	Stops recording the call. If you use stop contact recording to stop recording an ongoing call, you can't use restart the contact recording. Only voice recordings are supported at this time.
	Suspend Contact Recording	Suspends recording the call when a contact is being recorded.
	Get Contact Attributes	Retrieves the contact attributes for the specified contact.
	Update Contact Attributes	Creates or updates user-defined contact attributes associated with the specified contact.
Instance Management	Create Instance	Initiates an Amazon Connect instance with all the supported channels enabled.
	Delete Instance	Deletes the specified instance.
	Get Instance Details	Retrieves details of the specified instance.
	Look up Hours of Operations	Retrieves a list of hours of operations.

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Category	Action	Description
	Look up Instances	Retrieves a list of instances.
	Look up Phone Numbers	Retrieves a list of phone numbers.
	Look up Prompts	Retrieves a list of prompts.
	Look up Queues	Retrieves a list of queues.
	Look up Security Profiles	Retrieves a list of security profiles.
Metric Management	Get Current Metrics Data	Retrieves the real-time metric data from the specified Amazon Connect instance.
	Get Metrics Data	Retrieves historical metric data from the specified Amazon Connect instance. **Note:** • The time must be specified using an interval of 5 minutes, such as 11:00, 11:05, and 11:10, and must be later than the start time timestamp. • The time range between the start and end time must be less than 24 hours.
Routing Policy Management	Associate Routing Profile Queues	Associates a set of queues with a routing profile.
	Create Routing Profile	Creates a routing profile.
	Disassociate Routing Profile Queues	Disassociates the specified set of queues from a routing profile.
	Get Routing Profile Details	Retrieves details of the specified routing profile.
	Look up Routing Profile Queues	Retrieves a list of routing profile queues.
	Look up Routing Profiles	Retrieves a list of routing profiles.
	Update Routing Profile Concurrency	Updates the specified routing profile concurrency.
	Update Routing Profile Default Outbound Queue	Updates the specified routing profile default outbound queue.

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Category	Action	Description
	Update Routing Profile Name	Updates the specified routing profile name.
	Update Routing Profile Queues	Updates the properties associated with a set of queues for a routing profile.
Tag Management	Add Tags to Resource	Associates a set of tags with the specified resource.
	Look up Tags for Resource	Retrieves all tags that are associated with the specified resource.
	Remove Tag from Resource	Removes the association of tag from resource.
User Management	Create User	Creates a user account for the specified Amazon Connect instance.
	Delete User	Deletes the specified user.
	Get User Details	Retrieves details of the specified user.
	Get User Hierarchy Group	Retrieves details of the user hierarchy group.
	Get User Hierarchy Structure	Retrieves details of the user hierarchy structure.
	Look up User Hierarchy Groups	Retrieves a list of user hierarchy groups.
	Look up Users	Retrieves the list of users.
	Update User Hierarchy	Updates the specified user hierarchy.
	Update User Identity Information	Updates the specified user identify information.
	Update User Phone Configuration	Updates details of the specified user phone configuration.
	Update User Routing Profile	Updates the specified user routing profile.
	Update User Security Profiles	Updates details of the specified user security profiles.
	Look up Agent Status	Retrieves a list of agent statuses.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon Connect spoke.

Set up the Amazon Connect spoke

Integrate the ServiceNow instance and Amazon Connect account using AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription
- Activate the Amazon Connect spoke
- Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Amazon Connect**.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `Amazon Connect Cred`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to Amazon Connect.
Secret Access Key	Secret Access Key of the user with full access to Amazon Connect.
Credential alias	Associated credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **Amazon Connect**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

6. Click **Submit**.

Result

The credential record the Amazon Connect spoke is created.

Amazon DynamoDB Spoke

Manage streams, tables, and tags in your Amazon DynamoDB database from your ServiceNow instance.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Amazon DynamoDB spoke v1.0.1 is the latest version. For version history of the spoke, see Amazon DynamoDB spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for API version 2012-08-10, but may be compatible with later versions.

Spoke requirements

- User with full access to Amazon DynamoDB.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

Spoke actions

The Amazon DynamoDB spoke provides actions to automate Amazon DynamoDB tasks when events occurs in the ServiceNow AI Platform. Available actions include:

Category	Action	Description
Stream Management	Disable Stream	Disables the stream for the specified table.
	Enable Stream	Enables the stream for the specified table.

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Category	Action	Description
	Get Shard Iterator	Returns a shard iterator. Use the shard iterator in a subsequent Get Records request to read the stream records from the shard.
	Get Stream	Returns information about the specified stream.
	Look up Records	Retrieves the stream records from a given shard.
	Look up Streams	Returns the list of all the streams associated with the current account.
Table Management	Create Backup	Creates a backup for an existing table.
	Create Table	Creates a table in the account.
	Delete Backup	Deletes an existing backup of a table.
	Delete Table	Deletes the specified table.
	Get Backup	Retrieves the details of an existing backup.
	Get Continuous Backup	Retrieves the status of continuous backups and point in time recovery of the specified table.
	Get Table	Retrieves information about the table.
	Look up Backups	Retrieves the list of all the backups associated with the account or backups of the specified table.
	Look up Tables	Retrieves the list of table names.
	Restore Table From Backup	Creates a table from an existing backup.
	Restore Table To Point In Time	Restores the specified table to the specified point in time within Earliest Restorable Date Time and Latest Restorable Date Time.
	Update Continuous Backup	Enables or disables point in time recovery for the specified table.
	Update Table	Updates the specified table.
Tag Management	Add Tags To DynamoDB Resource	Adds tags to DynamoDB resource.
	Look up Tags Of DynamoDB Resource	Lists the tags of the DynamoDB resource.
	Remove Tags From DynamoDB Resource	Removes the tags from the DynamoDB resource.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

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Note: Two Credential aliases are available for the Amazon DynamoDB spoke.

For information about setting up the spoke, see Set up the Amazon DynamoDB spoke.

Set up the Amazon DynamoDB spoke

Integrate the ServiceNow instance and Amazon DynamoDB account using AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription
- Activate the Amazon DynamoDB spoke
- Role required: admin

Create Credential records for the Amazon DynamoDB spoke

Create two Credential records for your Amazon DynamoDB account. The Amazon DynamoDB spoke connection and credential alias uses these credential records to perform actions in your Amazon DynamoDB account.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Amazon DynamoDB**.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `Amazon DynamoDB Cred`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to Amazon DynamoDB.
Secret Access Key	Secret Access Key of the user with full access to Amazon DynamoDB.
Credential alias	Associated Amazon DynamoDB credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **Amazon DynamoDB**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

6. Click **Submit**.
7. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

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8. Open for the record for **Amazon DynamoDB Streams**.
9. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
10. Select **AWS Credentials**.
11. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `Amazon DynamoDB Streams Cred`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to Amazon DynamoDB.
Secret Access Key	Secret Access Key of the user with full access to Amazon DynamoDB.
Credential alias	Associated Amazon DynamoDB Streams credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **Amazon DynamoDB Streams**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

12. Click **Submit**.

Amazon EBS Spoke

Manage block level storage volumes and snapshots in Amazon EBS from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

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- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke version

Amazon EBS spoke v1.0.2 is the latest version. For version history of the spoke, see Amazon EBS spoke release notes.

Supported version

This spoke was built for API version 2016-11-15, but may be compatible with later versions.

Note: If you use different API version, ensure that you change the API version in all spoke actions.

Spoke requirements

- User with full access to Amazon EC2.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

Spoke actions

The Amazon EBS spoke provides actions to automate Amazon EBS tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Elastic Block Store Management	Attach Volume	Attaches an EBS volume to a running or stopped instance.
	Create Snapshot	Creates a snapshot of an EBS volume.
	Create Volume	Creates an EBS volume that can be attached to an instance in the same Availability Zone.
	Delete Snapshot	Deletes the specified snapshot.
	Delete Volume	Deletes the specified EBS volume.
	Detach Volume	Detaches an EBS volume from an instance.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon EBS spoke.

Set up the Amazon EBS spoke

Integrate the ServiceNow instance and Amazon EBS account using AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription
- Activate the Amazon EBS spoke
- Role required: admin

Create Credential record for the Amazon EBS spoke

Create Credential record for your Amazon EBS account. The Amazon EBS spoke connection and credential alias uses this credential to perform actions on Amazon EBS.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Amazon EBS**.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `EBS Credentials`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to Amazon EC2.
Secret Access Key	Secret Access Key of the user with full access to Amazon EC2.
Credential alias	Associated credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AmazonEBSAuthAlgo**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

6. Click **Submit**.

Result

The credential record for the Amazon EBS spoke is created.

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Amazon EC2 Spoke

Integrate ServiceNow instance with Amazon Elastic Compute Cloud (EC2). Manage Amazon instances, Amazon Machine Images (AMIs), Key Pairs, and Tags from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Amazon EC2 spoke v1.4.1 is the latest version. For version history of the spoke, see Amazon EC2 spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported version

This spoke was built for API version 2016-11-15, but may be compatible with later versions.

Spoke requirements

- User with full access to Amazon EC2.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

Spoke flows and subflows

This spoke has no flows and subflows.

Available sample conversational subflows

Install Now Assist for Conversational Spokes and start using the conversational ability of Integration Hub spokes. For more information, see Now Assist in Conversational Spokes.

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Sample conversational subflows

Conversational subflow	Description
Look up Images - Sample	Returns information on the specified images.
Run instances - Sample	Executes the specified instances.

Spoke actions

The Amazon EC2 spoke provides actions to automate Amazon EC2 tasks when events occurs in ServiceNow. Available actions include:

Spoke Actions

Category	Action	Description
Amazon Machine Image Management	Copy Image	Copies an Amazon Machine Image (AMI) from the specified source region to the current region.
	Create Image	Creates an Amazon EBS supported AMI from an Amazon EBS supported instance that is either running or stopped.
	Deregister Image	Deregisters the specified AMI.
	List Image Attribute	Retrieves the specified AMI attribute.
	List Images	Retrieves the specified AMIs.
Instance Management	Get Instance Attribute	Retrieves the specified attribute of the specified instance.
	Get Instances Status	Retrieves the status of the specified instance.
	Get Password Data	Retrieves the encrypted administrator password for an active Windows instance.
	List Instance Types	Retrieves the list of all instance types in an AWS region.
	List Instances	Retrieves a list of all instances.
	Monitor Instances	Enables monitoring for all active instances.
	Reboot Instances	Reboots the specified instances.
	Run Instances	Launches the specified number of instances using an AMI.

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Spoke Actions (continued)

Category	Action	Description
	Start Instances	Starts the specified instances.
	Stops Instances	Stops the specified instances.
	Terminate Instances	Shutdowns or terminates the specified instances.
	Unmonitor Instances	Disables monitoring for the specified running instances.
	Update Instance Attribute	Updates the specified attribute for the specified instance. **Note:** You can specify only one attribute at a time. Before you update an attribute, ensure that the instance is stopped.
Key Pair Management	Create Key Pair	Creates a 2048-bit SSH-2 RSA key pair.
	Delete Key Pair	Deletes the specified key pair.
	List Key Pair	Retrieves the specified key pair or a list of all key pairs.
Region and Availability Zone Management	Get Availability Zones	Retrieves the list of availability zones in the specified AWS region.
	List Regions	Retrieves the list of all AWS regions.
Tag Management	Create Tags	Adds or overwrites the specified set of tags from the specified set of resources.
	Delete Tags	Deletes the specified set of tags from the specified set of resources.
	List Tags	Retrieves the list of tags for the specified region.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon EC2 spoke.

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Set up the Amazon EC2 spoke

Integrate the ServiceNow instance and Amazon EC2 using AWS credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription
- Activate the Amazon EC2 spoke
- Role required: admin

Create Credentials record for the Amazon EC2 spoke

Create Credential records for the Amazon EC2 instance. The Amazon EC2 spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the record for Amazon_EC2.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Description
Name	Name to uniquely identify the connection record. For example, enter `AWS Credentials`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to EC2.
Secret Access Key	Secret Access Key of the user with full access to EC2.
Credential alias	Associated credential record.
Authentication Algorithm	Custom authentication algorithm for out bound signing requests. Select **Amazon EC2AuthAlgo**. **Note:** Do not directly modify the de fault authentication algorithm.

6. Click **Submit**.

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Amazon Elastic Container Service Spoke

Manage clusters, instances, services and so on, in Amazon Elastic Container Service account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Amazon Elastic Container Service spoke v1.0.2 is the latest version. For version history of the spoke, see Amazon Elastic Container Service spoke release notes.

Supported versions

This spoke was built for Amazon Elastic Container Service API version 2014-11-13, but may be compatible with later versions.

Spoke requirements

- User with full access to Amazon Elastic Container Service.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Amazon Elastic Container Service spoke provides actions to automate Amazon Elastic Container Service tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
Cluster Management	Create Cluster	Creates an Amazon ECS cluster.
	Delete Cluster	Deletes the specified cluster.
	Look up Cluster	Retrieves the specified cluster.
	Look up Clusters	Retrieves the list of existing clusters.
	Update Cluster Settings	Updates settings of the specified cluster.
Instance Management	Deregister Container Instance	Deregisters an Amazon ECS container instance from the specified cluster.
	Look up Container Instances	Lists Amazon Elastic Container Service container instances.
	Register Container Instance	Registers an EC2 instance into the specified cluster.
Service Management	Create Service	Runs and maintains the desired number of tasks from the specified task definition.
	Delete Service	Deletes a specified service within a cluster.
	Look up Service	Retrieves the specified service running in your cluster.
	Look up Services	Retrieves the services that are running in a specified cluster.
	Update Service	Updates the parameters of a service.
Task Definition Management	Deregister Task Definition	Deletes the specified task set within a service.
	Look up Task Definition	Deregisters the specified task definition by family and revision.
	Look up Task Definitions	Deregisters the specified tasks definition by family and revision.
	Register Task Definition	Creates a task set in the specified cluster and service.
Task Management	Create Task Set	Creates a task set in the specified cluster and service.
	Delete Task Set	Deletes the specified task set within a service.
	Look up Task Set	Lists the task sets in the specified cluster and service.
	Run Task	Starts a task using the specified task definition.
	Start Task	Starts a task from the specified task definition on the specified container instance or instances.
	Stop Task	Stops the specified running task.
	Update Task Set	Modifies the specifies task set.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon Elastic Container Service spoke.

Set up the Amazon Elastic Container Service spoke

Integrate the ServiceNow instance and Amazon Elastic Container Service account by using the AWS credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Amazon Elastic Container Service spoke.
- Role required: admin

Create a credential record for the Amazon Elastic Container Service spoke

Create a credential record for the Amazon Elastic Container Service account. The Amazon Elastic Container Service spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **AWS Credentials**.
4. On the form, fill these values.

AWS Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `Amazon ECS Cred`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to Amazon Elastic Container Service.
Secret Access Key	Secret Access Key of the user with full access to Amazon Elastic Container Service.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AmazonECSAuthAlgo**.

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Field	Description
	Note: Users are cautioned against directly modifying the default authentication algorithm.
Credential alias	Credential alias associated with the spoke.

5. Click **Submit**.

Amazon RDS Spoke

Integrate ServiceNow instance with Amazon Relational Database Service (RDS). Manage the process of performing various operations like set up, operate, and scale on Amazon RDS using this spoke.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Amazon RDS spoke v1.0.5 is the latest version. For version history of the spoke, see Amazon RDS spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported Versions

This spoke was built for API version 2014-09-01 and 2014-10-31, but may be compatible with later versions.

Spoke Requirements

- User with full access to Amazon RDS.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

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Spoke flows and subflows

This spoke has no flows and subflows.

Spoke actions

The Amazon RDS spoke provides actions to automate Amazon RDS tasks when events occurs in ServiceNow. Available actions include:

Spoke Actions

Category	Action	Description
Account Management	List Account Attributes	Retrieves the list of attributes of an account.
	List Certificates	Retrieves the list of certificates of an account.
DB Engines Management	List DB Engines	Retrieves the list of available database (DB) engines.
Default	Generate Random Password	Generates a random password.
DB Instance Management	Create DB Instance	Creates an instance of DB.
	Create DB Instance Read Replica	Creates a read replica of a DB instance.
	Delete DB Instance	Deletes an existing provisioned DB instance. **Note:** When you delete a DB instance, all the automated backups of that instance are also deleted and cannot be recovered.
	List DB Instances	Retrieves the list of provisioned DB instances.
	List Reserved DB Instances	Retrieves the list of reserved DB instances.
	Promote DB Instance Read Replica	Promotes a read replica of a DB instance to standalone DB instance.
	Reboot DB Instance	Reboots a DB instance.
	Restore DB Instance From DB Snapshot	Creates a DB instance from a DB snapshot.
	Start DB Instance	Starts a DB instance.
	Stop DB Instance	Stops a DB instance.
DB Snapshots Management	Create DB Snapshot	Creates a snapshot of a DB instance.

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Spoke Actions (continued)

Category	Action	Description
	Delete DB Snapshot	Deletes a snapshot of a DB instance.
	List DB Snapshots	Retrieves the list of snapshots of a DB instance.
	Update DB Snapshot	Updates a snapshot of a DB instance.
Event Management	Create Event Subscription	Creates an RDS event notification subscription.
	Delete Event Subscription	Deletes an event notification subscription.
	List Event Categories	Retrieves a list of categories for the specified or all event source types.
	List Event Subscriptions	Retrieves a list of all subscription descriptions of a customer account.
	List Events	Retrieves a list of events of the RDS resources.
	Update Event Subscription	Updates an existing event notification subscription.
Groups Management	Create DB Parameter Group	Creates a DB parameter group.
	Create DB Subnet Group	Creates a DB subnet group. **Note:** A DB subnet group must contain at least one subnet in at least two Availability Zones (AZ) in the Amazon Web Services (AWS) region.
	Create Option Group	Creates an option group.
	Delete DB Parameter Group	Deletes the specified DB parameter group. **Note:** Before deleting the DB parameter group, ensure that DB parameter group is not associated with any DB instances.
	Delete DB Subnet Group	Deletes a DB subnet group.

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Spoke Actions (continued)

Category	Action	Description
	Delete Option Group	Deletes an existing option group.
	List DB Parameter Groups	Retrieves a list of DB parameter groups.
	List DB Subnet Groups	Retrieves a list of DB subnet group descriptions. **Note:** If a DB subnet group name is specified, the list contains descriptions of only the specified DB subnet group.
	List Option Groups	Retrieves a list of option groups.
	Reset DB Parameter Group	Modifies the parameters of a DB parameter group to the engine or system default values.
	Update DB Parameter Group	Updates the parameters of the specified DB parameter group.
	Update DB Subnet Group	Updates an existing DB subnet group. **Note:** A DB subnet group must contain at least one subnet in at least twos availability zones (AZs) in the Amazon Web Services (AWS) region.
	Update Option Group	Updates an existing option group.
Logs Management	List DB Log Files	Retrieves a list of all the log files of a DB instance.
	View DB Log File	Displays a part of or an entire specified log file. **Note:** The size of the log file must not exceed 1 MB.
Tags Management	Add Tags To RDS Resource	Adds tags to RDS resource.
	List Tags For RDS Resource	Retrieves a list of tags of RDS resource.

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Spoke Actions (continued)

Category	Action	Description
	Remove Tags From RDS Resource	Removes the tags from an RDS resource.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon RDS spoke.

Set up the Amazon RDS spoke

Integrate the ServiceNow instance and Amazon RDS using AWS credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription
- Activate the Amazon RDS spoke
- Role required: admin

Create Credentials records for the Amazon RDS spoke

Create Credential records for the Amazon RDS instance. The Amazon RDS spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credentials Aliases**.
2. Open for the record for Amazon RDS.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these fields.

Field	Description
Name	Name to uniquely identify the connection record. For example, enter `AWS Credentials`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to Amazon RDS.

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Field	Description
Secret Access Key	Secret Access Key of the user with full access to Amazon RDS.
Credential alias	Associated credential record.
Authentication Algorithm	Custom authentication algorithm for out bound signing requests. Select **Amazon RDS Auth Algorithm**. **Note:** Do not directly modify the de fault authentication algorithm.

6. Click **Submit**.

Amazon Route 53 Spoke

Integrate ServiceNow instance with Amazon Route 53. Manage domain registrations, Domain Name System (DNS) routing, and health checking from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for Amazon Route 53 API version 2013-04-01, but may be compatible with later versions.

Spoke version

Amazon Route 53 spoke v1.0.2 is the latest version. For version history of the spoke, see Amazon Route 53 spoke release notes.

Spoke requirements

- User with full access to Amazon Route 53 account.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

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- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Amazon Route 53 Spoke provides actions to automate Amazon Route 53 tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Domain Management	Check Domain Availability	Checks and returns the availability of a domain name. **Note:** If a domain name is in pending state, you must check the availability of the domain name again, until the status is processed
	Get Domain Details	Retrieves detailed information about a specified domain that is associated with the current AWS account.
	Look up Domain Suggestions	Retrieves a list of suggested domain names.
	Look up Domains	Retrieves all the domain names registered with Amazon Route 53 for the current AWS account.
	View Billing	Retrieves all the domain related billing records for the current AWS account for a specified period.
Hosted Zone Management	Create Hosted Zone	Creates a new public or private hosted zone.
	Delete Hosted Zone	Deletes a hosted zone.
	Get Change	Retrieves the current status of a change batch request.
	Get Hosted Zone	Retrieves information about a specified hosted zone.
	Get Hosted Zone Count	Retrieves total number of hosted zones for the account.
	Get Hosted Zone Limit	Retrieves the specified limit for a specified hosted zone.
	Look up Hosted Zones	Retrieves a list of associated public and private hosted zones.
	Look up Hosted Zones By Name	Retrieves a list of the hosted zones in alphabetical order.

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Category	Action	Description
	Update Hosted Zone Comment	Updates the comment for a specified hosted zone.
Record Set Management	Delete GeoLocation Record Set	Deletes a GeoLocation resource record set that contains authoritative DNS information for a specified domain name or subdomain name.
	Delete Simple Record Set	Deletes a simple resource record set that contains authoritative DNS information for a specified domain name or subdomain name.
	Delete Weighted Record Set	Deletes a weighted resource record set that contains authoritative DNS information for a specified domain name or subdomain name.
	Look up Record Sets	Retrieves a list of resource record sets in a specified hosted zone.
	Test DNS Answer	Retrieves the value that Amazon Route 53 returns in response to a DNS request for a specified record name and type.
	Upsert Geolocation Record Set	Creates a GeoLocation resource record set or updates an existing GeoLocation resource record set that contains authoritative DNS information for a specified domain name or subdomain name.
	Upsert Simple Record Set	Creates a simple reocord set or updates an existing simple resource record set that contains authoritative DNS information for a specified domain name or subdomain name.
	Upsert Weighted Record Set	Creates a weighted resource record set or updates an existing weighted resource record set that contains authoritative DNS information for a specified domain name or subdomain name.
Tag Management	Add Tags For Domain	Assigns a set of tags to a domain.
	Add Tags For Hosted Zone	Assigns a set of tags to a hosted zone.
	Look up Tags For Domain	Retrieves a list of tags that are associated with the specified domain.
	Look up Tags For Hosted Zone	Retrieves a list of tags that are associated to the specified domain.
	Remove Tags From Domain	Removes tags that are associated to a domain.
	Remove Tags From Hosted Zone	Removes tags that are associated to a hosted zone.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon Route 53 spoke.

Set up the Amazon Route 53 spoke

Integrate the ServiceNow instance and Amazon Route 53 by using the AWS credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Amazon Route 53 spoke
- Role required: admin

Create a credential record for the Amazon Route 53 spoke

Create a credential record for the Amazon Route 53 custom application. The Amazon Route 53 spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **AWS Credentials**.
4. On the form, fill these values.

AWS Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, Amazon Route 53 Cred.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of your AWS account.
Secret Access Key	Secret Access Key of your AWS account.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **Amazon Route53**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

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Field	Description
Credential alias	Credential alias associated with the spoke. **sn_amzn_rout53_spk.AmazonRoute53**

5. Right-click the form header and click **Submit**.

Amazon S3 Spoke

Integrate ServiceNow with Amazon S3. Manage buckets, objects, tags, and related ACLs in Amazon S3 from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Amazon S3 spoke v1.3.2 is the latest version. For version history of the spoke, see Amazon S3 spoke release notes.

Supported version

This spoke was built for API version 2010-03-31, but may be compatible with later versions.

Supported regions

Currently, the spoke does not support the government or federal government regions.

Spoke requirements

- User with full access to Amazon S3.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For information about creating and accessing keys, see the AWS Security Credentials documentation.

Spoke actions

The Amazon S3 spoke provides actions to automate Amazon S3 tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Bucket Management	Create Bucket	Creates a bucket in Amazon S3.
	Look up Buckets	List Amazon S3 buckets.

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Category	Action	Description
	Look up Bucket Region	Retrieves the AWS region in which an Amazon S3 bucket was created.
Object Management	Copy Object	Copies object from source to destination.
	Delete Object	Deletes specified object from a bucket.
	Look up Objects by Bucket Stream	Lists the objects in the specified Amazon S3 bucket.
	Download S3 Object to ServiceNow Record	Downloads the requested object from Amazon S3 and attaches it to a record in ServiceNow.
	Upload ServiceNow Attachment to S3	Uploads file from the System Attachment Table (sys_attachment) to a specified Amazon S3 bucket.
Permission Management	Create ACL	Create new ACL for a bucket and delete the existing one.
	Look up ACL	Retrieves the ACL details for the requested resource.
Tag Management	Look up Tags	Lists tags of the specified Amazon S3 resource.
	Update Tags	Updates the tags of the specified Amazon S3 resource.

Note: Spoke actions can be used independently without subscribing to notifications from Amazon S3.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon S3 spoke.

MID Server requirements

This spoke can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Amazon S3 alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Amazon S3 spoke

Use Amazon S3 as file storage in place of attachments in ServiceNow. Adds Amazon S3 storage to your ServiceNow instance and enables users to reference Amazon S3 files in ServiceNow records.

Before you begin

- Request an Integration Hub subscription
- Activate the Amazon S3 spoke
- Role required: admin

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Configure a connection for the Amazon S3 spoke

Configure a connection for the Amazon S3 spoke to enable the spoke to connect to the Amazon S3 host. After connecting, the spoke can perform various actions on Amazon S3.

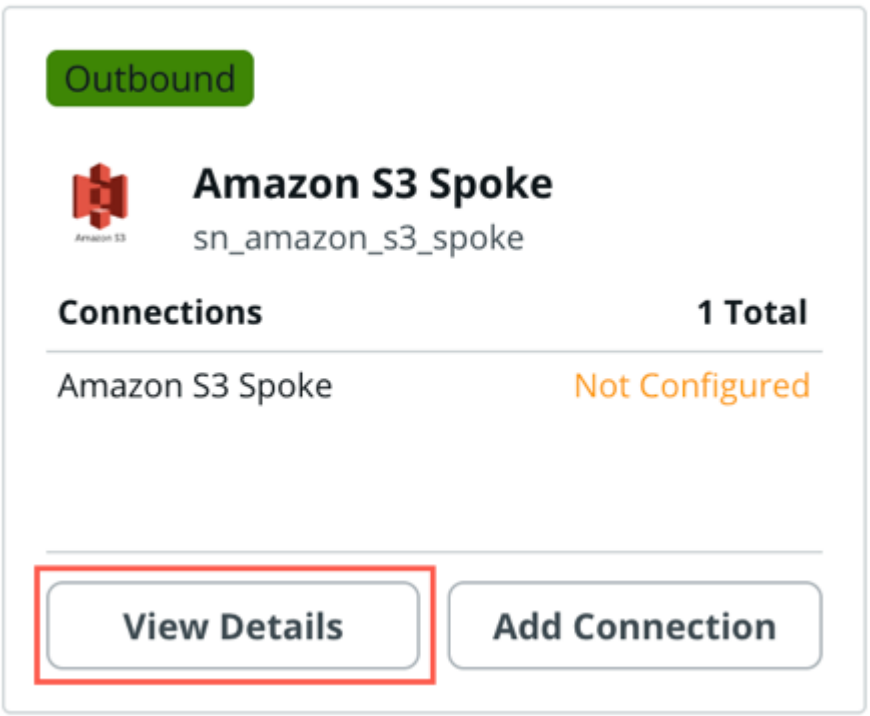
Before you begin

Create the AWS access key ID and the secret access key. For more information, see create secret access key and key ID from AWS CLI.

Role required: admin.

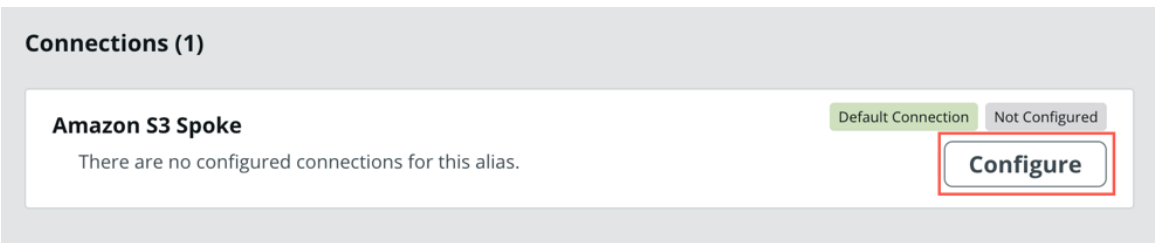
Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Amazon S3 Spoke** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Amazon S3 spoke, click **View Details**.



   - To manage more than one Amazon S3 spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



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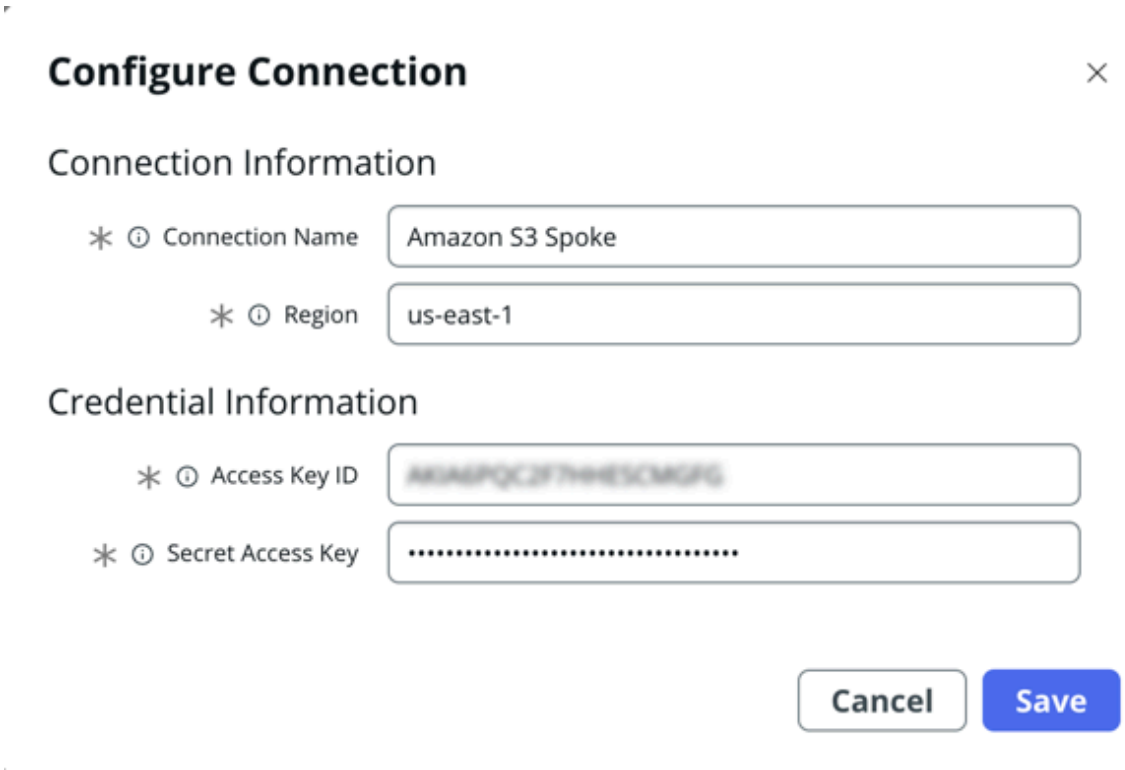
5. On the form, fill in these fields:

Field	Value required
Connection Information	
Name	Auto-generated name to identify the connection record.
Region	AWS region where your data resides.
Credential Information	
Access Key ID	Access Key ID of your AWS account.
Secret Access Key	Secret Access Key of your AWS account.



6. Click **Save**.

Result
The connection record for the Amazon S3 spoke is configured and the spoke actions can be used.

Amazon SNS Spoke

Integrate ServiceNow with Amazon SNS. Manage topics and subscriptions, and delegate roles in Amazon SNS from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Amazon SNS spoke spoke v1.1.4 is the latest version. For version history of the spoke, see Amazon SNS spoke release notes.

Supported version

This spoke was built for API version 2010-03-31, but may be compatible with later versions.

Spoke requirements

- User with full access to Amazon SNS.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For information about creating and accessing keys, see the AWS Security Credentials documentation.

Spoke subflows

The Amazon SNS spoke provides a sample subflow to demonstrate automating Amazon SNS tasks. To customize the sample subflow, copy it to a new application scope. Available sample subflow is, Amazon SNS Subscription. The subflow receives three types of messages; Notification, Subscription Confirmation, and Unsubscribe Confirmation. This subflow is triggered when you configure your ServiceNow instance to receive events from Amazon SNS. For more information about the required configurations, see Receive events at your ServiceNow instance from Amazon SNS.

Note: Spoke subflow can be used independently to subscribe for notifications from Amazon SNS. For more information about the configurations, see Receive events at your ServiceNow instance from Amazon SNS.

Spoke actions

The Amazon SNS spoke provides actions to automate Amazon SNS tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Permission Management	Add Permission	Adds a statement to a topic's access control policy and grants access for the specified AWS accounts for the specified actions.
	Remove Permission	Removes a statement from a topic's access control policy and revokes access for the specified AWS accounts for the specified actions.
Subscription Management	Confirm Subscription	Verifies intent of endpoint owner to receive messages by validating the token sent to the endpoint through an earlier Subscribe action.

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Category	Action	Description
	Create Subscription	Creates a subscription on a topic.
	Delete Subscription	Deletes a subscription on a topic.
	Get Subscription Attributes	Retrieves all properties of a subscription.
	List Subscriptions	Retrieves a list of all subscriptions to a specific region. **Note:** In your flow, use the Get Subscription Attributes action before this action to populate the required records.
	List Subscriptions By Topic	Retrieves a list of the subscriptions to a specific topic. **Note:** In your flow, use the Get Subscription Attributes action before this action to populate the required records.
	Set Subscription Attributes	Enables a subscription owner to set an attribute of the subscription to a new value.
Topics Management	Create Topic	Creates a topic for which notifications can be published.
	Delete Topic	Deletes a topic and all its subscriptions.
	Get Topic Attributes	Retrieves all properties of a topic. Topic properties retrieved may differ based on the authorization of the user.
	List Topics	Retrieves a list of the requester's topics. **Note:** In your flow, use the Get Topic Attributes action before this action to populate the required records.
	Publish Batch Messages to Topic	Sends batch messages to an Amazon SNS topic.
	Publish Message to Topic	Sends a message to an Amazon SNS topic.
	Set Topic Delivery Policy	Enables a topic owner to set a delivery policy of the topic to a new value.
	Set Topic Display Name	Enables a topic owner to set a display name of the topic to a new value.

Note: Spoke actions can be used independently without subscribing to notifications from Amazon SNS.

Spoke module

The Amazon SNS spoke adds an AWS Configurations module to your ServiceNow instance. If you want receive events at your ServiceNow instance from Amazon SNS, you must specify the

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subflow internal name here. For more information about the required configurations, see Receive events at your ServiceNow instance from Amazon SNS.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon SNS spoke.

Set up the Amazon SNS spoke

Integrate the ServiceNow instance and Amazon SNS using AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription
- Activate the Amazon SNS spoke
- Role required: admin

About this task

To receive events at your ServiceNow instance from Amazon SNS, see Receive events at your ServiceNow instance from Amazon SNS. Spoke set up described here enables you to use spoke subflow and actions.

Create Credential record for the Amazon SNS spoke

Create Credential record for your AWS account. The Amazon SNS spoke uses this credential to perform actions on Amazon SNS.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Amazon SNS**.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `SNS Credentials`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of your AWS account.
Secret Access Key	Secret Access Key of your AWS account.
Credential alias	Associated credential record.

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Field	Value required
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **SNS Algorithm**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

6. Click **Submit**.

Result
The credential record for the Amazon SNS spoke is created.

Receive events at your ServiceNow instance from Amazon SNS

Receive events (Notification, Subscription Confirmation, and Unsubscribe Confirmation) from Amazon SNS at your ServiceNow instance.

Before you begin
- Request an Integration Hub subscription
- Activate the Amazon SNS spoke
- Role required: admin

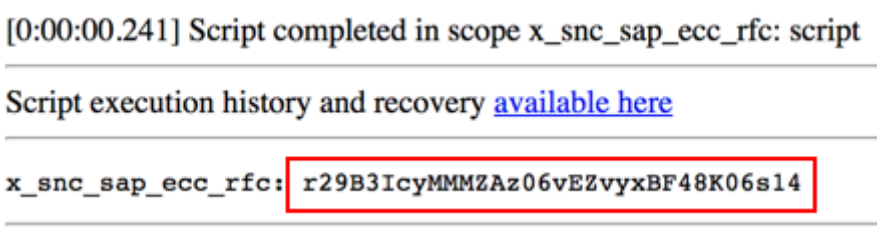
About this task
You can receive events at your ServiceNow instance from Amazon SNS even without setting up the Amazon SNS spoke. To set up the Amazon SNS spoke and use the spoke actions, see Set up the Amazon SNS spoke.

Create secret for the Amazon SNS spoke

Create a client secret to authorize requests from Amazon SNS.

Before you begin
Role required: admin.

Procedure
1. Navigate to **All** > **System Definition** > **Scripts - Background**.
2. Enter this command in the **Run script (JavaScript executed on server)** text field:
   `gs.info(GlideSecureRandomUtil.getSecureRandomString(32));`
3. Click **Run Script**.
4. Copy and record the generated value for later use.



Create a record in AWS Configurations

Create a record in AWS Configurations to authorise requests from Amazon SNS spoke.

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Before you begin
Role required: admin.

Procedure
1. Navigate to **All** > **AWS Configuration** > **All Configurations**.
2. Click **New**.
3. On the form, fill in the fields.

AWS Configurations form

Field	Description
Property Value	Internal name of the Amazon SNS Subscription subflow. For example, `amazon_sns_subscription`. **Note:** The Amazon SNS Subscription subflow is a sample subflow. You must create a copy of this subflow and use it to customize event management as per your requirement. In this case, specify the internal name of the customized subflow.
Property Name	Name to identify the record.
Client Secret	Client Secret generated by the script. For information about generating Client Secret see, Create secret for the Amazon SNS spoke.

4. Right-click the form header and click **Save**.
5. Right-click the form header and click **Copy sys_id**. Record this value for later use.

Record the Base API path of the Amazon SNS spoke

Record the Base API path of the Amazon SNS spoke to authorise requests from Amazon SNS.

Before you begin
Role required: admin.

Procedure
1. Navigate to **All** > **System Web Services** > **Scripted Web Services** > **Scripted REST APIs**.
2. Open the record for **Amazon SNS**.
3. Copy and record the value of **Base API path** for later use.

Create topic

Use the Create Topic spoke action to create a topic in Amazon SNS for your ServiceNow instance.

Before you begin
Role required: admin.

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Procedure

1. In Workflow Studio, create a flow and include the Create Topic spoke action.
   For information about creating flows in Workflow Studio, see Building flows.
2. Customize flow to provide these values as inputs to the Create Topic spoke action:

Field	Description
Region	AWS geographic area where the infrastructure is housed.
Topic Name	Name to identify the topic.

3. Test the flow and check the **Executions** tab to ensure that flow is executed as expected.

Create subscription

Use the Create Subscription spoke action to create subscription in Amazon SNS for your ServiceNow instance.

Before you begin

Role required: admin.

Procedure

1. In Workflow Studio, create a flow and include the Create Subscription spoke action.
   For information about creating flows in Workflow Studio, see Building flows.
2. Customize flow to provide these values as inputs to the Create Subscription spoke action:

Field	Description
Region	AWS geographic area where the infrastructure is housed.
Topic ARN	ARN to uniquely identify the required topic. Subscriptions are created for this topic.
Protocol	**HTTPS**
Endpoint	Endpoint URL in this format: `https://<servicenow-instance>.service-now.com/<base-api-path>/<aws-configuration-sys_id>/<client-secret>`. **Note:** For information about obtaining the required values, see Record the Base API path of the Amazon SNS spoke, Create a record in AWS Configurations, and Create secret for the Amazon SNS spoke.

3. Test the flow.
   The flow internally triggers the default Amazon SNS Subscription subflow.
4. In the **Executions** tab, open the record associated with the subflow execution.

   Note: Ensure that you check the execution details of the default Amazon SNS Subscription subflow, not the flow you had created.

5. In the Execution Details page, click **RUNTIME VALUE**.
6. Copy and record the value of Token for later use.

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This confirmation token is needed to Confirm subscription.



Note: Ensure that you use the confirmation token to Confirm subscription within its validity period.

Result
Subscription for the required topic in Amazon SNS for your ServiceNow instance is created.

Confirm subscription

Use the Confirm Subscription spoke action to confirm subscription in Amazon SNS for your ServiceNow instance.

Before you begin
Role required: admin.

Procedure

1. In Workflow Studio, create a copy of the default Amazon SNS Subscription subflow. For information about using subflows in Workflow Studio, see Building subflows.
2. In Workflow Studio, create a flow that includes the copy of the default subflow. For information about creating flows in Workflow Studio, see Building flows.
3. Customize the subflow to include the Confirm Subscription spoke action.
4. Customize subflow to provide these values as inputs to the Confirm Subscription spoke action:

Field	Description
Region	AWS geographic area where the infrastructure is housed.
Topic ARN	ARN to uniquely identify the required topic. Subscriptions are created for this topic.
Token	Confirmation token generated after creating subscription. See Create subscription, for more information. **Note:** Ensure that you use the confirmation token to confirm subscription within its validity period.

5. Test the flow and check the **Executions** tab to ensure that flow is executed as expected.

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Result
The Amazon SNS subscription for your ServiceNow instance is confirmed.

Customize event management

Customize the management of events (Notification, Subscription Confirmation, and Unsubscribe Confirmation) you receive for your ServiceNow instance from Amazon SNS.

Before you begin
Role required: admin.

Procedure

1. In Workflow Studio, create a copy of the default subflow, Amazon SNS Subscription and customize the subflow as per your requirement.
   For more information about creating subflows, see Building subflows.
2. Copy and record the internal name of the customized subflow.
3. Navigate to **AWS Configuration** > **All Configurations**.
4. Open the record you had created to receive events.
   In this record, the internal name of the default Amazon SNS Subscription subflow is specified in **Property Value**.
5. Update this record by replacing the internal name of default subflow with the internal name of the customized subflow in **Property Value**.

   Note: Use the same **Client Secret**.

Result
The event management is customized as per your requirement.

Amazon SQS Spoke

Amazon SQS spoke automates various actions on the Amazon SQS based on a trigger in your ServiceNow instance. Set up a flow in the Workflow Studio using the actions and automate tasks on Amazon SQS. For example, you can set up a flow that automates sending messages to a queue.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription
This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Amazon SQS spoke v1.0.1

is the latest version. For version history of the spoke, see Amazon SQS Spoke release notes.

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow Integration Hub Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke actions

The Amazon SQS provides actions to automate tasks on the simple queue services when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Message Management	Change Visibility for Message	Changes the visibility of a message from a queue. You specify inputs such as the queue URL and the visibility timeout and the action returns the status of the execution.
	Change Visibility for Messages	Changes the visibility of up to 10 messages from a queue. You provide inputs such as the queue URL and the request that comprises the messages' list and the action returns the list of messages and the status of the action.
	Delete Message	Deletes a message from a queue. You provide the queue URL and the receipt handle and the action returns the status of the execution.
	Delete Messages	Deletes up to 10 messages from a queue. You provide the queue URL and the receipt handle and the action returns the status of the execution.
	Receive Message	Retrieves up to 10 messages from a queue. You provide the queue URL and the number of messages as inputs and the action returns the list of messages and the status of the execution.
	Send Message	Delivers a message to a queue. You provide inputs such as the queue URL and the message and the action returns outputs such as sequence number and message ID.
	Send Messages	Sends up to 10 messages to a queue. You provide inputs such as the queue URL and the message and the action returns outputs such as sequence number and message ID. **Note:** You can send messages with size up to 256 KB.
Permission Management	Add Permission	Adds a permission to a queue for a principal. You provide inputs such as the queue URL and the permission label and the action returns the status of the execution.

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Category	Action	Description
	Remove Permission	Revokes permissions in the queue policy that matches a label. You provide inputs such as the queue URL and the permission label and the action returns the status of the execution.
Queue Management	Create FIFO Queue	Creates a FIFO queue. You can provide inputs such as region and queue name and the action returns the new queue URL and the status of the execution.
	Create Standard Queue	Creates a standard queue. You can specify inputs such as region and the queue name and the action returns the queue name and the status of the execution.
	Delete Queue	Deletes a queue. You can provide the queue URL and the action returns the estatus of the execution.
	Look up Queue Attributes	Retrieves the attributes of a queue. You can specify the queue URL and the action returns the queue attributes.
	Look up Queue URL	Retrieves the URL of the specified queue. You can specify inputs such as the region and queue name and the action returns the queue URL.
	Look up Queues Stream	Retrieves a list of queues in a region. You provide inputs such as region and page size and the action returns the details.
	Purge Queue	Deletes the messages in a queue. You specify the queue URL and the action returns the execution status code.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

To learn to set up the spoke, see Set up Amazon SQS spoke.

Set up Amazon SQS spoke

Set up outbound integration between your ServiceNow instance and Amazon SQS (Simple Queue Service). The integration enables automation of actions in Amazon SQS when an event occurs on your ServiceNow instance. For example, you can automate actions such as creating a standard queue or sending a message to a queue.

Before you begin

- Request an Integration Hub subscription.
- Activate the Amazon SQS spoke.
- Ensure that you have access to the Amazon Web Services (AWS) account to create access keys and secure access keys.
- Role required: admin

Set up credential record for Amazon SQS

Create a credential record on your ServiceNow instance for accessing the Amazon AWS.

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Before you begin

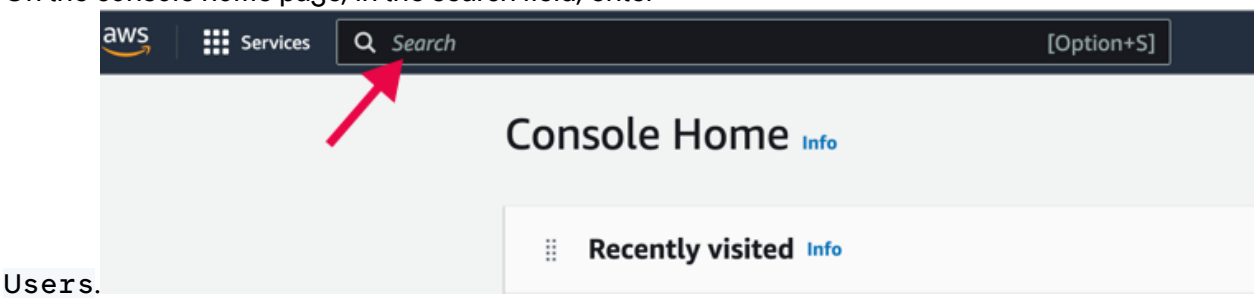
- Request an Integration Hub subscription.
- Activate the Amazon SQS spoke plugin.
- Ensure that you have access to the Amazon Web Services(AWS) account to create access keys and secure access keys.
- Role required: admin

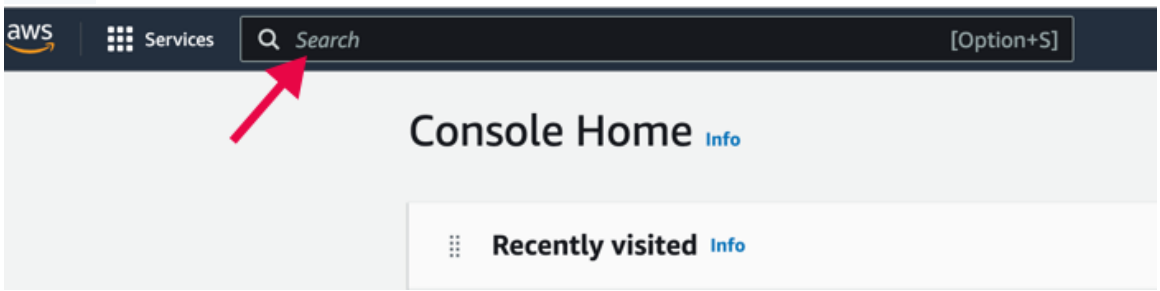
Procedure

1. Create an access key and a secure access key in the Amazon AWS.

   a. Log in to Amazon Web Services.

   b. On the console home page, in the search field, enter `Users`.





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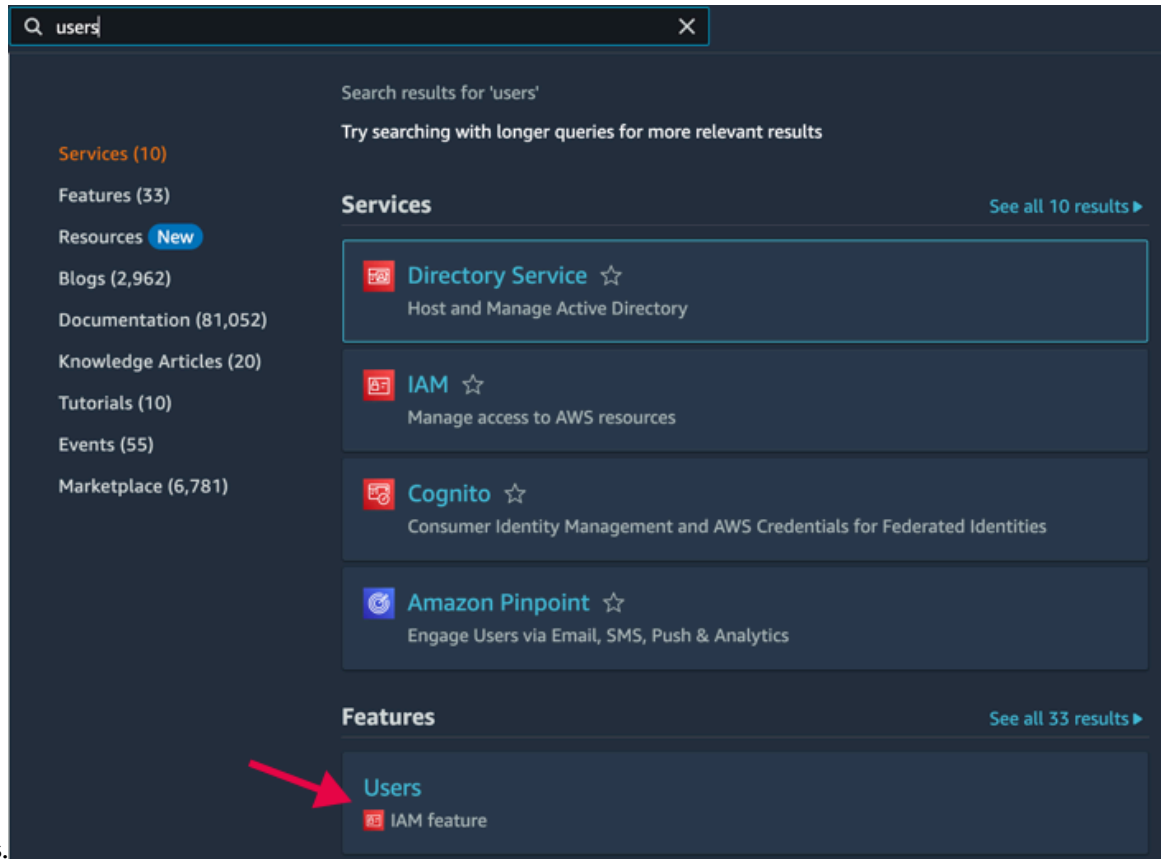
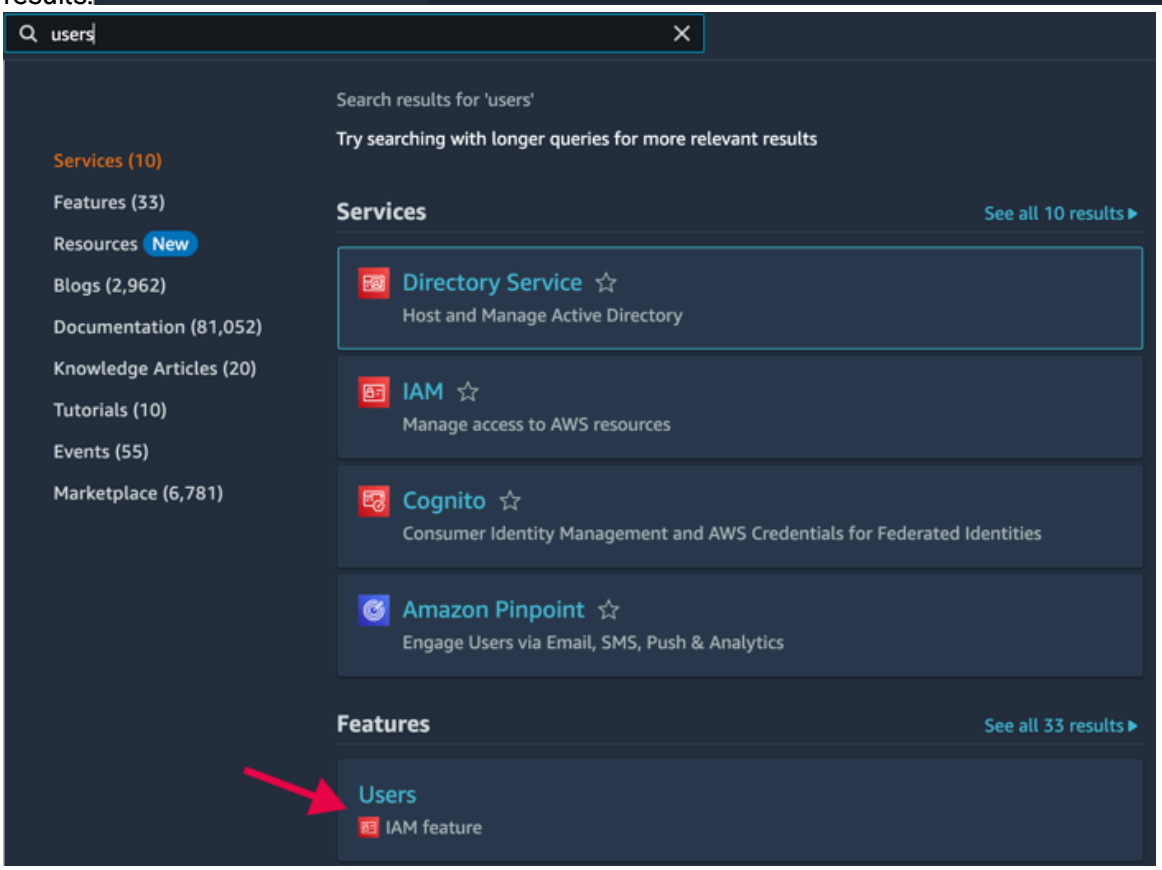
c. Select Users from the search results.





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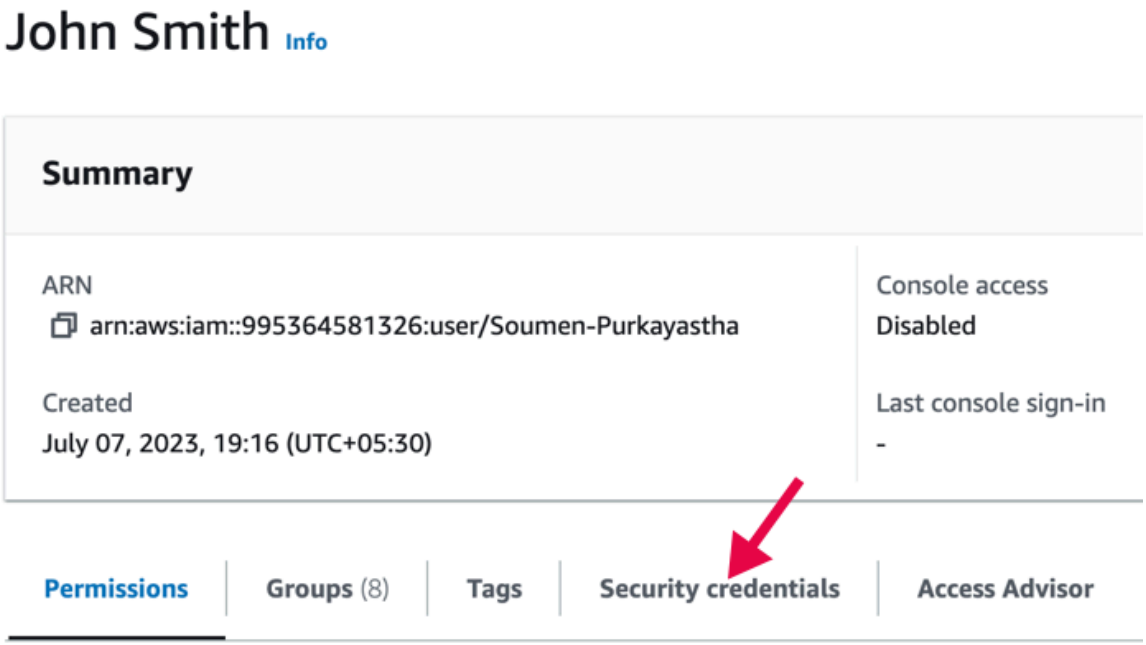
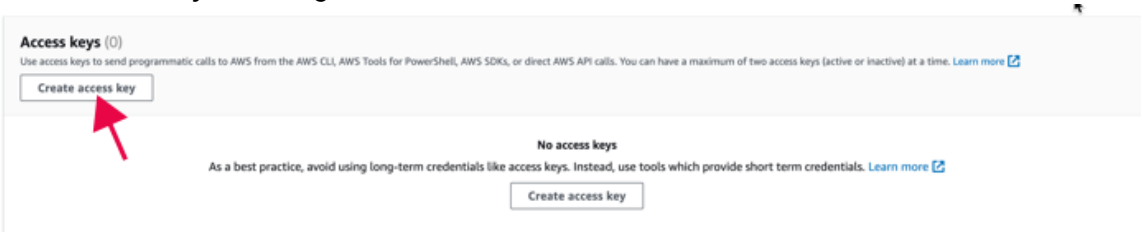
d. In the Users field, enter the user name under which you want to create the access and secret access keys or select a user name under the User name column.

e. Select the Security credentials tab.



f. Under the Access keys heading, select **Create access key**.



g. Under the Access key best practices & alternatives heading, select Other.

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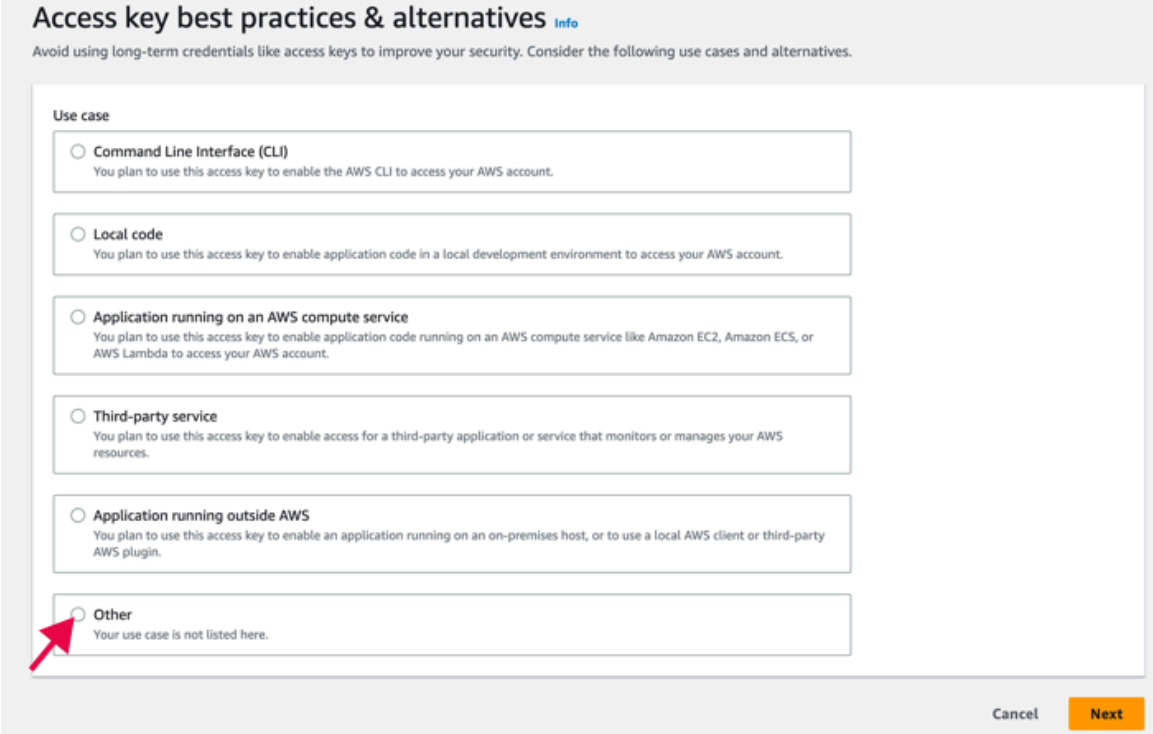
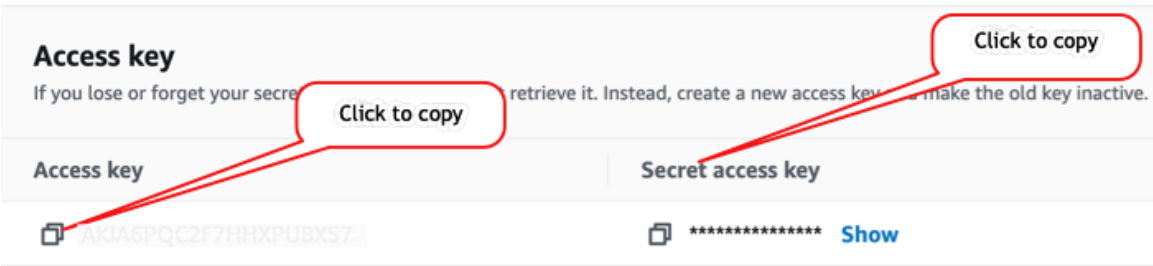


h. Select **Next**.

i. **Optional:** In the Description tag value field, enter a custom tag that describes the access key.

j. Select **Create access key**.

k. Copy the access key and the secret access key, and store at a secure place.
The credential record you set up on your ServiceNow instance requires the access and secret access keys.



l. To view the secret access key, select **Show**.

m. Select **Done**.

2. Create the credential record.

a. Log in to your ServiceNow instance.

b. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.

c. Select the Amazon SQS connection and credential alias.

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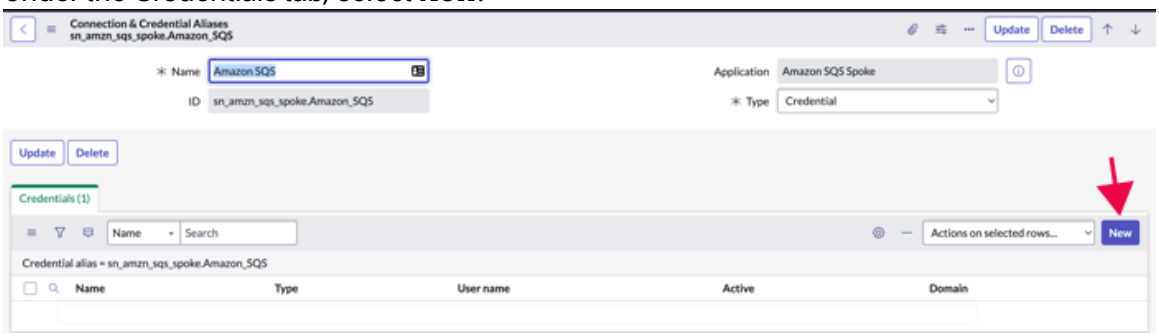
The alias becomes available as a base system component when you install the Amazon SQS spoke plugin.

d. Under the Credentials tab, select **New**.



e. Under the heading What type of Credentials would you like to create?, select AWS Credentials.

f. Fill the form.

AWS credentials

Field	Description
Name	Custom name of the credential record.
Active	If the field is selected, you can use this record to access the Amazon SQS.
Access Key ID	Enter the access key you had generated on Amazon AWS.
Secret Access Key	Enter the secret access key you had generated on Amazon AWS.
Authentication Algorithm	Algorithm used to authenticate credential record. To select the algorithm, select and from the list, select Amazon SQS.

g. Select **Submit**.

Amazon VPC Spoke

Provision a logically isolated section of the AWS cloud using Amazon VPC and launch the required AWS resources in a virtual network, from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Amazon VPC spoke v1.0.3 is the latest version. For version history of the spoke, see Amazon VPC spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported version

This spoke was built for API version 2016-11-15, but may be compatible with later versions.

Note: If you use different API version, ensure that you change the API version in all spoke actions.

Spoke requirements

- User with full access to Amazon VPC.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

Spoke subflows

The Amazon VPC spoke provides sample subflows to demonstrate automating Amazon VPC tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Delete Subnet	Deletes the specified subnet. Before you delete the subnet, you must terminate all the running instances in the subnet.
Delete VPC	Deletes the specified VPC. Before you delete the VPC, you must terminate all the associated instances.

Spoke actions

The Amazon VPC spoke provides actions to automate Amazon VPC tasks when events occur in ServiceNow. Available actions include:

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Category	Action	Description
Network & Security Group Management	Add Egress Rules To A Security Group	Adds the specified egress rules to a security group.
	Add Ingress Rules To A Security Group	Adds the specified ingress rules to a security group.
	Create Security Group	Creates a security group.
	Delete Egress Rules From Security Group	Removes the specified egress rules from security group. Values must match the existing rule's values exactly.
	Delete Ingress Rules From Security Group	Adds the specified ingress rules to a security group.
	Delete Security Group	Deletes a security group.
	List Security Groups	Lists the specified security groups or all of your security groups.
	Lookup Security Group	Retrieves the specified security group.
Virtual Private Cloud Management	Create Subnet	Creates a subnet in an existing VPC.
	Create VPC	Creates a VPC with the specified IPv4 CIDR block and can optionally request an IPv6 CIDR block for the VPC.
	Delete NAT Gateway	Deletes the specified NAT gateway. Deleting a NAT gateway disassociates its Elastic IP address, but does not release it.
	Delete Route Table	Deletes the specified route table. You must disassociate the route table from any subnets before you can delete it.
	Delete Subnet	Deletes the specified subnet. You must terminate all running instances in the subnet before you can delete the subnet.
	Delete VPC	Deletes the specified VPC. You must detach or delete all gateways and resources that are associated with the VPC before you can delete it or use Delete VPC subflow.
	Delete VPC Peering Connection	Deletes a VPC peering connection. Either the owner of the requester VPC or the owner of the accepter VPC can delete the VPC peering connection if it's in the active state.
	Detach Internet Gateway	Detaches an internet gateway from a VPC, disabling connectivity between the internet and the VPC.

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Category	Action	Description
	Detach Route Table	Disassociates a subnet from a route table.
	List Internet Gateways	Retrieves the details of the required internet gateways.
	List NAT Gateways	Retrieves the details of the required NAT gateways.
	List Route Tables	Retrieves the details of the required route tables.
	List Subnets	Retrieves the details of the required subnets in an existing VPC.
	List VPC Peering Connections	Retrieves the details of the required VPC peering connections.
Virtual Private Network Management	Detach VPN Gateway	Detaches a virtual private gateway from a VPC.
	List VPN Gateways	Retrieves the details of the required virtual private gateways.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Amazon VPC spoke.

Set up the Amazon VPC spoke

Integrate the ServiceNow instance and Amazon VPC using AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Amazon VPC spoke.
- Role required: admin.

Create Credential record for the Amazon VPC spoke

Create Credential record for your Amazon VPC account. The Amazon VPC spoke connection and credential alias uses this credential to perform actions on Amazon VPC.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Amazon VPC**.
3. From the **Credentials** tab, click **New**.

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The system displays the message `What type of Credentials would you like to create?`.

4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `VPC Credentials`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to Amazon VPC.
Secret Access Key	Secret Access Key of the user with full access to Amazon VPC.
Credential alias	Associated credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AmazonVPCAuthAlgo**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

6. Click **Submit**.

Result
The credential record the Amazon VPC spoke is created.

Ansible Spoke

Integrate your ServiceNow instance with Ansible Tower. Automate Ansible Tower tasks when events occur in ServiceNow.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

IntegrationHub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Ansible spoke v2.4.0 is the latest version. For version history of the spoke, see Ansible spoke release notes.

Note: Ansible spoke supports MID Server from v2.4.0 onwards. If you are using a previous version of the spoke and want to use MID Server, upgrade to the latest version of Ansible spoke, delete the existing connection and credential record, and create a new connection and credential record using authentication template. For more information, see Set up the Ansible spoke.

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Supported version

This spoke was built for Ansible Tower v2, but may be compatible with later versions.

Spoke requirements

- Ansible Tower
- If you are using custom OAuth application:
  - Ansible Tower administrator credentials to create a custom application
  - Application information such as Client ID and Client Secret
- If you are using basic authentication, credentials of the user with System Administrator role to log in to Ansible Tower.

Spoke actions

The Ansible spoke provides actions to automate Ansible Tower tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Adhoc Command Management	Look up Status From Ad-Hoc Command by ID	Retrieves the run status from the ad-hoc command.
	Run An Ad-Hoc Command	Runs an ad-hoc command on the target devices.
Credential Management	Look up Credential Details Stream	Retrieves the list of credentials from the Ansible Tower environment.
	Look up Credentials Details by ID	Retrieves details of the required credential in the Ansible Tower environment.
Credential Type Management	Look up Credential Type Details by ID	Retrieves details of the required credential type in the Ansible Tower environment.
	Look up Credential Type Details Stream	Retrieves the list of credentials in the Ansible Tower environment.
Inventory Management	Look up Hosts From Inventory by ID	Lists hosts from the inventory in Ansible Tower environment.
	Look up Instance Groups From Inventory by ID	Lists instance groups from inventory.
	Look up Inventory Details by ID	Retrieves details of the required inventory from Ansible Tower.
	Look up Inventory Details Stream	Retrieves inventory details from Ansible Tower.
Inventory Script Management	Look up Inventory Script Details Stream	Retrieves the list of inventory scripts from Ansible Tower.

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Category	Action	Description
	Look up Inventory Scripts Details by ID	Retrieves details of the required inventory script from Ansible Tower.
Inventory Source Management	Look up Inventory Source Details by ID	Retrieves details of the required inventory source from Ansible Tower.
	Look up Inventory Source Details Stream	Retrieves inventory source details stream from Ansible Tower.
Job Management	Cancel Job	Cancels the required job in the Ansible Tower environment.
	Look up Job Details by ID	Retrieves details of the specific job in the Ansible Tower environment.
	Look up Job Details Stream	Retrieves the list of job details.
	Look up Jobs Stream	Retrieves the list of jobs.
	Relaunch Job	Relaunches job in the Ansible Tower environment.
	Schedule Job	Schedules a job.
Metadata Retrieval	Get Credentials	Retrieves credentials in the Ansible Tower environment.
	Get Inventories	Retrieves inventories in the Ansible Tower environment.
	Get Projects	Retrieves projects in the Ansible Tower environment.
	Get Additional Input Fields	Retrieves list of fields that can be used as a dynamic template or dynamic object.
	Get Entity Data	Retrieves data from the required entity.
Organization Management	Look up Organization Details by ID	Retrieves details of the required organization from Ansible Tower.
	Look up Organization Stream	Retrieves details of organizations from Ansible Tower.
Project Management	Look up Project Details by ID	Retrieves details of the required project from Ansible Tower.
	Look up Projects Stream	Retrieves details of projects from Ansible Tower.
Record Management	Create Record	Creates a record in the Ansible Tower environment.

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Category	Action	Description
	Delete Record	Deletes the required record in the Ansible Tower environment.
	Update Record	Updates details of the required record in the Ansible Tower environment.
Role Management	Look up Role Details by ID	Retrieves details of the required role in Ansible Tower environment.
	Look up Roles Stream	Retrieves details of the roles in the Ansible Tower environment.
	Look up Teams by Role Stream	Retrieves details of the teams associated with the required role.
	Look up Users by Role Stream	Retrieves details of the users with the required role.
Team Management	Look up Team Details by ID	Retrieves details of the required team.
	Look up Teams Stream	Retrieves details of the teams in the Ansible Tower environment.
Template Management	Create Job Template	Creates a job template.
	Launch Job Template	Launches a job template.
	Look up Job Templates Stream	Retrieves the list of job templates.
User Management	Associate User to Organization	Associates or disassociates the required user to an organization.
	Associate User to Team	Associates or disassociates the required user to a team.
	Create User	Creates a user in the Ansible Tower environment.
	Delete User	Deletes user in the Ansible Tower environment.
	Look up User Details by ID	Retrieves details of the required user from Ansible Tower.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

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For information about setting up the spoke, see Set up the Ansible spoke.

MID Server requirements

This spoke can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Ansible alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Ansible spoke

Integrate your ServiceNow instance and Ansible Tower to automate Ansible spoke actions. For example, you can create a flow that retrieves a list of credentials from the Ansible Tower environment.

Before you begin

- Request an Integration Hub subscription.
- Activate the Ansible spoke.
- Role required: admin.

Note: Ansible spoke supports MID Server from v2.4.0 onwards. If you are using a previous version of the spoke and want to use MID Server, upgrade to the latest version of Ansible spoke and delete the existing connection and credential record.

To delete the existing connection and credential record:

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Search and open the default connection and credential record for the Ansible spoke. For example, **AnsibleTowerAlias**.
3. Under the **Connections** tab, open the default HTTP(s) Connection record. For example, **Ansible Spoke Connection**.
4. Click **Delete**. System prompts you confirm delete action.
5. Click **Delete**.
6. Navigate to **All** > **Connections & Credentials** > **Credentials**.
7. Search and open the default credential record for the Ansible spoke. For example, **Ansible credential**.
8. Click **Delete**. System prompts you confirm delete action.
9. Click **Delete**.

Create an OAuth application in the Ansible Tower

Create an OAuth application on the Ansible Tower to have the connection requests from your ServiceNow instance authenticated by the OAuth application.

Before you begin

Role required: admin
Ensure that you have the administrator's access to the Ansible Tower instance.

Procedure

1. Log in to the Ansible Tower application instance.
2. On the left panel, under Administration, select Applications.

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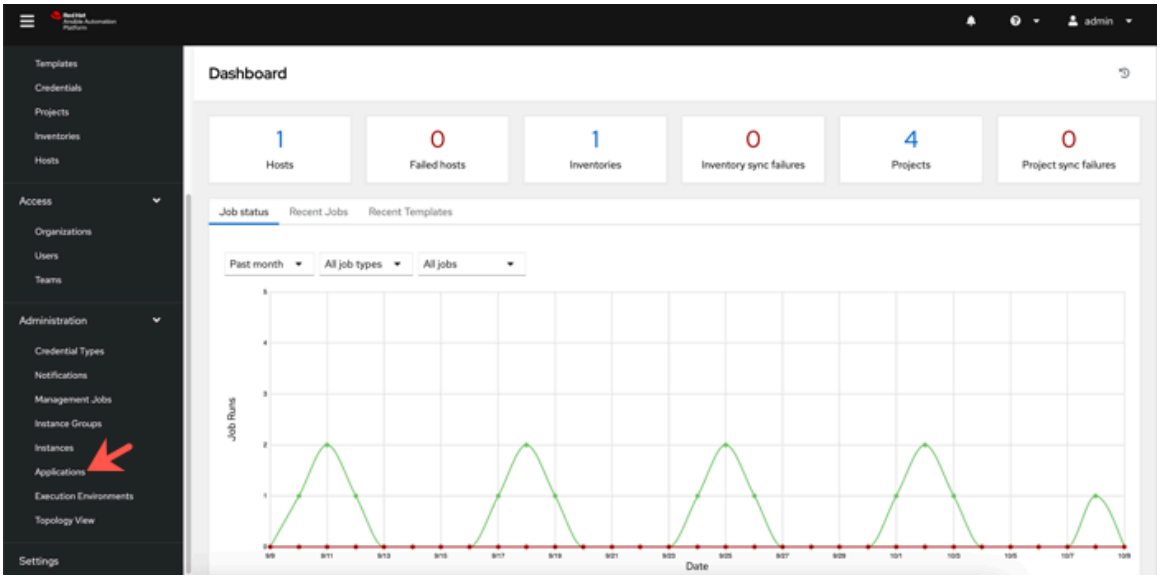
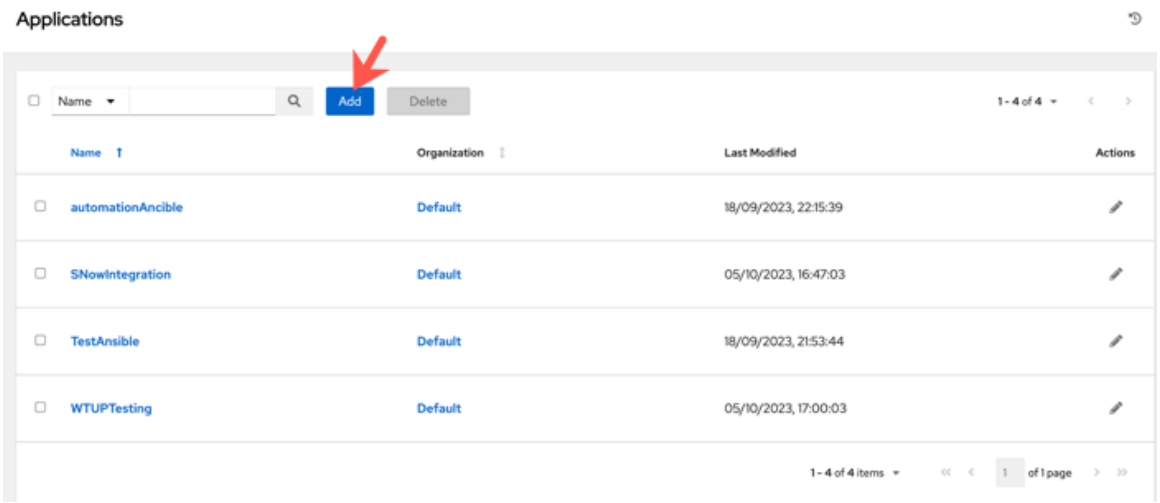


3. On the Applications page, select **Add**.



4. Fill the form.

Create a New Application

Field	Description
Name	Unique name of the OAuth application.
Description	Description of the application. This field is optional.
Organization	Organization the OAuth application is associated with.
Authorization grant type	The basis of the OAuth application granting access to the client. The basis could be an authorization code given to the client or a resource-owner password.
Redirect URIs	Redirect the URI to the client after access is granted. Enter the redirect URI in the format `https://<ServiceNow-Instance-Name>.service-now.com/oauth_redirect.do`.

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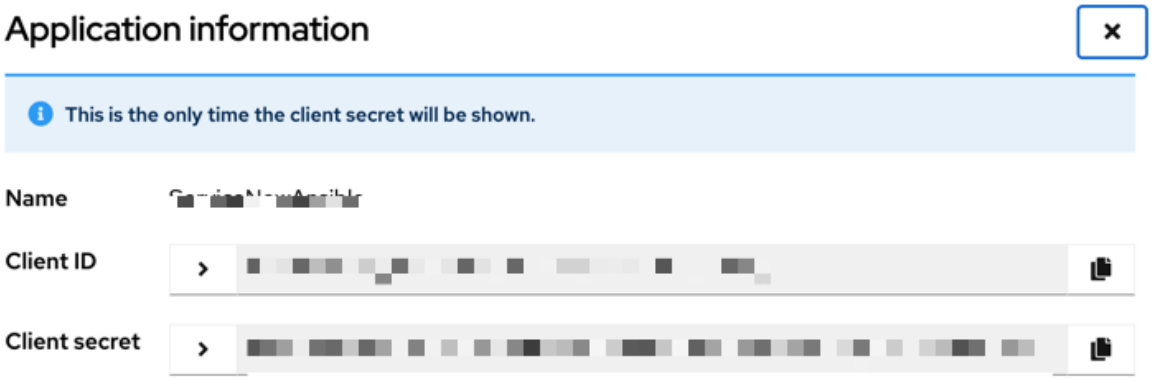
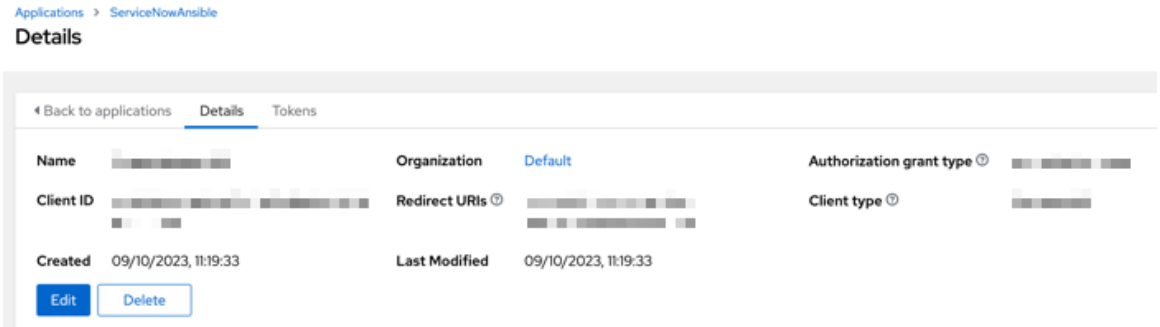
Field	Description
Client type	Type of client that requests authentication from the OAuth application.

5. Select **Save**.
6. Copy the Client ID and Client Secret and store them at a secure place.



You've created the OAuth application.



Set up the Ansible spoke connection record

Create the connection record that contains the information that enables your ServiceNow instance to send an authentication request to the Ansible Tower instance and get an OAuth token.

Before you begin

Role required: admin

Ensure you have set up an OAuth application on the Ansible Tower instance.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **AnsibleTowerAlias** and click **View Details**.

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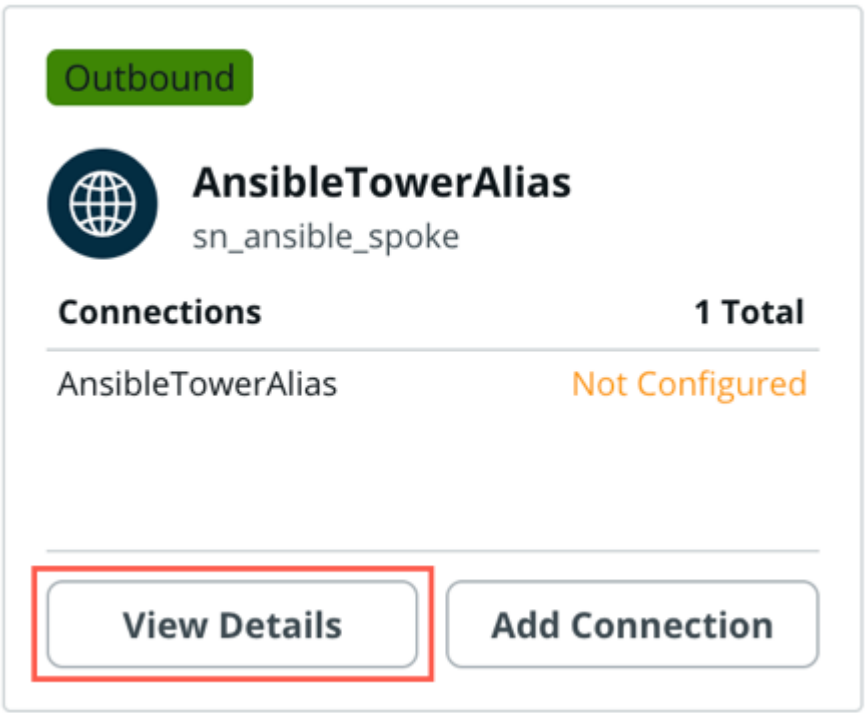
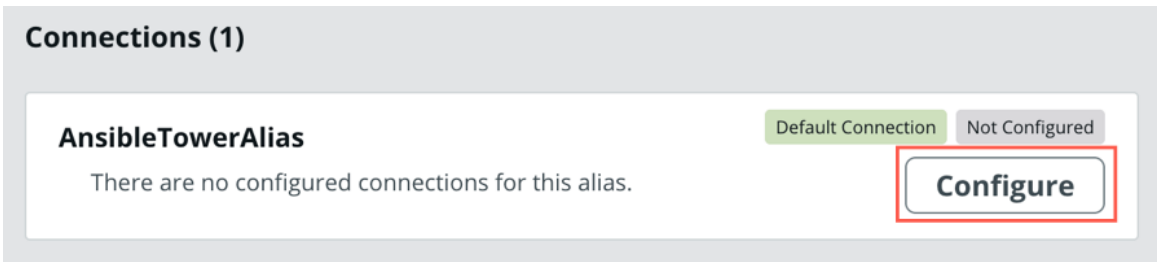
- To configure the default connection and credential alias record that is shipped along with the Ansible spoke, click **View Details**.



- To manage more than one Ansible spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the form, fill in these fields:

Configure Connection

Field	Description
Connection Name	Name of the connection established with the Ansible Tower instance.
Connection URL	The URL your ServiceNow instance uses to connect to the Ansible Tower instance.
Credential Name	Name to identify the credential record.
Application Registry Name	Name to identify the application registry record.

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Field	Description
OAuth Client ID	The client ID that you had generated while you set up the OAuth application.
OAuth Client Secret	The client secret that you had generated while you set up the OAuth application.
Oauth Entity Profile Name	Name to identify the OAuth application.
Authorization URL	The URL that the client uses to request access to the Ansible Tower instance. The URL format is `https://<ansible-tower-instancename>.com/api/o/authorize`.
Token URL	The URL that the client uses to request a token to access the Ansible Tower instance. The URL format is `https://<ansible-tower-instance-name>.com/api/o/token`.
OAuth Redirect URL	The redirect URL that the OAuth application uses to redirect to your ServiceNow instance. The URL must be in the format `https://<ServiceNow-Instance-Name>.service-now.com/oauth_redirect.do`.

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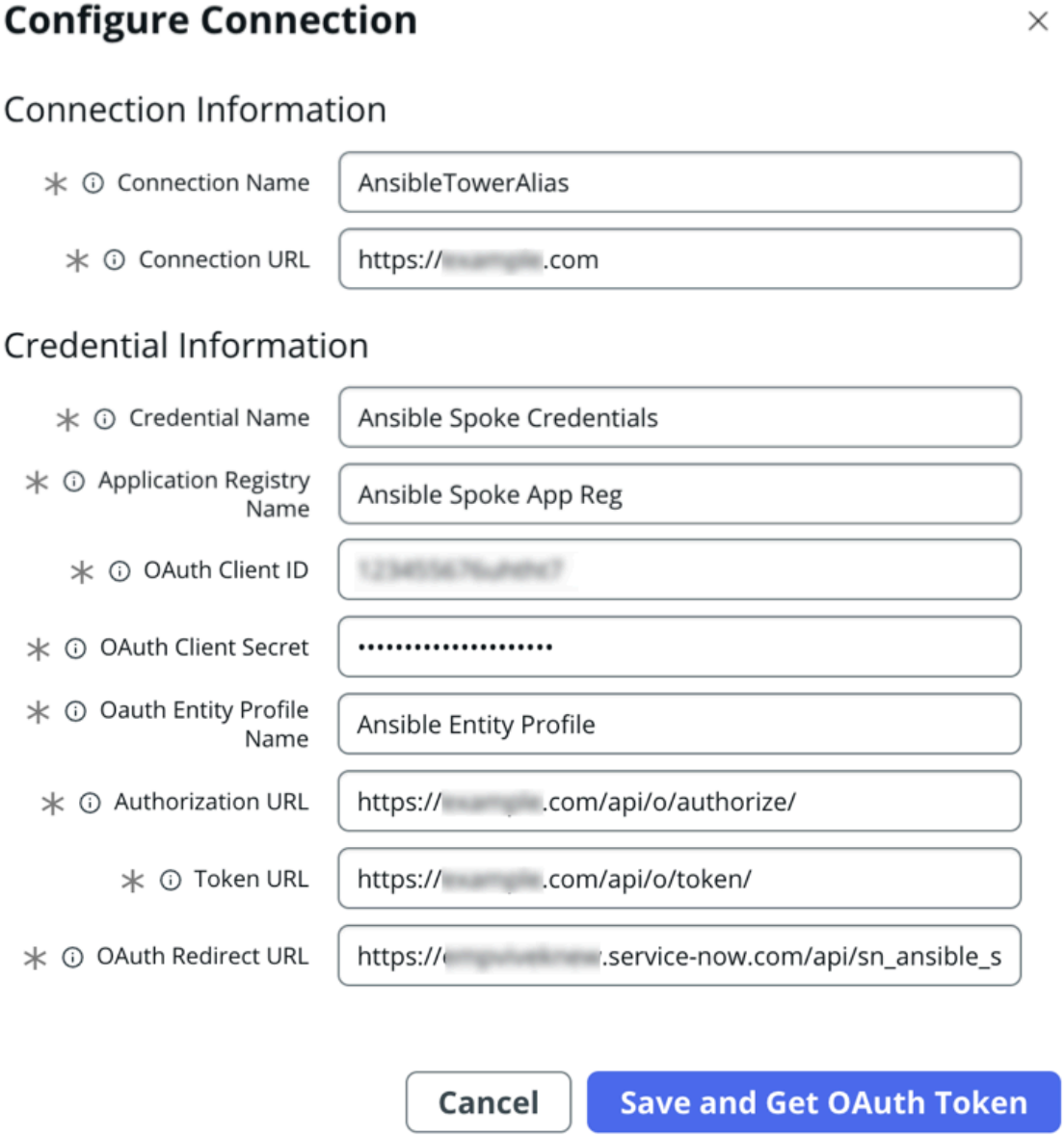

6. Click **Save and Get OAuth Token**.
   The OAuth application authenticates the connection request and provides a temporary token to access the Ansible Tower instance.

Asana Spoke

The Asana spoke provides actions to view and analyze meaningful usage data for Asana software subscriptions based on stories created by the user. Use this data to determine which licenses are stale so that you can reclaim these licenses and realize potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Asana spoke v1.0.2 is the latest version. For version history of the spoke, see Asana Spoke release notes.

Spoke requirements

Asana account with an Admin role.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream Inputs (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses if used outside the spoke implementation.

Spoke actions

The Asana spoke provides actions to automate Asana tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Workspace Management	Look up Workspaces	Retrieves details of all workspaces.
	Get Workspaces (metadata)	Retrieves the list of the workspaces for the user. This action is used to create dynamic choices for the input **Workspace** in other spoke actions.
Task Management	Look up Workspaces Tasks	Retrieves list of all workspace tasks.
	Look up Stories Stream	Retrieves details of the stories.
User Management	Look up Users Stream	Retrieves details of all users.
	Remove User from Workspace	Removes a user from a workspace.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Set up the Asana spoke

Configure the Asana spoke to integrate your ServiceNow instance with the Asana instance. The integration enables you to set up a flow and, when a trigger occurs, automate actions on the Asana instance. For example, set a trigger that triggers a flow every day at 13:00 to get the meta data about a workspace.

Before you begin

- Request an Integration Hub subscription.
- Activate the Asana spoke.
- Access to the Asana developer's console.
- Role required: admin

Set up an OAuth application

Set up an OAuth application on the Asana developer's console to generate the client ID and secret that you use to set up the Asana spoke connection record later.

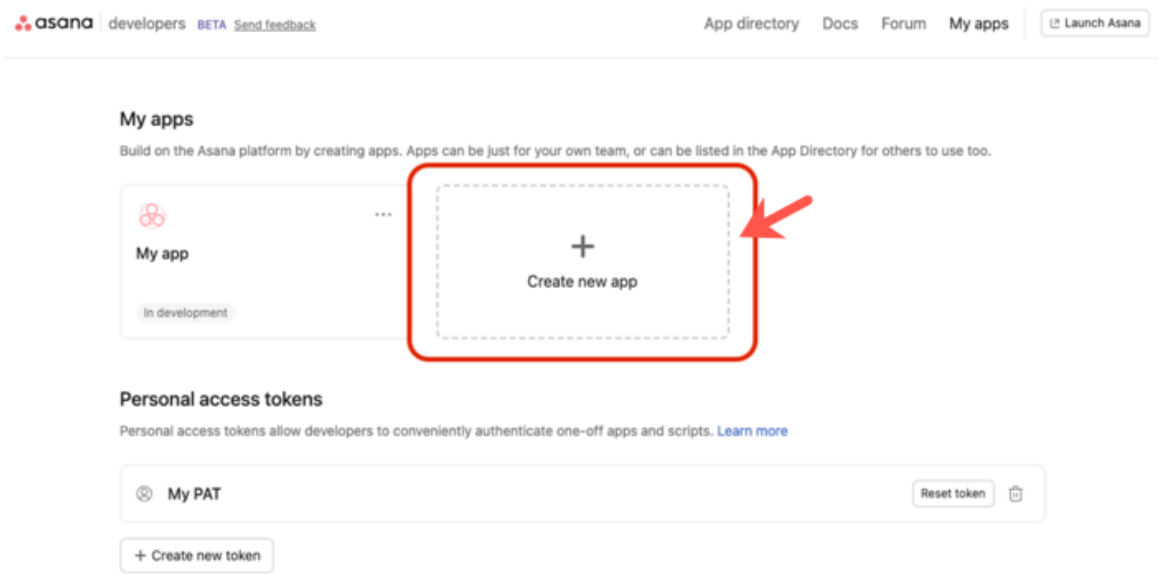
Before you begin

Role required: admin

Access to the Asana developer's console.

Procedure

1. Log in to the Asana developer's console.
2. Under My apps, select **Create new app**.



3. Enter a name of the app.

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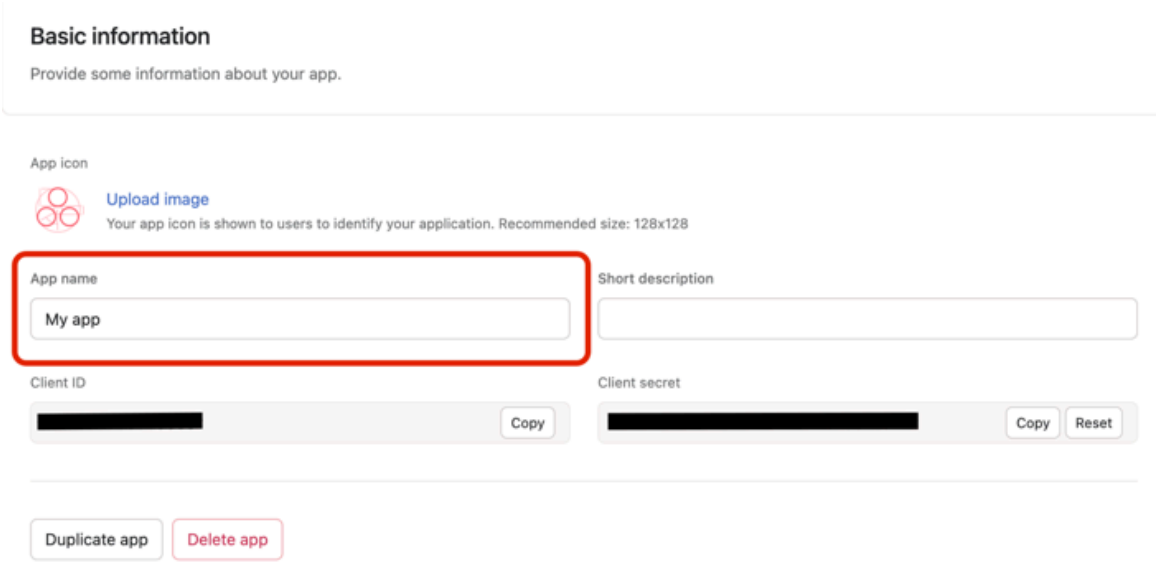
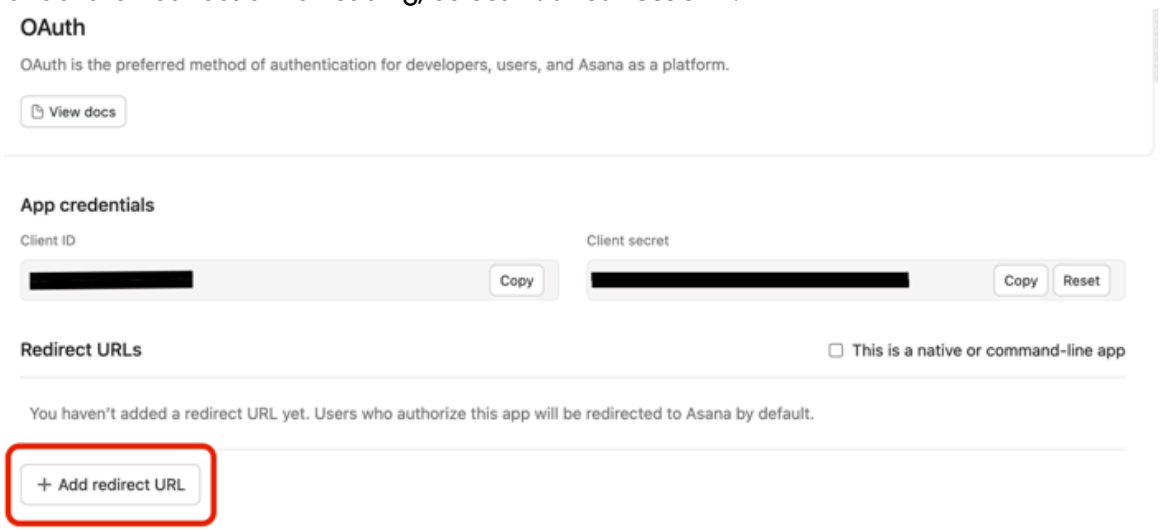
You can change the app name as many times as needed. To change the name, go to the Basic information tab on the left



panel.

4. From the Client ID and Client secret fields, copy the respective values and store them securely.
5. Under the Redirect URLs heading, select **Add redirect URL**.



6. Enter the redirect URL in the format `https://<your instance name>.service-now.com/oauth_redirect.do`.
   You've created the OAuth app and generated the details required to create a connection record for the Asana spoke.

Create a connection record for the Asana spoke

Create a connection record with all the details needed to integrate your ServiceNow instance to the Asana instance. When your ServiceNow instance requests a connection, the OAuth app you had set up authenticates the request based on the details in the connection record.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.

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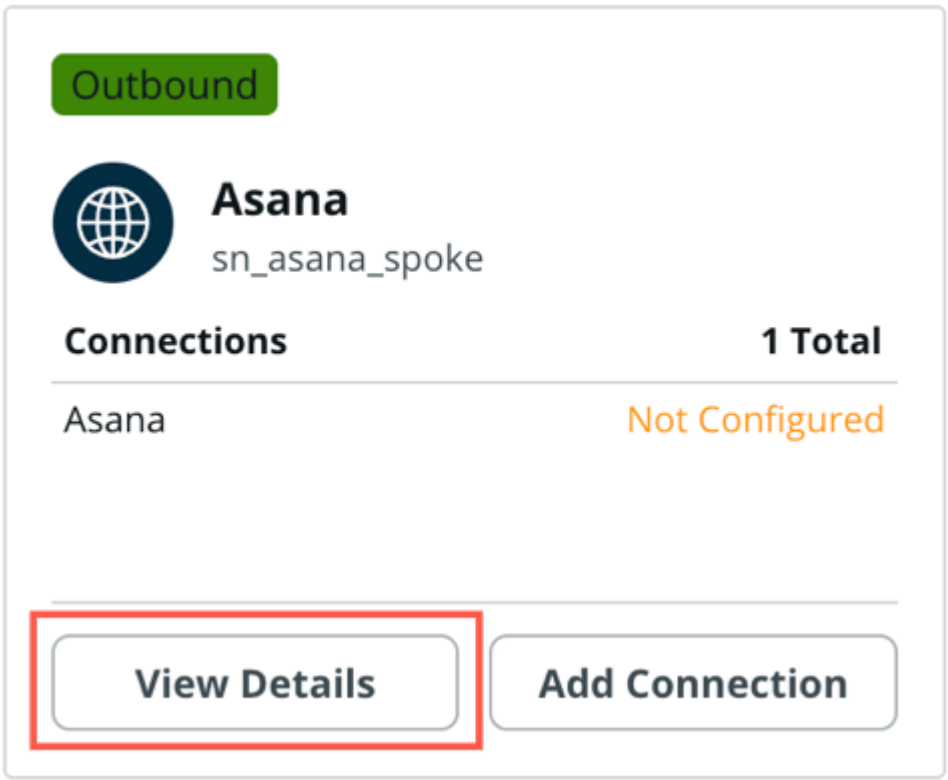
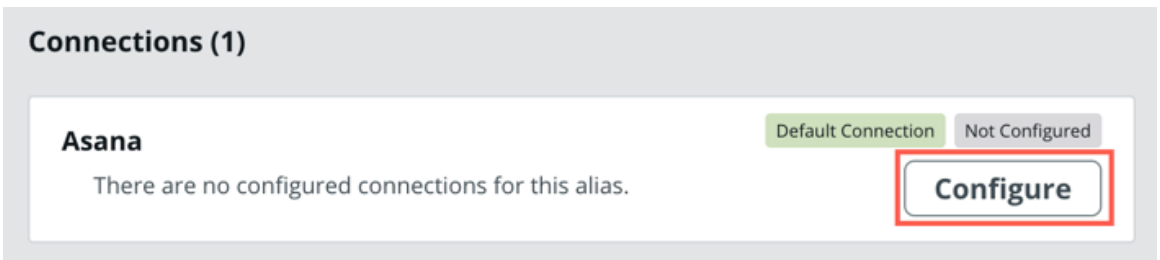
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Asana** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Asana spoke, click **View Details**.



   - To manage more than one Asana spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the form, fill in these fields:

Configure Connection

Field	Description
Connection Name	Name of the connection established with the Asana instance. The first connection's default name is automatically assigned to match the name specified in the Connections and Credentials form on the Connection &

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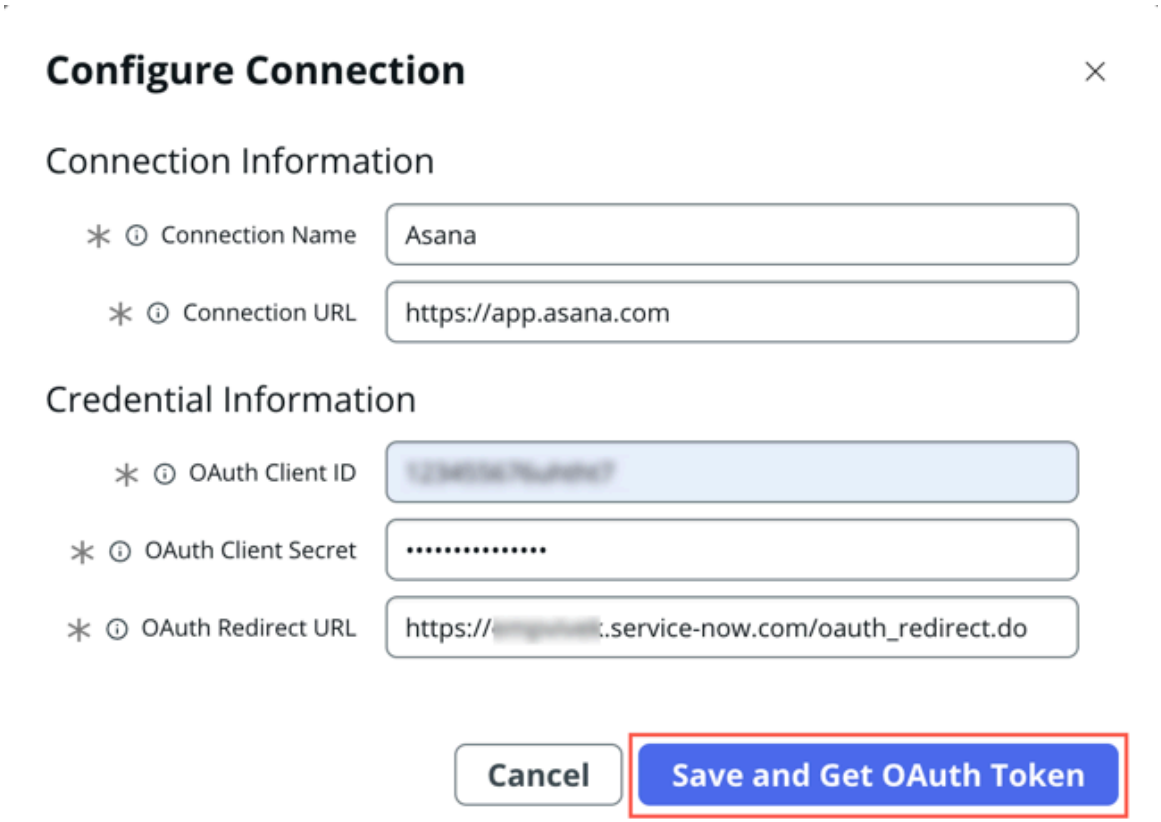
Field	Description
	Credential Aliases page. To provide your custom name, create a connection record by selecting **Add Connection**.
Connection URL	The URL your ServiceNow instance uses to connect to the Asana instance.
OAuth Client ID	The client ID that you had generated while you set up the OAuth application.
OAuth Client Secret	The client secret that you had generated while you set up the OAuth application.
OAuth Redirect URL	The redirect URL that the OAuth application uses to redirect to your ServiceNow instance. The URL must be in the format `https://<your instance name>.service-now.com/oauth_redirect.do`.



6. Click **Configure and Get OAuth Token**.
   The OAuth application authenticates the connection request and provides a temporary token to access the Asana instance.

Register an Asana OAuth application

Register the Asana OAuth application to access the Asana API 1.0 and to receive a Client ID and Client secret.

Before you begin

Asana Role required: admin

- The Asana Integration Hub spoke must be active. For more information, see Asana Spoke.

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Procedure

1. Log in to your Asana account.
2. Select the user's profile icon on the top-right corner.
3. Select **My Settings**.
4. Select the **Apps** tab.
5. Select the **Manage Developers App** link at the bottom to navigate to the developer console window.
6. Select **+ Create new app**.
7. On the **Create new app** page, provide a name for your application.
8. Select the **I agree to API terms and conditions** check box.
9. Select **Create app**.
10. **Optional:** Provide basic information about your application.
11. Select **OAuth** in the left-pane.
12. Copy the Client ID and Client secret for later use.
13. In the **Redirect URLs** field, select **+ Add redirect URL**.
14. Enter `https://<instance>.service-now.com/oauth_redirect.do` where <instance> is the name of your ServiceNow instance.

Atlassian Administration Spoke

The Atlassian Administration spoke provides actions to view and analyze meaningful usage data for Atlassian Administration subscriptions. The spoke downloads subscription information and usage, pulls group details, and removes users from a group.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Atlassian Administration Spoke v1.0.1 is the latest version. For version history of the spoke, see Atlassian Administration Spoke release notes.

Supported versions

This spoke was built for Atlassian Administration v1, but may be compatible with later versions.

Spoke requirements

- Atlassian Administration account
- Atlassian Administration Role required: Organization admin
- API Key to authenticate the ServiceNow instance.

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Spoke subflows

The Atlassian Administration spoke provides sample subflows to demonstrate automating Atlassian Administration tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Pull Atlassian Group Details	This subflow retrieves all Group Details from Atlassian Administration such as group product and site details.

Spoke actions

The Atlassian Administration spoke provides actions to automate Atlassian Administration tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Group Management	Look up Organization Groups Stream	Retrieves information about groups, users, and roles assignments.
User Management	Look up Organization Users Stream	Retrieves information about users, groups, and product last access.
	Remove User from Group	Removes given user from a group in the Atlassian Administration instance.

Spoke module

The Atlassian Administration spoke adds the Atlassian Administration application to your instance and includes these modules:

Module	Description
Groups	Contains data related to groups.
Product and Site Details	Contains data related to product and site.
Group Product Site Role Details	Contains data related to site roles for product groups.

Spoke user roles

The Atlassian Administration spoke provides these user roles to control access to data:

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User role	Description
Atlassian Admin (sn_atlassian_spoke.atlassian_admin)	Creates connections for the Atlassian Administration application.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Create an Atlassian Administration API Key

Create an Atlassian Administration API Key to authenticate ServiceNow requests.

Before you begin

Role required: Organization admin

Procedure

1. Log in to Atlassian Administration with your admin credentials.
2. Select your organization if you have more than one.
3. Select **Settings** > **API keys**.
4. Select **Create API key**.
5. On the Create an API key page, provide a name to identify the API key and the expiration date in the **Expires on** field.

   Note: By default, the key expires in one week from the creation date. If you'd like to modify the expiration date, select a new date in the **Expires on** field. You must select a date within one year of the creation date.

6. Select **Create** to save the API key.
7. Copy the values for your Organization ID and API key.

   Note: Save these values to use them later.

8. Select **Done**.
   The key appears in your list of API keys. You can also revoke the API by selecting **Revoke** from the Actions column.

Set up the Atlassian Administration spoke

Integrate the ServiceNow instance and Atlassian Administration by using an API key to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Atlassian Administration spoke.
- Create an Atlassian Administration API key.
- Role required: admin

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Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the record for **Atlassian Administration** alias.
3. From the Related Links section, select **Create New Connection & Credential**.
4. On the form, fill in the fields.

Create Connection and Credential

Field	Description
Connection information	
Name	Name of the Atlassian Administration connection.
Connection URL	URL for the connection. This field is automatically set to `https://api.atlassian.com`.
Organization ID	Atlassian Administration Organization ID that you find while creating an Atlassian Administration API Key.
Credential information	
API Key	The API Key that you find while creating an Atlassian Administration API Key.

5. Select **Create**.

Automation Anywhere Spoke

Manage workflows and robotics processes in Automation Anywhere instance from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Automation Anywhere spoke v1.3.0 is the latest version. For version history of the spoke, see Automation Anywhere spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- Complex Object (com.glide.cobject)
- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Automation Anywhere spoke provides actions to automate Automation Anywhere tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Bot Management	Deploy Bot	Deploys a bot in the bot runner devices.
	Get Bot	Retrieves details of the specific bot.
	Look up Bots	Retrieves information about all the bots.
Device Management	Get Device Details	Retrieves details of the specific device.
	Look up Devices	Retrieves details of all the devices.
	Look up Pool	Retrieves details of the specified pool.
Folder Management	Get Folder	Retrieves details of the requested folder.
	Look up Folders	Retrieves information about all the folders.
Queue Management	Look up Queues Stream	Retrieves all queues for the Enterprise Control Room.
	Look up Work Items in Queue	Retrieves details of all the work items in a queue.
User Management	Look up User	Retrieves details of the requested user.
	Look up Users Stream	Retrieves details of all the users.

Note: Only users with bot runner or admin role can execute the spoke actions.

Spoke module

The Automation Anywhere spoke adds the Automation Anywhere application to your instance and includes the Authentication module. In this module, you should provide details in the default credential record to authentication the ServiceNow requests. See Create a Credential record for the Automation Anywhere spoke for more information.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

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For information about setting up the spoke, see Set up the Automation Anywhere spoke.

Set up the Automation Anywhere spoke

Integrate ServiceNow and Automation Anywhere instances by using the Automation Anywhere credential record to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Automation Anywhere spoke.
- Role required: admin.

Create a Credential record for the Automation Anywhere spoke

Create a credential record for the Automation Anywhere instance. The Automation Anywhere spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Automation Anywhere** > **Authentications**.
2. Open the record, **Automation Anywhere Credential**.
3. On the form, fill these values.

Field	Description
Name	Default name of the credential record. **Note:** Users are cautioned against modifying the default credential name.
User Name	Credentials to log in to your Automation Anywhere instance.
Password	
Credential alias	Default credential alias available along with the Automation Anywhere spoke. For example, select **sn_autoanywher_spk.Automation_Anywhere**.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **Automation Anywhere**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.
Connection URL	URL to connect to your Automation Anywhere instance.
Dedicated Integration User	Option to specify if you are using a dedicated user for the purpose of integrating Automation Anywhere and ServiceNow instances.

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Field	Description
	Note: ○ The dedicated user mentioned here, should be used only for the purpose of integrating Automation Anywhere with ServiceNow. ○ If you aren't using a dedicate user, the ServiceNow instance makes 2 or 3 API calls to execute an action. ○ If you are using a dedicated user, the ServiceNow instance makes only one API call to execute an action.

4. Right-click the form header and click **Save**.
5. Click **Get Token**.

   Note: This step is applicable when you select the **Dedicated Integration User** check box.

   The confirmation message, `Token retrieval successful` is displayed.

AWS Certificate Manager Spoke

Manage certificates in AWS Certificate Manager account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

AWS Certificate Manager spoke v1.0.1 is the latest version. For version history of the spoke, see AWS Certificate Manager spoke release notes.

Supported versions

This spoke was built for AWS Certificate Manager API version 2015-12-08, but may be compatible with later versions.

Spoke requirements

- User with full access to AWS Certificate Manager.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The AWS Certificate Manager spoke provides actions to automate AWS Certificate Manager tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Certificate Management	Delete Certificate	Deletes a certificate and its associated private key.
	Get Certificate	Retrieves an Amazon-issued certificate and its certificate chain.
	Get Certificate Details	Retrieves detailed metadata about the specified ACM certificate.
	Import Certificate	Imports a certificate to AWS Certificate Manager (ACM) to use with services that are integrated with ACM.
	Look up Certificates	Retrieves a list of certificate ARNs and domain names.
	Request Certificate	Requests an ACM certificate for use with other AWS services.
	Resend Validation Email	Resends the email that requests domain ownership validation.
	Update Certificate Option	Updates details of the specified certificate.
Tag Management	Add Tags To Certificate	Associates a set of tags with the required certificate.
	Look up Tags For Certificate	Retrieves all tags that are associated with the specified certificate.
	Remove Tags From Certificate	Removes the association of tags from certificate.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the AWS Certificate Manager spoke.

Set up the AWS Certificate Manager spoke

Integrate the ServiceNow instance and AWS Certificate Manager by using the AWS credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the AWS Certificate Manager spoke.
- Role required: admin.

Create a credential record for the AWS Certificate Manager spoke

Create a credential record for the AWS Certificate Manager account. The AWS Certificate Manager spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **AWS Credentials**.
4. On the form, fill these values.

AWS Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, Cred.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to AWS Certificate Manager.
Secret Access Key	Secret Access Key of the user with full access to AWS Certificate Manager.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AWS Certificate Manager**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.
Credential alias	Credential alias associated with the spoke.

5. Click **Save**.
   The AWS Certificate Manager spoke is set up and you can start using the spoke actions in your flows.

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AWS CloudFormation Spoke

Model and provision AWS resources in your cloud environment using AWS CloudFormation from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for AWS CloudFormation API version 2010-05-15, but may be compatible with later versions.

Spoke version

AWS CloudFormation spoke v1.1.4 is the latest version. For version history of the spoke, see AWS CloudFormation spoke release notes.

Spoke requirements

- User with full access to AWS CloudFormation.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The AWS CloudFormation spoke provides actions to automate AWS CloudFormation tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
Change Set Management	Create Change Set	Creates a list of changes that will be applied to a stack so that you can review the changes before executing them.
	Delete Change Set	Deletes the specified change set.
	Execute Change Set	Updates the stack using the input information that was provided when the specified change set was created.
	Get Change Set	Returns the details of the specified change set.
	Look up Change Sets	Returns basic information of each active change set for a stack.
Stack Management	Cancel Update Stack	Cancels an update on the specified stack.
	Continue Update Rollback	For the specified stack that is in the UPDATE_ROLLBACK_FAILED state, continues rolling the state back to the UPDATE_ROLLBACK_COMPLETE state.
	Create Stack	Creates a stack as specified in the template.
	Delete Stack	Deletes the specified stack.
	Get Stack Policy	Returns the stack policy for a specified stack.
	Get Template	Returns the template body for a specified stack.
	Look up Stack Events	Returns all stack related events for a specified stack in reverse chronological order.
	Look up Stack Set Operation Stream	Returns the summary of information for the operations performed on a stack set.
	Look up Stack Set Operation Result Stream	Returns the summary of information for the results of a stack set operation.
	Look up Stack Resources	Returns details of all resources of the specified stack.

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Category	Action	Description
	Look up Stacks	Returns the details for the specified stack.
	Set Stack Policy	Sets policy for the specified stack.
	Update Stack	Updates the specified stack.
	Validate Template	Validates a specified template. AWS CloudFormation initially verifies if the template is a valid JSON. If it is not a valid JSON, AWS CloudFormation verifies if the template is a valid YAML. If both these checks fail, AWS CloudFormation returns a template validation error.
Stack Set Management	Create Stack Instance	Creates stack instances for the specified accounts, within the specified regions.
	Create Stack Set	Creates Stack set in the specified region.
	Delete Stack Instance	Deletes stack instances for the specified accounts, in the specified regions.
	Delete Stack Set	Deletes the specified Stack set.
	Get Stack Set	Returns the details of the specified stack set.
	Look up Stack Instances	Returns information about stack instances that are associated with the specified stack set.
	Look up Stack Sets	Returns summary information about all the stack sets or the stack sets with the specified Status.
	Update Stack Set	Updates the specified stack set and associated stack instances in the specified accounts and Regions.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the AWS CloudFormation spoke.

Set up the AWS CloudFormation spoke

Integrate the ServiceNow instance and AWS CloudFormation using AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the AWS CloudFormation spoke.
- Role required: admin.

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Create Credential record for the AWS CloudFormation spoke

Create Credential record for your AWS CloudFormation account. The AWS CloudFormation spoke connection and credential alias uses this credential to perform actions in AWS CloudFormation.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Amazon VPC**.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `CloudFormation Credentials`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to AWS CloudFormation.
Secret Access Key	Secret Access Key of the user with full access to AWS CloudFormation.
Credential alias	Associated credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AWS_CloudFormation**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

6. Click **Submit**.

Result
The credential record the AWS CloudFormation spoke is created.

AWS Elastic Beanstalk Spoke

AWS Elastic Beanstalk enables you to quickly deploy and manage applications in the Amazon AWS Cloud. Elastic Beanstalk reduces management complexity without restricting choice or control. When you upload your application, Elastic Beanstalk automatically handles capacity provisioning, load balancing, scaling, and application health monitoring.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

AWS Elastic Beanstalk spoke v1.0.3 is the latest version. For version history of the spoke, see AWS Elastic Beanstalk spoke release notes.

Supported versions

AWS Elastic Beanstalk API version 2010-12-01.

Spoke subflows

There are no subflows provided with the AWS Elastic Beanstalk spoke.

Spoke actions

The AWS Elastic Beanstalk spoke provides actions to perform Elastic Beanstalk tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Account Management	Look Up Account Attributes	Retrieves attributes related to AWS Elastic Beanstalk that is associated with the calling AWS account.
Application Management	Check DNS Availability	Checks if the specified CNAME is available.
	Create application	Creates an application that has one configuration template name default and no application versions.
	Create Application Version	Creates an application version for the specified application.
	Create Configuration Template	Creates an AWS Elastic Beanstalk configuration template, associated with a specific Elastic Beanstalk application.
	Delete Application	Deletes the specified application along with all associated versions and configurations.
	Delete Application Version	Deletes the specified version from the specified application.
	Delete Configuration Template	Deletes the specified application along with all associated versions and configurations.
	Look Up Application Versions	Retrieves the descriptions of existing applications.
	Look up Applications	Retrieves the descriptions of existing applications.

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Category	Action	Description
	Update Application	Updates the specified application to have the specified properties.
	Update Application Version	Updates the specified application version to have the specified properties.
	Update Configuration Template	Updates the specified configuration template to have the specified properties or configuration option values.
Environment Management	Create Environment	Launches an AWS Elastic Beanstalk environment for the specified application.
	Create Storage Location	Creates a bucket in Amazon S3 to store application versions, logs, and other files used by Elastic Beanstalk environments.
	Get Environment Health	Lists the overall health information of the specified environment.
	Look up Available Solution Stacks	Lists the available solution stack names.
	Look up Environment Resources	Lists AWS resources for the specified environment.
	Look up Environments	Retrieves the information about the existing environments.
	Look Up Instances Health	Retrieves the descriptions of existing applications.
	Restart App Server	Restarts the application container server running on each Amazon EC2 instance in the environment.
	Swap Environment CNAMEs	Swaps the CNAMEs of two environments.
	Terminate Environment	Terminates the specified environment.
	Update Environment	Updates the specified environment.

AWS Elastic Beanstalk account requirements

The AWS Elastic Beanstalk spoke requires a credential that you create in the Amazon Web Services Management Console.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

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For information about setting up the spoke, see Create a credential record for the AWS Elastic Beanstalk spoke.

Set up the AWS Elastic Beanstalk spoke

Create a credential record to integrate AWS Elastic Beanstalk with ServiceNow.

Before you begin

Role required: admin

Create an access key

Create an access key in Amazon Web Services to authorize actions.

Before you begin

Role required: admin

Procedure

1. Log in to AWS Management Console.
2. From the menu under your user name, select **My Security Credentials**.
3. Click **Create access key**.
4. Copy the access key ID and the secret access key to a text file.
   You can only show the secret access key once, but you can delete and create keys if necessary. For more information, see Create new access keys for an IAM user in AWS documentation.

Create a credential record for the AWS Elastic Beanstalk spoke

Create a credential record to integrate AWS Elastic Beanstalk with ServiceNow. The AWS Elastic Beanstalk connection and credential aliases use these credentials to authorize actions. Once connected, Elastic Beanstalk uses basic authentication to authenticate ServiceNow requests.

Before you begin

To set up the AWS Elastic Beanstalk spoke, you must be able to configure security credentials in Amazon Web Services and have a ServiceNow admin role.

- Request an Integration Hub subscription.
- Activate the AWS Elastic Beanstalk spoke spoke.
- Role required: admin.

Procedure

1. Navigate to **IntegrationHub** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the record **AWS_Elastic_Beanstalk**.
3. In the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Description
Name	Name to identify the credential record. For example, `Elastic Beanstalk Cred`.

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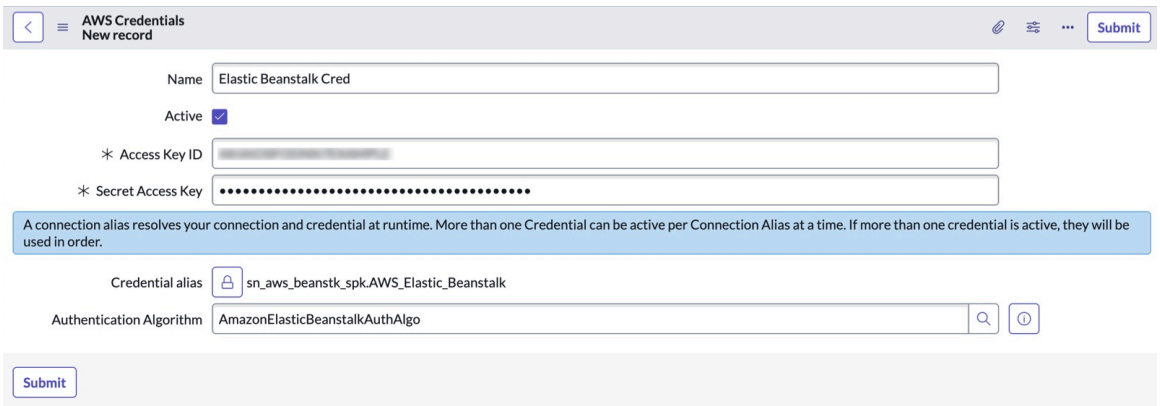
Field	Description
Access Key ID	Access key ID you created in AWS Management Console. For more information, see Create an access key.
Secret Access Key	Secret access key you created in AWS Management Console. For more information, see Create an access key.
Authentication Algorithm	Select **AmazonElasticBeanstalkAuthAlgo**.



6. Click **Submit**.

Result

The AWS Elastic Beanstalk spoke is set up and integrated with the ServiceNow instance.

AWS Elastic Load Balancing Spoke

Manage load balancers, tags, and target groups in AWS account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

AWS Elastic Load Balancing spoke v1.0.1 is the latest version. For version history of the spoke, see AWS Elastic Load Balancing spoke release notes.

Supported versions

This spoke was built for AWS Elastic Load Balancing API version 2012-06-01.

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Spoke requirements

- User with full access to AWS Elastic Load Balancing.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - XML Parser (com.glide.hub.action_step.xmlparser)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The AWS Elastic Load Balancing spoke provides actions to automate AWS Elastic Load Balancing tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Elastic Load Balancer Management	Create Load Balancer	Creates an application load balancer or network load balancer.
	Create Load Balancer Listener	Creates a listener for the specified application load balancer or network load balancer.
	Delete Load Balancer	Deletes the specified application load balancer or network load balancer.
	Delete Load Balancer Listener	Deletes the specified listener.
	Get Account Limits	Lists the Elastic Load Balancing resource limits for the AWS account.
	Get Load Balancer Attributes	Lists the attributes for the specified application load balancer or network load balancer.
	Look up Listeners	Retrieves list of the specified listeners for the specified application load balancer or network load balancer.
	Look up Load Balancers	Retrieves list of the specified load balancers or all the load balancers.
	Look up SSL Policies	Lists all policies used for SSL negotiation.

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Category	Action	Description
	Update Load Balancer Attributes	Updates the specified attributes of the specified application load balancer or network load balancer.
Tag Management	Add Tags	Adds the specified tags to the specified Elastic Load Balancing resource.
	Delete Tags	Removes the specified tags from the specified Elastic Load Balancing resource.
	Look up Tags	Retrieves list of the tags for the specified resources.
Target Group Management	Create Target Group	Creates a target group.
	Deregister Target	Deregisters the specified targets from the specified target group.
	Get Target Group Attributes	Lists the attributes for the specified target group.
	Get Target Health	Lists the health of the targets.
	Look up Target Groups	Retrieves details of the specified target groups or all of your target groups.
	Register Target	Registers the specified targets with the specified target group.
	Update Target Group	Updates the health checks used for evaluating the health state of the targets in the specified target group.
	Update Target Group Attribute	Updates the specified attributes of the specified target group.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the AWS Elastic Load Balancing spoke.

Set up the AWS Elastic Load Balancing spoke

Integrate the ServiceNow instance and AWS Elastic Load Balancing account using AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the AWS Elastic Load Balancing spoke.
- Role required: admin.

Create Credential record for the AWS Elastic Load Balancing spoke

Create credential record for the AWS Elastic Load Balancing account. The AWS Elastic Load Balancing spoke connection and credential alias uses these credentials to authorize actions.

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Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the record, **AWS_Elastic_Load_Balancing**.
3. In the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `Elastic Load Balancing Cred`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to AWS Elastic Load Balancing.
Secret Access Key	Secret Access Key of the user with full access to AWS Elastic Load Balancing.
Credential alias	Associated credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AmazonElasticLoadBalancingAuthAlgo**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

6. Right-click the form header and click **Submit**.

AWS IAM Spoke

Integrate ServiceNow instance with AWS IAM to manage access to AWS services and resources securely. Manage groups, policies, and roles in AWS IAM from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes .

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview .

Spoke version

AWS IAM spoke v1.2.0 is the latest version. For version history of the spoke, see AWS IAM spoke release notes .

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Supported version

This spoke was built for API version 2010-05-08, but may be compatible with later versions.

Note: If you use different API version, ensure that you change the API version in all spoke actions.

Spoke requirements

- User with full access to IAM.
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see AWS Identity and Access Management Documentation site.

Spoke subflows

The Jenkins spoke provides sample subflows to demonstrate automating AWS IAM tasks. Available subflows are:

Subflow	Description
Delete Group	Deletes the specified AWS IAM group.
Delete User	Deletes the specified AWS IAM user.
Delete Policy	Deletes the specified policy from the AWS IAM account.

Spoke actions

The AWS IAM spoke provides actions to automate AWS IAM tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Group Management	Add User to Group	Adds user to a group in AWS IAM.
	Create Group	Creates a group in AWS IAM.
	Delete Group	Deletes a group in AWS IAM.
	Look up Group	Searches for the required group in AWS IAM.
	Look up Group Users	Lists all the users in the required group.
	Remove User from Group	Removes a user from a group in AWS IAM.
Group Policy Management	Attach Inline Policy in Group	Adds or updates an inline policy document embedded in the specified IAM group.
	Attach Policy to Group	Attaches the specified managed policy to the required IAM group.

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Category	Action	Description
	Detach Inline Policy from Group	Deletes the specified inline policy from the specified AWS IAM group
	Detach Policy from Group	Detaches the specified managed policy from the required IAM group.
	Look up Attached Group Policies	Retrieves the list of all policies attached to the IAM group.
	Look up Group Policies	Retrieves all the inline policies of the specified group. If none exists, the operation returns an empty list
Policy Management	Create Policy	Creates managed policy in the specified IAM group.
	Delete Policy	Deletes specified Policy from AWS IAM.
	Detach Policy from Roles	Detaches the specified managed policy from the specified IAM Role.
	Look up Entities for Policy	Lists all entities (Users, Group, and Roles) attached to this policy.
User Management	Create User	Creates a user in AWS IAM.
	Deactivate MFA Device	Deactivates the required MFA device attached to a user.
	Delete Access Key for User	Deletes the access key of the AWS IAM user.
	Delete Login Profile	Deletes the password for the specified IAM user, which terminates the user's ability to access AWS services through the AWS Management Console.
	Delete Service Specific Credential	Deletes the required service-specific credential.
	Delete Signing Certificate	Deletes a signing certificate associated with the specified IAM user.
	Delete SSH Public Key	Deletes the specified SSH public key.
	Delete User	Deletes the required IAM User.
	Delete Virtual MFA Device by User	Deletes the specified Virtual MFA device.
	Detach Policy from User	Detaches the specified managed policy from the specified IAM role.
	Look up User	Searches for the required user in the AWS IAM.
	Look up Access Keys by User	Lists the access key of the AWS IAM user.

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Category	Action	Description
	Look up Groups for User	Retrieves the list of all the groups, a particular user belongs to.
	Look up Inline User Policies	Retrieves all the inline policies of the specified IAM user. If none exists, the operation returns an empty list.
	Look up MFA Devices by User	Retrieves information about the MFA services associated with the specified IAM user. If none exists, the operation returns an empty list.
	Look up Service Specific Credentials	Retrieves information about the service-specific credentials associated with the specified IAM user.
	Look up Signing Certificates by User	Retrieves information about the signing certificates associated with the specified IAM user. If none exists, the operation returns an empty list.
	Look up SSH Public Keys by User	Retrieves information about the SSH public keys associated with the specified IAM user. If none exists, the operation returns an empty list.
User Policy Management	Attach Policy to User	Attaches the specified managed policy to the specified user.
	Delete Inline User Policy	Deletes an inline policy attached to the user.
	Look up Attached User Policies	Retrieves all the attached policies of the user.
Role Management	Look up Roles	Retrieves list of all roles.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the AWS IAM spoke.

Set up the AWS IAM spoke

Integrate the ServiceNow instance and AWS IAM using AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the AWS IAM spoke.
- Role required: admin.

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Create Credential record for the AWS IAM spoke

Create Credential record for your AWS IAM account. The AWS IAM spoke connection and credential alias uses this credential to perform actions on AWS IAM.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **AWS IAM**.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `AWS Credentials`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to IAM.
Secret Access Key	Secret Access Key of the user with full access to IAM.
Credential alias	Associated credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AWS IAM Auth Algo**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

6. Click **Submit**.

Result
The credential record the AWS IAM spoke is created.

AWS Lambda Spoke

Manage alias and function in AWS Lambda from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

AWS Lambda spoke v1.1.3 is the latest version. For version history of the spoke, see AWS Lambda spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- AWS IAM Spoke (sn_aws_iam_spoke)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported version

This spoke was built for API version 2010-05-08, but may be compatible with later versions.

Note: If you use different API version, ensure that you change the API version in all spoke actions.

Spoke requirements

- User with full access to Lambda.

  Note: The AWSLambdaFullAccess IAM policy must be assigned to the user. See Identity-based IAM policies for AWS Lambda for more information about the IAM policy.

- Access Key ID and Secret Access Key of the user as obtained in the IAM Console. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

Spoke actions

The AWS Lambda spoke provides actions to automate AWS Lambda tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Alias Management	Create Function Alias	Creates an alias for the specified function.
	Delete Function Alias	Deletes the specified alias of the function.

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Category	Action	Description
	Get Function Alias Details	Retrieves the details of the specified function alias.
	List Function Aliases	Retrieves the list of all aliases for the specified function.
	Update Function Alias	Updates settings of the specified alias.
Function Management	Add Permission	Grants an AWS service or another account permission to use the specified AWS Lambda function.
	Create Function	Creates a function in AWS Lambda.
	Delete Function	Deletes the specified AWS Lambda function or function version.
	Get Function Details	Retrieves details of the specified AWS Lambda function or function version.
	Invoke Function	Invokes the specified AWS Lambda function.
	List Functions	Retrieves list of all AWS Lambda functions in a region
	Update Function Code	Updates code of the specified AWS Lambda function.
	Update Function Configuration	Updates configuration of the specified AWS Lambda function.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the AWS Lambda spoke.

Set up the AWS Lambda spoke

Integrate the ServiceNow instance and AWS Lambda account using AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the AWS IAM Spoke.
- Activate the AWS Lambda spoke.
- Role required: admin.

Create a credential record for the AWS Lambda spoke

Create a credential record for your AWS Lambda account. The AWS Lambda spoke connection and credential alias uses this credential to perform actions on AWS Lambda.

Before you begin

Role required: admin.

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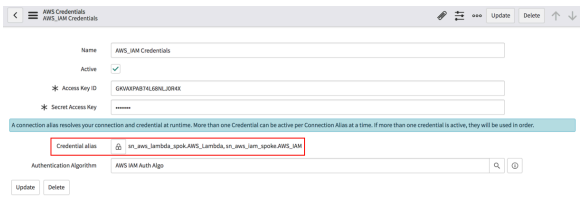
Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the record, **AWS_Lambda**.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `Lambda Credentials`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to AWS Lambda.
Secret Access Key	Secret Access Key of the user with full access to AWS Lambda.
Credential alias	Associated credential records of the AWS IAM spoke and AWS Lambda spoke. 
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AWS IAM Auth Algo**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

6. Click **Submit**.

Result

The credential record the AWS Lambda spoke is created.

AWS OpsWorks Spoke

Manage elastic load balancers, instances, relational database services, and others in AWS OpsWorks account from the ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for AWS OpsWorks API version 2013-02-18, but may be compatible with later versions.

Spoke requirements

- User with full access to AWS OpsWorks
- Access Key ID and Secret Access Key of the user. Record these values for later use.

For more information about creating user in IAM and providing the required access, see Understanding and Getting Your Security Credentials page on the AWS Documentation site.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke version

AWS OpsWorks spoke v1.0.2 is the latest version. For version history of the spoke, see AWS OpsWorks spoke release notes.

Spoke actions

The AWS OpsWorks spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Elastic Load Balancer Management	Attach Elastic Load Balancer	Attaches an Elastic Load Balancer to a specified layer.
	Detach Elastic Load Balancer	Detaches a specified Elastic Load Balancing instance from its layer.
	Look up Elastic Load Balancers	Retrieves information about Elastic Load Balancers of the specified stack ID.
Instance Management	Create Instance	Creates an instance in the specified stack.

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Category	Action	Description
	Delete Instance	Deletes the specified instance.
	Look up Instances	Retrieves the list of instances for the specified stack ID.
	Start Instance	Starts the specified instance.
	Start Stack Instances	Starts instances of the specified stack.
	Stop Instance	Stops the specified instance.
	Stop Stack Instances	Stops instances of the specified stack.
Relational Database Service Management	Deregister RDS DB Instance	Deregisters an Amazon RDS instance.
	Look up RDS DB Instances	Retrieves the list of Amazon RDS instances.
	Register RDS DB Instance	Registers an Amazon RDS instance with a stack.
Stack Management	Delete App	Deletes a specified app.
	Delete Layer	Deletes the specified layer.
	Get Stack Summary	Retrieves information of the specified stack ID.
	Get User Profile	Retrieves information about the user profile.
	Look up Apps	Retrieves information about the apps in the specified stack ID.
	Look up Deployments	Retrieves information about the deployments in the specified stack ID.
	Look up Layers	Retrieves list of the layers in the specified stack ID.
	Look up Permissions	Retrieves information about the permissions for the specified stack ID or IAM user.
	Look up Stacks	Retrieves list of information of the specified stack ID.
Tag Management	Add Tags	Adds tags for the specified resource.
	Delete Tags	Deletes tags of the specified resource.
	Look up Tags	Retrieves list of tags for the specified resource.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the AWS OpsWorks spoke.

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Set up the AWS OpsWorks spoke

Integrate the ServiceNow instance and AWS OpsWorks account by using the AWS credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the AWS OpsWorks spoke.
- Role required: admin.

Create a credential record for the AWS OpsWorks spoke

Create a credential record for the AWS OpsWorks account. The AWS OpsWorks spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **AWS Credentials**.
4. On the form, fill these values.

AWS Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `AWS OpsWork Credential`.
Active	Option to actively use the credential record.
Access Key ID	Access Key ID of the user with full access to AWS OpsWorks.
Secret Access Key	Secret Access Key of the user with full access to AWS OpsWorks.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **AmazonOpsWorkAuthAlgo**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.
Credential alias	Credential alias associated with the AWS OpsWorks spoke.

5. Right-click the form header and click **Submit**.

AWS Translate Spoke

Integrate your ServiceNow instance with AWS Translate to detect languages in the text and translate text to the required language.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

AWS Translate Spoke v1.0.3 is the latest version. For version history of the spoke, see AWS Translate Spoke release notes.

Supported version

This spoke was built for AWS Translate API version 2017-07-01 and AWS Comprehend version 2017-11-27, but may be compatible with later versions.

Note:

- If you use different API version, ensure that you change the API version in all spoke actions.
- The current version of the AWS Translate spoke is not compatible with dynamic translation.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke requirements

- User with full access to AWS Translate.
- Access Key ID and Secret Access Key of the user. Record these values for later use. For more information, see Create an access key.

For more information about creating user and providing the required access, see AWS Identity and Access Management Documentation site.

Spoke flow

The AWS Translate spoke provides a sample flow, Translate Short Description when Incident is Created to demonstrate translating the short description to Spanish when an incident is

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created. You can customize the sample flow as per your requirement by creating a copy of it in the required scope.

Spoke actions

The AWS Translate spoke provides actions to automate translating tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Language Management	Detect Dominant Language	Detects the language of text using AWS Comprehend service.

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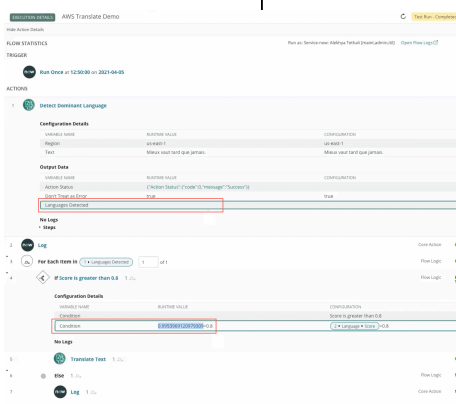
Category	Action	Description
		Note: Provide the text for which you want to detect the dominant language in the action input **Text**. The output is a JSON string that contains an array of the detected languages. One of the elements in the array is **Score**. This is a decimal number and its value is between 0 and 1.  When the action is executed, the Languages Detected action output may not display any runtime value. However, the output data pill still holds the response data and can be used in the subsequent actions in the flow or subflow. 
Translate Management	Translate Text	Translates text from the source language to the target language using AWS Translate service.

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Category	Action	Description
		Note: • For **Source Language** and **Target Language**, input values can't be selected until a valid input value is provided for **Region**. • If you select **Auto** from the **Source Language** list, the AWS Translate API uses the AWS Comprehend service to automatically detect the language. In this case, you must provide the region that supports Amazon Comprehend. Else, the request returns an error indicating the auto-detect is not supported.

Note: The actions have **Region** as an input. To retrieve the list of available regions, use the List Regions action from the Amazon EC2 Spoke.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the AWS Translate spoke.

Set up the AWS Translate spoke

Integrate the ServiceNow instance and AWS Translate using the AWS credential to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the AWS Translate spoke.
- Role required: admin.

Create an access key

Create an access key for the required user in the AWS Management Console to authenticate requests from the ServiceNow® instance.

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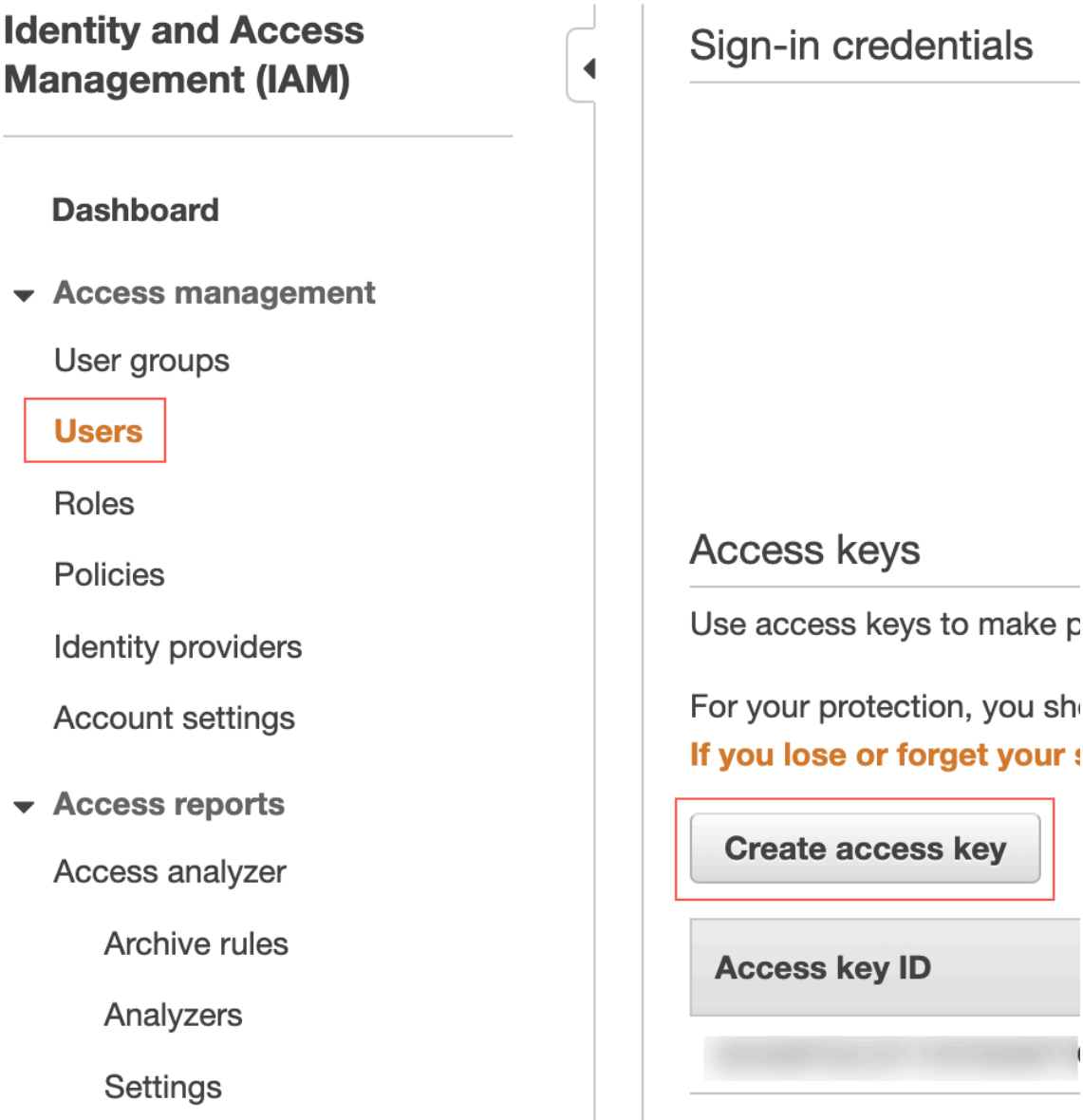
Procedure

1. Log in to the AWS Management Console and open the IAM console.
2. In the navigation pane, click **Users**.
3. Click the required user record for which you want to create or manage the access keys.

   Note: Ensure that the user has admin access to AWS Translate.

4. Click the **Security credentials** tab.
5. Under **Access keys**, click **Create access key**.



The access key is created.

6. Click **Download .csv file** to save the access key ID and secret access key to a CSV file and record them for later use.
   For more information, see Managing access keys (console).

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Create credential record

Create Credential record for the AWS Translate spoke. The AWS Translate spoke uses this credential to perform actions on AWS Translate.

Procedure

1. Navigate to **Integration Hub** > **Connection & Credential Aliases**.
2. Open the record, **AWS Translate**.
3. In the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **AWS Credentials**.
5. On the form, fill these values.

Field	Description
Name	Name to identify the credential record.
Access key ID	Access key ID you had copied from the AWS Management Console.
Secret Access Key	Secret access key you had copied from the AWS Management Console.
Authentication algorithm	Authentication algorithm to authenticate the web services. Select **AWS Translate Authentication Algorithm**.

6. Click **Submit**.

Result

The credential record for the AWS Translate spoke is created.

BigFix Inventory Spoke

Manage hardware, software, and licenses in BigFix Inventory from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

BigFix Inventory spoke v1.6.0 is the latest version. For version history of the spoke, see BigFix Inventory spoke release notes.

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Streaming (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - Get Connection Info (com.glide.hub.action_step.get_connection_info)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for BigFix Inventory version 9.2.16.0, but may be compatible with later versions.

Spoke requirements

BigFix Inventory Management account.

Spoke flow

The BigFix Inventory spoke provides a sample flow, Configure End of Support Date for Software Component to demonstrate setting the end of support date for software component when the Set Software Support End Date service catalog request is created. You can customize the sample flow as per your requirement by creating a copy of it in the required scope.

Spoke subflow

The BigFix Inventory spoke provides a sample subflow, Send an Email Notification for BigFix Inventory Report to demonstrate sending an email notification with the received BigFix Inventory report attachment. To customize the sample subflow, copy it to the required application scope.

Spoke remote table

ServiceNow provides a sample remote table that you can use to connect to BigFix Inventory, and view, pull, and manipulate data from the BigFix Inventory. The name of the sample remote table is Computers. You can create custom remote tables based on the sample remote table. To access the remote table, on your instance, navigate to **All** > **BigFix Inventory Spoke** > **Software Inventories** > **Remote Table**, and then select **Computers**.

For more information on remote tables, see Remote tables.

Spoke actions

The BigFix Inventory spoke provides actions to automate BigFix Inventory tasks when events occur in ServiceNow. Available actions include:

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Category	Action	Description
Hardware Management	Look up BIOS Details by Computer ID	Retrieves the BIOS details of a computer.
	Look up BIOS Details Stream	Retrieves the list of BIOS Details of the scanned systems
	Look up Computer Hardware Fields by Computer ID	Retrieves list of logical partitions associated with a computer.
	Look up Hardware Inventories Stream	Lists summary information about hardware records in the BigFix Inventory system.
	Look up IP Addresses by Computer ID	Retrieves the list of IP addresses associated with a computer.
	Look up IP Addresses Stream	Retrieves the list of IP address details of the computers in the Infrastructure.
	Look up Logical Partitions by Computer ID	Retrieves the list of logical partitions associated with a computer.
	Look up Logical Partitions Stream	Retrieves the list of logical partition details of the computers in the infrastructure.
	Look up Memory Details by Computer ID	Retrieves the memory details of a computer.
	Look up Memory Details Stream	Retrieves the list of system memory details of the scanned systems.
	Look up Network Adapters by Computer ID	Retrieves the list of network adapters associated with a computer.
	Look up Network Adapters Stream	Retrieves the list of network adapters.
	Look up Operating System Details by Computer ID	Retrieves the operating system details of a computer.
	Look up Operating System Details Stream	Retrieves details of the operating system of the scanned computers.
	Look up Physical Partition Details by Computer ID	Retrieves list of physical partitions associated with a computer.
	Look up Physical Partitions Stream	Retrieves the list of physical partitions of the scanned computers.

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Category	Action	Description
	Look up Processor Details by Computer ID	Retrieves the operating system details of a computer.
	Look up Processor Details Stream	Retrieves the details of all active physical processors.
	Look up Shared Disks Stream	Lists shared disks in BigFix Inventory.
	Look up Storage Devices by Computer ID	Retrieves list of the physical partitions associated with a computer.
	Look up Storage Devices Stream	Retrieves the list of storage devices of the scanned systems.
License Management	Look up License Metric Utilizations Stream	Retrieves utilization data for licenses in BigFix Inventory.
Software Management	Look up Cluster Information Stream	Lists clusters in the BigFix Inventory system.
	Look up IBM Product Release by Product ID	Retrieves the list of releases associated with an IBM software product.
	Look up IBM Product Release Instances by Release ID	Retrieves the list of instances associated with an IBM software product release.
	Look up IBM Product Release Instances Stream	Retrieves the list of Instances associated with the specified software product release.
	Look up IBM Product Releases Stream	Retrieves the list of releases associated with the specified software product.
	Look up IBM Software Products Stream	Retrieves the list of IBM software product details installed in the infrastructure.
	Look up License Usages Stream	Lists peak license usage over the last 90 days.
	Look up Software Components Stream	Lists software components in BigFix Inventory.
	Look up Software Inventories Stream	Lists installed software in the infrastructure scanned by BigFix Inventory.
	Look up VM Managers	Lists VM managers in the BigFix Inventory system.
	Set End of Support Date for Software Component	Configures the End of Support Date for software component.

For information about setting up the spoke, see Set up the BigFix Inventory spoke.

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Spoke modules

The BigFix Inventory spoke provides the BigFix Inventory Spoke application that has these modules:

Field	Description
Software Inventories	Displays details of all software inventories.
Remote Table	
Computers	Displays details of all computers in the BigFix Inventory. When users navigates to this module, the system retrieves this data and displays it for a duration of 5 minutes. After this duration, the data is deleted.

Spoke user role

The BigFix Inventory spoke the bigfix_admin (sn_bigfix_in_spoke.bigfix_admin) role. Users with this role can access the BigFix Inventory Spoke application.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Set up the BigFix Inventory spoke

Integrate the ServiceNow instance and the BigFix Inventory using an API key for authenticating ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the BigFix Inventory spoke.
- BigFix Inventory administrator access to the BigFix Inventory portal.
- Role required: admin.

Generate an API key

Generate an API key that enables your ServiceNow instance to request access to the BigFix Inventory instance.

Before you begin

BigFix Inventory requirements:

- BigFix Inventory account
- Role required: BigFix Inventory administrator

Complete these steps from your BigFix Inventory environment. For more information on installation and configuration, see BigFix V9.5 Inventory Documentation.

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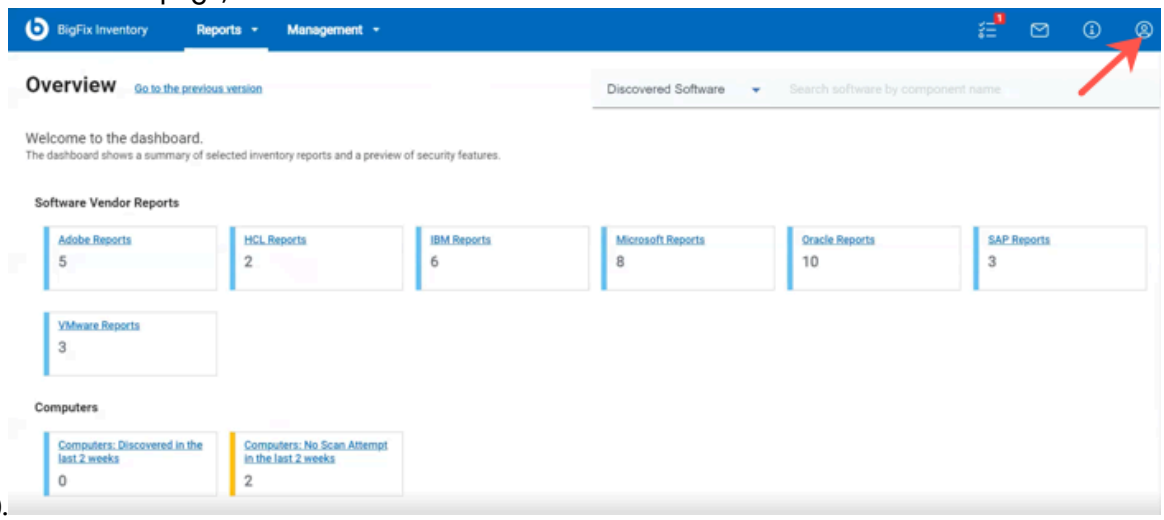
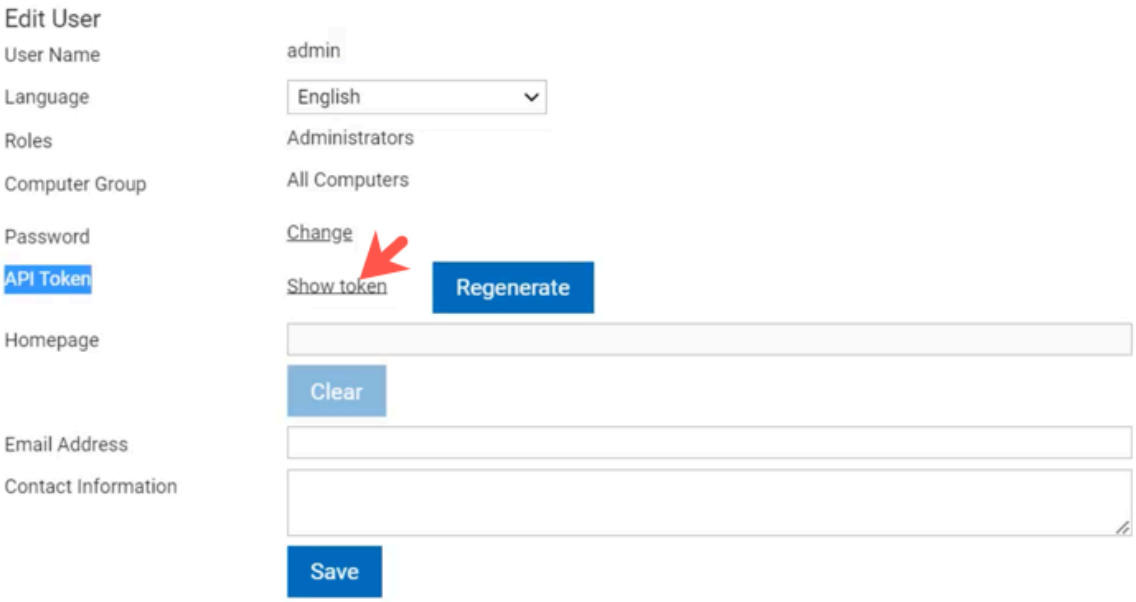
Procedure

1. Log in to your BigFix Inventory portal.
2. On the Overview page, select the Profile icon ().



3. Select Profile.
4. On the Edit User page, select the Show token link in the API Token field.



5. Copy the API token and store at a secure place.
6. Navigate to **Management** > **Configuration** > **Mail Setting**.
7. Configure the mail settings.

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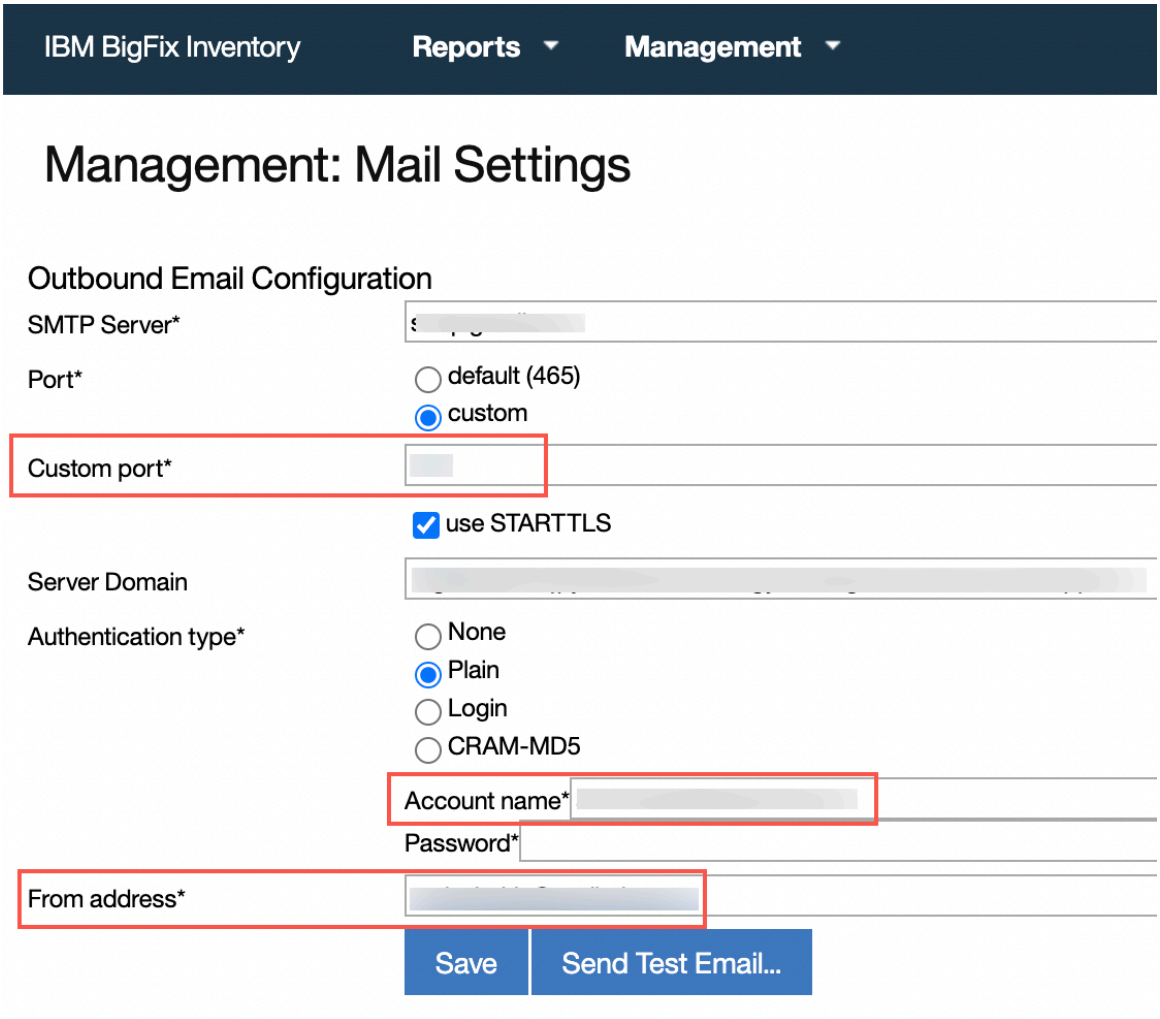

8. Schedule exports of the required reports.

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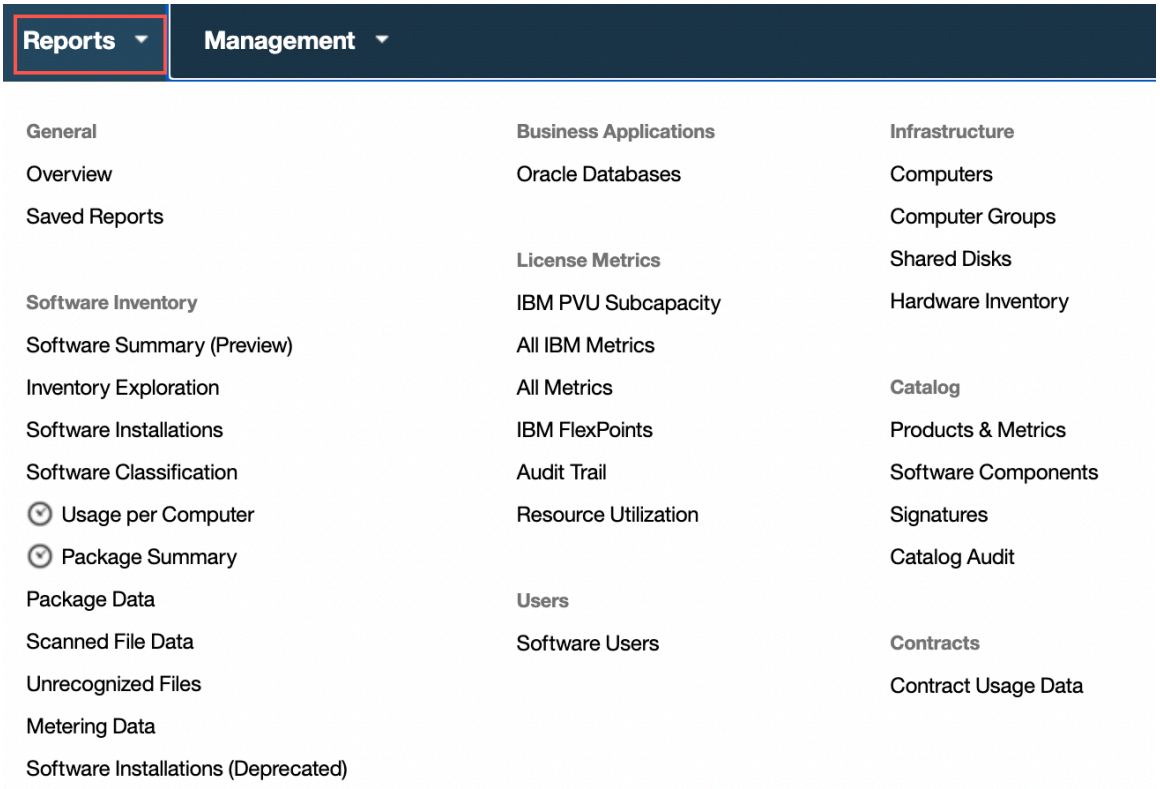
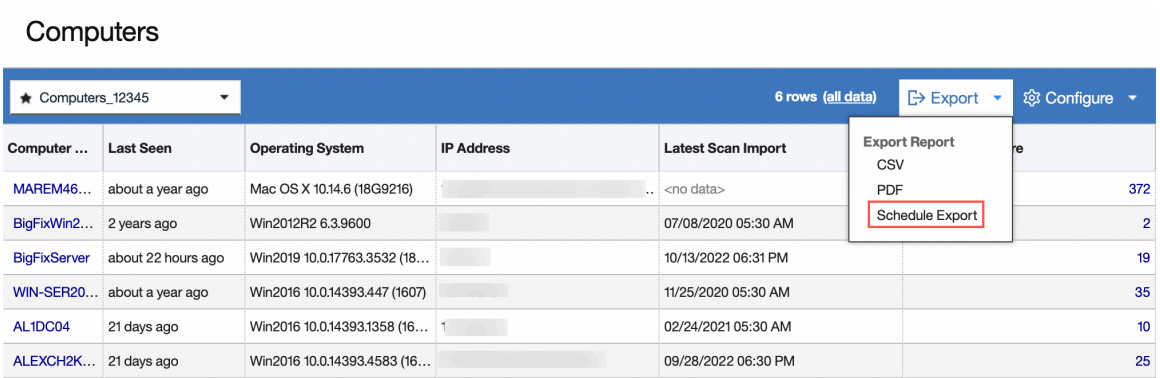
a. Navigate to the required report under **Reports**, for example, **Computers**.



b. Select **Schedule Export**.



c. On the form, specify the ServiceNow instance email address to which the report must be sent and the frequency and time at which the report must be emailed.

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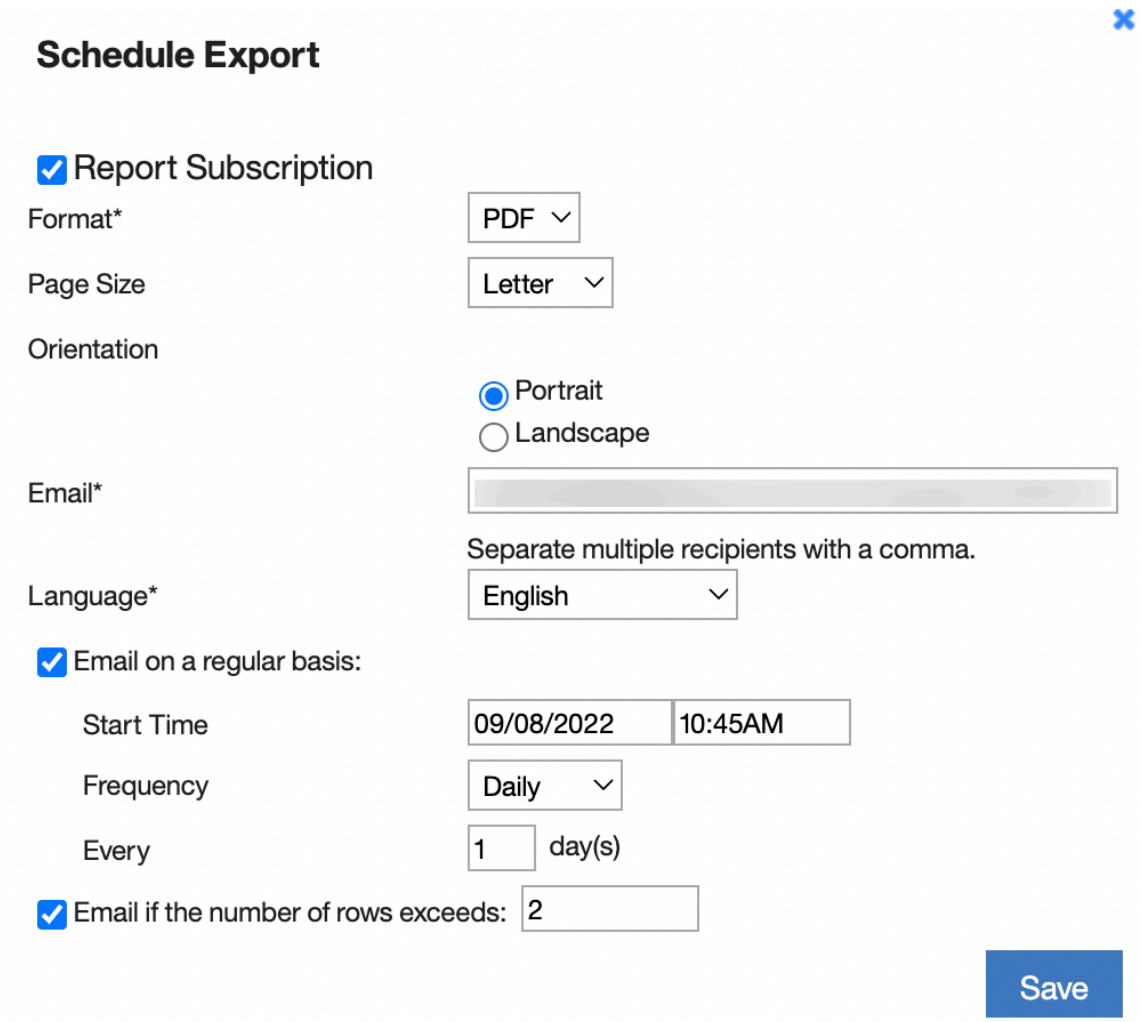

d. Save the configurations.

Configure the connection and credential record

Configure the connection and credential record that contains the information to request access to the BigFix Inventory instance.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **BigFix_Inventory** and click **View Details**.

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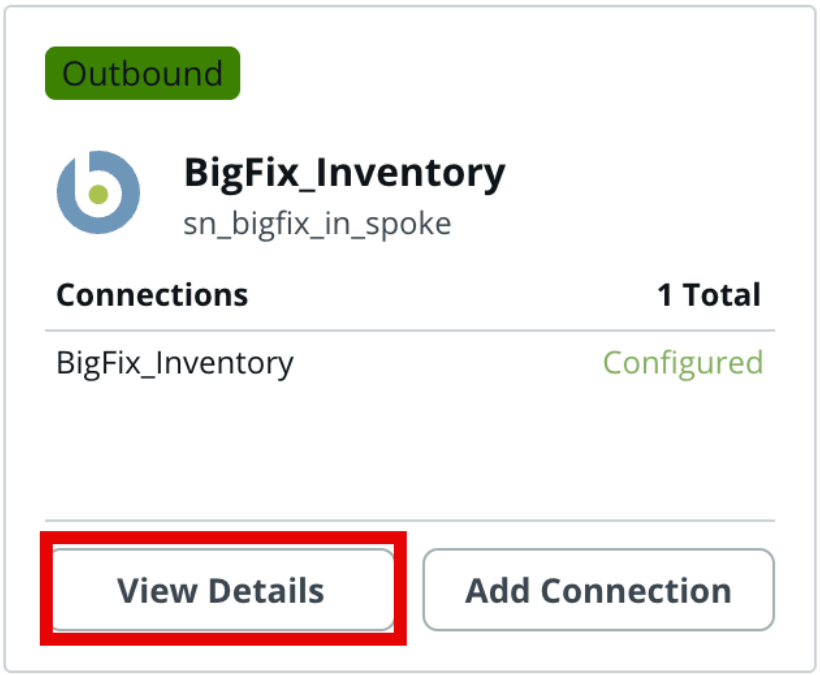
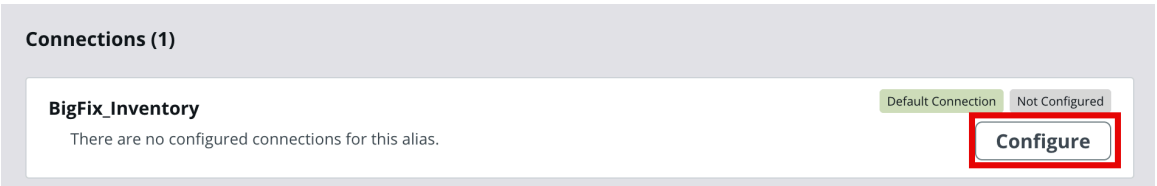
- To configure the default connection and credential alias record that is shipped along with the BigFix Inventory spoke, click **View Details**.



- To manage more than one BigFix Inventory spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the form, fill in these fields:

Field	Value required
Connection Information	
Name	Name of the connection established with the BigFix Inventory instance. The first connection's default name is automatically assigned to match the name specified in the Connections and Credentials form on the Connection & Credential Aliases page. To provide your custom name, create a connection record by selecting `Add Connection`.
URL	The URL your ServiceNow instance uses to connect to the BigFix Inventory instance.
Credential Information	
API Key	The key that your ServiceNow instance requires to access the BigFix Inventory instance. Enter the API key that you had generated in the BigFix Inventory portal. To learn how to generate an API key, seeGenerate an API key.

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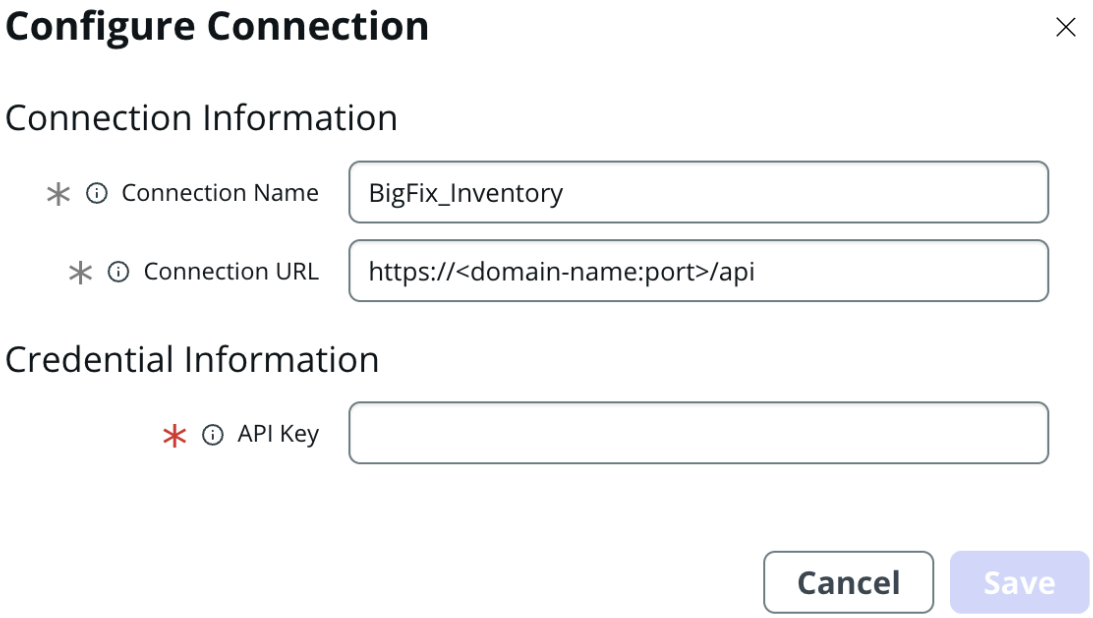

6. Click **Save**.

Blue Prism Spoke

Manage jobs and processes in Blue Prism environment from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Blue Prism spoke v1.0.2 is the latest version. For version history of the spoke, see Blue Prism spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Workflow Studio - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Integration Hub Action Step - SOAP (com.glide.hub.action_step.soap)
- ServiceNow Integration Hub Action Step - XML Parser (com.glide.hub.action_step.xmlparser)

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Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for Blue Prism Process Dispatch Framework version 2.6, but may be compatible with later versions.

Spoke Requirements

Blue Prism account.

Spoke flows and subflows

This spoke has no flows and subflows.

Spoke actions

The Blue Prism spoke provides actions to automate Blue Prism tasks when events occur in ServiceNow. Available actions include:

Spoke actions

Category	Action	Description
Job Management	Get Job Status	Retrieves the status of the specified job.
	List Job Outputs	Retrieves the list of outputs of a job associated with the specified session ID.
	Start Job	Executes a job with the specified inputs on the Blue Prism environment.
Process Management	Get Process Parameters	Retrieves the list of parameters for the specified process on the Blue Prism environment.
	List Processes	Retrieves the list of processes on the Blue Prism environment.
Utilities	Generate Collection Inputs	Creates a formatted string of the collection type. This formatted string is used as input for the Start Job action.

For information about setting up the spoke, see Set up the Blue Prism spoke.

MID Server requirements

To use these actions, your instance must have a MID Server set up and configured to use SOAP. For more information about running actions on the MID Server, see Integration steps. For more information about the MID Server, see MID Server.

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To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Blue Prism spoke

Integrate your ServiceNow instance with the Blue Prism server to have the requests from your ServiceNow instance authenticated.

Before you begin

- Request an Integration Hub subscription.
- Activate the Blue Prism spoke.
- Role required: admin.

Configure Blue Prism application

Configure the Dispatch Framework and Process info utilities in your Blue Prism environment to enable integration with ServiceNow.

Before you begin

Blue Prism Digital Exchange account.

Role required: admin.

Procedure

1. Log in to Blue Prism Digital Exchange.
2. Click **Link to Asset** of Dispatch Framework utility.
   You're redirected to the Dispatch Framework repository on GitHub.
3. Complete the steps mentioned in the Blue Prism Process Dispatch Framework User Guide.
4. Click **Link to Asset** of Process Info utility.
   You're redirected to the Process Info repository on GitHub.
5. Complete the steps mentioned in the Blue Prism Process Info VBO User Guide.
   Your Blue Prism environment is ready for integration with your ServiceNow instance.

Create Connection and Credential record for Blue Prism ProcessInfo

Create a connection and credential record to enable your ServiceNow instance to connect to the Blue Prism ProcessInfo utility. The record is a single form that contains all the information needed to connect to the Blue Prism ProcessInfo utility every time.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection and Credential Aliases**.
2. Open the record for **BluePrismProcessInfo**.
3. From the **Related Links** section, Click **Create New Connection & Credential**.
4. On the form, fill these fields:

Field	Description
Connection Name	Name of the connection. Default value is `Blue Prism Process Info Connection`.

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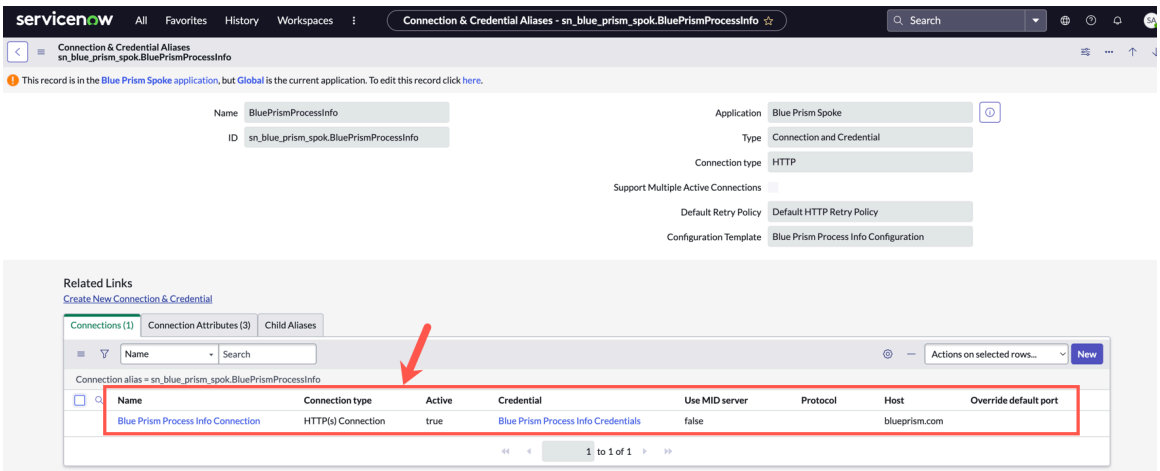
Field	Description
Connection URL	URL used to connect to the connection to the Blue Prism environment.
Database Credential Name	Credential name of the database. Default value is `DB Read User`.
Database Server Address	Database server address in the Blue Prism environment.
Database Name	Name of the database. Default value is `BluePrism`.
Credential Name	Blue Prism Process Info Credentials.
User Name	User name that the Blue Prism Process Info server authenticates.
Password	Password that the Blue Prism Process Info server authenticates.

5. Click **Create**.
   A new connection and credential record is created in the Connections tab. This is the default record unless you create another record and set that as default.

Default connection and credential record created



6. Click to open the record.
7. Enable the **Use MID server** option.

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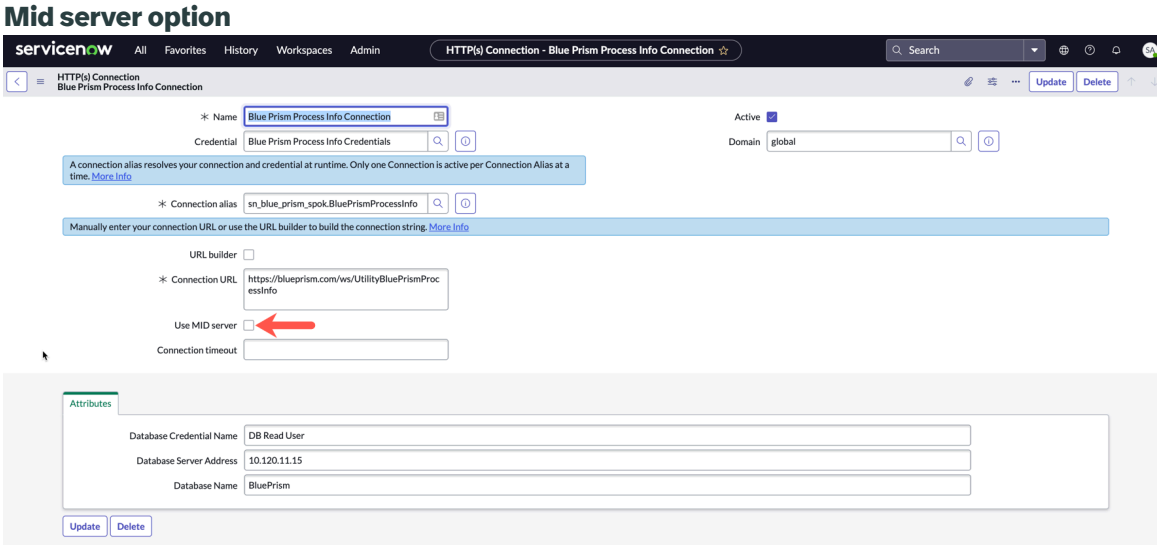

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Create Connection and Credential record for Blue Prism Process Dispatcher

Create a connection and credential record to enable your instance to connect to the Blue Prism Process Dispatcher utility. The record is a single form that contains all the information needed to connect to the Blue Prism ProcessInfo utility every time.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection and Credential Aliases**.
2. Open the record for **BluePrismProcessDispatcher**.
3. From the **Related Links** section, click **Create New Connection & Credential**.
4. On the form, fill these fields:

Field	Description
Connection Name	Name of the connection. Default value is `Blue Prism Process Dispatcher Connection`.
Connection URL	URL used to connect to the Blue Prism environment.
Runtime Credential Name	Credential with runtime access configured in the Blue Prism environment.
Credential Name	Name of the credential. Default value is `Blue Prism Process Dispatcher Credentials`.
User Name	User name that the Blue Prism Process Dispatcher server authenticates.
Password	Password that the Blue Prism Process Dispatcher server authenticates.

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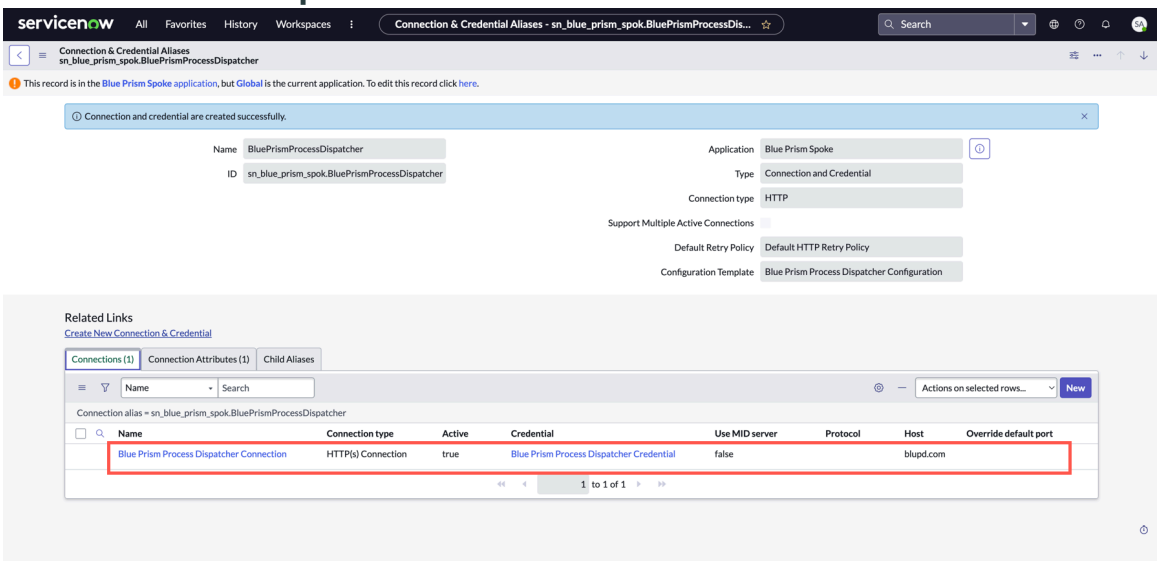
5. Click **Create**.
   A new connection and credential record is created in the Connections tab. This is the default record unless you create another record and set that as default.

Blue Prism Process Dispatcher connection and credential record



6. Click to open the record.
7. Enable the **Use MID server** option.

   To set up the MID Server for this spoke, see Set up MID Server for a spoke.

BMC Remedy Spoke

Manage change requests, incidents, problems, and other records in BMC Remedy from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

BMC Remedy spoke v1.5.0 is the latest version. For version history of the spoke, see BMC Remedy spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

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- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for BMC Remedy AR server version 19.08, but may be compatible with later versions.

Spoke flows

The BMC Remedy spoke provides the Look up Record sample flow to demonstrate retrieving the details of records based on last modified date. To customize the sample flow, copy it to the required application scope.

Spoke subflows

The BMC Remedy spoke provides the Get Incident Request ID sample subflow to demonstrate retrieving the Request IDs of the specified incident numbers. To customize the sample subflow, copy it to the required application scope.

Spoke actions

The BMC Remedy spoke provides actions to perform BMC Remedy tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Change Management	Create Change	Creates a change request in BMC Remedy.
CMDB Management	Get Class Attributes	Retrieves class attributes schema from BMC Remedy.
	Get Classes	Retrieves the list of all non-abstract classes in the BMC Remedy CMDB.
	Get Datasets	Retrieves the list of all datasets in BMC Remedy CMDB.
	Get Namespace	Retrieves the list of all namespaces in BMC Remedy CMDB.
	Look up CMDB Data	Get All Incidents all CMDB data for specified dataset, namespace, and class from BMC Remedy.
Incident Management	Create Incident	Creates an incident in BMC Remedy.
	Get All Incidents	Retrieves details of all incidents from BMC Remedy.
	Update Attachment	Updates the attachment of the required incident in BMC Remedy.
	Get Incident By Number	Retrieves details of the specified incident.
Metadata Retrieval	Get All Objects	Retrieves name and label of all objects in BMC Remedy.

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Category	Action	Description
	Alias Selector	Validates the given alias specific to the BMC Remedy spoke and retrieves the alias if it is valid.
	Get Change Form Fields	Retrieves the list of fields in the Change Interface form table.
	Get Change Status	Retrieves the list of all statuses in the BMC Remedy Change Management.
	Get Change Timing	Retrieves the list of all change timings in BMC Remedy Change Management.
	Get Creatable Fields	Retrieves the list of creatable fields in a required standard or custom BMC Remedy table.
	Get Creatable Objects	Retrieves the list of creatable objects in BMC Remedy.
	Get Impact	Retrieves the list of all impacts in the BMC Remedy.
	Get Incident Form Fields	Retrieves the list of fields in the Incident Interface form table.
	Get Incident Status	Retrieves the list of all statuses in BMC Remedy Incident Management.
	Get Investigation Driver	Retrieves the list of all investigation drivers in BMC Remedy Problem Management.
	Get Object Schema	Retrieves schema of the specified object in BMC Remedy.
	Get Problem Form Fields	Retrieves the list of fields in the Problem Interface form table.
	Get Problem Status	Retrieves the list of all statuses in BMC Remedy Problem Management.
	Get Queryable Fields	Retrieves the list of updatable fields in a required standard or custom BMC Remedy table.
	Get Reported Source	Retrieves the list of all reported sources in BMC Remedy Incident Management.
	Get Risk Level	Retrieves the list of all risk levels in BMC Remedy Change Management.
	Get Service Type	Retrieves the list of all service types in BMC Remedy Incident object.
	Get Token	Generates access token for BMC Remedy.
	Get Updatable Fields	Retrieves the list of updatable fields in the required standard or custom BMC Remedy table.
	Get Urgency	Retrieves the list of all urgencies in BMC Remedy.
Problem Management	Create Problem	Creates a problem in BMC Remedy.
Record Management	Create Record	Creates record of the required type in BMC Remedy.
	Get Record Details By ID	Retrieves details of the specified record.

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Category	Action	Description
	Look up Record	Looks up a record in BMC Remedy based on the query fields.
	Update Record	Updates details of the specified record in BMC Remedy.
Service Request Management	Create Service Request	Creates a service request in BMC Remedy.
	Get Service Request Form Fields	Retrieves the list of fields in the Service Request Interface form table.
	Get Service Request Status	Retrieves the list of all status in the BMC Remedy Service Request management.

Spoke modules

The BMC Remedy spoke adds a BMC Remedy application to your instance and includes these modules:

Module	Description
Credentials	Credential records for the BMC Remedy spoke can be accessed here.
Objects	Information about the objects in BMC Remedy can be accessed here. You can also create an object that can be used in your flows. See Create a BMC Remedy object in your ServiceNow instance for information about creating an object.

Spoke user roles

The Remedy_Admin (sn_bmcremedy_spoke.Remedy_Admin) is available when the BMC Remedy spoke is installed. Users with role can view and create objects in the Objects module.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Two aliases are available when you install the BMC Remedy spoke; one alias is of the **Connection and Credential** type and the other alias is of the **Credential** type. For information about setting up the spoke, see Set up the BMC Remedy spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the BMC Remedy alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the BMC Remedy spoke

Integrate the ServiceNow instance and BMC Remedy by using Remedy credentials to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the BMC Remedy spoke.
- Role required: admin.

Note: Ensure that you perform these steps in the **BMC Remedy Spoke** application scope only.

Create Credential record for the BMC Remedy spoke

Create Credential records for your BMC Remedy application. The BMC Remedy spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the record for the **BMC Remedy spoke** whose **Type** is **Credential**, for example, `BMCRemedy_Credential`.
3. From the **Credentials** tab, click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
4. Select **Remedy Credential**.
5. On the form, fill in the fields.

Field	Value required
Name	Name to uniquely identify the record. For example, `Remedy Cred`.
Active	Option to actively use the credential record.
User name	User name of the BMC Remedy user. **Note:** Administrator user isn't necessary. However, ensure that the BMC Remedy user has permissions to perform the required change, incident, and problem management actions.
Password	Password of the BMC Remedy user's account.
Credential alias	Credential alias record associated with this record.
Token Status	Status of the BMC Remedy token. Select **Active**.
Applies to	MID Servers that can use this credential record.
MID servers	Specific MID Servers that can use this credential record. **Note:** This field appears only when **Specific MID servers** is selected from **Applies to**.

6. Right-click the form header and click **Save**.

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Result
The credential record the BMC Remedy spoke is created.

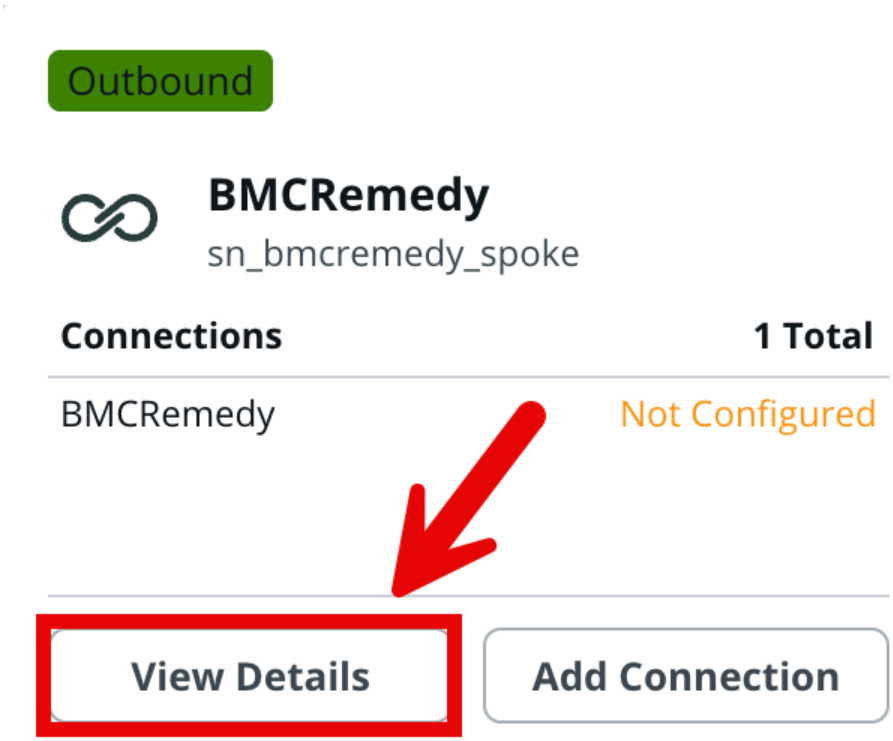
Create Connection record for the BMC Remedy spoke

Create Connection record for your BMC Remedy application. The BMC Remedy spoke connection and credential alias uses this connection to perform actions in BMC Remedy.

Before you begin
Role required: admin.

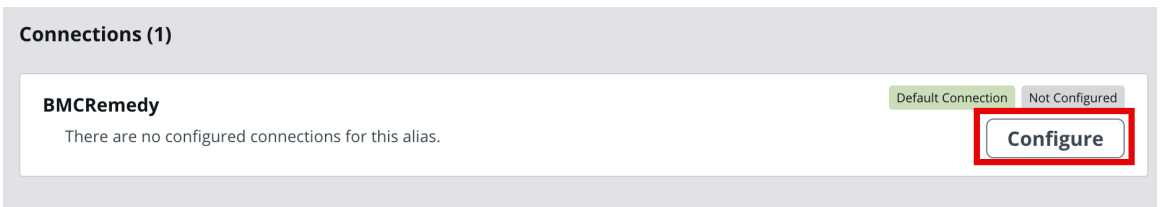
Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **BMCRemedy** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the BMC Remedy spoke, click **View Details**.



   - To manage more than one BMC Remedy spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



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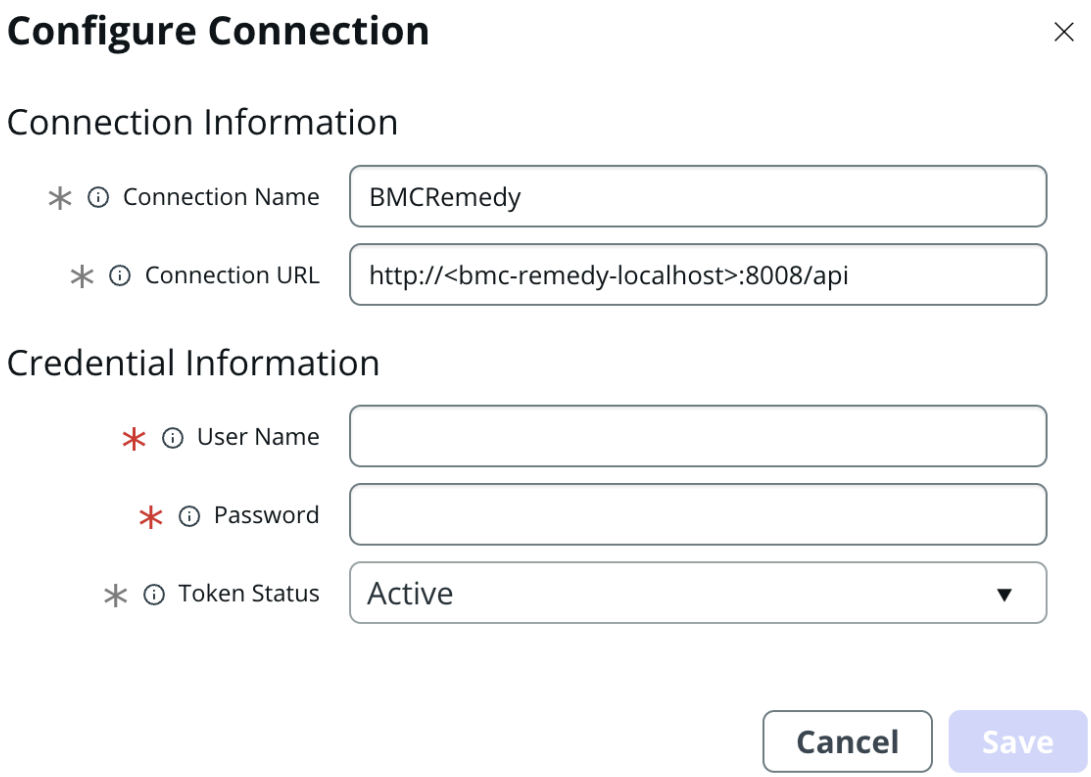
5. On the form, fill in these fields:

Field	Value required
Connection Information	
Name	Auto-generated name to identify the connection record.
URL	URL of the connection website.
Credential Information	
User Name	User name of the BMC Remedy user.
Password	Password of the BMC Remedy user's account.
Token Status	Status of the BMC Remedy token. Select `Active`.



6. Click **Configure and Get OAuth Token**.

Result
The connection record the BMC Remedy spoke is created.

Create a BMC Remedy object in your ServiceNow instance

Manage other objects in BMC Remedy from your ServiceNow instance by creating the required object.

Before you begin
Role required: admin or Remedy_Admin

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About this task

By default, the BMC Remedy spoke supports the change request, incident, and problem objects. To manage other objects, such as Product Catalog, create an object in your ServiceNow instance.

Procedure

1. Navigate to **All** > **BMC Remedy Spoke** > **Objects**.
2. Click **New**.
3. On the form, fill these fields.

BMC Remedy Objects form

Field	Description
Name	Name of the required form. This value is unique to each object. For example, the form value for Product Catalog is PCT : `Product Catalog`.
Label	Label name to identify the record.
Creatable	Option to create records in the object. Select the option to create records and use the object in your flows.

4. Click **Submit**.

Box Spoke

Move attachments to Box where they can be managed as shared documents.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Box spoke v3.7.0 is the latest version. For version history of the spoke, see Box Spoke release notes.

Supported versions

API version v2.

Spoke requirements

Ensure that same languages are selected in your ServiceNow instance and Box account.

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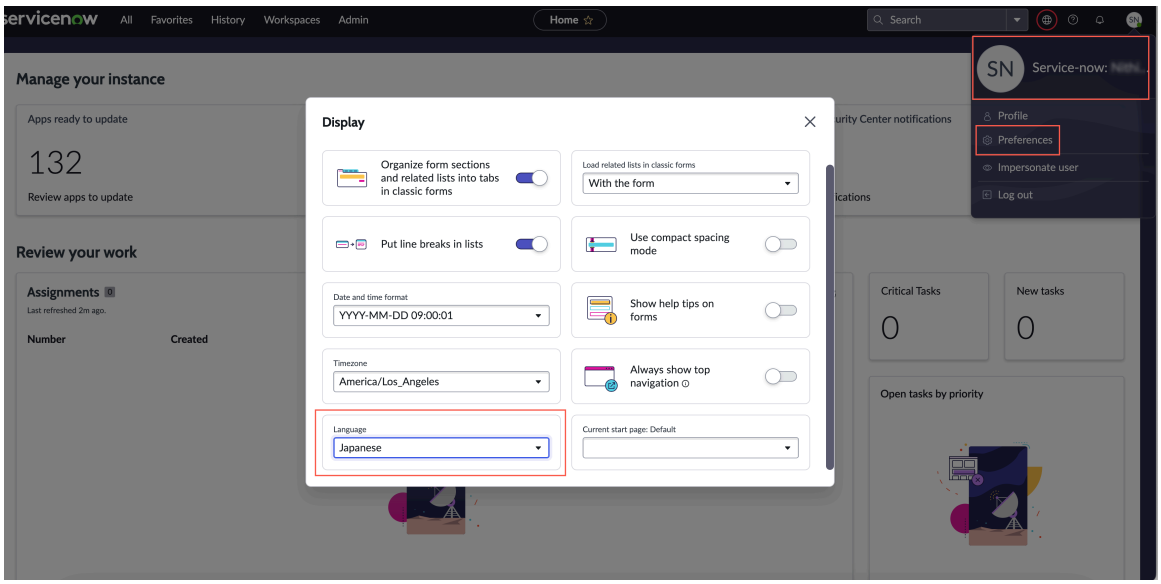
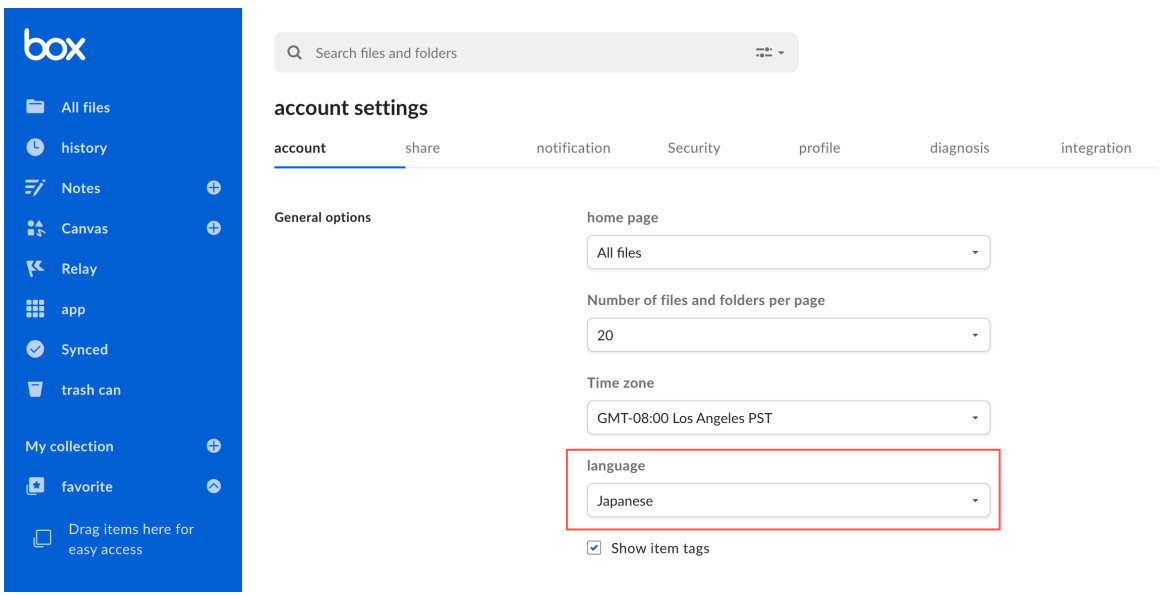
- In your ServiceNow instance, select the required language by navigating to **User Profile** > **Preferences** > **Display**.



- In your Box account, select the required language by navigating to **Account Settings** > **Account** > **General Options**.



Spoke flows

The Box spoke provides sample flows in the draft state to demonstrate automating Box tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Move Attachment when created to Box	Moves attachment files from ServiceNow to Box when a new attachment record is added. Updates the trigger record with a shared link to the moved attachment file on Box.

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Flow	Description
On-boarding user	Creates a user in Box when you create a ServiceNow user in the **Box User** group.

Spoke actions

The Box spoke provides actions to automate Box tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Box AI Management	Ask Question	Sends a prompt to the supported AI models using the provided context and returns a brief answer focused on the user's question.
	Extract Metadata Freeform	Sends a context#aware request to supported AI models and extracts metadata as structured key#value pairs.
	Look up AI Agent Default Configuration	Retrieves the default configuration settings for the specified AI agent.
Box Hub Management	Look up Box Hub Info by ID	Retrieves details for a Box Hub using the specified Hub ID.
	Look up Box Hub Items Stream	Retrieves all items associated with the specified Box Hub.
	Look up Box Hubs Stream	Retrieves all Box Hubs available to the requesting user based on the Box credentials used to generate the access token.
Document Management	Add Metadata to File	Stores the provided attributes information by adding it as metadata for Box files.
	Attach Box File to Record	Copies a file from Box and attaches it to the specified ServiceNow record.
	Lookup File ID	Retrieves the ID of the specified file in Box.
	Move Owned Item	Moves all items owned by the specified user in Box to the specified folder.
	Remove File	Removes the specified file from Box.
	Search Content Stream	Searches for files, folders, web links, and shared files across the user's content or across the entire enterprise.

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Category	Action	Description
	Upload File	Uploads the specified file to Box.
	Look up Archives Stream	Retrieves all available archives from the Box application.
Document Sharing	Add Collaborator	Grants a user or group a specified level of access to a particular file or folder. Collaborators have one of these access levels. • Co-Owner • Editor • Previewer • Preview Uploader • Uploader • Viewer • Viewer Uploader
	Create Shared Link	Create a direct and read-only link to a file or folder in Box.
	Look up Folder Collaborators By ID	Retrieves all the collaborators associated to the specified folder ID.
	Remove Collaborator	Removes the specified collaboration from a file or folder in Box.
File Management	Look up File Information	Retrieves detailed information for the specified file.
Folder Management	Create Folder	Creates a folder in Box on behalf of the specified Box user account.
	Delete Folder	Deletes the specified folder in Box.
	Lookup Folder ID	Retrieves the ID of the specified folder in Box. **Note:** Items added to Box require 10 minutes to become accessible. For example, if one action creates a folder, a Lookup Folder ID action won't return results until after 10 minutes have passed.

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Category	Action	Description
	Look up Folder Information	Retrieves details for the specified folder.
	Look up Folder Items Stream	Retrieves all items within the specified folder, including files, subfolders, and web links.
Group Management	Create Group	Creates a group in Box with the specified invitation preferences.
	Delete Group	Deletes the specified group in Box.
	Update Group	Updates the specified group in Box with the specified preferences.
Legal Hold Management	Assign Legal Hold Policy	Assigns a legal hold policy to a file, file version, folder, or user.
	Create Legal Hold Policy	Creates a legal hold policy.
	Look up All Legal Hold Policies Stream	Retrieves a list of legal hold policies of an enterprise.
	Look up Legal Hold Policy Assignment by ID	Retrieves a legal hold policy assignment for the specified ID.
	Look up Legal Hold Policy Assignments Stream	Retrieves a list of items assigned to a legal hold policy.
	Look up Legal Hold Policy by ID	Retrieves a legal hold policy for the specified ID.
	Remove Legal Hold Policy	Deletes an existing legal hold policy.
	Unassign Legal Hold Policy	Removes the assignment of an item to a legal hold.
	Update Legal Hold Policy	Updates a legal hold policy.
Metadata Management	Look up Metadata Instance on File By File ID	Retrieves the metadata instance of the file with the specified file ID.
	Look up Metadata Instance on File by Scope and Template Key	Retrieves the metadata instance of a folder with the specified scope and template key.
	Look up Metadata Instance on Folder By Folder ID	Retrieves all the metadata of the folder with the specified folder ID.

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Category	Action	Description
		Note: Don't use this action on a root folder that has a folder ID value as zero.
	Look up Metadata Instance on Folder by Scope and Template Key	Retrieves all the metadata of a folder with the specified scope and template key.
	Query Files or Folders by Metadata Stream	Searches for files or folders using SQL-like syntax and returns the matching results.
Retention Policy Management	Assign Retention Policy	Assigns a retention policy to an item.
	Create Retention Policy	Creates a retention policy.
	Look up Retention Policies	Retrieves all the retention policies of an enterprise.
	Look up Retention Policy Assignment By ID	Retrieves the retention policy with the specified ID.
	Look up Retention Policy Assignments Stream	Returns a list of all retention policy assignments associated with a specified retention policy.
	Look up Retention Policy by ID	Retrieves the retention policy with the specified ID.
	Update Retention Policy	Updates a retention policy.
User Management	Add User to Group	Adds the specified user to the specified group in Box.
	Create User	Creates a user account in Box.
	Delete User	Deletes the specified user in Box.
	Disable User	Sets the status of the specified user in Box to inactive.
	Enable User	sets the status of the specified user in Box to active.
	Lookup User ID	Retrieves the ID of the specified user in Box.
	Update User	Updates the specified user in Box with the specified role changes.
Webhook Management	Create Webhook	Creates a webhook.
	Look up Webhook By ID	Retrieves the webhook with the specified ID.

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Category	Action	Description
	Look up Webhooks Stream	Retrieves all the defined webhooks for the specified application.
	Remove Webhook	Removes a webhook.
	Update Webhook	Updates a webhook.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Box user management AI agent	Manages user management tasks (that is, adds a user to group, enables a user, create user, delete user, update user, look up user ID, disable user) in Box.
Box folder management AI agent	Manages folder management tasks (that is, create a folder, look up the folder ID, delete a folder) in Box.
Box document sharing AI agent	Manages document sharing tasks (that is, remove a collaborator, add a collaborator, create a shared link, look up the folder collaborators by ID) in Box.
Box group management AI agent	Manages group management tasks (that is, update a group, create a group, delete a group) in Box.
Box metadata management AI agent	Manages metadata retrieval tasks (that is, look up a metadata instance on a file by scope and template key, look up a metadata instance on a folder by folder ID, look up a metadata instance on a folder by scope and template

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AI agent	Description
	key, look up a metadata instance on a file by file ID) in Box.
Box retention policy management AI agent	Manages retention policy management tasks (that is, update a retention policy, look up a retention policies stream, look up a retention policy assignment by id, look up a retention policy by id, look up a retention policy assignments stream) in Box.
Box document management AI agent	Manages document management tasks (that is, remove a file, attach a box file to a record, upload a file, move an owned item, search a content stream, look up a file ID, add metadata to a file) in Box.
Box legal hold management AI agent	Manages legal hold management tasks (that is, create a legal hold policy, look up a legal hold policy assignment by ID, update a legal hold policy, look up all legal hold policies stream, look up a legal hold policy by ID, unassign a legal hold policy, remove a legal hold policy, look up a legal hold policy assignments stream) in Box.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke triggers

ServiceNow supports specific events on Box that create triggers. You must first configure a flow with a supported trigger definition. When an event, for example, a push request, occurs on the Box, it sends the payload via a webhook to the ServiceNow instance. After that, the flow that you configured is triggered at the ServiceNow instance to automate a workflow. The supported events are:

Category	Trigger	Description
File Management	File Downloaded	Flow is triggered when a file is downloaded.
	File Locked	Flow is triggered when a file is locked.
	File Moved	Flow is triggered when a file is moved.
	File Renamed	Flow is triggered when a file is renamed.
	File Unlocked	Flow is triggered when a file is unlocked.
	File Uploaded	Flow is triggered when a file is uploaded.

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Category	Trigger	Description
Folder Management	Folder Created	Flow is triggered when a folder is created.
	Folder Downloaded	Flow is triggered when a folder is downloaded.
	Folder Moved	Flow is triggered when a folder is moved.
	Folder Renamed	Flow is triggered when a folder is renamed.

For information about setting up the triggers for the Box spoke, see Set up triggers for the Box spoke. For more information about inbound integration, see Conditional and event-driven inbound integration.

Spoke user roles

The following user roles are available with the spoke:

- Policy User (sn_box_spoke.box_policies_user): Users with this role have access only to **Retention Policies** module.
- Legal Hold Policy User (sn_box_spoke.legal_hold_policy_user): Users with this role have access only to the **Legal Hold Policies** module.
- Box Webhook Registry User (sn_box_spoke.box_webhook_registry_user): Users with this role have access only to the **Box Webhook Registry** module.

Box spoke module

Bi-directional webhooks can be set up to be notified about the required events. A webhook registry defines the conditions that must be met to notify the ServiceNow app. These conditions are based on the events in Box that you want to be notified about. When the conditions are met, the specified trigger name triggers the associated subflow, which in turn automates the Box tasks.

Webhooks require separate setup and can be used independently without using the spoke actions. The Box spoke adds the Box Spoke application to your instance and includes the following modules.

Box module

Module	Description
Box Webhook Registry	Create and view the Box webhooks in ServiceNow.
Legal Hold Policies	View the list of available Box legal policies.
Retention Policies	View the list of available Box retention policies.

Box account requirements

The Box spoke requires creating a custom app on your Box account to generate OAuth 2.0 tokens. See Create an OAuth application.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the following alias records to authorize actions.

Connection & Credential alias	Description	Connection alias requirements
Box	Connection to the Box Collaboration and File Management APIs.	• Connection type: HTTP • Connection URL: https://api.box.com
Box Upload	Connection to the Box upload service.	• Connection type: HTTP • Connection URL: https://upload.box.com

To use the spoke connection aliases, create an associated Connection record and an associated Credential record for each alias. For information about setting up the spoke, see Set up the Box spoke.

Set up the Box spoke

Integrate your ServiceNow instance and the Box APIs to automate the Box spoke actions. For example, you can set up a flow that removes a file in your Box account. When you set up the Box spoke, this flow is automated.

Before you begin

- Request an Integration Hub subscription.
- Activate the Box spoke.
- Access to Box developer's console.
- Role required: admin.

Create an OAuth application

Create a custom OAuth application from your Box account to enable OAuth 2.0 authentication with the Box spoke.

Before you begin

Box requirements:

- Box account
- Box administrator credentials
- Role required: admin

About this task

Complete these steps from your Box account. See the Box Developer Portal documentation for instructions on creating and configuring custom applications.

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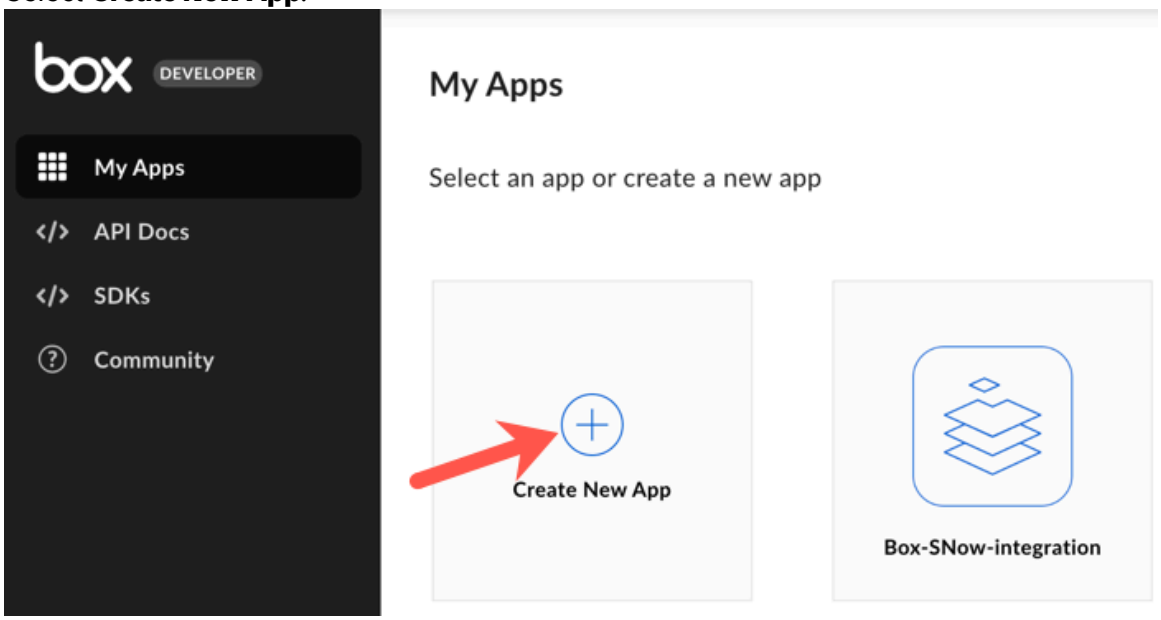
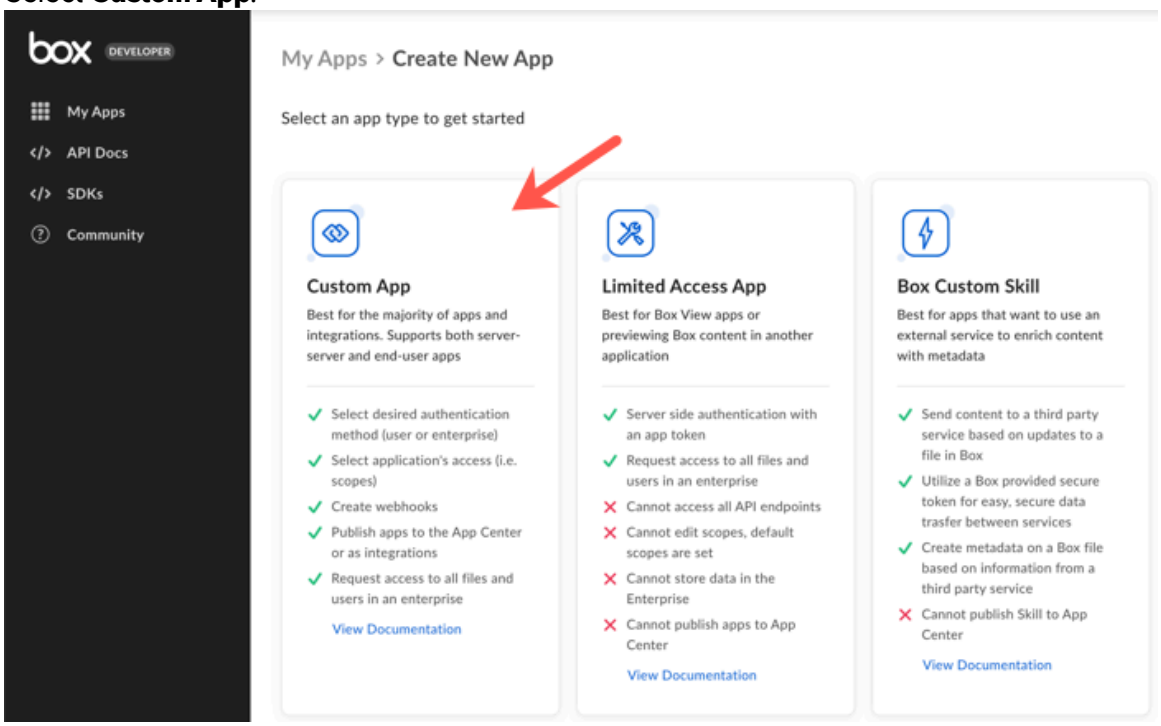
Procedure

1. Log in to the Box developer's console.
2. Select **Create New App**.



3. Select **Custom App**.



4. Complete the form.

Field	Value
App Name	`Box App`

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Field	Value
Description (optional)	Leave this field empty
Purpose	Select**Custom Portal**

5. Select **Next**.
   The Create a Custom App modal appears.
6. Select **User Authentication (OAuth 2.0)**.
7. To confirm, select **Create App**.
   You are in your application's configuration settings.
8. In the OAuth 2.0 Credentials section, copy the Client ID and Client Secret.

   You need this information to register the application as a third-party OAuth provider on your ServiceNow instance.
9. In the Application Scopes section, enable the scope permissions you want to support.

Application Scopes	Use for
Read and write all files and folders stored in Box	Document management, document sharing, and folder management actions
Manage users	User management actions
Manage groups	Group management actions
Manage enterprise properties	Document sharing, group management, and user management actions
Manage webhooks	Configuring V2 webhooks
Manage AI	Interact with Box AI actions

10. Select **Save Changes**.

Configure a connection record for the Box spoke

Add and configure a Box connection to authenticate ServiceNow requests in a Box spoke.

Before you begin
Role required: admin

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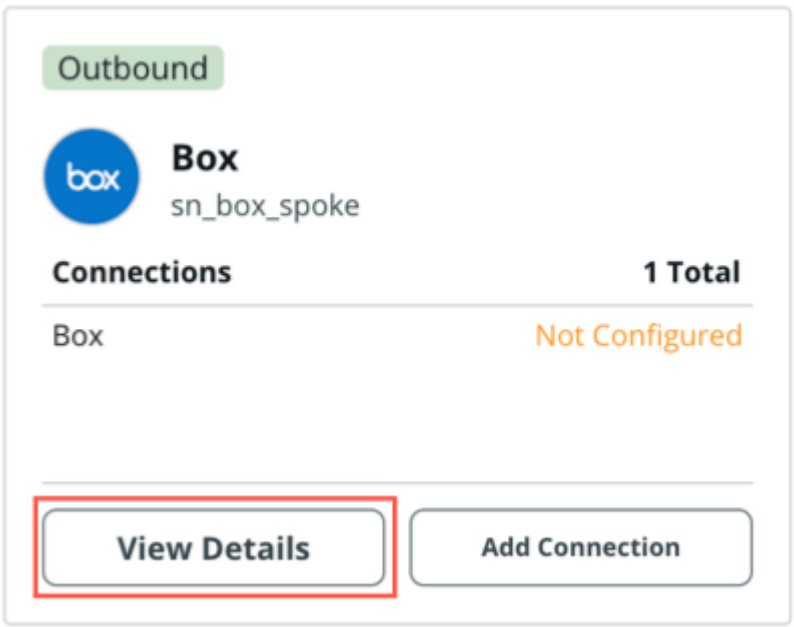
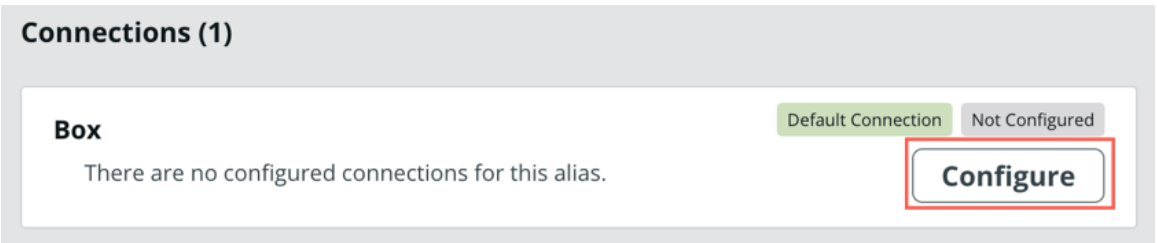
Procedure

1. In your ServiceNow instance, navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Box** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Box spoke, click **View Details**.



   - To manage more than one Box spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the form, fill these values.

Field	Value
Connection Name	`Box`.
Connection URL	The instance URL in this format:`<provider-domain-name>.net`.

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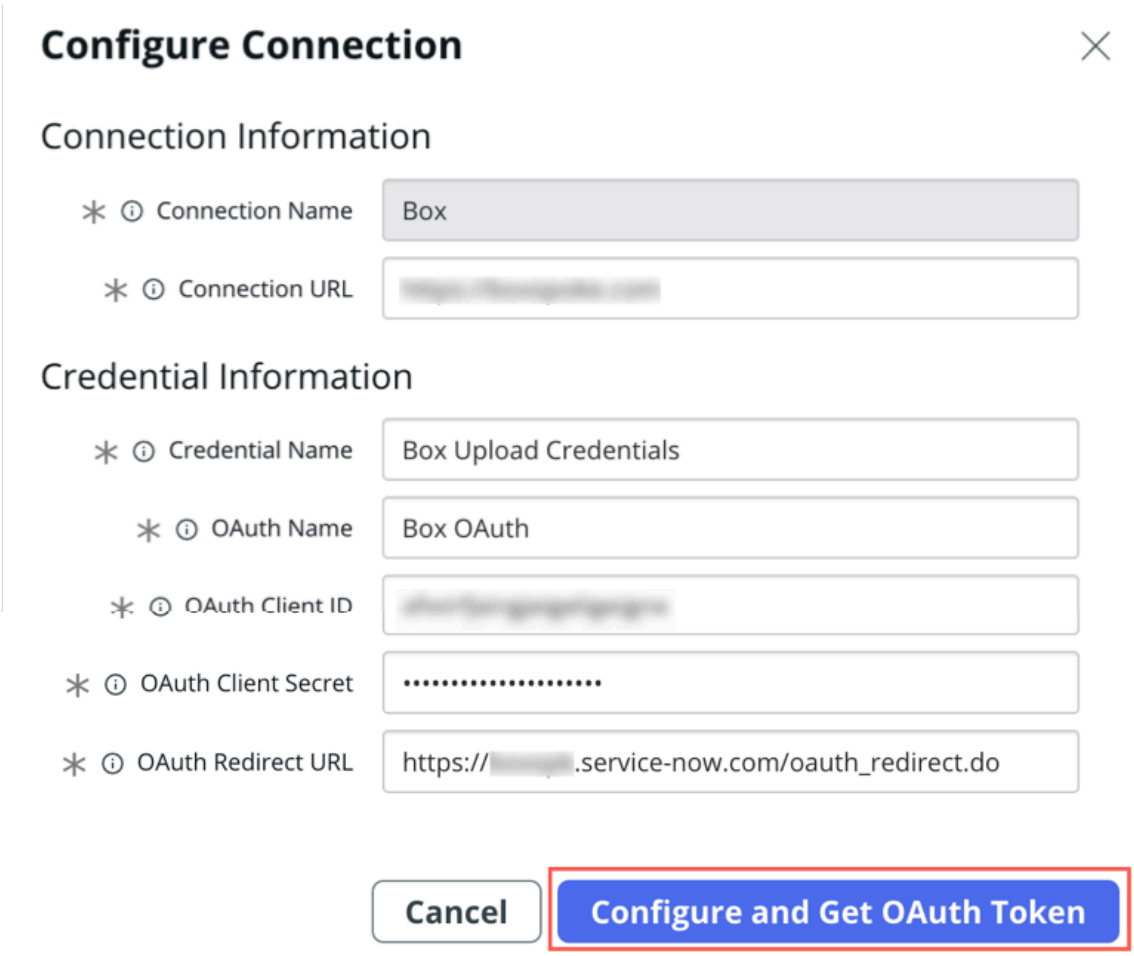
Field	Value
Credential Name	`Box Upload Credentials`.
OAuth Name	`Box OAuth`.
OAuth Client ID	The application client ID. For more information, see Create an OAuth application.
OAuth Client Secret	The application client secret. For more information, see Create an OAuth application.
OAuth Redirect URL	The URL in this format: `https://<ServiceNow-instance-name>.service-now.com/oauth_redirect.do`. Replace `<ServiceNow-instance-name>` with your ServiceNow instance name.



6. Click **Configure Connection**.

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Result
The spoke connection is configured and ready to be used.

Note: OAuth tokens expire after 30 days. An administrator can regenerate the spoke OAuth token every 30 days.

Regenerate Box OAuth token

Regenerate the Box OAuth token when it expires. The Box spoke OAuth token expires every thirty days.

Before you begin
Role required: admin

Procedure
1. In your ServiceNow instance, navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select the **Connections** tab.
3. Search for the **Box** connection alias.
4. Select **View Details**.
5. Select **Get OAuth Token** for the connection.

Result
The Box spoke receives a new OAuth access token. It expires in 30 days.

Integrate ServiceNow instance with JWT Bearer grant type

Set up an OAuth provider with the JWT Bearer grant type to integrate your ServiceNow instance with Box.

Before you begin
Role required: admin

Procedure
1. Do the steps at the Box end.
   a. Sign Up for Box Developer Account.
   b. On the Developer Console, select **Custom App** .
   c. Confirm that the authentication method is OAuth 2.0 with JWT (Server Authentication).
   d. Enter a unique name for the app and create the app.
   e. View the app.
   f. On OAuth 2.0 Credentials, copy the Client ID and Client Secret.
   g. Create a new keystore and export a public key from that into BOX.
   h. Note the enterpriseID under the App Settings.
   i. Navigate to **My apps** > **<App Name>** > **General** > **Submit for Authorization**.
   j. Select your account name on the top of the Admin Console.
   k. In your account, create a folder and upload a text file.
2. Do the steps at the ServiceNow instance end.
   a. Navigate to **System Definition** > **Certificates** > **New** > **Type** > **Storepass**.
   b. Attach the keystore certificate.

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c. Configure a JWT signing key by navigating to **System OAuth** > **JWT Keys** > **New**.

d. Create OAuth application registry entry by navigating to **System OAuth** > **Application Registry** > **New** > **Connect to a third party OAuth Provider** > **Default Grant type (JWT Bearer)**.

e. Under the OAuth entity profile (oauth_entity_profile) associate the created 'jwt provider'.

f. Create a REST message.

g. In the REST Message, select **Get OAuth token** to get the access token.

h. Go to the 'Default GET' method and click on 'Test'.

i. An the BOX end, share the folder and file.

Set up a bi-directional webhook for the Box spoke

Configure a webhook to subscribe to Box with a ServiceNow callback URL.

Before you begin

- Request an Integration Hub subscription.
- Activate the Box spoke.
- Role required: admin.

Add an endpoint URL in a Box account

Specify an endpoint URL in your Box account to create a webhook for Box spoke.

Before you begin

Role required: admin

Procedure

1. Log in to the Box developer's console.
2. Create an app according to your requirements.

   For more information about app creation, see Create an OAuth application.
3. Generate a primary Key and secondary Key for your app and record the values.

   a. In **My Apps**, select the application.
   You are in your application's **General Settings**.

   b. Navigate to **Webhooks**.

   c. Select **Manage Signature Keys**.

   d. In the Primary Key section, select **Generate Key**.

   e. In the Secondary Key section, select **Generate Key**.

   f. Copy and save both key values for later.
4. Navigate to the **Webhooks** section.
5. To create a V1 webhook, select **Create Webhook** and select **V1**.

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a. Complete the fields.

Field	Value
Name	`Update Chatter feed`
Description	`Automatically updates your Chatter feed when a change occurs`
Event Type	Enable at least one option
Endpoint URL	The endpoint URL of the ServiceNow instance in the following format: `https://<instance-name>.service-now.com/api/sn_box_spoke/box_spoke_webhook_endpoints/webhook_endpoint`
Payload format	Select the appropriate payload data format
Callback Parameters	Select **add callback parameter** to configure any GET or POST methods

b. Select **Save Webhoook**.

6. To create a V2 webhook, select **Create Webhook** and select **V2**.

> **Note:** To create a V2 webhook, you must enable **Manage webhooks** in the **Configuration** settings. For more information, see Create an OAuth application.

a. For the URL Address, enter the endpoint URL of the ServiceNow instance in the following format: `https://<instance-name>.service-now.com/api/sn_box_spoke/box_spoke_webhook_endpoints/webhook_endpoint`.

b. For The type of item to trigger a webhook, select **Choose an item**.

c. Select the webhook configured file or folders.

d. To confirm select **Choose**.
A list of configured webhook triggers display in the **Create a Webhook** page.

e. Enable the appropriate GET and POST methods for each trigger.

f. To confirm, select **Create Webhook**.

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Result
The endpoint URL is added in your Box account. You can create webhook registries and subflows according to your requirements.

Register a Box webhook in ServiceNow

Create a Box webhook registry in ServiceNow to notify the ServiceNow app when certain events occur in your Box account.

Before you begin
Role required: admin.

Procedure

1. In your ServiceNow, navigate to **All** > **Box** > **Box Webhook Registry**.
2. Select **New**.
3. Fill in the fields.

Field	Value
Name	Optionally, name the webhook registry
Trigger Name	Select the appropriate event trigger
Primary Key	The primary key that you generated in Add an endpoint URL in a Box account
Flow Name	The flow that occurs when the event triggers
Secondary Key	The secondary key that you generated in Add an endpoint URL in a Box account
Description	Optionally, describe the purpose of the record

4. To confirm, select **Submit**.

Result
The Box webhook is registered in your ServiceNow instance.

Set up triggers for the Box spoke

Set up the trigger to generate the secret and callback URL on your ServiceNow instance.

Before you begin

- Request an Integration Hub subscription.
- Activate and set up the Box spoke.
- Role required: admin.

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Configure secret and callback URL in Box

Set the secret and callback URL to enable Box to securely send webhooks to your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Log in to the Box account.
2. Create a custom application.
   a. Click **Dev Console**.
   b. Under **My Platform Apps**, click **Create Platform App**.
   c. Click **Custom App**.
   d. On the Create a Custom App form, provide app details.
      Provide a name for **App Name** and select **Custom Portal** for **Purpose**.
   e. Click **Next**.
   f. Select **Server Authentication (with JWT)** for **Authentication Method** and click **Create App**.
      The custom application is created and the **Configuration** tab is displayed.
   g. Copy the value of **Client ID** from the **Configuration** tab.
3. Authorize the custom application.
   a. Navigate to the **Admin console** from the Box account homepage.
   b. Click **Integrations**.
   c. Under the **Platform Apps Manager**, click **Server Authentication App**.
   d. Click **Add Platform App**, paste the value of **Client ID**, and click **Next**.
      The custom application details are displayed.
   e. Click **Authorize**.
4. Provide the required application scopes to the custom application.
   a. In the **Configuration** tab, for **Application Scopes** select the **Write all files and folders stored in Box**, **Manage signature requests**, **Manage webhooks**, and **Enable integrations** options.
   b. Click **Save Changes**.
5. Generate primary key for the custom application.
   a. In the **Webhooks** tab, click **Manage Signature Keys**.
   b. Under **Primary Key**, click **Generate Key**.
   c. Click **Copy** to copy the value of **Primary Key** and record it for later use.

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6. Create a webhook for the custom application and add ServiceNow endpoint URL.

   a. In the **Webhooks** tab, click **Create Webhook** and select **V2**.

   b. For **URL Address** under **Configuration**, enter ServiceNow endpoint URL in this format: `https://<ServiceNow-Instance-Name>.service-now.com/api/sn_box_spoke/box_external_trigger?X-SkipCookieAuthentication=true`.

   c. For **Content Type**, select either file or folder as per your requirement. Flow events differ based on the selected **Content Type**.

   d. Select the required triggers that are associated with the selected **Content Type**.

   e. Click **Create Webhook**.

Activate the trigger definition on ServiceNow instance for the Box spoke

Activate the trigger definition to generate the secret and callback URL on your ServiceNow instance for the Box spoke.

Before you begin

Role required: flow_designer and connection_admin.

About this task

Box uses the secret and callback URL to securely send the payload to the ServiceNow instance. The ServiceNow instance verifies the secret that Box sends and accepts the payload.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. Toggle and enable the **Inbound** tab.
4. Locate the **Box Spoke** card and select **View Details**.
5. Select **Configure**.
6. In the **User** field, select the user name on whose behalf the inbound session or flow is triggered.
7. In the **Secret** field, paste the value of **Primary Key** that was generated in the Box account. The secret is used to sign the payload of the webhook.
8. Select **Activate**.
   The callback URL is generated in the URL field.

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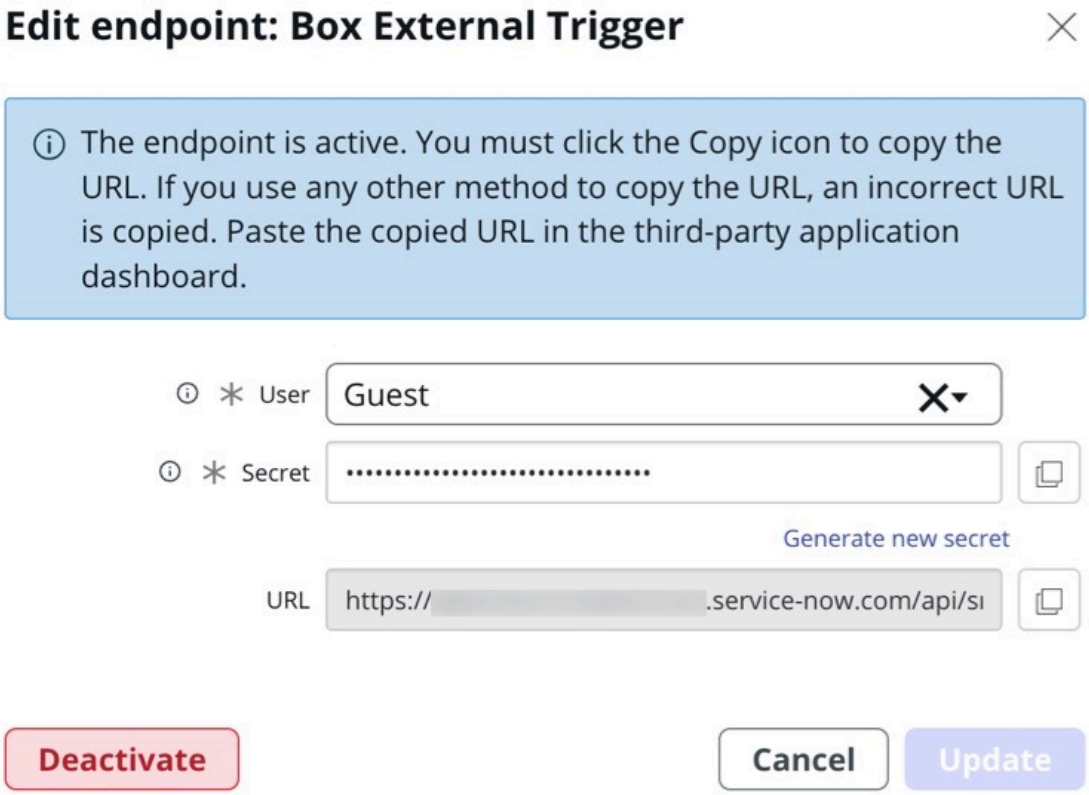

9. Close the window.

Calendly Spoke

The Calendly spoke provides actions to view and analyze meaningful usage data for Calendly software subscriptions. Analyze usage for a Calendly account to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Calendly spoke v1.3.1 is the latest version. For version history of the spoke, see Calendly spoke release notes.

Spoke requirements

- Organization owner or admin role in Calendly
- LastPass Enterprise admin account

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Calendly spoke provides actions to automate Calendly tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Event Management	Cancel Event	Cancels the specified event.
	Look up Event	Retrieves the details of a specified event.
	Look up Scheduled Events Stream	Retrieves details about all scheduled events within an organization.
User Management	Invite User to Organization	Invites the specified user to the organization.
	Look up Organization	Retrieves the URI of the organization that the authenticated user currently belongs to.
	Look up Organization Members Stream	Retrieves details about all members within an organization.
	Look up User	Retrieves the details of the specified user.
	Remove User from Organization	Deletes a user's organization membership.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Calendly spoke.

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Set up the Calendly spoke

Set up an outbound integration between your ServiceNow instance and the Calendly APIs by creating an OAuth application in Calendly and a connection and credential record on your ServiceNow instance.

Before you begin

- Request an Integration Hub subscription.
- Activate the Calendly spoke.
- Ensure that you have a Calendly account.
- Role required: admin.

About this task

After setting the outbound integration, you can set up a flow on the Workflow Studio using the Calendly spoke actions and automate tasks in Calendly. For example, you can set up a flow that cancels an event on Calendly. The connection and credentials record contains the credentials to establish a connection with the Calendly APIs before you automate the tasks on Calendly. The OAuth application authenticates the connection request from your ServiceNow instance.

Set up an OAuth application in Calendly

Set up an OAuth application that authenticates requests from your ServiceNow instance.

Before you begin

Role required: Calendly organization owner or admin

Procedure

1. Go to https://developer.calendly.com/ .
2. Log in to the developer portal.
3. Select **+ Create new app**.
4. Fill the form.

Calendly OAuth app

Field	Description	Mandatory?
Name of app	Custom name of the OAuth application.	Yes
Kind of app	Type of application the OAuth app will support. Select **Web**.	Yes
Environment type	Type of environment in which the OAuth app will be deployed.	Yes
Redirect URI	The URL of your ServiceNow instance.	Yes

5. Select **Save & Continue**.
   The client ID and client secret that you use in the connection and credentials record are generated.
6. To copy the client ID, select **Copy**.
7. To copy the client secret, select **Copy**.

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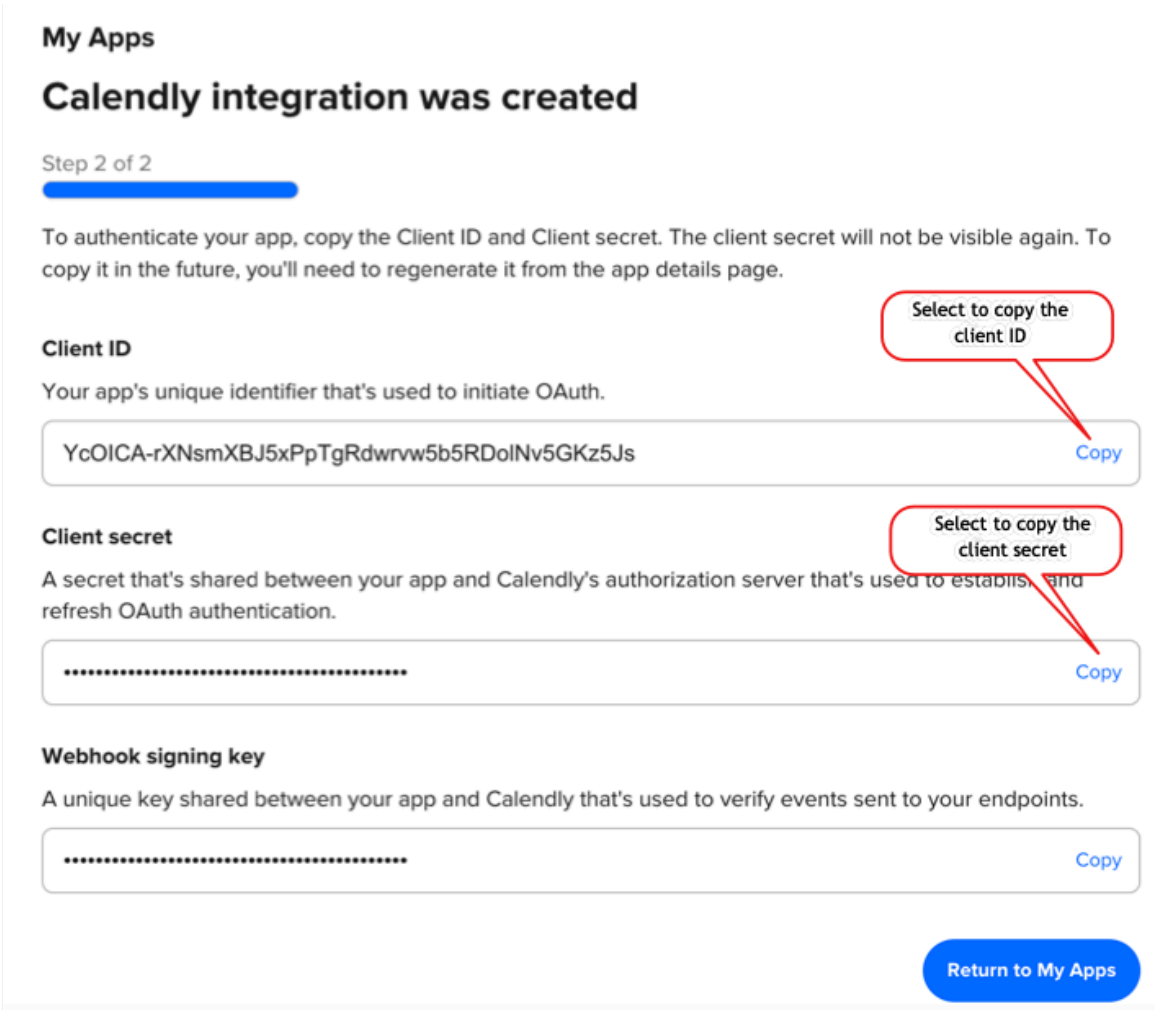
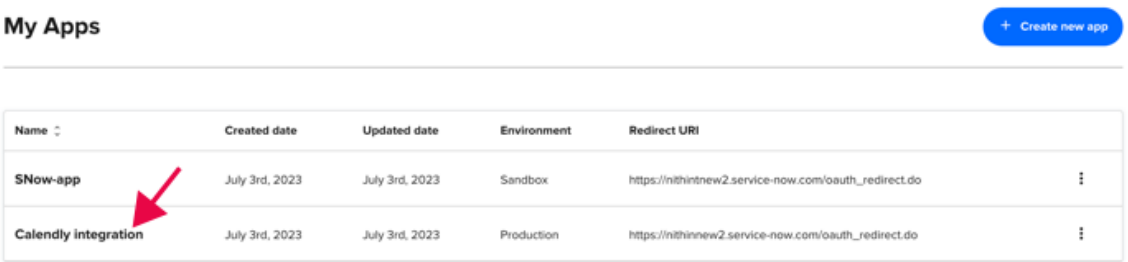


8. Select **Return to My Apps**.
   The OAuth app is created.



Create a connection and credential record

Create a connection and credential record that contains the details required to access the Calendly APIs.

Before you begin

Role required: ServiceNow admin

Procedure

1. Log in to your ServiceNow instance.
2. Navigate to **Process Automation** > **Workflow Studio**.
3. Select **Integrations**.

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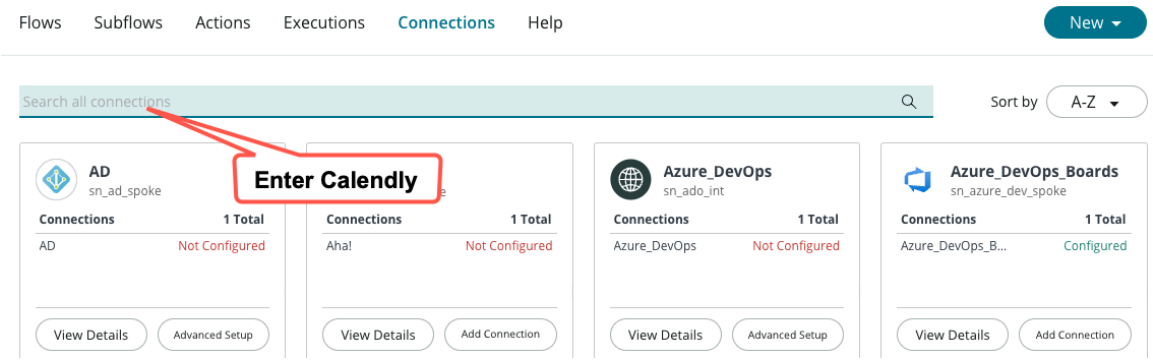
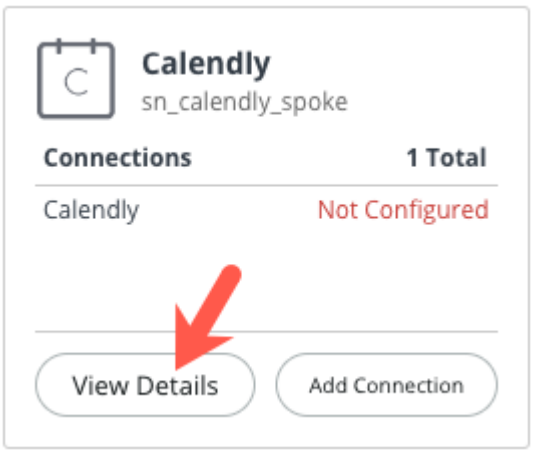
4. In the Search all connections field, enter `Calendly`.

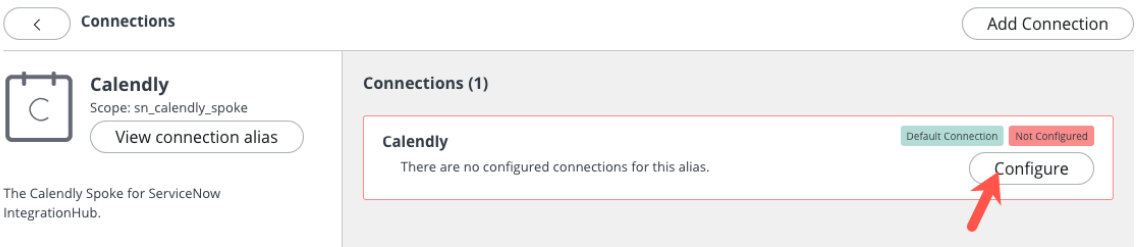


The **Outbound** tab is enabled by default. Confirm that the **Outbound** tab is enabled already.

5. On the Calendly card, select **View Details**.



6. Select **Configure**.



7. Fill the form.

Create Connection and Credential dialog box

Field	Description
Connection Name	Name of the connection. **Note:** The first and default connection name is read-only. To provide a custom name, create a connection by selecting **Add Connection**.
Connection URL	Base URL for the Calendly Application Programming Interface (API). This field is automatically set to `https://api.calendly.com`.
OAuth Client ID	Client ID that you had generated on the Calendly developers portal.

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Field	Description
	To learn how to generate a client ID, see Set up an OAuth application in Calendly.
OAuth Client Secret	Client ID that you had generated on the Calendly developers portal. To learn how to generate a client secret, see Set up an OAuth application in Calendly.
OAuth Redirect URL	URL of the OAuth provider that users are redirected to after authentication. This field populates automatically based on your instance name.

8. Select **Configure and Get OAuth Token**.
9. Select **Connect to Calendly**.
   The OAuth refresh token becomes available.



10. To get the OAuth token, select **Get OAuth Token**.

> **Important:** To get the OAuth token, log in to https://calendly.com/app/login with your licensed account credentials.

Cisco Webex Meetings Spoke

Manage users of the Cisco Webex Meetings application. Get a list of all users, view user activity, and deactivate user accounts.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Cisco Webex Meetings spoke v2.3.3 is the latest version. For version history of the spoke, see Cisco Webex Meetings spoke release notes.

Supported versions

Webex Meetings XML API

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Spoke actions

The Cisco Webex Meetings spoke provides actions to automate Webex tasks when events occur in the ServiceNow AI Platform. Available actions include:

Category	Action	Description
Training Management	Look up Trainings Stream	Retrieves details of all scheduled training sessions.
Support Session Management	Look up Support Sessions Stream	Retrieves details of the previously hosted support sessions.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Webex Meetings account requirements

The Cisco Webex Meetings spoke requires creating a custom app in Cisco DevNet to generate OAuth 2.0 tokens. See Create a Webex OAuth application in Cisco DevNet.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the Webex alias record to authorize actions. For information about setting up the spoke, see Set up Cisco Webex Meetings spoke.

Set up Cisco Webex Meetings spoke

Integrate your ServiceNow instance and the Cisco Webex Meetings application by creating a custom OAuth application in Cisco DevNet to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Cisco Webex Meetings spoke.
- Role required: admin.

Create a Webex OAuth application in Cisco DevNet

Create a custom OAuth application in Cisco DevNet to enable OAuth 2.0 authentication with the Cisco Webex Meetings spoke.

Before you begin

Webex Meetings requirements:

- Webex Meetings account
- Role required: Webex Meetings administrator

Procedure

1. Navigate to https://developer.webex.com/ and log in.
2. Click on your profile icon and select **My Webex Apps**.

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3. Click **Create a New App**.
4. Click **Create an Integration**.
5. On the form, fill in the fields.

Field	Value
Integration name	Name of the integration as it appears in Webex. For example, ServiceNow integration.
Icon	Icon that displays in Webex. Upload your own icon and select from the available default icons.
App Hub Description	Short description about the integration.
Redirect URI(s)	`https://<instance-name>.service-now.com/oauth_redirect.do`, where `<instance-name>` is the name of your ServiceNow instance
Scope	Webex Meetings application scope permissions you want the application to support. **Note:** Select the **admin_schedule_read scope** for the integration.

6. Click **Add Integration**.
   After the integration is successfully created, the values of **Client ID** and **Client Secret** are displayed.
7. Record the client ID and client secret to register the application as a third-party OAuth provider on your ServiceNow instance.

Configure a connection for Cisco Webex Meetings spoke

Add and configure a Cisco Webex Meetings connection to authenticate ServiceNow requests in the Cisco Webex Meetings spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the **Webex** connection alias and click **View Details**.

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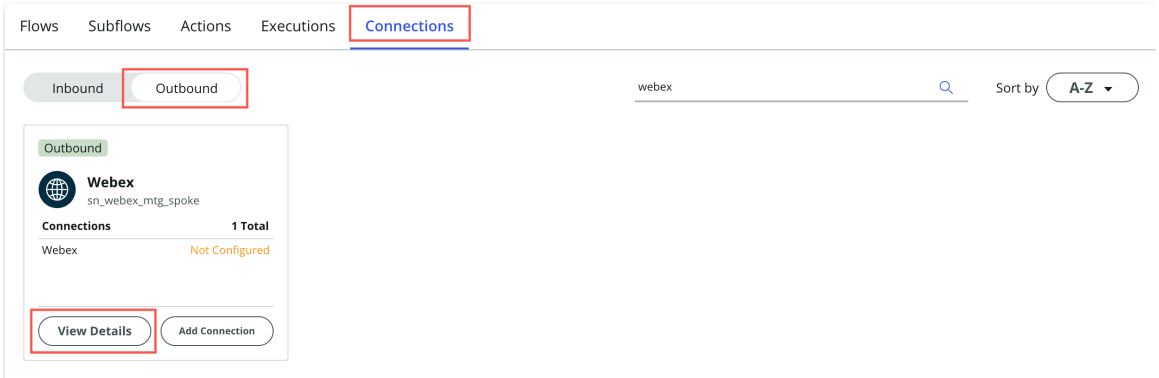
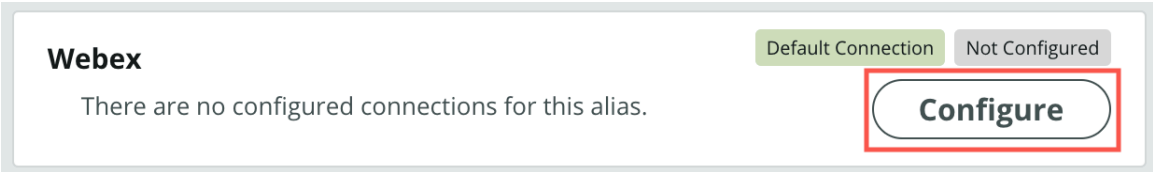
- To configure the default connection and credential alias record that is shipped along with the Cisco Webex Meetings spoke, click **View Details**.



- To manage more than one Cisco Webex Meetings spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the form, fill in the fields.

Connection form

Field	Description
Connection Information	
Connection URL	`https://<site>.webex.com/WBXService/XMLService`, where *`site`* is the name of your Webex site.
Webex Admin User Name	User name for the Webex administrator account.
Credential Information	
OAuth Client ID	Client ID you created during the Webex app configuration.
OAuth Client Secret	Client Secret you created during the Webex app configuration.
OAuth Redirect URL	`https://<instance-name>.service-now.com/oauth_redirect.do`, where *`instance-name`* is the name of your ServiceNow instance.

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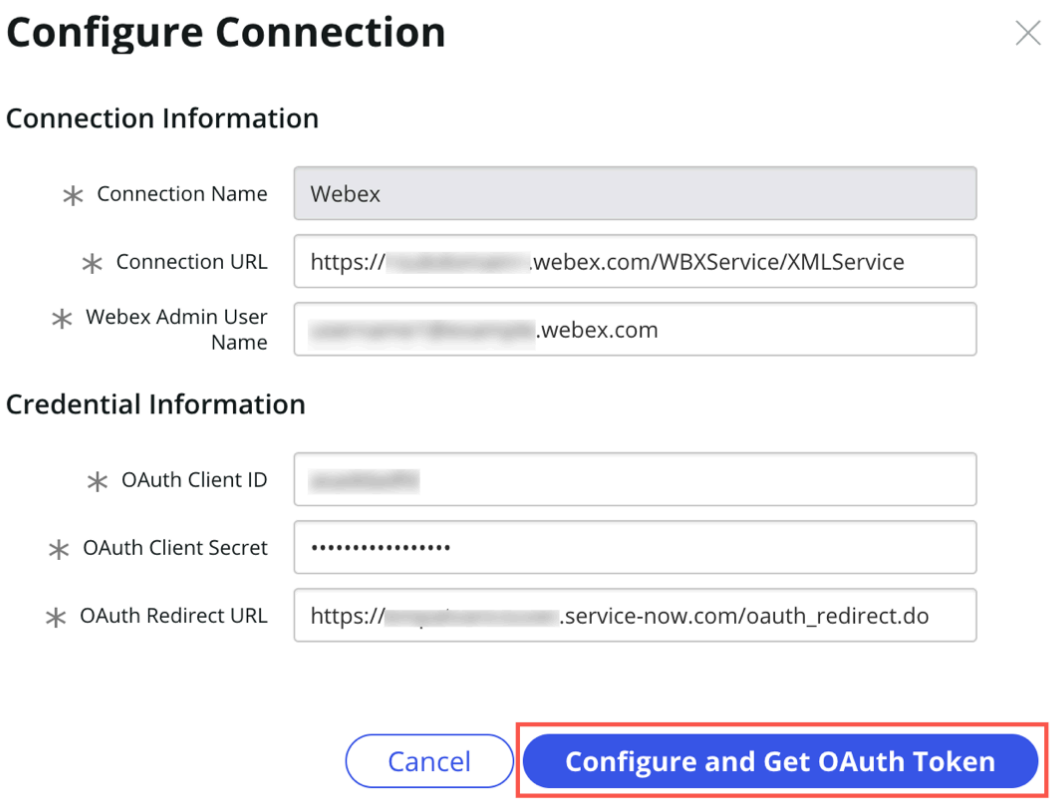

6. Click **Configure and Get OAuth Token**.

Result
The spoke is configured and ready to be used.

Cisco Webex Teams Spoke

Manage Cisco Webex Teams from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Cisco Webex Teams spoke v2.3.6 is the latest version. For version history of the spoke, see Cisco Webex Teams spoke release notes.

Supported versions

This spoke was built for Cisco Webex Teams v1, but may be compatible with later versions.

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Spoke requirements

Cisco Webex Teams account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Cisco Webex Teams Spoke provides actions to automate Cisco Web Teams tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Membership Management	Create Membership	Creates membership and adds a member to a space using the specified email address. You can choose to make the member as the moderator of the space.
	Delete Membership	Removes membership from a space for the specified member.
	Get Membership	Retrieves details for a space membership.
	Look up Membership	Retrieves a list of all space memberships.
	Update Membership	Updates details of a space membership.
Message Management	Delete Message	Deletes the specified message.
	Get Message Details	Retrieves details of the specified message.
	Look up Direct Messages	Retrieves a list of messages in a direct space.
	Look up Messages	Retrieves all messages in a space.
	Post Direct Message	Posts a plain text or rich text message to a the specified email address. A file can be specified as an attachment to the message optionally.
	Post Message to Space	Posts a plain text or rich text message to the specified space. A file can be specified as an attachment to the message optionally.

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Category	Action	Description
Space Management	Create Space	Creates a space.
	Delete Space	Deletes the specified space.
	Get Space Details	Retrieves details of the specified space.
	Look up Spaces	Retrieves details of the spaces to which the authenticated user belongs.
	Update Space	Updates details of the specified space.
Event Management	Look up Events Stream	Retrieves all events in an organization.
People Management	Update Person	Updates details of a person.
	Delete Person	Deletes details of the specified person.
	Look up Person Details	Retrieves details of a person.
	Look up People Stream	Retrieves all people in an organization.
Organization Management	Look up Organizations	Retrieves all organizations visible to the authenticated user.
Meeting Management	Look up Meetings Stream	Retrieves a list of meetings.
License Management	Look up Licenses	Retrieves all licenses for an organization. If the organization ID is not specified, the default is the authenticated user's organization.
	Look up Roles	Retrieves all authenticated user roles.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

You can use OAuth 2.0 or the custom Cisco Webex Credentials to authenticate requests. For information about setting up the spoke, see Set up the Cisco Webex Teams spoke.

Set up the Cisco Webex Teams spoke

Integrate the ServiceNow instance and Cisco Webex Teams by creating a custom OAuth application in Cisco Webex Teams or using the custom Cisco Webex Credentials to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Cisco Webex Teams spoke.
- Role required: admin.

You can choose to use either OAuth 2.0 or the custom credentials, Cisco Webex Credentials, for authentication.

Register Cisco Webex Teams as an OAuth provider

Use the information generated during the Cisco Webex Teams application configuration to register Cisco Webex Teams as an OAuth provider and allow the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Click **New**.
   The system displays this message: `What kind of OAuth application?`.
3. Select **Connect to a third party OAuth Provider**.
4. On the form, fill these values.

Application Registries form

Field	Description
Name	Name to uniquely identify the record. For example, enter: `Cisco Webex Teams OAuth`
Client ID	Client ID created during the Cisco Webex Teams application configuration.
Client Secret	Client Secret created during the Cisco Webex Teams application configuration.
Authorization URL	OAuth authorization code endpoint. Enter: `https://webexapis.com/v1/authorize`
Token URL	OAuth server token endpoint. Enter: `https://webexapis.com/v1/access_token`
Token Revocation URL	OAuth server token revocation endpoint.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`
OAuth API Script	Script to customize the request and response. Select **OauthCiscoWebexTeamsUtils**.
Logo URL	URL that contains an image to use as the application logo.
Default Grant Type	Grant type used to establish the token. Select **Authorization Code**.

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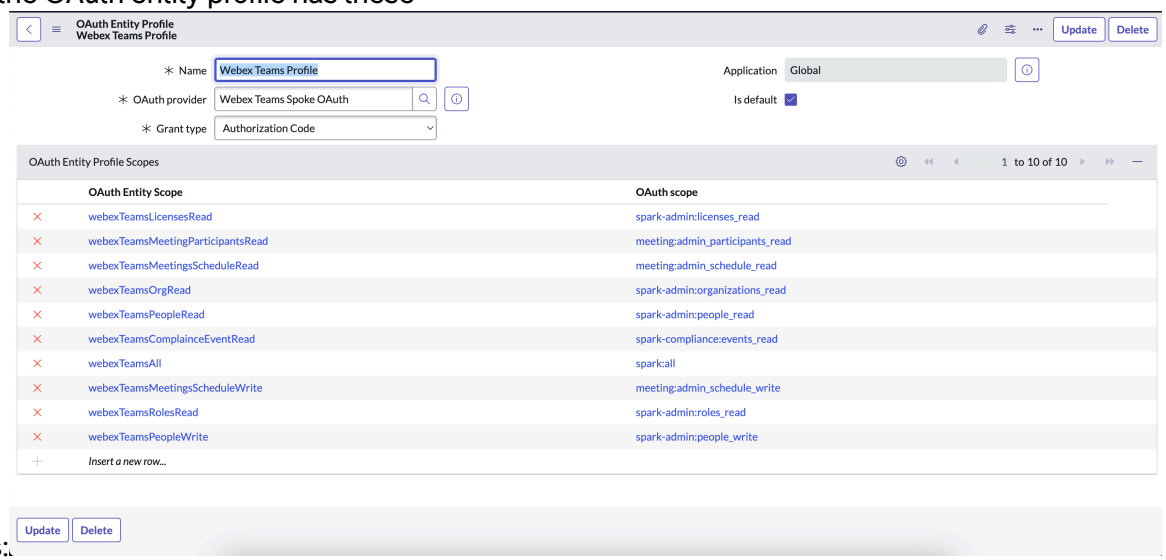
Field	Description
Refresh Token Lifespan	Time, in seconds, that the refresh token is valid. The default time is 8,640,0000 seconds.
PKCE required	Option to enable public clients to require PKCE for an authorization. **Note:** You can use only **Authorization Code** as the **Default Grant type** when **PKCE** is enabled.
Application	Application scope that contains this record.
Accessible from	Application scope that this registry is accessible from.
Active	Option to actively use the application registry.
Use mutual authentication	Option to use mutual authentication for token request and revocation. This option requires a mutual authentication profile to be specified.

5. Right-click the form header, and click **Save**.

What to do next

Ensure that the OAuth entity profile has these permissions:



Create a OAuth credential record for the Cisco Webex Teams Spoke

Create a credential record for the Cisco Webex Teams account. The Cisco Webex Teams Spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`

3. Select **OAuth 2.0 Credentials**.

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4. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, Cisco Webex Teams Cred.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile created during the registration of Cisco Webex Teams as an OAuth provider. For example, Cisco Webex Teams OAuth Profile.
Applies to	Option to specify if the credential applies to all MID Servers in your network, or to one or more **Specific MID servers**. Specify the MID Servers that should use this credential in the **MID servers** field.
Order	Order to apply this credential. For example, 100.
Credential alias	Credential alias associated with the spoke.

5. Right-click the form header and click **Submit**.
6. To generate the OAuth token, click the **Get OAuth Token** related link.

Create a connection and credential alias record for the Cisco Webex Teams Spoke

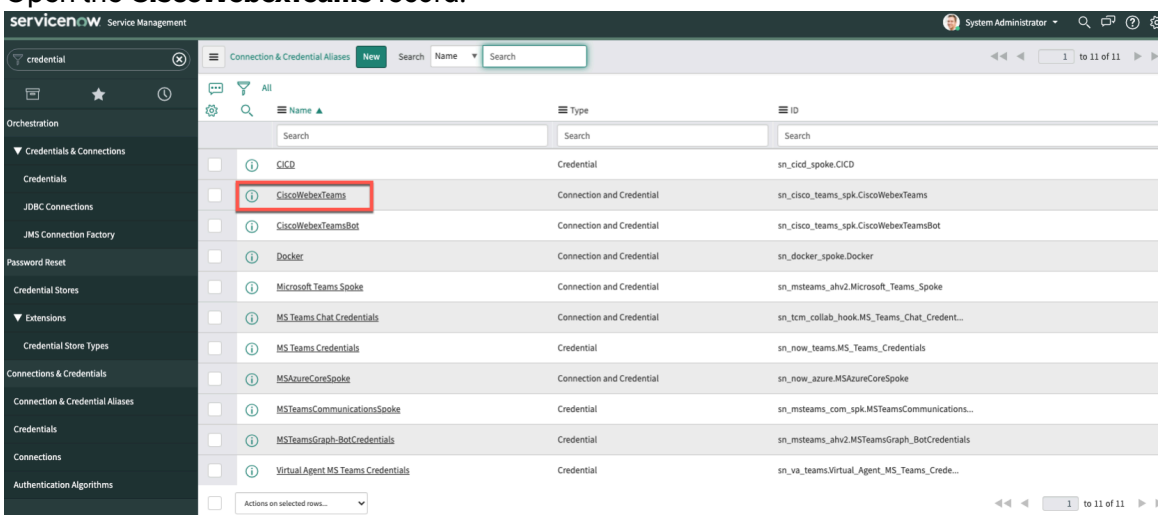
Create a credential record for the Cisco Webex Teams account. The Cisco Webex Teams Spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the **CiscoWebexTeams** record.



The **CiscoWebexTeams** Connection & Credential Aliases display.

3. Click **New** under **Connections** tab.

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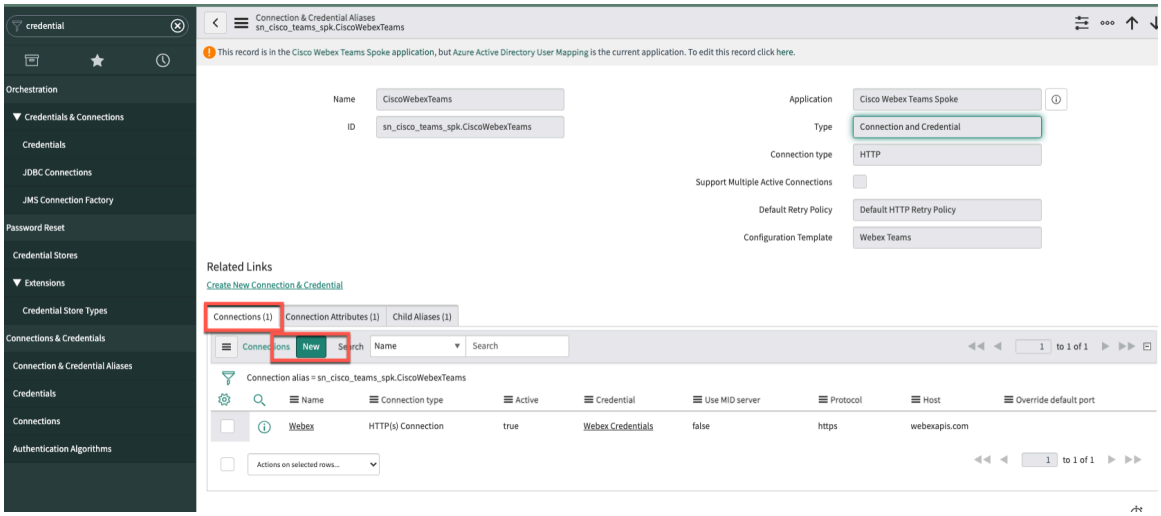
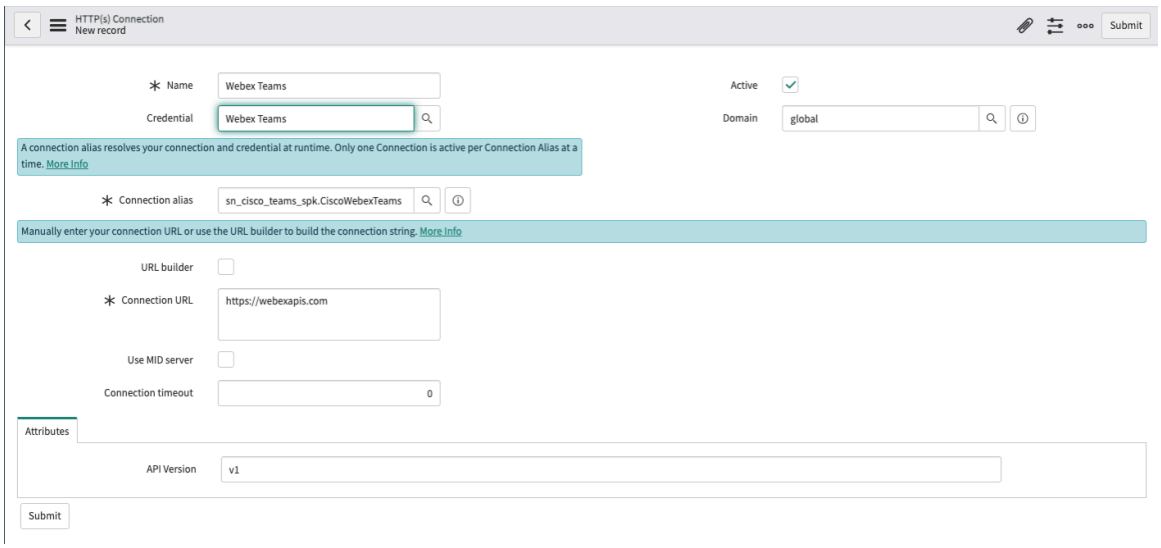


4. On the form, fill these values.

Connection & Credential for Cisco Webex Teams

Field	Description
Name	Name for the HTTPS connection record for Cisco Webex Teams spoke
Credentials	Name of the credential created for Cisco Webex Teams spoke Provide the value ceated in “Create a OAuth credential record for the Cisco Webex Teams spoke”.
Connection URL	Option to provide the connection URL. Provide the value as https://webexapis.com



5. Right-click the form header and click **Submit**.

Create a Connection & Credentials alias for Visa Spoke

Create a connection record for your . The Visa spoke connection and credential aliases use these connections to perform actions in .

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Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for .
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `<Application-Name> Connection`.
Credential	Credential record created for Visa spoke. For example, `<Application-Name> Cred`.
Connection alias	Alias record associated with this connection.
Host	Fully qualified domain name of the target host where the server is installed. For example, `<host>.<domain>.com`.
Connection URL	Base URL to connect to . Enter:
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use a MID Servers for this connection. If the check box is selected, define the fields in the Advanced MID Server Configuration related list.

5. Click **Submit**.

Confluence Cloud Spoke

The Confluence Cloud spoke provides actions to manage groups, group members, and search content in your Confluence Atlassian account.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Confluence Cloud spoke v2.1.1 is the latest version. For version history of the spoke, see Confluence Cloud Spoke release notes.

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Supported versions

This spoke was built for the Confluence Cloud REST API.

Spoke requirements

Atlassian site admin account

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Confluence Cloud spoke provides actions to automate Confluence Cloud tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Account Management	Look up Accessible Resources	Retrieves sites with scopes that are granted by the OAuth token.
Content Management	Look up Pages Stream	Retrieves a list of pages in a Confluence space. Inputs: • Page size: Limit number of pages returned per request. • Query (Optional): Use query input to filter status of pages (for example, `status=archived`). Values include: current, archived, deleted, and trashed.
	Look up Spaces Stream	Retrieves a list of Confluence spaces. Inputs: Page size. Number of Space entries expected to be fetched per page.
	Search Content	Retrieves the list of content based on the provided query.
Group Management	Look up Groups	Retrieves all groups in the Atlassian account, including default groups.

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Category	Action	Description
	Look up Members By Group ID	Retrieves all active users within the specified group.
	Remove Member From Group By Group ID	Removes a user from the specified group.
User Management	Look up Group Memberships For User	Retrieves information about the groups that the user is a member of.
	Report Personal Data	Reports a user's personal data for the specified apps.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Spoke module

The Confluence Cloud spoke adds the Confluence Cloud application to your instance and includes these modules:

Module	Description
Confluence Groups	Enables you to specify the groups that have access to Confluence products. By specifying these groups, you can manage the users within only these groups using the Confluence Cloud spoke.

Data accessed through these spoke modules is stored in these tables:

Table	Description	Fields
Confluence Groups	Displays the list of groups that have access to Confluence products.	• Group Name • Group ID

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Confluence Cloud spoke.

Set up the Confluence Cloud spoke

Integrate the ServiceNow instance and Confluence Cloud by creating a custom OAuth 2.0 application in Confluence Cloud to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Confluence Cloud spoke.
- Atlassian role required: site admin
- Role required: admin.

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Obtain the value of Cloud ID

Obtain the value of Cloud ID of the cloud instance. This value is required during the configuration of the connection record in your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Log in to Atlassian Administration as an admin.
2. Click **Select** against the required organization.
3. From the **Jira Software** product, click **Manage product access**.
   A new window is opened and the URL is in this format: `https://admin.atlassian.com/s/<Cloud-ID>/apps`.
4. Copy the value of the Cloud ID for later use.

Configure a connection for the Confluence spoke

Add and configure a Confluence Cloud connection to authenticate ServiceNow requests in Confluence Cloud spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, the **Outbound** connections are displayed by default.
4. Locate the **Confluence Cloud** connection alias and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Confluence Cloud spoke, click **View Details**.
   - To manage more than one Confluence Cloud spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.
5. On the **Connection** form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection. For example, `Confluence Cloud Spoke Connection`.
Connection URL	URL of the Atlassian API endpoint: `https://api.atlassian.com/ex/jira/{cloud-id}/`. Replace `{cloud-id}` with value of the Cloud ID you had obtained previously.
Scopes	By default, these scopes are provided: `ace:confluence`, `read:page:confluence`, `search:confluence`,

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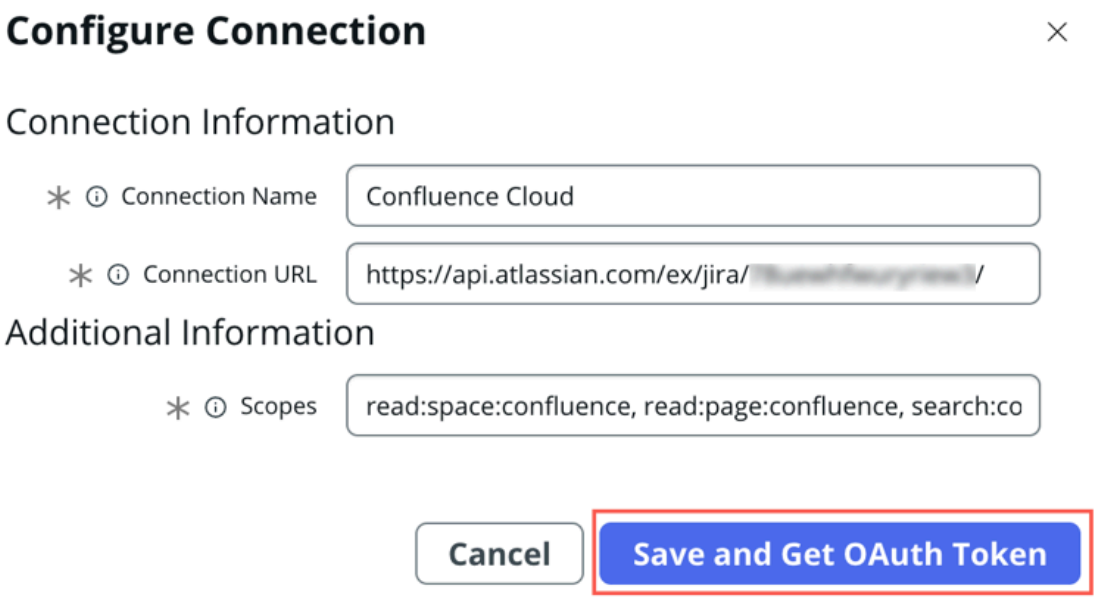
Field	Description
	`read:confluence-groups, write:confluence-groups, read:confluence-user, read:me, read:account, offline_access`. You can modify the scopes as per your requirement.



6. Click **Save and Get OAuth Token**.

Confluent Kafka REST Proxy Spoke

Integrates your ServiceNow instances with the Kafka cluster through Confluent Kafka REST Proxy API.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Confluent Kafka REST Proxy Spoke v1.0.0 is the latest version. For version history of the spoke, see Confluent Kafka REST Proxy Spoke release notes.

Supported versions

This spoke was built for Confluent REST Proxy API v2.

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Spoke dependencies

If you're having trouble installing the app, ensure that the dependent plugin, ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime) is installed.

Note: The plugin is a licensable feature and requires appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Confluent Kafka REST Proxy spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Action	Description
Assign Consumer Instance to Topic Partition	Assigns a list of partitions to this consumer manually.
Commit Consumer Offsets	Commits a list of offsets for the consumer. When the post body is empty, all the records that have been fetched by the consumer instance are committed.
Create a Consumer Instance within a Consumer Group	Creates a consumer instance within Kafka consumer group.
Delete Consumer Instance	Destroys the consumer instance.
Get Kafka Partition Details For A Topic	Retrieves partition details for a Kafka topic.
Get Messages	Retrieves messages from a Kafka topic.
Publish Message	Produces messages to a Kafka topic.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Confluent Kafka REST Proxy spoke.

Set up the Confluent Kafka REST Proxy spoke

Integrate Confluent Kafka REST proxy with your ServiceNow instance using basic authentication.

Before you begin

- Request an Integration Hub subscription.
- Activate the Confluent Kafka REST Proxy spoke.
- Role required: admin.

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Note: This procedure outlines steps to set up Confluent Kafka REST Proxy spoke using basic authentication. However, based on your customisations, you can also set up the spoke using ay other HTTP authentication mechanism that is currently supported by the ServiceNow Platform.

Procedure

1. Create a credential record for the Confluent Kafka REST Proxy spoke.

   a. Navigate to **Connections & Credentials** > **Credentials**.

   b. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.

   c. Select **Basic Auth Credentials**.
   A blank Basic Auth Credentials form displays.

   d. Enter these values.

Field	Value required
Name	Name to uniquely identify the record. For example, enter `Kafka spoke Credentials`.
User name	User name to connect to the Confluent Kafka REST Proxy API endpoint.
Password	Password to connect to the Confluent Kafka REST Proxy API endpoint.
Active	Option to actively use the record.
Order	Order to apply this credential. For example, enter `100`.

   e. Click **Submit**.

2. Create a connection record for the Confluent Kafka REST Proxy spoke.

   a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

   b. Open for the record, **Kafka REST** .

   c. From the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.

   d. Enter these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `Kafka spoke Connection`.
Credential	Credential record you created for the Confluent Kafka REST Proxy spoke. For example, select **Kafka spoke Credentials**.

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Field	Value required
Connection URL	URL to connect to the Confluent Kafka REST Proxy API.

e. Click **Submit**.

Continuous Integration and Continuous Delivery (CICD) Spoke

Build a Continuous Integration and Continuation Delivery (CICD) pipeline for your ServiceNow instances. You can automate publishing and installing applications from an application repository, activating plugins, running ATF test suites, and running an instance scan.

CICD spoke application

The CICD spoke application is installed by default from the Orlando upgrade onward.

Spoke version

Continuous Integration and Continuous Delivery (CICD) spoke v1.0.11 is the latest version.

Supported versions

Continuous Integration and Continuous Delivery (CICD) REST API version 1.0.0, which is a ServiceNow AI Platform feature active by default.

Spoke flows

This spoke has no sample flows.

Spoke subflows

The Continuous Integration and Continuous Delivery (CICD) spoke provides sample subflows in the draft state to demonstrate automating CICD tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Activate Plugin	Activate a plugin by ID on the specified instance URL.
Apply Changes From Source Control With ID	Apply remote changes from source control to an application by its Sys ID.
Apply Changes From Source Control With Scope	Apply remote changes from source control to an application by its scope name.
ATF Suite Start With ID	Start a test suite by its Sys ID on the specified instance URL. Return the test suite execution results.
ATF Suite Start With Name	Start a test suite by its name on the specified instance URL. Return the test suite execution results.

Batch Install	Given a Batch Plan in JSON format, install multiple packages (applications, customizations to store applications, and plugins) together in a single batch operation. Example JSON:
	`{`
	`"applications": [`

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Subflow	Description

	{
	{
	"id": "syd_id_abcefghi",
	"type": "application",
	"load_demo_data": false,
	"requested_version": "1.0.2",
	"notes": "User specific text to describe this application install"
	},
	{
	"id": "syd_id_defabcde",
	"type": "application",
	"requested_version": "1.0.0",
	"requested_customization_version": "2.0.7",
	"notes": "Customization for CSM App1"
	},
	{
	"id": "com.glide.some.plugin",
	"type": "plugin",
	"load_demo_data": true,
	"notes": "Plugin related notes"
	}
	],
	"rollback_on_failure": true
	}

Batch Results	Given the sys_id of a result object, view the installation status of each package along with entire batch plan.
Batch Rollback	With a rollback ID, roll back the installation(s) of package(s) installed as a single batch.
Get Instance Scan Results	Return Instance Scan execution results by progress ID. Scan_results always return but scan_finding results display only if present.
Import Application from Source Control	Import Application from Source Control using repository URL on the given instance.
Instance Scan Execute Full Scan	Start full Instance Scan on specified instance URL. Scan runs with all active checks.
Instance Scan Execute Point Scan	Start Instance Scan on specified instance starting from a particular table and record (the table and sys_ID). Target is scanned using all relevant and applicable checks.
Instance Scan Execute Suite Scan	Start full Instance Scan on specified instance URL using a specific suite of checks.
Instance Scan Execute Suite Scan on one or more scoped apps	Start Instance Scan on specified scoped apps using checks from a specified suite ID.
Instance Scan Execute Suite Scan on one or more update sets	Start Instance Scan on the specified update sets using checks from a specified suite ID.
Install Application With ID	Install an application by its Sys ID from the application repository.

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Subflow	Description
Install Application With Scope	Install an application by its scope name from the application repository.
Publish Application With ID	Publish an application by its Sys ID to the application repository.
Publish Application With Scope	Publish an application by its scope name to the application repository.
Rollback Application With ID	Roll back an application by its Sys ID. Confirm the rollback version number matches the specified version number or produce an error.
Rollback Application With Scope	Roll back an application by its scope name. Confirm the rollback version number matches the specified version number or produce an error.
Rollback Plugin	Roll back a plugin by ID on the specified instance URL to the last installed version.
Wait Until Tracker Completes	Wait for a tracker to complete its progress on the specified instance URL and return the results.

Spoke actions

The Continuous Integration and Continuous Delivery (CICD) spoke provides actions to automate CICD tasks when events occurs in the ServiceNow AI Platform. Available actions include:

Category	Action	Description
Application Repo	Install Application With ID	Install an application by its Sys ID from the application repository.
	Install Application With Scope	Install an application by its scope name from the application repository.
	Publish Application With ID	Publish an application by its Sys ID to the application repository.
	Publish Application With Scope	Publish an application by its scope name to the application repository.
	Rollback Application With ID	Rollback an application by its Sys ID. Confirm the rollback version number matches the specified version number or produce an error.
	Rollback Application With Scope	Roll back an application by its scope name. Confirm the rollback version number matches the specified version number or produce an error.
ATF	ATF Get Suite Results	Return the test suite execution results by Sys ID.
	Get Execution Tracker Progress	Return tracker progress information by Sys ID.
	Start ATF Suite With ID	Start a test suite by its Sys ID on the specified instance URL.
	Start ATF Suite With Name	Start a test suite by its name on the specified instance URL.

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Category	Action	Description
Batch Install	Batch Install	Install multiple applications at once
	Batch Results	View installation status of each package along with entire batch plan.
	Batch Rollback	With a rollback ID, roll back the installation(s) of package(s) installed as a single batch.
Instance Scan	Get Instance Scan Results	Return Instance Scan execution results by progress ID. Scan_results always display but scan_finding results display only if present.
	Instance Scan Execute Full Scan	Return Instance Scan execution results by progress ID. Scan_results always return but scan_finding results display only if present.
	Instance Scan Execute Point Scan	Start full Instance Scan on specified instance URL. Scan runs with all active checks.
	Instance Scan Execute Suite Scan	Start Instance Scan on specified instance starting from a particular table and record (the table and sys_ID). Target is scanned using all relevant and applicable checks.
	Instance Scan Execute Suite Scan on one or more scoped apps	Start full Instance Scan on specified instance URL using a specific suite of checks.
	Instance Scan Execute Suite Scan on one or more update sets	Start Instance Scan on specified scoped apps using checks from a specified suite ID.
Plugin	Activate Plugin	Activate a plugin by ID on the specified instance URL.
	Rollback Plugin	Rollback a plugin by ID on the specified instance URL to the last installed version.
Source Control	Apply Changes From Source Control With ID	Apply remote changes from source control to an application by its Sys ID.
	Apply Changes From Source Control With Scope	Apply remote changes from source control to an application by its scope name.
	Import Application from Source Control	Import Application from Source Control using repository URL on the given instance.

CICD account requirements

The Continuous Integration and Continuous Delivery (CICD) spoke requires creating basic authorization credentials. The user credentials must have either the admin or sn_cicd.sys_ci_automation roles to authorize CICD actions and flows.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the CICD alias record to authorize actions on local and remote instances. For information about setting up the spoke, see Set up the Continuous Integration and Continuous Delivery (CICD) spoke.

MID Server requirements

These actions use REST calls, which can run on an instance or MID Server. Use the connection record associated with the CICD alias to configure where actions run as well as set MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Continuous Integration and Continuous Delivery (CICD) spoke

Use basic authentication to authenticate CICD REST API calls on a ServiceNow instance.

Before you begin

- Request an Integration Hub subscription.
- Activate the Continuous Integration and Continuous Delivery (CICD) spoke.
- Role required: admin or sn_cicd.sys_ci_automation.

Create Credential records for the Continuous Integration and Continuous Delivery (CICD) spoke

Create Credential records to the ServiceNow instance. The Continuous Integration and Continuous Delivery (CICD) spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **Basic Auth Credentials**.
   A blank Basic Auth Credentials form displays.
4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `CICD Credentials`.
User name	The ServiceNow instance user name that authorizes and runs spoke actions and flows. This user must have either the admin or sn_cicd.sys_ci_automation roles.
Password	The password for the ServiceNow instance user.
Active	Enable

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Field	Value required
Order	Select the order to apply this credential. For example, enter `100`.

5. Click **Submit**.

Create Connection records for the Continuous Integration and Continuous Delivery (CICD) spoke

Create Connection records to your ServiceNow instance. The Continuous Integration and Continuous Delivery (CICD) spoke connection and credential alias uses these connections to perform actions on your ServiceNow instance.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **CICD**.
3. From the **Connections** tab, click **New**.
   The system displays a blank HTTP or HTTPS Connection form.
4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `CICD Connection`.
Credential	Select the Credential record you created for CICD. For example, select **CICD Credentials**.
Connection URL	The URL of the ServiceNow instance on which the spoke runs actions and flows.

5. Click **Submit**.

Cornerstone Spoke

Manage employee records, approvals, and employee learning in your Cornerstone instance from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Cornerstone spoke v1.4 is the latest version. For version history of the spoke, see Cornerstone spoke release notes.

Supported versions

This spoke was built for Cornerstone version v2, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke flows

The Cornerstone spoke provides a sample flow in the draft state to demonstrate automating the Cornerstone tasks. The sample flow, Cornerstone - Pull Todos Details, retrieves the list of Todos for the required user. Ensure that this user is added to your ServiceNow instance. The retrieved records can be accessed by navigating to the TO DO Lists module in the Cornerstone application of your instance.

To customize the sample flow, copy it to a new application scope.

Spoke subflows

The Cornerstone spoke provides sample subflows in the draft state to demonstrate automating Cornerstone tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Cornerstone - Get Certificate Transcript Details	Retrieves the certificate information of the required employee.
Cornerstone - Get Transcripts	Retrieves the transcript information of the required employee.
Cornerstone - Remove Dangling To Do	Deletes the dangling Todo records. Some of the retrieved Certificate records may not have values set for the **Status** and **Launch URL** fields. The Cornerstone - Remove Dangling To Do action deletes such todo records.

Spoke actions

The Cornerstone spoke provides actions to automate Cornerstone tasks when events occurs in ServiceNow. Available actions include:

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Category	Action	Description	Permission Required	OAuth 2.0 Scope
Core Management	Look up Approval Details Stream	Retrieves information about the pending approvals.	Request Items - View, Manage Employee Relationships	approval:read
	Look up Organizational Units Stream	Retrieves the list of organization units based on organization unit type.	No permission required.	ou:read
	Global Search Stream	Searches for the required people, training, certification, and so on.	No permission required.	globalsearch:read
Employee Management	Create Employee	Creates an employee record and retrieves core employee data from Cornerstone.	Employee API - Edit	No OAuth scope required.
	Get Custom Fields For Employee Stream	Retrieves custom fields for an employee from Cornerstone.	Employee API - View/View - Constrainable	No OAuth scope required.
	Look up Employees Stream	Retrieves core data of the required employees in Cornerstone.	Employee API - View/View - Constrainable	No OAuth scope required.
	Update Employee	Updates details of the required employee in Cornerstone.	Employee API -Edit	No OAuth scope required.
Learning Management	Look up Approvals Stream	Retrieves the pending approvals of the manager or approver.	No permission required.	approval:read
	Look up Assigned Trainings	Retrieves details of the trainings assigned to a user.	No permission required.	transcript:read
	Look up Catalog Search Stream	Retrieves details of the required training.	Course Catalog - View	training:read
	Look up Certification	Retrieves certification transcript	No permission required.	certification:read

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Category	Action	Description	Permission Required	OAuth 2.0 Scope
	Transcripts Stream	information of the required user.		
	Look up Inbox Items	Retrieves all items in the required user's inbox as shown on the welcome page.	No permission required.	inbox:read
	Look up Learning Object	Retrieves the learning objects from Cornerstone. The supported learning object types are, Curriculum, Event, Session, Material, Test, Video, and Online Course.	No permission required.	training:read
	Look up Sessions Stream	Retrieves details of the upcoming sessions.	No permission required.	transcript:read
	Look up Suggested Trainings Stream	Retrieves details of the required and suggested learning objects that have been added to user's transcripts.	No permission required.	transcript:read
	Look up Tasks	Retrieves all the incomplete tasks assigned to the user.	No permission required.	task:read
	Look up Transcripts Stream	Retrieves the transcript records of the required user.	No permission required.	transcript:read
	Create Assignment	Creates a standard assignment.	Assignment Tool-Standard/ Email Settings-View/Bypass User Payment	learningassignment:create
	Look up Assignment Details	Looks up assignment details based on Assignment ID.	Assignment Tool - Standard	learningassignment:read
Reporting on Learning Module Management	Look up Tasks From Reporting Data Stream	Retrieves the main view to get training form user tasks.	Reporting API	Reporting API

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Category	Action	Description	Permission Required	OAuth 2.0 Scope
	Look up Trainings From Data Exporter Stream	Retrieves the main view to get training data.	Reporting API	Reporting API
	Look up Transcripts From Data Exporter Data Stream	Retrieves the main view to get all user transcript related data.	transcript_core	Reporting API
	Look up Training Local From Reporting Data Stream	Retrieves the main view to get the training's local data.	Reporting API	Reporting API

Spoke module

The Cornerstone spoke adds a Cornerstone application to your ServiceNow instance. The Cornerstone application has the TO DO Lists module. List of Todos that the sample flow, Cornerstone - Pull Todos Details, retrieves for the specified user, can be accessed here.

Cornerstone spoke account requirements

If you want to use the default settings and permissions provided along with the spoke, you can install the ServiceNow tile on the Cornerstone Marketplace. For more information about registering an application, see Register an OAuth Application in Cornerstone Online Help. Record the generated Client ID and Client Secret for later use.

If you want to configure and customise the spoke as per your requirement and provide additional permissions, register an OAuth 2.0 application in your Cornerstone account to generate OAuth 2.0 tokens for the Cornerstone spoke. For more information, see API Management in the Cornerstone online help . Record the generated Client ID and Client Secret for later use.

Connection and credential alias requirements

Integration hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Cornerstone spoke.

Set up the Cornerstone spoke

Integrate your Cornerstone application with your ServiceNow instance. Register an OAuth application in Cornerstone and authenticate requests from ServiceNow.

Before you begin

- Request an Integration Hub subscription.
- Activate the Cornerstone spoke.
- Role required: admin.

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Register an application in the Cornerstone instance

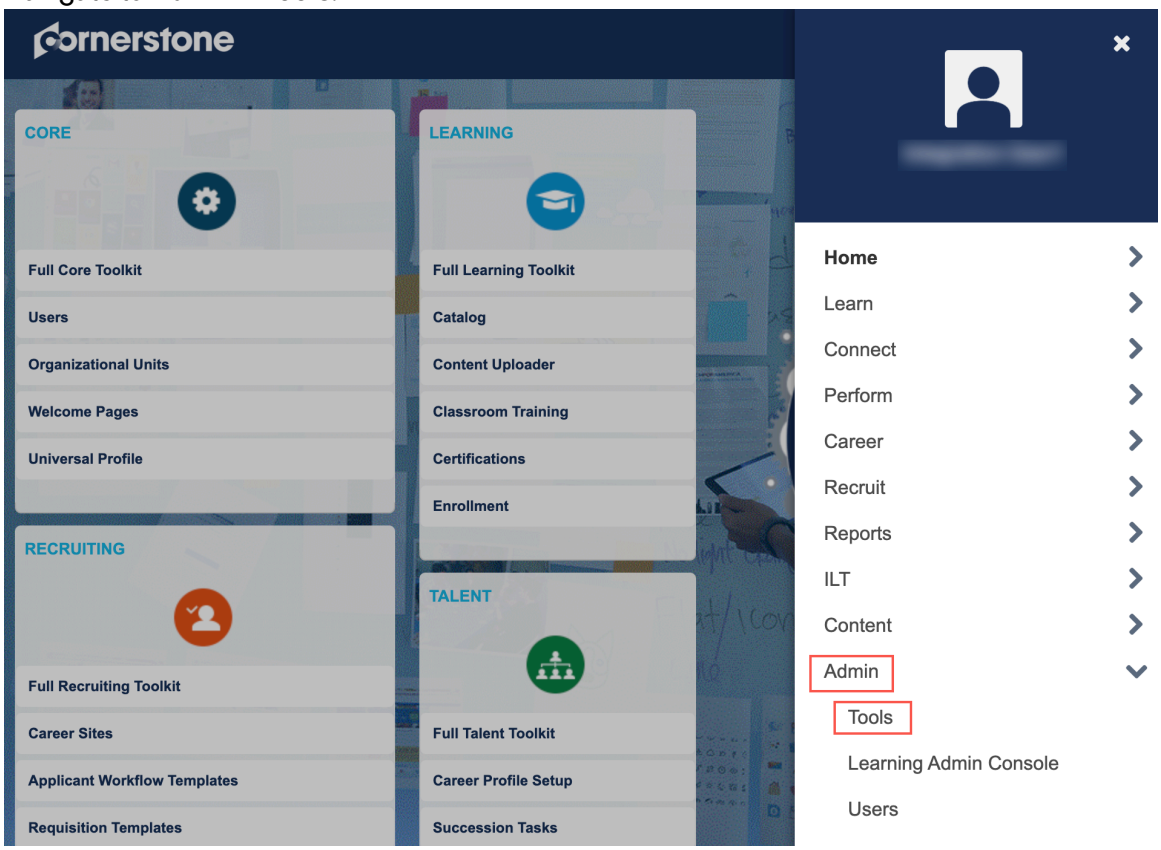
Register an application in the Cornerstone instance and record the generated Client ID and Client Secret for later use.

Before you begin

Role required: admin

Procedure

1. Log in to the Cornerstone instance as an admin.
2. Navigate to **Admin** > **Tools**.



3. Click **EDGE**.
4. Click **API Management** under **Develop**.

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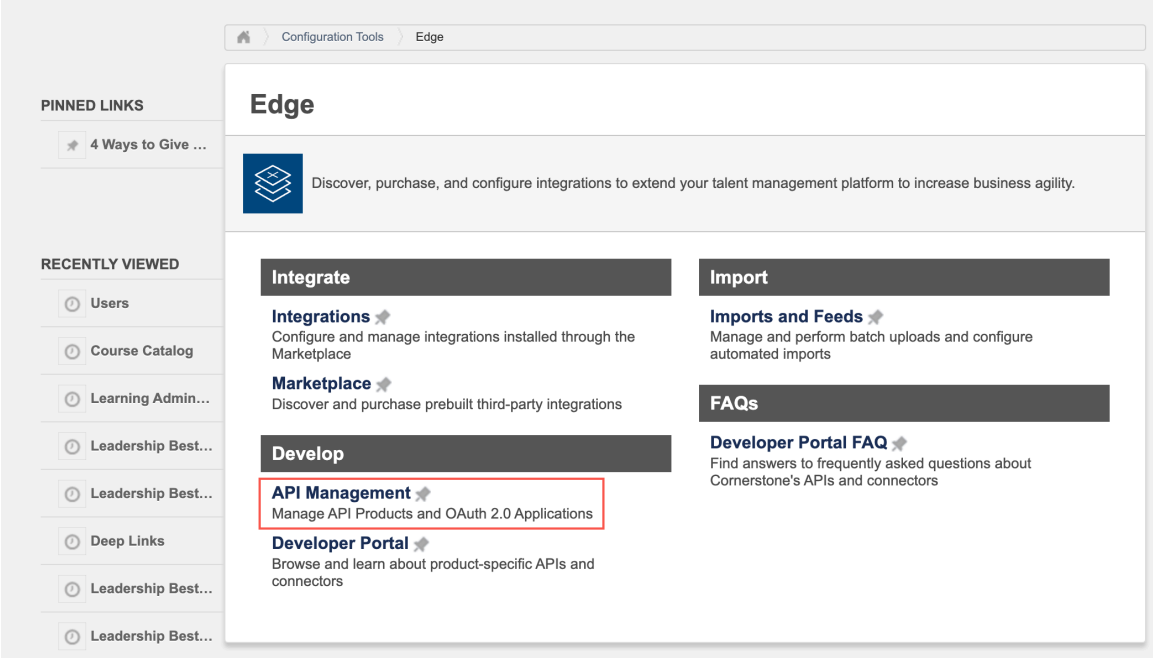

The API Management window is displayed in a new browser tab.

5. Click the **Manage OAuth 2.0 Applications**.
6. Click **+ Register New Application**.
7. On the form, fill the values.

Field	Description
Application Name	Name to identify the application.
User ID	User ID for an active user account in your Cornerstone portal.

8. Select the scopes as per your requirement.

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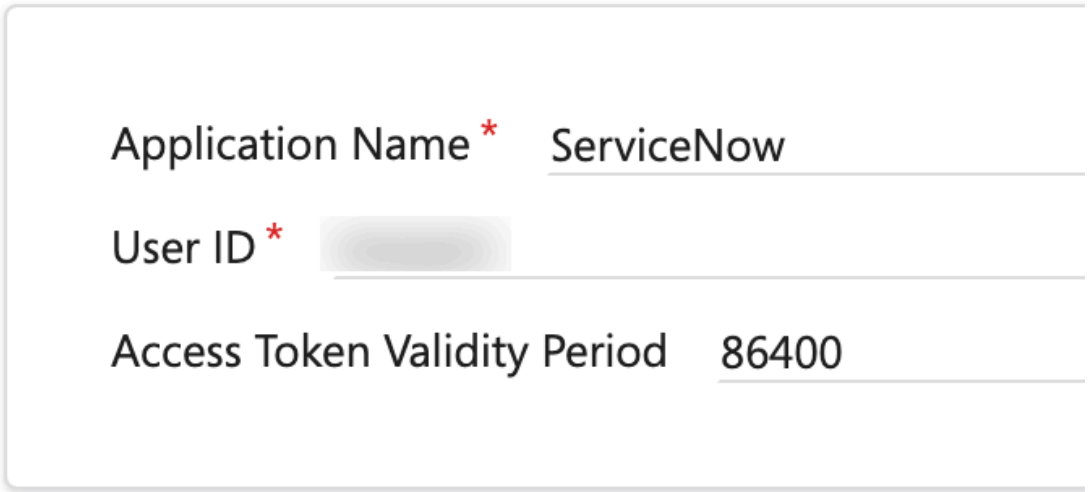

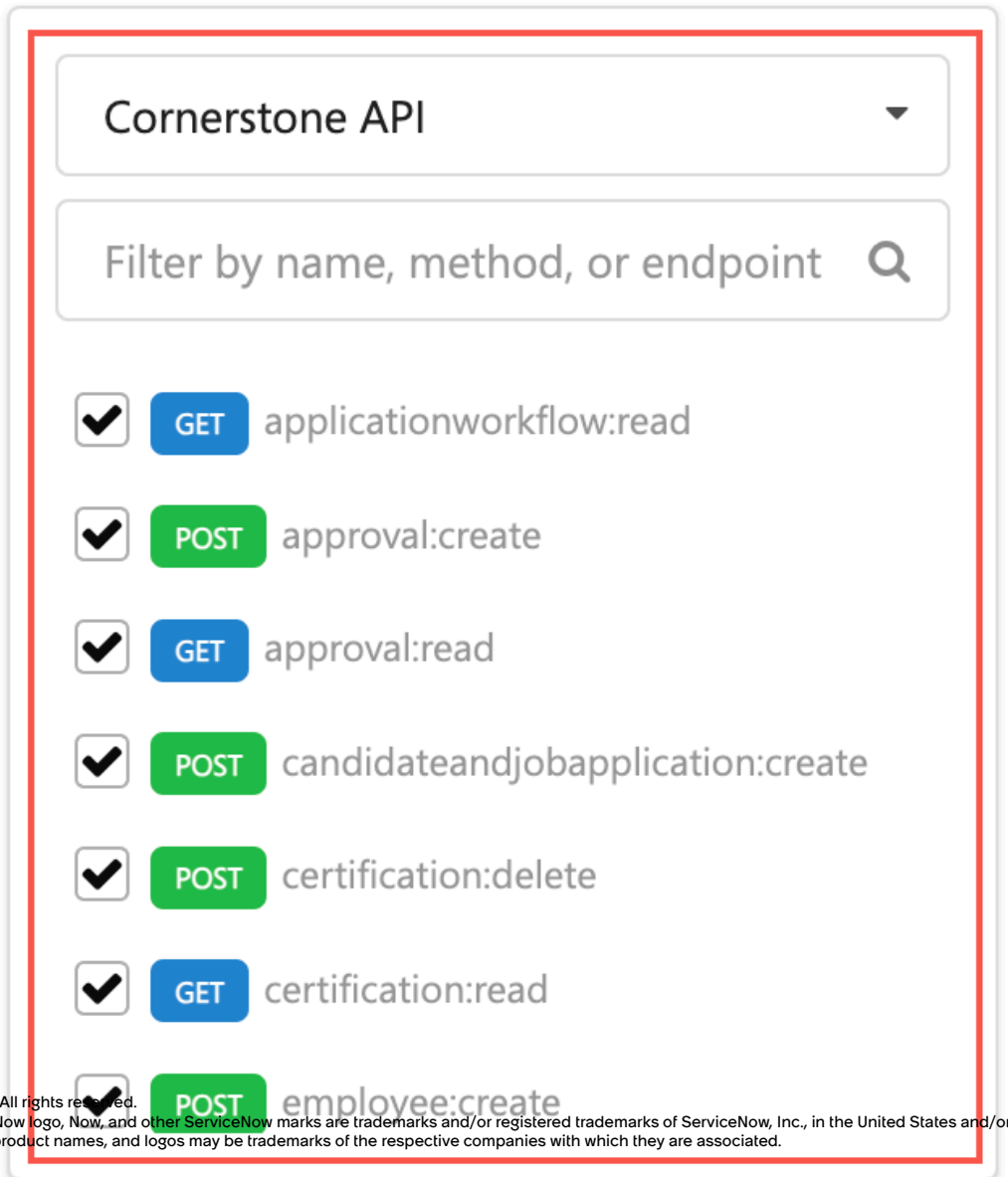

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9. Click **Register Application**.
   The values of Client ID and Client Secret are generated. Copy and record these values for later use.

Configure connection for the Cornerstone spoke

Add and configure a Cornerstone connection to authenticate ServiceNow requests in Cornerstone spoke.

Before you begin

Role required: admin.

Procedure

1. Navigate to **Process Automation** > **Flow Designer**.
2. Click the **Connections** tab.
3. Locate the **Cornerstone** connection alias in the outbound connections.
4. Click **View Details**.

   Note: Don't click **Add Connection**.

5. Click **Edit** or if you are configuring the spoke for the first time, click **Configure**.
6. On the form, fill in the fields.

Configuration form

Field	Description
Connection Name	Name to identify the connection record.
Connection URL	URL of the Cornerstone instance.
Base URL	URL of the Cornerstone instance.
OAuth Entity Name	Name to identify the application registry record.
OAuth Client ID	Client ID created during the application configuration in Cornerstone.
OAuth Client Secret	Client Secret created during the application configuration in Cornerstone.
Token URL	OAuth server token endpoint. For example, `https://<Cornerstone-Instance>.com/services/api/oauth2/token`.

7. Click **Configure and Get OAuth Token**.

Result

The spoke connection is configured and ready to be used.

Coupa Spoke

Manage business spend and automate approval, contract, inventory, purchase order, requisition, supplier, and user management in Coupa from your ServiceNow instance.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Coupa spoke v4.17.0 is the latest version. For version history of the spoke, see Coupa Spoke release notes.

Supported versions

This spoke was built for Coupa version stable_v4.2.0, but may be compatible with later versions.

Spoke requirements

Create an API key in your Coupa instance and record the API key for later use. See Coupa documentation for information about creating API key.

Spoke user roles

The following user roles are available with the spoke:

- Coupa Admin (sn_coupa_spoke.Coupa Admin): Users with this role have access to both, **My Current Approvals** and **Contracts** modules.
- Coupa Approval User (sn_coupa_spoke.Coupa Approval User): Users with this role have access only to the **My Current Approvals** module
- Coupa Contract User (sn_coupa_spoke.Coupa Contract User): Users with this role have access only to the **Contracts** module.

Spoke module

The Coupa spoke adds a Coupa application to your ServiceNow instance. The Coupa application supports Coupa Approval User and Coupa Contract User roles. You can access the Coupa application from the ServiceNow instance on your Now Mobile app.

Note: Make sure that Coupa Login attribute and the user ID of ServiceNow instance match before using the **My Current Approvals** module.

The Coupa application has the following modules.

Module	Description
My Current Approvals	Displays the list of approvals in Coupa for a user.
Contracts	Displays a list of contracts in Coupa.

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Available sample conversational subflows

Install Now Assist for Conversational Spokes and start using the conversational ability of Integration Hub spokes. For more information, see Now Assist in Conversational Spokes.

Sample conversational subflows

Conversational subflow	Description
Look up Suppliers - Sample	Retrieves the specified supplier in Coupa using the Coupa query.
Look up Purchase Orders - Sample	Retrieves the specified purchase order in Coupa using the Coupa query.
Look up Contracts - Sample	Retrieves the specified contract records in Coupa using the Coupa query.
Look up Receipts - Sample	Retrieves the specified receipts in Coupa using the Coupa query.
Look up Invoices - Sample	Retrieves details of the specified invoices in Coupa.
Look up Approvals - Sample	Retrieves details of approvals in Coupa.
Look up Requisitions - Sample	Retrieves the specified requisitions in Coupa using the Coupa query.

Spoke actions

The Coupa spoke provides actions to automate approval, contract, inventory, invoice, catalog item, purchase order, requisition, supplier, and user management when events occur in ServiceNow. Available actions include:

Category	Action	Description
Approval Management	Approve Approval Request	Approves the required approval request in Coupa.
	Look up Approval Details by Approval ID	Retrieves the details of the required approval in Coupa.
	Look up Approval	Looks up an approval record in Coupa using the Coupa query.
	Look up Approval By Requisition ID	Looks up the required approval record in Coupa using its Requisition ID.
	Look up Approvals Stream	Retrieves details of approvals in Coupa.
	Reject Approval Request	Rejects the required approval request in Coupa.
Catalog Management	Create Item	Creates an item in Coupa.
Contract Management	Create Contract	Creates contract with the provided details in Coupa.

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Category	Action	Description
	Look up Contracts Stream	Looks up the required contract records in Coupa using the Coupa query.
Primary Data Management	Look up Addresses Stream	Retrieves the address details from Coupa.
	Look up Conversion Rates Stream	Retrieves details of the conversion rates in Coupa.
	Look up Currencies Stream	Retrieves details of currencies in Coupa.
	Look up Legal Entities Stream	Retrieves details of the legal entities in Coupa.
	Lookup Cost Centers Stream	Retrieves details of the cost centers in Coupa.
	Look up Advanced Shipment Notices Stream After Updated Date	Retrieves details of advance shipment notices after filtering by the specified updated at field in Coupa.
	Look up Advance Shipment Notice by Purchase Order Line ID	Retrieves details of the advance shipment notice for the specified purchase order line ID.
	Look up Advanced Shipment Notices by Purchase Order Line ID Stream	Retrieves details of all advance shipment notices for the specified purchase order line ID. **Note:** This is a data stream action.
	Look up Accounts Stream	Retrieves details of the chart of accounts in Coupa.
Inventory Management	Create Goods Receipt	Creates a goods receipt record in Coupa.
	Create Receipt	Creates a receipt in Coupa. **Note:** Ensure that description has the exact item name. When you want to access the item name in a flow, use the description data pill.
	Get Receipt Fields	Retrieves the list of fields in the Coupa Receipts table. **Note:** This is a metadata action and doesn't make an API call to Coupa.
	Look up Advanced Shipment Notices After Updated Date	Retrieves the details of the advance shipment notices after the updated date in Coupa.
	Look up Advance Shipment Notice By Purchase Order Line ID	Look up an advance shipment notice by purchase order line ID in Coupa.

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Category	Action	Description
	Look up Receipt	Looks up the required receipt in Coupa using the Coupa query.
	Look up Receipt Details by Receipt ID	Retrieves details of the required receipt.
	Look up Receipts Stream	Looks up the required receipts in Coupa using the Coupa query.
	Void Receipt	Makes the required receipt void.
Invoice Management	Create Invoice	Creates an invoice with the provided details in Coupa.
	Update Invoice	Updates the details of the specified invoice in Coupa.
	Void Invoice	Makes the required invoice void.
	Look up Invoices Stream	Retrieves details of the required invoices in Coupa.
	Look up Invoice Payments Details Stream	Retrieves information about the required invoice payment details in Coupa.
	Bypass Approval	Bypasses the approvals for the specified invoice in Coupa.
	Submit Invoice	Submits the specified invoice in Coupa.
Item Management	Look up Items Stream	Looks up the required items in Coupa using the Coupa query.
	Look up Item	Looks up the required item in Coupa using the Coupa query.
	Look up Commodities Stream	Retrieves commodity records from Coupa based on the specified filter criteria.
Purchase Order Management	Cancel Purchase Order	Cancels the required purchase order in Coupa.
	Close Purchase Order	Closes the required purchase order in Coupa.
	Create Fixed Assets	Creates fixed assets with the specified details in Coupa.
	Create Purchase Order	Creates a purchase order in Coupa.
	Look up PO Line by Line ID	Retrieves details of a purchase order line in Coupa.
	Look up Purchase Order	Looks up the required purchase order in Coupa using the Coupa query.
	Look up Purchase Orders Stream	Looks up the details of the purchase orders in Coupa that you specify using the Coupa query.
	Revise Purchase Order	Revises or updates the purchase order in Coupa.
	Update Purchase Order Status in Coupa	Updates status of the required purchase order in Coupa.

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Category	Action	Description
Requisition Management	Create Draft Requisition	Creates a requisition in Coupa with its status as Draft.
	Create Requisition	Creates a requisition with the status as Pending Approval or Pending Buyer Action.
	Get Requisition Fields	Retrieves the list of fields in the Coupa Requisitions table. **Note:** This is a metadata action and doesn't make an API call to Coupa.
	Look up Requisition	Looks up the required requisition in Coupa using the Coupa query.
	Look up Requisitions Stream	Looks up the required requisitions in Coupa using the Coupa query.
	Update Requisition	Updates an existing requisition in Coupa.
Sourcing Management	Award Purchase	Awards a purchase in Coupa. To award a purchase, you can specify the quote request ID and the quote supplier ID as inputs.
	Create Sourcing Event	Creates a sourcing event in Coupa.
	Look up Sourcing Quote Response Stream	Looks up the quote response in Coupa based on the quote request ID that you specify. You can also specify other criteria such as the limit of records that the response returns, and the offset.
	Look up Sourcing Events Stream	Retrieves details of the required sourcing event in Coupa.
Supplier Management	Look up Supplier	Looks up the required supplier in Coupa using the Coupa query.
	Create Supplier	Creates a supplier in Coupa.
	Deactivate Supplier	Deactivates the specified supplier in Coupa.
	Update Supplier	Updates details of the specified supplier in Coupa.
	Look up Product Catalogs Stream	Retrieves the product catalogs in Coupa.
	Look up Suppliers Stream	Retrieves list of suppliers in Coupa using the query.
	Look up Suppliers Payment Stream	Retrieves details of the required supplier payments in Coupa.
	Create Supplier Payment Information	Creates supplier payment information in Coupa.
	Update Supplier Payment Information	Updates supplier payment information in Coupa.
	Get Supplier Fields (Metadata)	Retrieves the list of fields in the Coupa Suppliers table.

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Category	Action	Description
		Note: This is a metadata action and doesn't make an API call to Coupa.
User Management	Look up User	Looks up the required user in Coupa using the Coupa query.
	Look up Users Stream	Looks up the required users in Coupa using the Coupa query.
	Reset User Password	Resets password of the required user in Coupa.

Note: Remote tables are created when the Coupa spoke is activated. Users are cautioned against directly modifying schema or inserting data in these tables.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Coupa sourcing management AI agent	Manages sourcing data (that is, looks up sourcing event streams, creates new sourcing events) in Coupa.
Coupa approval management AI agent	Manages approvals (that is, looks up approvals, retrieves approval details) in Coupa.
Coupa requisition management AI agent	Manages requisition (that is, looks up operations to retrieve requisition data) in Coupa.
Coupa purchase order management AI agent	Manages purchase orders (that is, closes purchase orders, retrieves detailed purchase order information, and creates fixed assets) in Coupa.

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AI Agent	Description
Coupa invoice management AI agent	Manages invoices (that is, creates invoices, retrieves invoice details, and queries payment details) in Coupa.
Coupa inventory management AI agent	Manages inventories (that is, looks up receipt details, manages advanced shipment notices, and creates goods receipts) in Coupa.
Coupa supplier management AI agent	Manages supplier information (that is, creates, retrieves supplier and product catalog information) in Coupa.
Coupa item management AI agent	Manages items (that is, look up items and retrieve item streams) in Coupa.
Coupa primary data management AI agent	Manages primary data (that is, looks up conversion rates, cost centers, currencies, and legal entities) in Coupa.
Coupa user management AI agent	Manages users (that is, reset user passwords, look up individual user details, and retrieve streams of user data) in Coupa.
Coupa catalog management AI agent	Creates a catalog item in Coupa.
Coupa contract management AI agent	Manages contracts (that is, looks up or creates a contract) in Coupa.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up the Coupa spoke

Integrate the ServiceNow instance and Coupa by creating a custom OAuth application in Coupa to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Coupa spoke.

  Note: If you are upgrading to version 4.0.0 from the previous versions (3.0.3 and earlier) of the spoke, see this KB article: KB0550471.

- Role required: admin.

Configure a connection for Coupa spoke

Add and configure a Coupa connection to authenticate ServiceNow requests in Coupa spoke.

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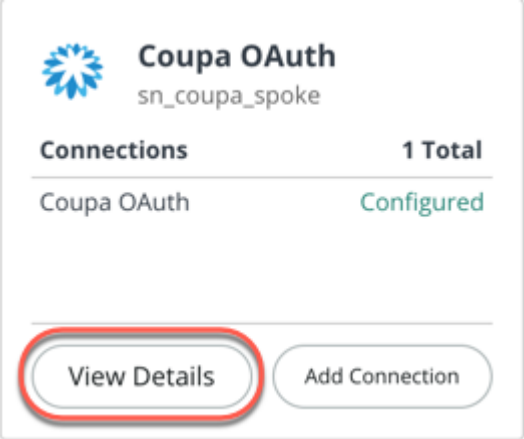
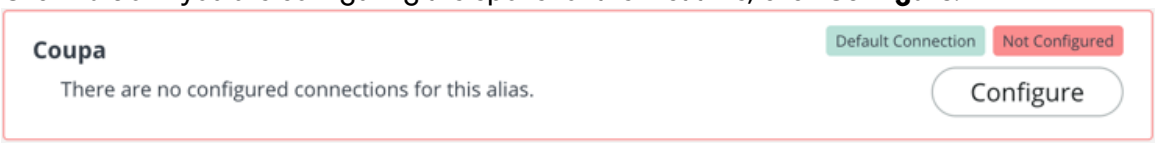
Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select **Integrations**.
3. Locate the **Coupa OAuth** connection alias and click **View Details**.

   Note: Don't click **Add Connection**.



4. Click **Edit** or if you are configuring the spoke for the first time, click **Configure**.



5. On the form, fill in the fields.

Configuration form

Field	Description
Name (Connection)	Name to uniquely identify the connection. For example, `Coupa spoke connnection`.
Connection URL	URL to make a connection to Coupa. ○ For customer instances, use this format: `https://{organization_name}.coupahost.com` ○ For partner and demo instances, use this format: `https://{organization_name}.coupacloud.com`
Name (Credential)	Name to uniquely identify the credential. For example, `Coupa spoke credential`.
Token URL	URL used to generate OAuth token. Use this format:`https://<connection_url>/oauth2/token`
OAuth Client ID	Identifier (Client ID) generated in Coupa.

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Field	Description
OAuth Client Secret	Secret (Client Secret) generated in Coupa.

6. Click **Configure and Get OAuth Token**.

Result
The spoke connection is configured and ready to be used.

Craft spoke

Manage alerts and retrieve company information from Craft from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Craft spoke v1.1.0 is the latest version. For version history of the spoke, see Craft Spoke release notes.

Supported versions

This spoke was built for Craft version v1, but may be compatible with later versions.

Spoke requirements

Craft account

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Remote Tables (com.glide.script.vtable)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Craft spoke provides sample flows to demonstrate automating the Craft tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

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Flow	Description
Create Incident if Company is not Active	Fetches company data using the required fragments aliases. If the company is not active, an incident with a description and a short description is created.

Spoke actions

The Craft spoke provides actions to automate Craft tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Alert Management	Look up Alerts Stream	Retrieves the list of alerts from Craft.
Company Data Management	Look up Added Companies Stream	Retrieves the list of added companies from Craft.
	Look up Company Data	Retrieves the company information for the specified details.
	Look up Company Details by Name.	Retrieves the company information for the specified company name.

Spoke module

The Craft spoke adds the Craft Spoke application to your instance and includes these modules:

Module	Description
Craft Alerts	Lists the alerts that are retrieved from the Import Craft Alerts import.
Query Fragments	Lists all the query data about the company such as company name, company ID and so on.

Data accessed through these spoke modules is displayed in these Remote tables:

Note: When you open a remote table, the actions you've set up run in the background to fetch information from Craft. This information displays in the table. When you close the remote table, the information is deleted.

Table	Description
Recently added companies	Retrieves the list of companies that were activated in the last 7 days.
Recent Craft alerts	Runs the remote Recent Craft Alerts remote definition in the background and retrieves the list of all alerts. **Note:** You can customize the alert filter by modifying the script in the Recent Craft Alerts remote definition.

Import set

The Craft spoke adds this Import in the integrations:

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Import	Description
Import Craft Alerts	Retrieves the alerts from Craft and stores them in the Crafts Alerts table.

Set up the Craft spoke

Integrate the ServiceNow instance and Craft spoke by using the basic authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Craft spoke.
- Role required: admin.

Configure a connection for Craft spoke

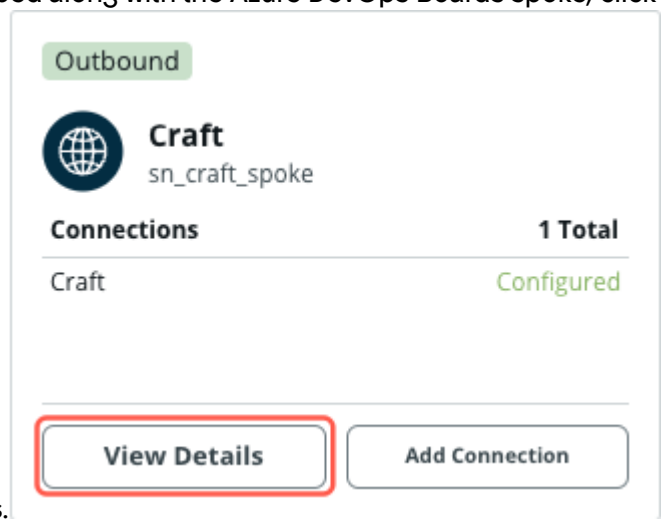
Add and configure a Craft spoke connection to authenticate ServiceNow requests.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio.**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **sn_craft_spoke** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Azure DevOps Boards spoke, click **View Details**.



   - To manage more than one Azure DevOps Boards spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



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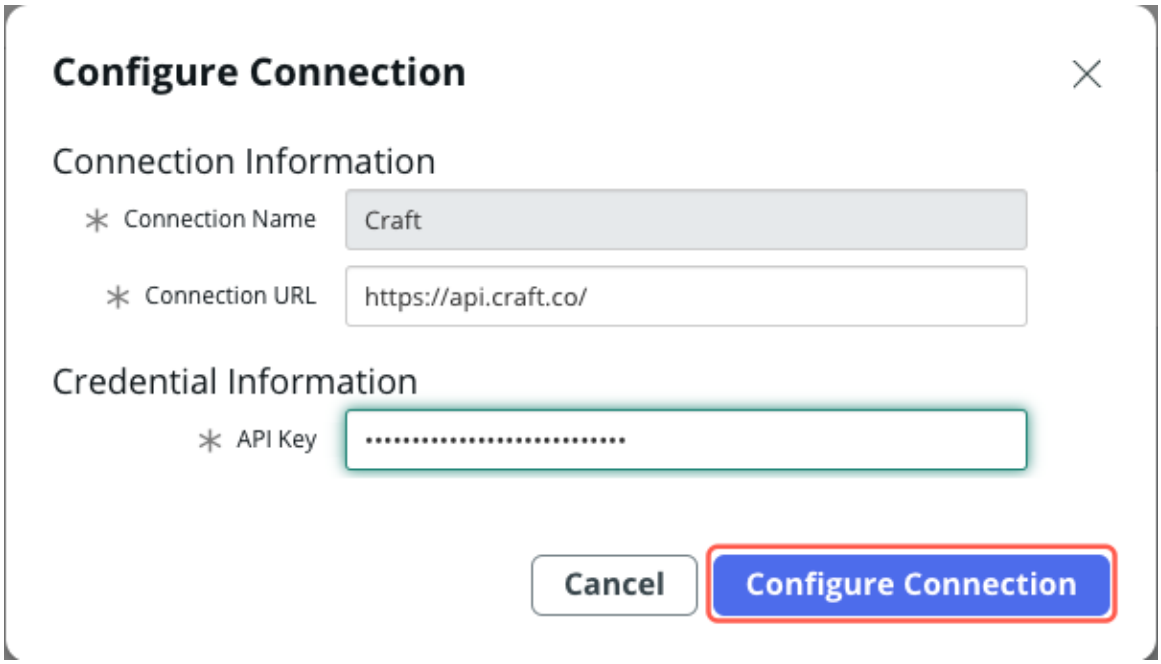
5. On the **Configure Connection** form, fill in the fields.

Field	Description
Connection name	Name to uniquely identify the connection record. For example, `Craft connection`.
Connection URL	URL of the Craft instance. For example, enter the URL in this format: `https://api.craft.co/`
API Key	API key from your Craft account.



6. Click **Configure Connection**.

Result
The spoke connection is configured and ready to be used.

Credly spoke

Credly integration helps employees prove, manage, and showcase their skills more effectively, addressing common issues related to skill verification, visibility, recognition, and career development.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Credly spoke v1.0.0 is the latest version. For version history of the spoke, see Credly Spoke release notes.

Supported versions

This spoke was built for brazil, and is compatible with later Washington DC and Xanadu versions.

Key features

Credly enables a flow designer to:

- Sync employee badges
- Accept/reject badges

Spoke requirements

A valid Credly account

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed: Credentials core

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Credly provides sample flows to demonstrate automating the Talent Development Core tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Credly event processing	Fetches employee badges to sync from Credly.

Spoke subflows

The Credly spoke provides sample subflows to demonstrate automating Talent Development Core tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Process credly event	Processes the credly event that was triggered.

Spoke actions

The Credly provides actions to automate Talent Development Core tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
Retrieving information	Process event information	Retrieves the event process information.
	Gen organization name	Retrieves the employee's organization name.
	Get event details	Retrieves the event details.
	Get employee data	Retrieves the employee data.

Spoke module

Data accessed through these spoke modules is stored in these tables:

Table	Description
Credly Event Log	Retrieves the list of events that were created.

Spoke user roles

The Credly provides these user roles to control access to data:

User role	Description
Admin	Role that is authorized to sync employee badges.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up the Credly spoke

Integrate the ServiceNow instance and Credly by creating a custom OAuth application in Credly to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Credly spoke.
- Role required: admin

Create a connection record for Credly spoke

Create a connection record for your Credly spoke. The Credly connection and credential aliases use these connections to perform actions in Credly.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for **Credly**.

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3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `<Credly spoke> Connection`.
Credential	Credential record created for Credly. For example, `<Credly spoke> Cred`.
Connection alias	Alias record associated with this connection.
URL builder	Option to use the URL builder to build the connection string.
Connection URL	Base URL to connect to **Credly**. Enter:
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use a MID Servers for this connection. If the check box is selected, define the fields in the Advanced MID Server Configuration related list.
Attributes	
Organization ID	The ID of the employee's organization in Credly.

5. Select **Submit**.

CrowdStrike Spoke

Manage licenses for CrowdStrike Falcon protection suite by fetching details of devices with active Falcon sensors installed and checking license compliance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

CrowdStrike spoke v1.1.0 is the latest version. For version history of the spoke, see CrowdStrike spoke release notes.

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Spoke requirements

CrowdStrike account with a Falcon administrator role.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require appropriate licenses when used outside the spoke implementation.

Spoke actions

The CrowdStrike spoke provides actions to automate CrowdStrike tasks when events occur in your ServiceNow instance.

Category	Action	Description
Host Management	Look up Active Hosts	Retrieves all active hosts. Active hosts are the hosts on which the last_seen date is greater than the date provided in the **Active Since** field.
	Look up Host Details	Retrieves details of the hosts for the Device IDs passed in the **Host IDs** field.
Sensor Management	Look up Hourly Sensor Usage	Retrieves a daily breakdown of your Customer Identification (CID) average hourly sensor usage by sensor category. **Note:** The usage data is retrieved up to two days prior to the current date.
	Look up Weekly Sensor Usage	Retrieves a daily breakdown of your CID average weekly sensor usage by sensor category. **Note:** The usage data is retrieved up to two days prior to the current date.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Register a CrowdStrike OAuth application

Register the CrowdStrike OAuth application to access the CrowdStrike API and to receive a Client ID and Client secret.

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Before you begin

The CrowdStrike Integration Hub spoke must be active. For more information, see CrowdStrike spoke.

Role required: CrowdStrike Falcon administrator

Important:

- To use the Sensor Usage APIs, your API client must be assigned the Sensor usage scope with read permissions.
- To use the Look up Hourly Sensor Usage and Look up Weekly Sensor Usage actions, contact your account team to enable the following feature flags:
  - Hourly usage data feature flag: This flag must be enabled for your Customer Identification (CID) to view hourly usage data.
  - Aggregated usage data feature flag: This flag must be enabled to get aggregated usage data in multi-CID (non-Flight Control) accounts.

Procedure

1. Log in to Falcon using your admin credentials.
2. Navigate to **Support** > **API Clients and Keys**.
3. Select **Add new API Client**.
4. Provide the client name and description.
5. Select the appropriate check boxes for the following scopes:
   - To use the Look up Active Hosts and Look up Host Details actions, select the **Read** check box for the **Hosts** scope.
   - To use the Look up Hourly Sensor Usage and Look up Weekly Sensor Usage actions, select the **Read** check box for the **Sensor usage** scope
   - To use all the supported actions, select the **Read** check box for both **Hosts** and **Sensor usage** scopes.
6. Select **ADD**.
   The API client created screen is displayed.
7. Copy the Client ID and Client secret for later use.

Create a CrowdStrike connection

Create a connection between your CrowdStrike applications and your ServiceNow instance so that your instance can retrieve user data from your applications.

Before you begin

ServiceNow Role required: admin

Procedure

1. Log in to your ServiceNow instance.
2. Navigate to **Connection & Credentials** > **Connection & Credentials Aliases**.
3. Locate your CrowdStrike connection and select **Create New Connection & Credential**.
4. In the dialog box, fill in the fields.

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Create Connection and Credential dialog box

Field	Value
Connection Information	
Connection Name	Name of the CrowdStrike connection. This field populates automatically.
Connection URL	URL for the connection. This field is automatically set to `https://api.crowdstrike.com`. Each CrowdStrike cloud has a different base URL. Use the base URL that corresponds to the cloud where your integration is hosted. ○ **US-1**: `https://api.crowdstrike.com` ○ **US-2**: `https://api.us-2.crowdstrike.com` ○ **EU-1**: `https://api.eu-1.crowdstrike.com` ○ **US-GOV-1**: `https://api.laggar.gcw.crowdstrike.com` ○ **US-GOV-2**: `https://api.us-gov-2.crowdstrike.mil`
Credential Information	
OAuth Client ID	Client ID that you generated while configuring the CrowdStrike API settings.
OAuth Client Secret	Client Secret that you generated while configuring the CrowdStrike API settings.
OAuth Redirect URL	`https://<instance name>/oauth_redirect.do`, where the instance name is the name of your ServiceNow instance.

5. Select **Create and Get OAuth Token**.
   The OAuth token is generated successfully.

Databricks Spoke

Retrieves details of warehouses, tables, schemas, and catalogs, and executes SQL statements in Databricks from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Databricks Spoke v1.0.1 is the latest version. For version history of the spoke, see Databricks Spoke release notes.

Supported versions

This spoke was built for these versions of Databricks, but may be compatible with later versions:

Action category	Databricks version
Unity Catalog Management	API version 2.1
SQL Management	API version 2.0

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke subflows

The Databricks spoke provides sample subflows to demonstrate automating tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Look up Catalogs	Retrieves list of all catalogs.
Look up Schemas	Retrieves list of all schemas from a specific catalog.
Look up Tables	Retrieves list of all tables from a specific schema in a catalog.
Sample - Execute Databricks SQL Statement	Executes a SQL statement on Databricks and returns the result columns and data array.

Spoke actions

The Databricks spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
SQL Management	Execute SQL Statement	Executes the provided SQL statement.
	Look up Execution Status	Retrieves the execution status of a SQL statement.
	Look up Result Chunk by Index	Retrieves a specific chunk of the result set for a SQL statement by chunk index. **Note:** If the data you want to retrieve is more than 5MB, modify the default value of the system property *glide.pf.rest.response_payload_max_size* and increase it as per your requirement.
	Look up Warehouses Stream	Retrieves a list of SQL warehouses.
Unity Catalog Management	Look up Catalogs	Retrieves details of the required number of catalogs. **Note:** To retrieve list of all catalogs, use the Look up Catalogs subflow.
	Look up Schemas	Retrieves details of the required number of schemas from a specific catalog. **Note:** To retrieve list of all schemas from a specific catalog, use the Look up Schemas subflow.
	Look up Tables	Retrieves details of the required number of tables from a specific schema in a catalog. **Note:** To retrieve list of all tables from a specific schema in a catalog, use the Look up Tables subflow.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up the Databricks spoke

Integrate your ServiceNow instance and the Databricks workspace by using an OAuth secret to authenticate the ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Databricks spoke.
- Role required: admin.

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Create an OAuth secret in Databricks workspace

Create an OAuth secret in Databricks workspace to authenticate the ServiceNow requests.

Before you begin
Role required: admin

Procedure

1. Log in to the Databricks workspace as an admin.
2. Click the user icon and click **Settings**.
3. Under **Workspace admin**, click **Identity and access**.
4. On the Identity and access page, for **Service principals** click **Manage**.
5. On the Service principals page, click **Add service principal**.
6. On the Add service principal form, click **Add new**.
7. On the Add service principal form, select the **Databricks Managed** option and for **Service principal name**, enter a name to identify the record.
8. Click **Add**.
   Service principal is added to the workspace and the list of service principals records is displayed.
9. Click and open the service principal record you have created.
10. Click the **Secrets** tab.
11. Under **OAuth secrets**, click **Generate secret**.
12. On the Generate OAuth secret form, for **Lifetime (days)** enter the required number of days the secret should be valid for.
13. Click **Generate**.
    The values of **Secret** and **Client ID** are generated.
14. Copy the values of **Secret** and **Client ID** for later use and click **Done**.
15. **Optional:** Click the **Permissions** tab.
16. **Optional:** Click **Grant access**.
17. **Optional:** On the Grant access to others form, select **User, Group or Service principal** and **Permission** as per your requirement and click **Save**.

Configure a connection for the Databricks spoke

Configure a connection to your Databricks workspace. The Databricks spoke connection and credential aliases use these connections to perform actions in the Databricks workspace.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Databricks** and click **View Details**.

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- To configure the default connection and credential alias record that is shipped along with the Databricks spoke, click **View Details**.

- To manage more than one Databricks spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.

5. On the form, fill in these fields:

Field	Value required
Connection Information	
Name	Auto-generated name to identify the connection record.
Connection URL	URL of the Databricks workspace.
Credential Information	
OAuth Client ID	Client ID you created in the Databricks workspace.
OAuth Client Secret	Key value you created in the Databricks workspace.
OAuth Redirect URL	Redirect URL of your ServiceNow instance in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`.

6. Click **Configure and Get OAuth Token**.

Docker Spoke

Lookup Docker data from your ServiceNow instance. Automate changes in the Docker engine when an event occurs in ServiceNow.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Docker spoke v2.4.3 is the latest version. For version history of the spoke, see Docker spoke release notes.

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

Community Edition version 18.09.0.

Spoke actions

The Docker spoke provides actions to automate Docker tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Images Management	Create An Image	Creates an image in the Docker instance.
	List Images	Lists images from the Docker instance.
	Remove An Image	Removes an image from the Docker instance.
	Search Images	Searches for images on Docker Hub.
Services Management	Create A Service	Creates a service in the Docker instance. Services are tasks run on a swarm.
	Delete A Service	Deletes a service from the Docker instance.
	Inspect A Service	Returns detailed information about a service in the Docker instance.
	Update A Service	Updates a service to the swarm on the docker instance.
	List Services	Returns a list of services from the Docker instance.
Containers Management	Create A Container	Creates a container in the Docker instance.
	Inspect A Container	Inspects a container in the Docker instance.
	Kill A Container	Kills a container in the Docker instance.
	List Containers	Lists containers in the Docker instance.

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Category	Action	Description
	Pause A Container	Suspends all processes in a container on the Docker instance.
	Remove A Container	Removes a container from the Docker instance.
	Rename A Container	Renames a container in the Docker instance.
	Restart A Container	Restarts a container in the Docker instance.
	Start A Container	Starts a container in the Docker instance.
	Stop A Container	Stop a container in the Docker instance.
	Unpause A Container	Unpauses a container in the Docker instance.
	Update A Container	Updates a container in the Docker instance with the provided values.
	Wait for A Container	Blocks all processes until a container stops, then returns the exit code for the container on the Docker instance.
Executions Management	Create An Exec Instance	Creates an exec instance in Docker, through which you can run a new command in a running container. To execute a command in a container, create and start an exec instance.
	Inspect An Exec Instance	Inspects an exec instance in Docker.
	Start An Exec Instance	Starts an exec instance in Docker, through which you can run a new command in a running container.
Networks Management	Create A Network	Creates a network on the Docker instance.
	Inspect A Network	Returns detailed information about a network in the Docker instance.
	List Networks	Returns a list of networks from the Docker instance.
	Remove A Network	Removes a network from the Docker instance.
Volumes Management	Create A Volume	Creates a volume in Docker.
	Inspect A Volume	Returns detailed information about a volume in Docker.
	List Volumes	Returns a list of volumes from Docker.
	Remove A Volume	Removes a volume from the Docker instance.

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Category	Action	Description
Swarm Management	Delete A Node	Deletes a node from the Docker instance.
	Initialize A New Swarm	Initializes a new Docker swarm. A swarm is a group of machines running Docker joined into a cluster.
	Inspect Swarm	Returns detailed information about a Docker swarm.
	Join An Existing Swarm	Joins a node to a swarm as a manager or worker node based on the Docker token.
	Leave A Swarm	Removes a Docker instance from a swarm.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the Docker alias record to authorize actions. To use the spoke connection alias, create an associated Connection record. This spoke does not require a credential record. For information about setting up the spoke, see Configure a connection for Docker spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Docker alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Docker spoke

Integrate the ServiceNow instance and Docker spoke by using the Docker Connection and Credential alias to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Docker spoke.
- Role required: admin.

Configure a connection for Docker spoke

Add and configure a Docker connection to authenticate ServiceNow requests in Docker spoke.

Before you begin

Role required: admin

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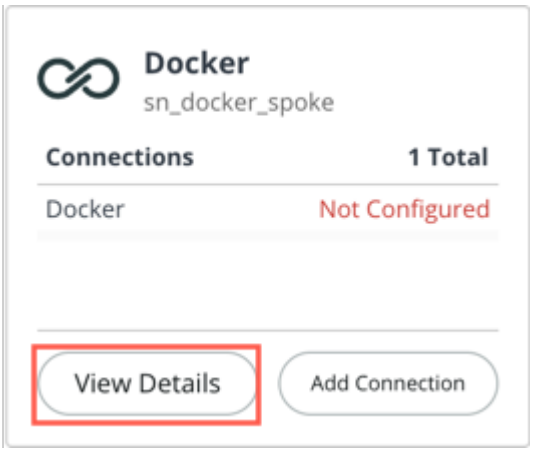
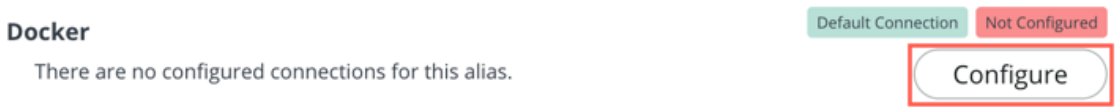
Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the **Docker** connection alias and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Docker spoke, click **View Details**.



   - To manage more than one Docker spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the Configure Connection form, fill in the fields.

Connection Name	Name to uniquely identify the connection record. For example, `Docker connection`.
Connection URL	IP address and port of the host server where Docker is installed. The format of the URL should be: `https://<ip_address>:<port_number>` or `https://<provider-domain-name>.com`.
Repository Name	Name of the repository.
User name	User name of your Docker account.
Email	Email address used in your Docker account.
Repository Type	Type of the Docker repository.
Password	Password of your Docker account.

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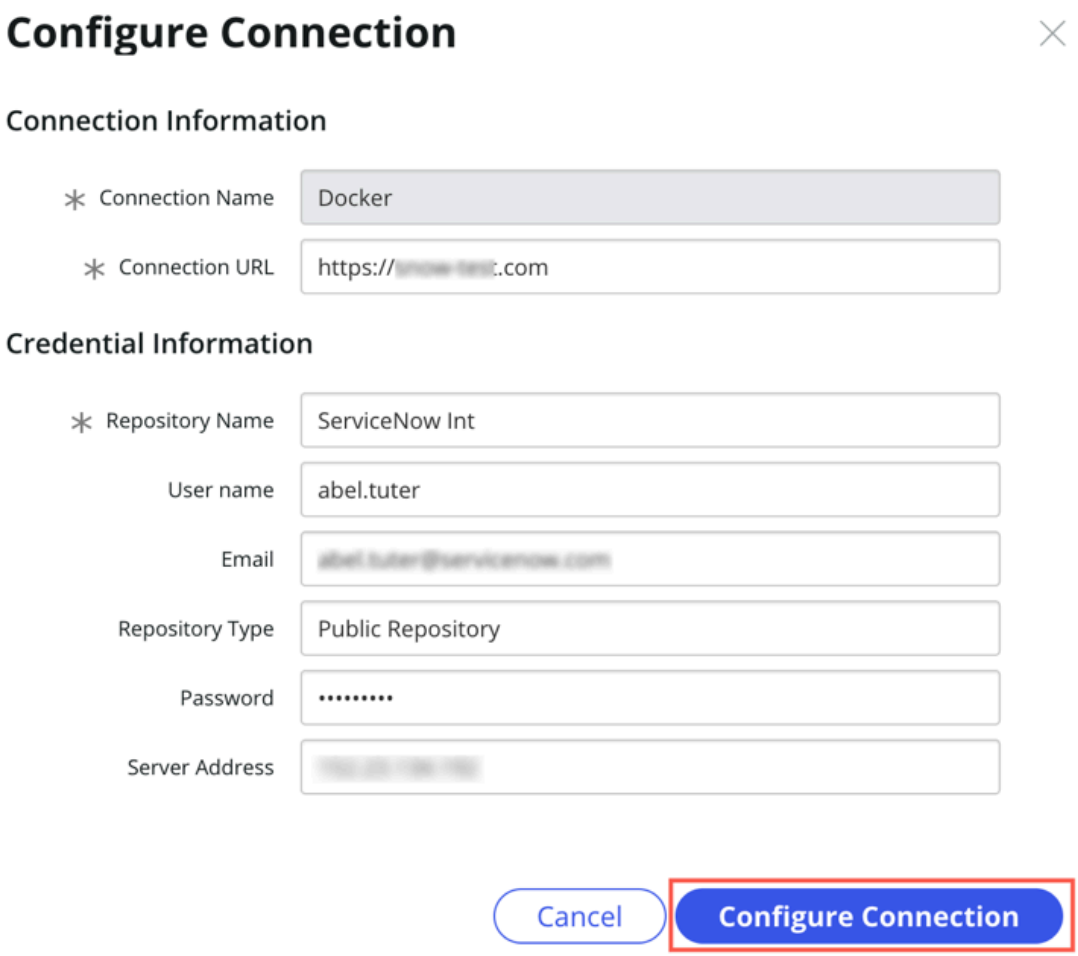
Server Address	IP address of the host server where Docker is installed.



6. Click **Configure Connection**.

Result
The spoke connection is configured and ready to be used.

Docusign eSignature Spoke

Automate the process of sending a document to an individual or list of recipients for digital signature using Docusign eSignature. For example, automate employee onboarding and offboarding, or send non-disclosure agreements, legal agreements, and statements of work. Use ServiceNow data in document templates and enable users to upload documents for signature as needed.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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IntegrationHub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Docusign eSignature spoke v4.5.1 is the latest version. For version history of the spoke, see Docusign eSignature Spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Compatible versions

This spoke was built for Docusign eSignature API version v2 or v2.1, but may be compatible with later versions.

Key features

Docusign eSignature spoke enables a flow designer to:

- Automate the process of sending a document from a ServiceNow attachment or Docusign eSignature template to an individual or recipient list for digital signature.
- Discover and synchronize Docusign eSignature accounts and templates in ServiceNow.
  - Retrieve a list of accounts and associated templates from Docusign eSignature and then insert or update them as records in the Accounts [sn_docusign_spoke_accounts] and Templates [sn_docusign_spoke_docusign_templates] tables using the Get Accounts subflow.
  - Retrieve templates associated with a specified Docusign eSignature account and then insert or update them as records in the Templates [sn_docusign_spoke_docusign_templates] table using the Get Templates Per Account subflow.
- Copy and customize sample flows for sending templates and on-demand document requests.
- Pause a flow until a document is signed. A scripted REST API webhook waits for the recipient to sign the document.
- Use values from a signed document in a flow.
- Attach a completed Docusign eSignature document to a ServiceNow record for auditing purposes.
- Manage envelopes and users.

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Spoke requirements

- Docusign eSignature account
- Docusign eSignature administrator credentials
- Docusign eSignature application configured to integrate with ServiceNow
- Docusign eSignature application details such as client ID, integrator key, secret keys, and RSA keypairs
- ServiceNow IntegrationHub subscription

Note: Ensure that you have activated the Flow Designer support for the Service Catalog (com.glideapp.servicecatalog.flow_designer) plugin.

See the Docusign Developer Center documentation for instructions on creating and configuring custom applications.

Spoke flows

The Docusign eSignature spoke provides sample flows to demonstrate automating Docusign tasks. Use Docusign eSignature spoke actions to automate any tasks desired by your organization. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Send a Document for Digital Signature	Sends a document to Docusign for a digital signature when a Service Catalog request is created by the **Send a Document for Digital Signature** item. Before using this flow, activate the **Send a Document for Digital Signature** catalog item.
Send employment offer to candidate using Docusign template	Sends a Docusign envelope to a user using a template. For example, use this flow to send a job offer to a candidate. Before using this flow, activate the **Demonstrate Template - Send Job Offer to Candidate** catalog item.

The Docusign eSignature spoke adds catalog items for use with the Docusign eSignature spoke sample flows. Before triggering a Docusign eSignature spoke sample flow, activate these catalog items.

Catalog item	Description
Send a Document for Digital Signature	Sends a document for digital signature in Docusign.
Demonstrate Template - Send Job Offer to Candidate	Sends a job offer using a Docusign template.

Spoke subflows

The Docusign eSignature spoke provides sample subflows to demonstrate automating Docusign tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

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Category	Subflow	Description
Envelope Management	Attach Docusign Envelope To ServiceNow Record	Attaches all the documents in an envelope to a ServiceNow record.
	Get & Set Docusign Field Data	Processes a list of catalog item variables and updates a draft envelope with each variable value.
User Management	Create User	Creates a user including the permission profile and group memberships.
	Update User	Updates a user including the permission profile and group memberships.
Templates Management	Get Templates Per Account	Retrieves templates from a Docusign account and stores them in the Templates table.
Default	Docusign Webhook Sample Subflow	Retrieves the recipient details for the specified envelope.
Account Management	Get Accounts	Retrieves Docusign Accounts and Templates related to every account and store them in Accounts and Templates table respectively.

Spoke actions

The Docusign eSignature spoke provides actions to automate Docusign tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Account Management	Look up Account Signature Providers	Retrieves a list of signature providers that the specified account can use.
	Look up Accounts by Alias	Retrieves accounts associated with the spoke Connection and Credential alias record.
	Look up Role ID	Retrieves the roles ID for the specified role name.
Bulk Envelopes Management	Create Bulk Send List	Creates a bulk send list.
	Create Bulk Send Request	Creates a bulk send request based on an existing bulk send list using an envelope or template.
	Create Bulk Send Test Request	Creates a bulk send test request for testing compatibility with the existing envelope or template.
	Delete Bulk Send List	Deletes the specified bulk send list.
	Look up Bulk Send Batch	Retrieves the envelopes from the specified bulk send batch.

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Category	Action	Description
	Envelopes Stream	
	Look up Bulk Send Batch Status	Retrieves the general status of the specified bulk send batch such as number of successes, number pending, number of errors and so on.
	Look up Bulk Send Batches Stream	Retrieves the information of the bulk send batches.
	Look up Bulk Send List	Retrieves the specified bulk send list.
	Look up Bulk Send Lists	Retrieves a list of the bulk send lists.
	Update Bulk Send Batch Action	Performs a bulk action (resend, correct or void) on the specified bulk send batch.
	Update Bulk Send Batch Status	Updates the name of the specified bulk send batch.
	Update Bulk Send List	Updates the specified bulk send list.
Document Signature	Look up Embedded Signing URL	Creates a signing URL that is embedded into an application. User can sign the document without leaving the application. **Note:** Signing URL is active for 300 seconds and can be sent to one recipient at a time.
	Look up Embedded Signing URL Inline	Retrieves a URL which enables you to embed the recipient view of the on Docusign.
Document Management	Add Document to Envelope	Adds documents to envelope.
	Attach Combined Document to ServiceNow Record	Attaches Docusign documents to a ServiceNow record.
	Attach Docusign Document	Retrieves a signed Docusign document and attaches it to a ServiceNow record.

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Category	Action	Description
	to ServiceNow Record	
	Look up Document ID by Name	Retrieves the document ID from an envelope using the specified document name.
	Look up Documents in an Envelope	Returns a list of documents with an ID and name in the given Docusign envelope.
	Replace Document in an Envelope	Replaces documents to envelope.
Envelope Management	Add Recipient to Envelope	Adds the specified recipient to the specified envelope. **Note:** • Recipient ID used in this action is associated with the envelope and is different from the Recipient ID used in the Get All Template Fields action. • Administrator enters a numeric value for this Recipient ID.
	Add Recipients to Envelope	Adds the specified recipients to the specified envelope.
	Attach Docusign Certificate To ServiceNow Record	Attaches a Docusign certificate to a ServiceNow record.
	Cancel Envelope	Cancels an in-process envelope.
	Create Draft Envelope from Template	Creates a draft envelope from an existing Docusign template.
	Create Envelope from Composite Template	Creates an envelope from an existing composite template.
	Look up Field ID	Retrieves the ID of the specified field from the specified draft envelope.
	Look up Field Value	Retrieves the value of the specified field from the specified envelope.

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Category	Action	Description
	Look up Fields	Retrieves the list of fields associated to a document in a draft envelope.
	Look up Recipient ID by Role Name	Retrieves the recipient ID of the specified role name from the specified envelope.
	Look up Recipients in an Envelope	Returns a list of recipients with a Recipient ID and Role Name in the given Docusign envelope.
	Remove Recipient from Envelope	Deletes a recipient from a Docusign envelope.
	Send Adhoc Signature Request to User	Sends a Docusign document associated with the specified ServiceNow record to the specified recipient for signature.
	Send Adhoc Signature Request To Users - Inline	Sends one or more uploaded documents from a ServiceNow record to multiple recipients.
	Send Envelope	Sends an envelope to the specified recipients. **Note:** All recipient details must be provided before sending an envelope.
	Resend Envelop	Send a reminder to recipients who are currently the pending signers.
	Lock Envelop	Locks the specified envelope and sets the time until the lock expires to prevent other users or recipients from changing the envelope.
	Unlock Envelope	Unlocks the specified locked envelope.
	Set Field Value	Sets the value of the specified field in the specified draft envelope.
	Set Field Values	Assigns the values of multiple fields associated to a document in a draft envelope.
	Wait for Signature from Docusign	Pauses a flow until the specified document has been signed or rejected. Returns the status of the document to the flow for further processing.

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Category	Action	Description
	Remove Recipient from Envelope	Deletes a recipient from an envelope. Prior to using this action, Create Draft Envelope from Template action should be used to generate a draft Envelope.
	Upsert Recipients for Envelope	Updates or adds recipients to the envelope. If a recipient with the specified recipient ID already exists, their information will be updated; otherwise, a new recipient will be created with the provided details. Prior to using this action, Create Draft Envelope from Template action will be used to generate a draft Envelope.
Group Management	Add User To Group	Adds user from a group.
	Look up Group ID	Retrieves a group ID for the specified role name.
	Remove User From Group	Removes the specified user from a group.
Template Management	Look up Templates Per Account	Retrieves the templates associated with the specified Docusign account.
	Look up Template Fields	Retrieves all fields in a template that is defined for a recipient. **Note:** • Recipient ID used in this action is associated with the template and is different from the Recipient ID used in the Add Recipient to Envelope action. • Value of the Recipient ID is a unique system-generated number.
	Look up Template Recipients	Retrieves all recipients defined for a template.
User Management	Create User	Creates a Docusign user with the specified user details.
	Look up User Detail	Retrieves details for a user.
	Update User	Updates the specified user.
	Delete User	Deletes the specified Docusign user.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

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- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Docusign eSignature account management AI agent	Manages account management (that is, looks up accounts by alias, retrieves role IDs and identifies account signature providers) in Docusign.
Docusign eSignature envelope management AI agent	Manages envelope management (that is, sendS signature requests, manages envelope statuses, and attaches DocuSign data to ServiceNow records) in Docusign.
Docusign eSignature templates management AI agent	Manages template management (that is, retrieves recipient details, accesses template fields, and fetches template names per account) in Docusign.
Docusign eSignature bulk envelopes management AI agent	Manages bulk envelope management tasks (that is, updates and looks up bulk send batch statuses, manages bulk send lists, create bulk send requests) in Docusign.
Docusign eSignature user management AI agent	Manages user management (that is, creates, updates, deletes, and retrieves user details) in Docusign.
Docusign eSignature group management AI agent	Manages group management (that is, looks up group IDs, adds users to groups, and removes users from groups) in Docusign.
Docusign eSignature document management AI agent	Manages document management tasks (that is, attaches documents, manages envelopes, and retrieves document details) in Docusign.
Docusign eSignature document signature AI agent	Manages document signature tasks (that is, looks up embedded signing URL, and looks up embedded signing URL inline) in Docusign.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

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Spoke module

The Docusign eSignature spoke adds a Docusign module to your ServiceNow instance. The Docusign eSignature spoke synchronizes and stores templates and envelopes in ServiceNow. The Docusign eSignature spoke includes these tables and records.

Table/Record	Description
Connection Aliases	The Docusign connection alias.
Scheduled Job	The Get Accounts & Templates scheduled job that synchronizes templates and envelopes with your Docusign account.
Accounts	Docusign accounts synchronized with your ServiceNow instance. To synchronize accounts, see Synchronize Docusign with ServiceNow. The Get Accounts subflow retrieves a list of accounts and associated templates from Docusign and then inserts or updates them as records in the Accounts [sn_docusign_spoke_accounts] and Templates [sn_docusign_spoke_docusign_templates] tables.
Templates	Docusign templates from synchronized Docusign accounts. The Get Templates Per Account subflow retrieves templates associated with a specified Docusign account and then inserts or updates them as records in the Templates [sn_docusign_spoke_docusign_templates] table.
Envelopes	Docusign envelopes from synchronized Docusign accounts. Records in the Envelopes table are updated only when webhook is configured for the Docusign account.
DocuSign Webhook Answer Subflows	List of webhook answer subflows.

The Docusign eSignature spoke tables include these fields.

Table	Fields
Accounts [sn_docusign_spoke_accounts]	• Account ID • Account Name • Description • Email • Alias • Display Name
Templates [sn_docusign_spoke_docusign_templates]	• Account • Template ID • Name • Description • Last Modified • Display Name

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Table	Fields
Envelopes [sn_docusign_spoke_envelopes]	• Account • ID • Status • Signed Date • Declined Reason • Display name • Embedded Signing • Signed Date Time Zone • Template

Spoke triggers

ServiceNow supports specific events on Docusign that create triggers. You must first configure a flow with a supported trigger definition. When an event, for example, a push request, occurs on the Docusign, it sends the payload via a webhook to the ServiceNow instance. After that, the flow that you configured is triggered at the ServiceNow instance to automate a workflow. The supported events are:

Category	Trigger	Definition
Envelope Management	Envelope Completed	Trigger is initiated when an envelope has been completed by all the recipients. Configure the flow to execute only when the specified trigger conditions are met.
	Envelope Declined	Trigger is initiated when an envelope has been declined by one of the recipients. Configure the flow to execute only when the specified trigger conditions are met.
	Envelope Deleted	Trigger is initiated when a sent envelope is deleted. Configure the flow to execute only when the specified trigger conditions are met.
	Envelope Delivered	Trigger is initiated when all recipients have opened the envelope through the Docusign signing website. Configure the flow to execute only when the specified trigger conditions are met.
	Envelope Sent	Trigger is initiated when an envelope is sent to recipient. Configure the flow to execute

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Category	Trigger	Definition
		only when the specified trigger conditions are met.
	Envelope Voided	Trigger is initiated when an envelope has been voided by the sender or has expired. Configure the flow to execute only when the specified trigger conditions are met.
Recipient Management	Recipient Completed	Trigger is initiated when the recipient has completed their actions for the envelope. Configure the flow to execute only when the specified trigger conditions are met.
	Recipient Declined	Trigger is initiated when the recipient declines to sign the document(s) in the envelope. Configure the flow to execute only when the specified trigger conditions are met.
	Recipient Delivered	Trigger is initiated when the recipient has viewed the document(s) in an envelope through the Docusign signing web site. Configure the flow to execute only when the specified trigger conditions are met.
	Recipient Sent	Trigger is initiated when an email notification is sent to the recipient signifying that it is their turn to sign an envelope. Configure the flow to execute only when the specified trigger conditions are met.

For information about setting up the triggers for the Docusign eSignature spoke, see Set up triggers for the Docusign eSignature spoke. For more information about inbound integration, see Conditional and event-driven inbound integration.

Docusign account requirements

The Docusign eSignature spoke requires configuring your Docusign account to generate an OAuth 2.0 JWT Bearer Grant token.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the Docusign Connection & Credential Alias record to authorize actions.

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Important:

- You can choose to set up the Docusign spoke using authorization code grant or JWT grant.
  - Use Authorization Code Grant if your integration uses a browser or client to make requests to a web server.
  - Use JWT Grant if each user of your integration will use a single system account to log in.

  For more information about when to chose either of the setup methods, see Choose OAuth Type in Docusign Developer documentation.
- Your company may have a Docusign account for each department that uses Docusign. To use multiple accounts with this spoke, create a child alias for each account. Also, ensure that you override the base alias with the child alias in your flows. At runtime, the system identifies the child alias associated with the account and sends the correct connection and credential information in the request.
  - For more information about child alias and overriding the base alias, see Supporting multiple connections.
  - For information about setting up multiple accounts, see Create child aliases for additional Docusign accounts.

  If your company only has one account, you can use the default **Docusign** alias provided with the spoke and proceed to setting up the Docusign spoke using authorization code grant or JWT grant.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Docusign alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up Docusign eSignature spoke using authorization code grant

Integrate the ServiceNow instance and Docusign eSignature spoke by using Authorization Code to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Docusign eSignature spoke.
- Role required: admin

Important: If you are setting up Docusign eSignature spoke using authorization code grant, you need not set up the spoke using JWT grant.

Configure the Docusign account

Configure a custom OAuth application from your Docusign account to enable authentication with the Docusign eSignature spoke.

About this task

Complete these steps from your Docusign account. See the Docusign Developer Center documentation for instructions on creating and configuring custom applications. Docusign uses

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a scripted webhook to send signed document data to ServiceNow instance. This enables flow designers to pause a flow until a document is signed, and use document data in the flow.

Before you begin

Docusign requirements:

- Docusign account
- Docusign app configured to integrate with ServiceNow
- Role required: Docusign administrator

Procedure

1. Log in to the Docusign account as an admin.
2. From your Docusign account, register your application.

   Note: Ensure that you select the **Authorization Code Grant** option for **User Application**.

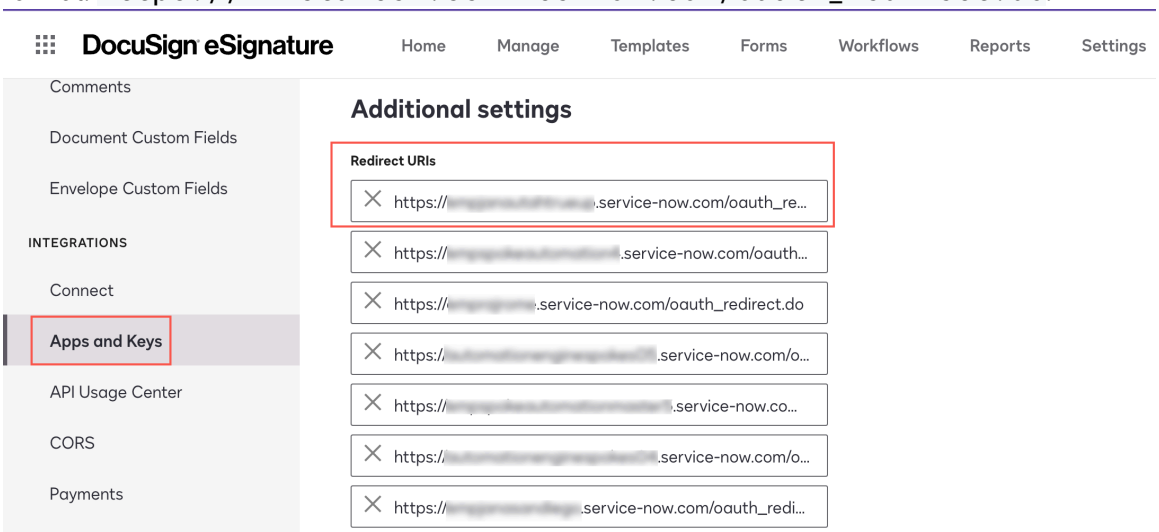
3. Generate an integrator key and secret key.
4. Record the values of integrator key and secret key to register the app as a third-party OAuth provider on your ServiceNow instance.
   You need these values when you Configure the connection for Docusign eSignature spoke.
5. Add the ServiceNow OAuth Redirect URL in your Docusign account.

   a. Navigate to **Integrations** > **App and Keys**.

   b. Under **Apps and Integration Keys**,find the required app.

   c. For the required app, click the **Actions** drop-down list and click **Edit**.

   d. Under **Additional settings**, click **Add URI** and add the OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`.



6. Obtain the value of **Account Base URI** from the Docusign account.

   a. Navigate to **Integrations** > **App and Keys**.

   b. Under **My Account Information**, you can find the value of the **Account Base URI**.

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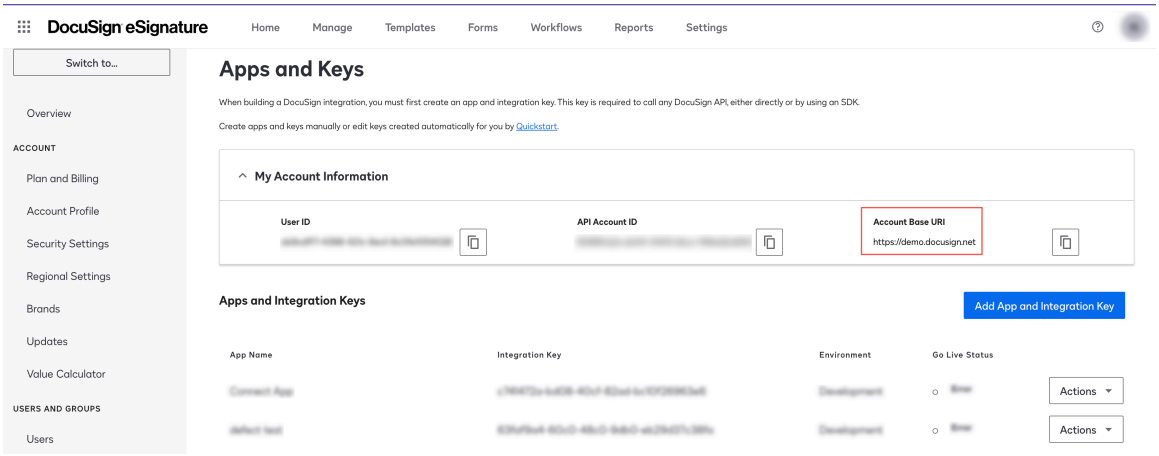


c. Copy and record this value for later use.

Configure the connection for Docusign eSignature spoke

Integrate the ServiceNow instance and Docusign account instance using authorization code grant to authenticate ServiceNow requests.

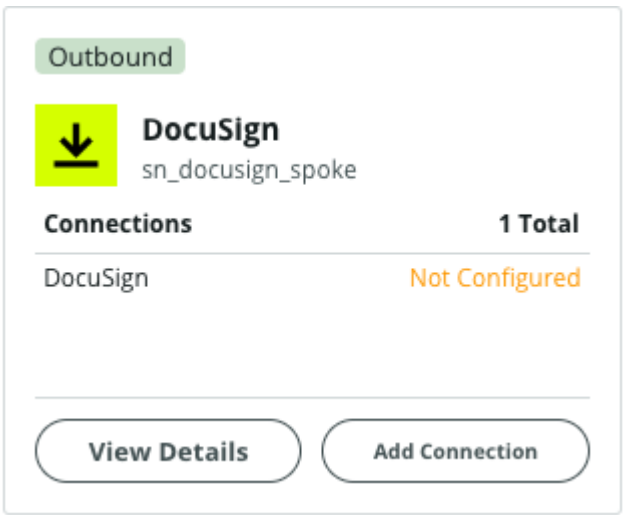
Before you begin

Role required: admin

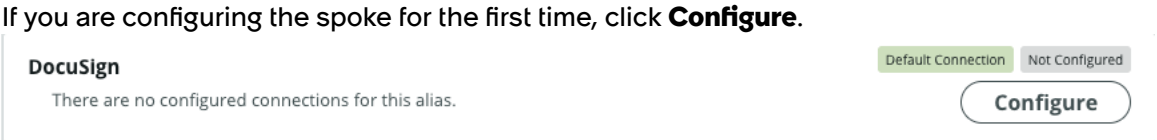
Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for Docusign and click **View Details**.

Note: Don't click Add Connection.



5. If you are configuring the spoke for the first time, click **Configure**.



6. On the Configure Connection form, fill in the fields.

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Configure Connection form

Field	Description
Connection Name	Unique name to identify the connection.
Connection URL	**Account Base URI** to connect to Docusign environment. This value can be obtained from your Docusign account. For more information see, Configure the Docusign account.
API Version	Docusign API version. The default value is v2.1.
Authorization URL	Docusign authorization URL. ○ For developer sandbox environment, enter `https://account-d.docusign.com/oauth/auth`. ○ For live production system, enter `https://account.docusign.com/oauth/auth`.
Token URL	URL from which the ServiceNow instance obtains the access token. ○ For developer sandbox environment, enter `https://account-d.docusign.com/oauth/token`. ○ For live production system, enter `https://account.docusign.com/oauth/token`. For more information see, Post Go-Live and User Info Endpoint Reference in the Docusign Developer Center documentation.
OAuth Client ID	Integrator key of your Docusign account.
OAuth Client Secret	Secret key (client secret) of your Docusign account.
OAuth Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`. **Note:** Ensure that you add this URL in your Docusign account. For more information see, Configure the Docusign account.

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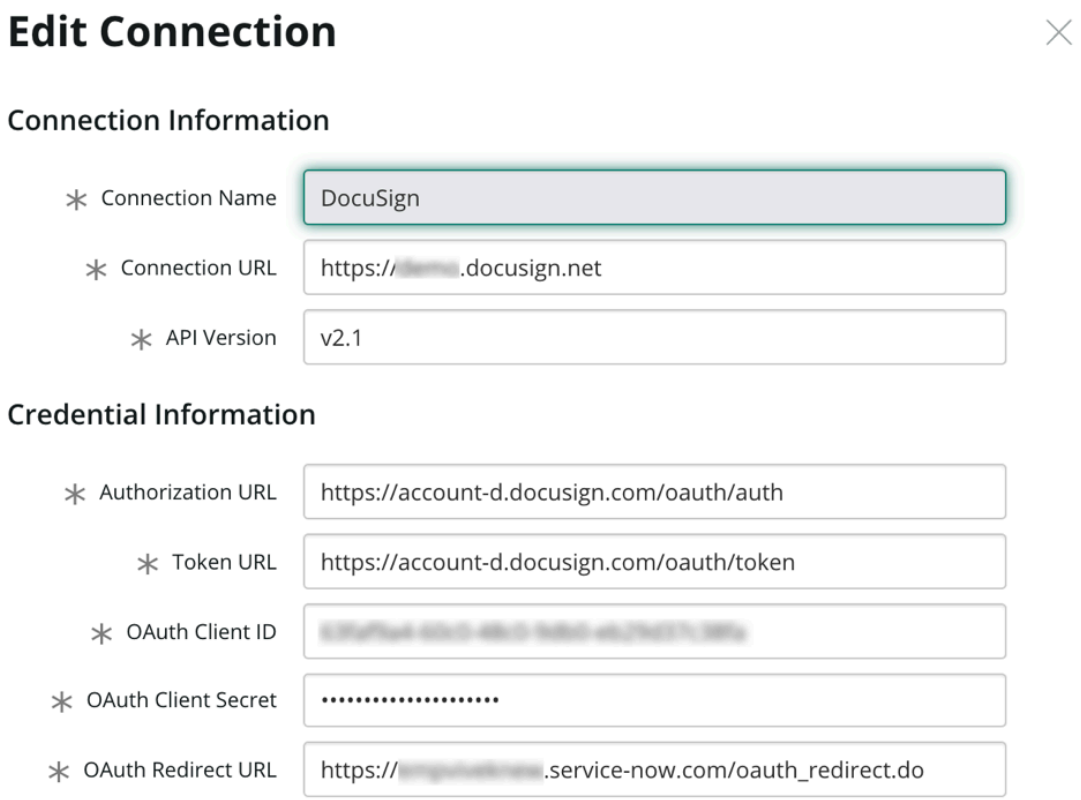

7. Click **Configure and Get OAuth Token**.

Set up Docusign eSignature spoke using JWT grant

Integrate the ServiceNow instance and Docusign by using JWT grant to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Docusign eSignature spoke.
- Role required: admin.

Important: If you are setting up Docusign eSignature spoke using JWT grant, you need not set up the spoke using authorization code grant.

Configure Docusign account

Create a custom OAuth application from your Docusign account to enable OAuth 2.0 authentication with the Docusign eSignature spoke.

Before you begin

Docusign requirements:

- Docusign account
- Docusign app configured to integrate with ServiceNow
- Role required: Docusign administrator

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About this task

Complete these steps from your Docusign account. See the Docusign Developer Center documentation for instructions on creating and configuring custom applications. Docusign uses a scripted webhook to send signed document data to ServiceNow instance. This enables flow designers to pause a flow until a document is signed, and use document data in the flow.

Procedure

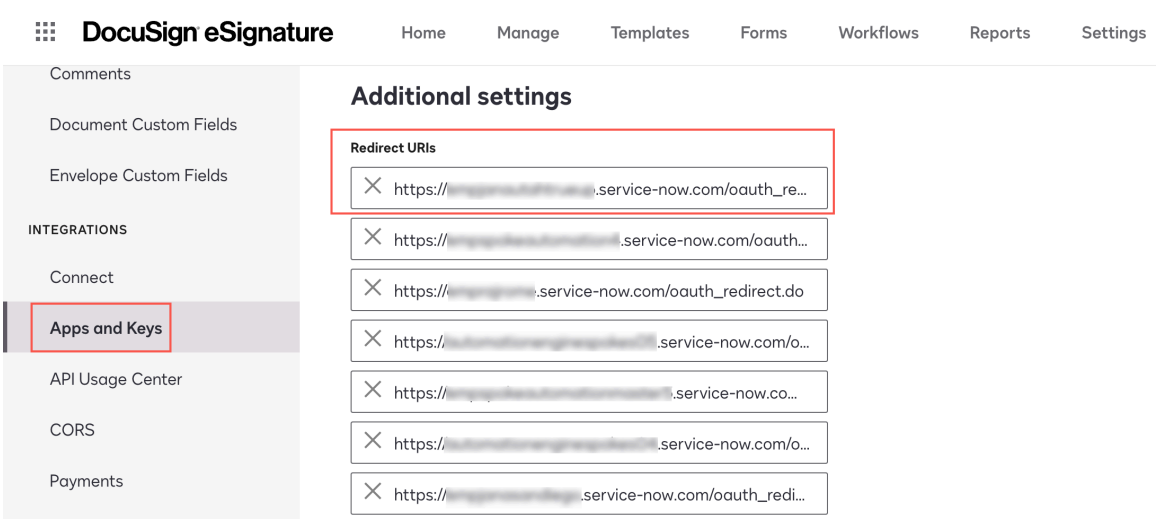
1. From your Docusign account, register your application.
2. Generate an integrator key and secret key.
3. Record the values of integrator key and secret key to register the app as a third-party OAuth provider on your ServiceNow instance.
   You need these values when you Register Docusign as OAuth Provider
4. Click **ADD RSA KEYPAIR** and record the **Keypair ID**, **Public Key**, and **Private Key**.
5. Add the ServiceNow OAuth Redirect URL in your Docusign account.

   a. Navigate to **Integrations** > **App and Keys**.

   b. Under **Apps and Integration Keys**,find the required app.

   c. For the required app, click the **Actions** drop-down list and click **Edit**.

   d. Under **Additional settings**, click **Add URI** and add the OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`.



6. Obtain the value of **Account Base URI** from the Docusign account.

   a. Navigate to **Integrations** > **App and Keys**.

   b. Under **My Account Information**, you can find the value of the **Account Base URI**.

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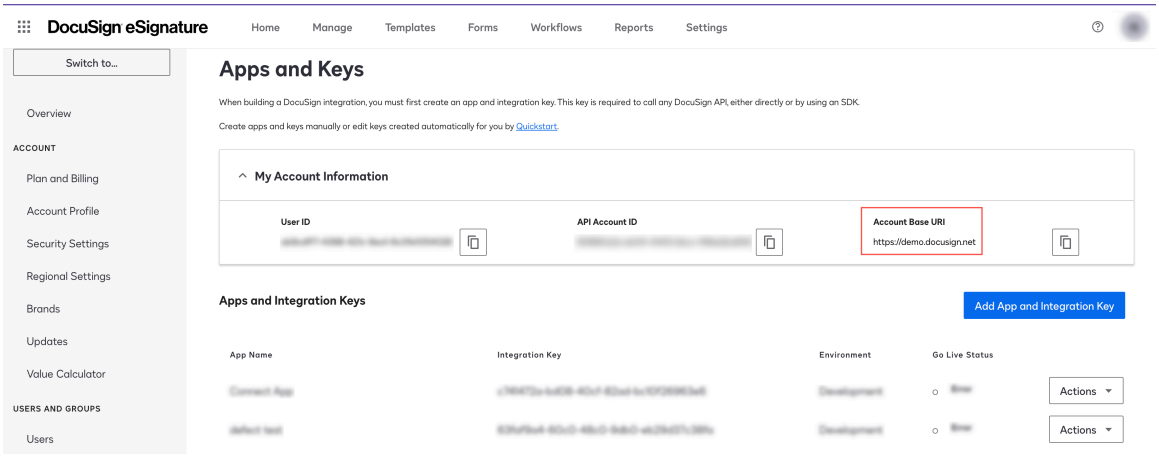

c. Copy and record this value for later use.

Generate the JKS certificate

Generate a JKS certificate for the JWT authentication of the Docusign eSignature spoke.

Before you begin

Role required: admin

Procedure

1. Open the text editor for code such as, Sublime Text.
2. Create a new file.
3. Paste the Private Key you had earlier generated from your Docusign integrator app. For more information, see Configure Docusign account.

   Note: Ensure that you include both beginning and ending of the private key.

4. Save the file with the .key extension, for example, `privatekey.key`.
5. Open terminal and navigate to the directory where you saved the file with the `.key` extension.
6. Create a CA signed certificate using your private key by executing the command:

   ```
   openssl req -new -x509 -key <file-name>.key -out
    <certificate-name>.pem -days 1095
   ```

   System prompts you to provide required details such as Country Name, Province Name and so on.
7. Enter the required details.
8. Create PKCS 12 file using your private key and CA signed certificate by executing the command:

   ```
   openssl pkcs12 -export -in <certificate-name>.pem -inkey
    <file-name>.key -certfile <certificate-name>.pem -out
    <PKCS-12-file-name>.p12
   ```

   System prompts you to provide a password.
9. Provide the export password.
10. Create the JKS file by executing this command:

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```
keytool -importkeystore -srckeystore
 <PKCS-12-file-name>.p12 -srcstoretype pkcs12 -destkeystore
 <JKS-certificate-filename>.jks -deststoretype JKS
```

System prompts you to provide a password.

11. Provide the destination and source keystore passwords.

Attach a Java Key Store certificate to the Docusign eSignature spoke

Enable the JWT Bearer Grant token authentication by attaching a valid Java KeyStore (JKS) certificate to the Docusign eSignature spoke.

Before you begin

- Ensure the availability of a valid Java KeyStore certificate
- Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Certificates**.
2. Click **New**.
3. Complete the form.

X.509 Certificate form fields

Field	Description
Name	Enter a name to uniquely identify the record. For example, `Docusign Certificate`.
Notify on expiration	Define users to be notified when the certificate expires.
Warn in days to expire	Enter the number of days to send a notification before the certificate expires.
Active	Enable
Type	Select **Java Key Store**.
Expires in days	Enter the number of days until the certificate expires.
Key store password	Enter a password associated with the certificate.
Short description	Enter a summary about the certificate.

4. Click the attachments icon ( ) and attach a JKS certificate.
5. Click **Validate Stores/Certificates**.

Create a JWT signing key for the Docusign eSignature spoke

Create a JSON Web Token (JWT) signing key to assign to your Java KeyStore certificate.

Before you begin

Role required: admin.

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Procedure

1. Navigate to **All** > **System OAuth** > **JWT Keys**.
2. Click **New**.
3. Complete the form.

JWT Keys form fields

Field	Description
Name	Enter a name to uniquely identify the JWT signing key. For example, `Docusign JWT Keys`.
Signing Keystore	Select the valid JKS certificate attached in the previous task. For example, `Docusign Certificate`.
Key Id	Enter a key Id to identify which key is used when multiple keys are used to sign tokens.
Signing Algorithm	Select an algorithm to sign with the JWT key.
Signing Key Password	Enter a password associated with the signing key.
Active	Enable.

4. Click **Submit**.

Create a JWT provider for the Docusign eSignature spoke

Add a JSON Web Token (JWT) provider to your ServiceNow instance.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System OAuth** > **JWT Providers**.
2. Click **New**.
3. On the form, fill in the fields.

JWT Provider form fields

Field	Description
Name	Enter a name to uniquely identify the JWT provider. For example, `Docusign JWT Provider`.
Expiry Interval (sec)	Enter a number in seconds to set the lifespan of JWT provider tokens.
Signing Configuration	Select a JWT signing key. For example, `Docusign JWT Keys`.

4. Right-click the form header, and click **Save**.
   The Standard Claims and Custom Claims related lists display.

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5. On the same page of the JWT provider record, enter values for **iss**, **sub**, and **aud** in the **Standard Claims** related list.

Claim	Value
iss	`<your_integration_key>`
sub	`<your_user_ID>`
aud	`account-d.docusign.com`

For more information, see How to get an access token with JWT Grant in Docusign Developer Center.

6. Insert a record in the **Custom Claims** related list and complete the form.

Custom Claims related list fields

Field	Value
Claim Name	scope
Claim Value Type	string
Claim Value	signature impersonation

7. Click **Update**.

Register Docusign as OAuth Provider

Use the information generated during Docusign account configuration to register Docusign as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Click **New**.
   The system displays the message **What kind of OAuth application?**
3. Select **Connect to a third party OAuth Provider**.
   The system displays a blank Application Registries form.
4. Complete the form.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `Docusign OAuth`.
Client ID	Enter the integrator key you generated during the Docusign account configuration.
Client Secret	Enter the client secret you generated during the Docusign account configuration.

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Field	Value required
Default Grant type	Select **JWT Bearer**.
Authorization URL	○ For developer sandbox environment, enter `https://account-d.docusign.com/oauth/auth`. ○ For live production system, enter `https://account.docusign.com/oauth/auth`.
Token URL	○ For developer sandbox environment, enter `https://account-d.docusign.com/oauth/token`. ○ For live production system, enter `https://account.docusign.com/oauth/token`. For more information see, Post Go-Live and User Info Endpoint Reference in the Docusign Developer Center documentation.

5. Right-click the form header, and click **Save**.
   - The system validates the OAuth credentials and populates the **Redirect URL**.
   - The system populates **OAuth Entity Profile** with **Grant Type** as **JWT Bearer**. For example, **OAuth Entity Profile** is created with default **Name**, **Docusign OAuth default_profile**
6. Insert a record in the **OAuth Entity Scopes** related list and fill the values.

OAuth Entity Scopes related list fields

Field	Value
Name	scope
OAuth Scope	signature impersonation

7. Copy the value from **Redirect URL**.
8. Click **Update**.
9. Login to your Docusign account to edit the configuration of your custom Docusign application. See the Docusign Developer Center for instructions.
10. Paste the Redirect URL value into the Redirect URI for your custom Docusign application. For example, paste `https://instance.service-now.com/oauth_redirect.do`

Result

The instance can request OAuth 2.0 tokens for the spoke.

Note: When an OAuth token expires, the spoke automatically regenerates a new token in most cases. If a token expires and is not regenerated, an administrator can regenerate the spoke OAuth token.

Obtain consent

Obtain explicit consent for the ServiceNow application from Docusign.

Role required: admin

Obtain consent for an organization administrator

See Docusign Developer documentation (Admin consent for internal applications) for instructions to obtain consent for an organization administrator.

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Create Credential records for the Docusign eSignature spoke

Create Credential records to the Docusign custom OAuth application you created during Docusign account configuration. The Docusign spoke connection and credential alias uses these credentials to authorize actions.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **OAuth 2.0 Credentials**.
   The pop-up window displays a blank OAuth 2.0 Credentials form.
4. Fill these values.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `Docusign Credentials`.
Active	Enable
OAuth Entity Profile	Select the OAuth profile you created when you registered the custom Docusign application as an OAuth provider. For example, select **Docusign OAuth default_profile**.
Applies to	Select the MID Servers that can use this credential. For example, select **All MID Servers**.
Order	Select the order to apply this credential. For example, enter `100`.

5. Save the record.
6. Click the **Get OAuth Token** related link to generate the OAuth token.

Create Connection records for the Docusign eSignature spoke

Create Connection records to your Docusign account. The Docusign spoke connection and credential alias uses these connections to perform actions in DocuSsign.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Docusign**.
3. From the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.
4. Enter these values.

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Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `Docusign Connection`.
Credential	Select the Credential record you created for Docusign. For example, select **Docusign Credentials**.
Connection URL	○ For demo environment, enter `https://demo.docusign.net`. ○ For live production system, enter the Base URI such as `na2.docusign.net` or `eu.docusign.net`. For instructions on obtaining the base URI, see Post Go-Live and User Info Endpoint Reference in the Docusign Developer Center documentation.

5. Click **Submit**.

What to do next
Synchronize ServiceNow with Docusign to access Docusign accounts, templates, and envelopes from the Docusign spoke. See Synchronize Docusign with ServiceNow.

Create child aliases for additional Docusign accounts

Create a child connection alias under the base alias for each account if your Docusign implementation includes multiple Docusign accounts.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Docusign** > **Connection Aliases**.
2. Select **New**.
3. In the **Name** field, add a descriptive name for the account, for example, `Docusign HR account`.
4. Save the record.

Set up triggers for the Docusign eSignature spoke

Set up the trigger to generate the callback URL on your ServiceNow instance.

Before you begin
- Request an Integration Hub subscription.
- Activate and set up the Docusign eSignature spoke.
- Role required: admin.

Enable system property for client credentials grant type

Create or enable the glide.oauth.inbound.client.credential.grant_type.enabled system property to use the OAuth client credentials grant type for inbound integrations from the Docusign OAuth client to ServiceNow instance.

Before you begin
Role required: admin

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About this task
For more information about client credentials grant type, see Client Credentials.

Procedure
1. Navigate to **All** > **System Properties** > **All Properties**.
2. Search for the `glide.oauth.inbound.client.credential.grant_type.enabled` system property.
3. Open the record.
4. For **Value**, enter `true`.
5. Right-click the form header and click **Save**.

Create an application registry to authenticate the inbound calls

Create an application registry in the ServiceNow instance to authenticate the inbound calls.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Click **New**.
3. Select **Create an OAuth API endpoint for external clients**.
4. On the form, fill in the fields.

Application Registries form

Field	Description
Name	Name to identify the application registry record. For example, `Docusign External Trigger`.
OAuth Application User	User role to which the OAuth token flow is mapped. **Important:** By default, this field is not displayed on the Application Registries form. Configure the form layout to see the field on the form. For information about configuring the form layout, see Configuring the form layout.

5. Right-click the form header and click **Save**.
   Application registry record is created and value of **Client Secret** is generated.

   Copy and record the values of **Client ID** and **Client Secret** for later use.

Activate the trigger definition on ServiceNow instance

Activate the trigger definition to generate the callback URL on your ServiceNow instance.

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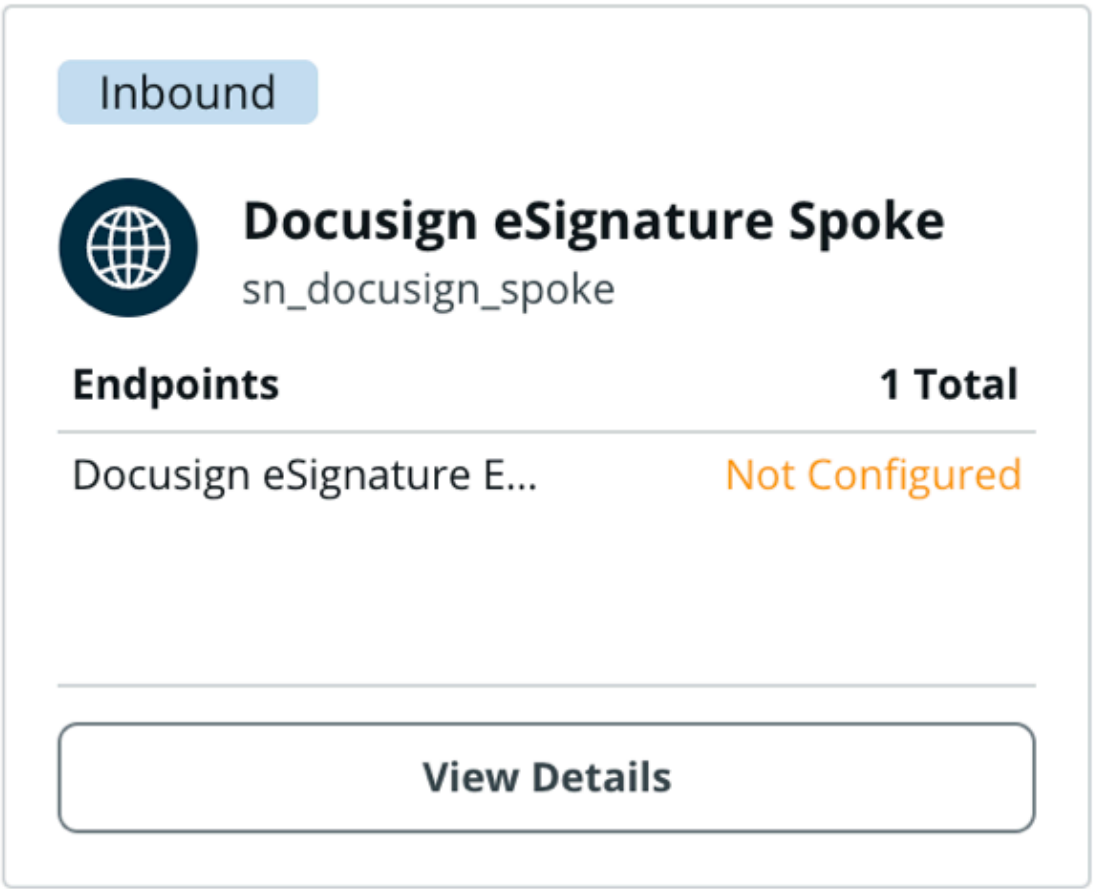
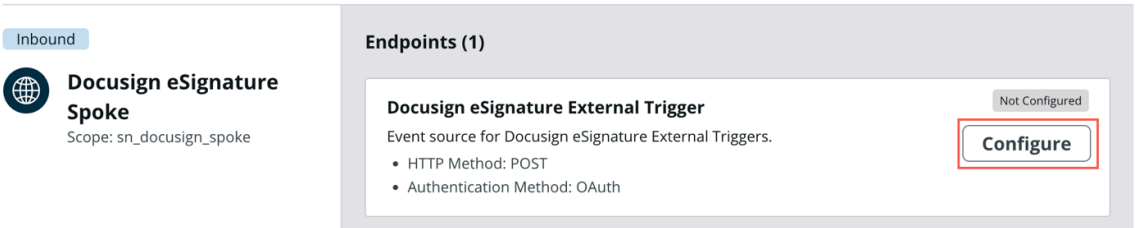
Before you begin
Role required: flow_designer and connection_admin.

About this task
Docusign uses the callback URL to securely send the payload to the ServiceNow instance.

Procedure
1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. Toggle and enable the **Inbound** tab.
4. Locate the **Docusign eSignature Spoke** card and select **View Details**.



5. Select **Configure**.



6. On the form, fill these values.

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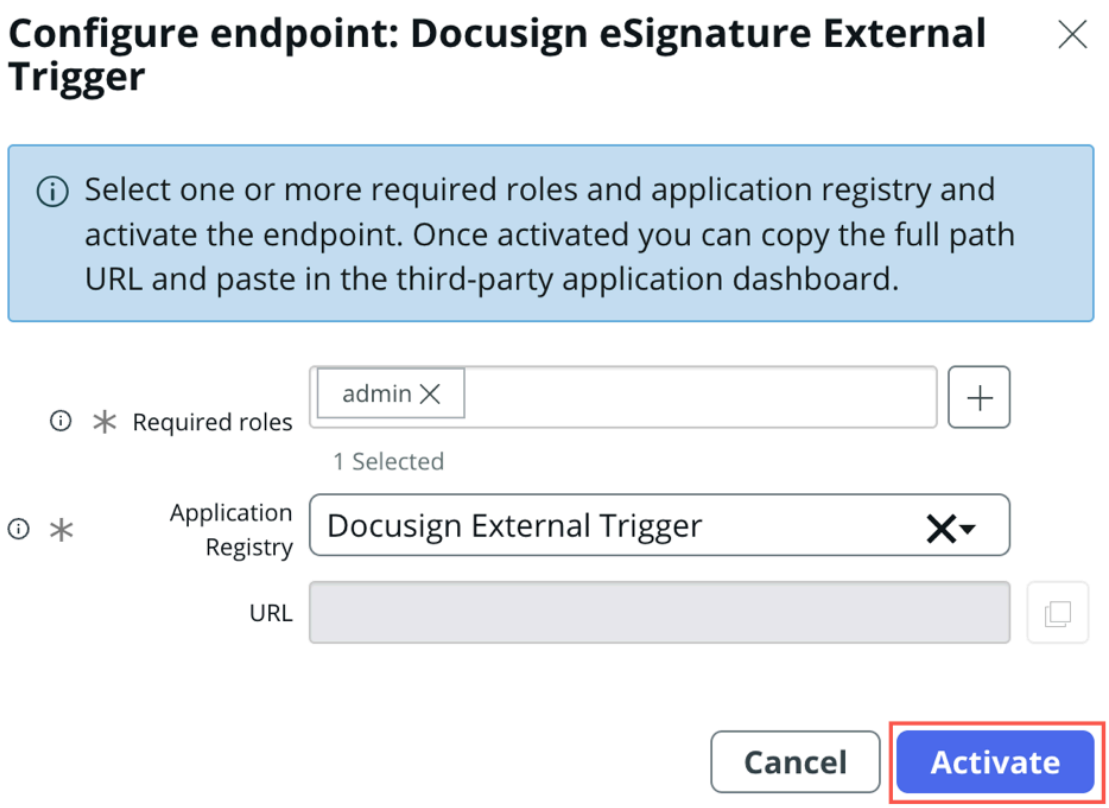
Field	Description
Required roles	Roles using which the flow will be triggered. For example, select **admin**.
Application Registry	Select the application registry you had created to authenticate inbound calls. For example, select **Docusign External Trigger**.



7. Click **Activate**.
   The endpoint is activated and the value of **URL** is generated.

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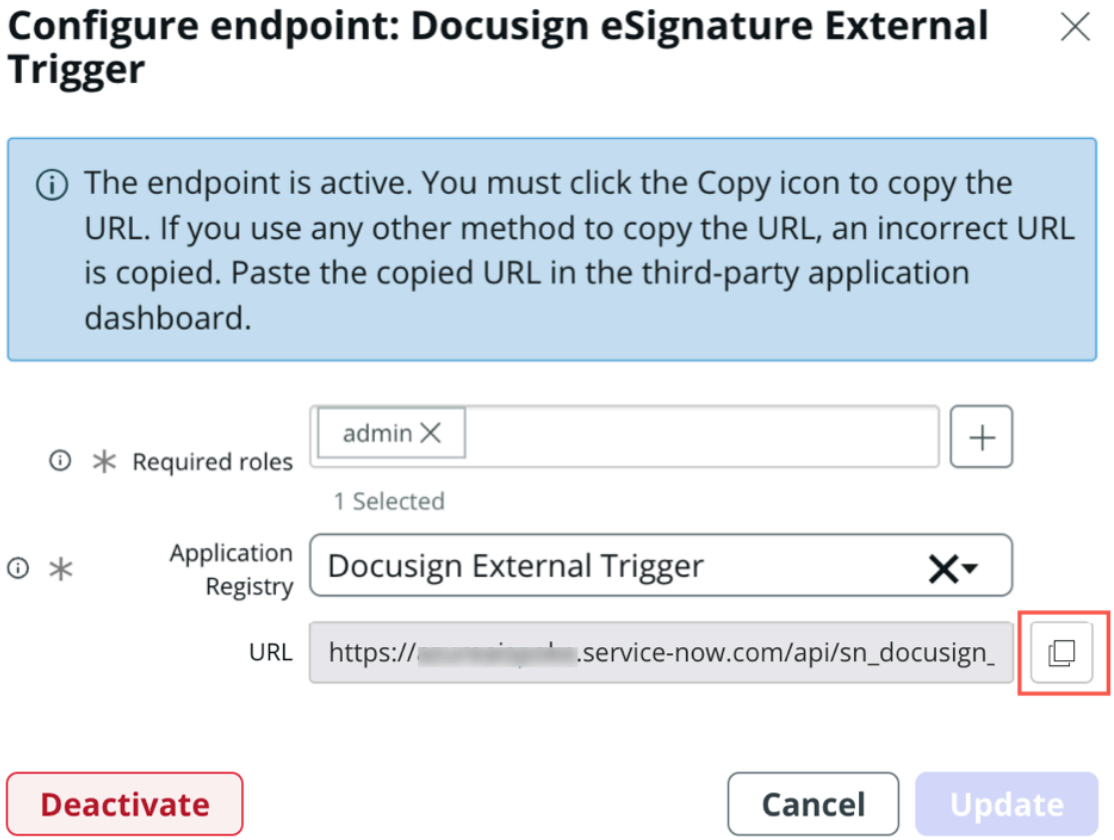
Copy and record the value of **URL** for later use.



Add configuration in Docusign account

Add a custom configuration in the Docusign account to send real-time data updates to the ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Log in to the Docusign account as an admin.
2. Click **Admin**.
3. Navigate to **Integrations** > **Connect**.
4. Under **Configurations**, click **Add Configuration** and select **Custom**.
5. On the form, fill in the values.

Field	Description
Name	Name to identify the custom configuration record.
URL to Publish	Enter the URL that is generated when you activated the trigger definition in this format: `https://<ServiceNow-instance-name>.service-`

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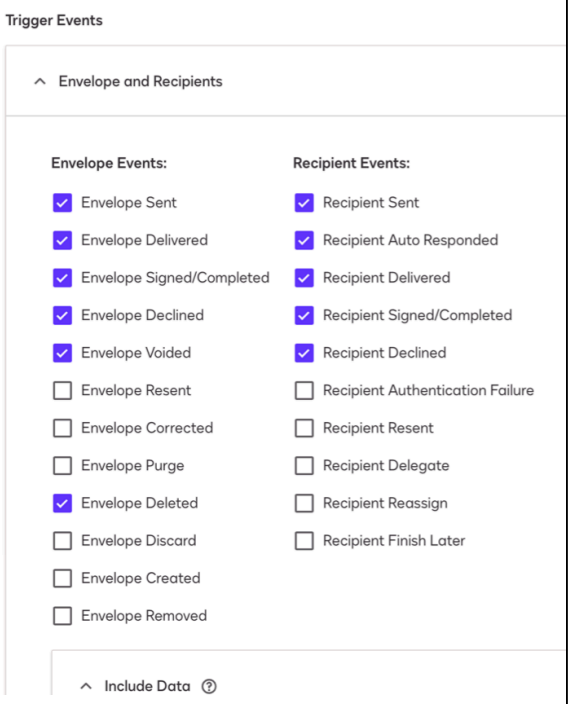
Field	Description
	`now.com/api/sn_docusign_spoke/docusign_esignature_external_trigger`. For more information, Activate the trigger definition on ServiceNow instance.
Data Format	Ensure that you select **REST v2.1**.
Event Message Delivery Mode	Select **Send Individual Messages (SIM)**.
Trigger Events	Expand **Envelope and Recipients** and select these events: ○ Envelope Sent ○ Envelope Delivered ○ Envelope Signed/Completed ○ Envelope Declined ○ Envelope Voided ○ Envelope Deleted ○ Recipient Sent ○ Recipient Auto Responded ○ Recipient Delivered ○ Recipient Signed/Completed ○ Recipient Declined  Under **Include Data**, select the **Recipients** option. Select other options as per your requirement.

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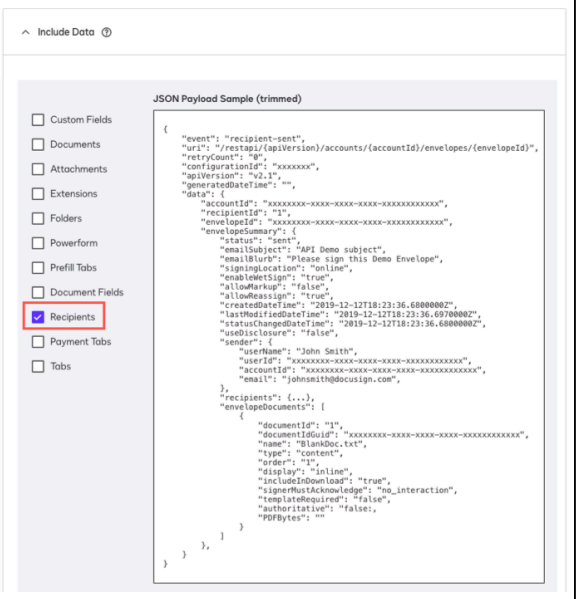
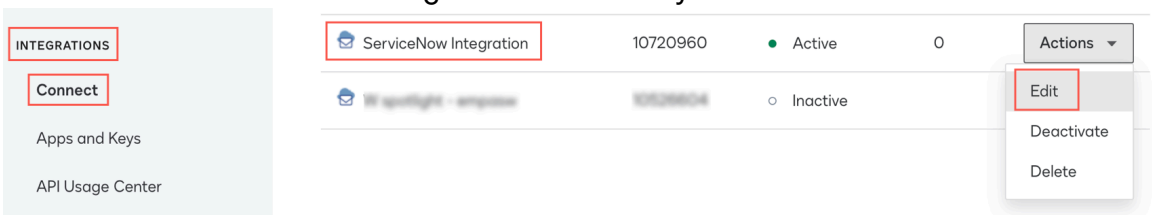
Field	Description
	

6. Under **Integration and Security Settings**, select the **Include OAuth (Recommended)** check box.
7. Click **Add Configuration**.
   The custom configuration record is created.
8. Click **Actions** for the custom configuration record that you created and select **Edit**.



9. Under **Integration and Security Settings**, click **Manage OAuth**.
   The **OAuth 2.0** tab is displayed.
10. Enter the values of Client ID and Client Secret.
    These values are created when you create application registry record in ServiceNow instance. For more information, see Create an application registry to authenticate the inbound calls.
11. Enter **Authorization Server URL** in this format: `https://<ServiceNow-instance-name>.service-now.com/oauth_token.do`.
12. Click **Save**.

What to do next

Create flows in Workflow Studio using these triggers as per your requirement. For more information, see Create a flow with an external trigger.

Set up a bi-directional webhook for the Docusign eSignature spoke

Configure the webhook in your Docusign account to enable Docusign to send data to ServiceNow when a recipient signs a document.

Before you begin

Role required: admin

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Procedure

1. Connect a custom configuration to enable your Docusign application to share events and data with your ServiceNow instance.

   a. Log in to your Docusign account as an admin.

   b. In the admin dashboard, navigate to **Integrations** > **Connect**.

   c. Click **Add Configuration**.
   A list of the configuration types is displayed.

   d. Select **Custom**.

   e. On the form, fill these values.

Field	Description
Name	Name to identify the custom configuration.
URL to Publish	Add your ServiceNow instance URL in this format: ▪ Under **Event Settings**, if you select **Data Format** as **Legacy**, enter `https://{instance-name}.service-now.com/api/sn_docusign_spoke/docusign_webhook` ▪ Under **Event Settings**, if you select **Data Format** as **REST v2.1**, enter, `https://{instance-name}.service-now.com/api/sn_docusign_spoke/docusign_webhook_rest`
Data Format	Select either **Legacy** or **REST v2.1**.

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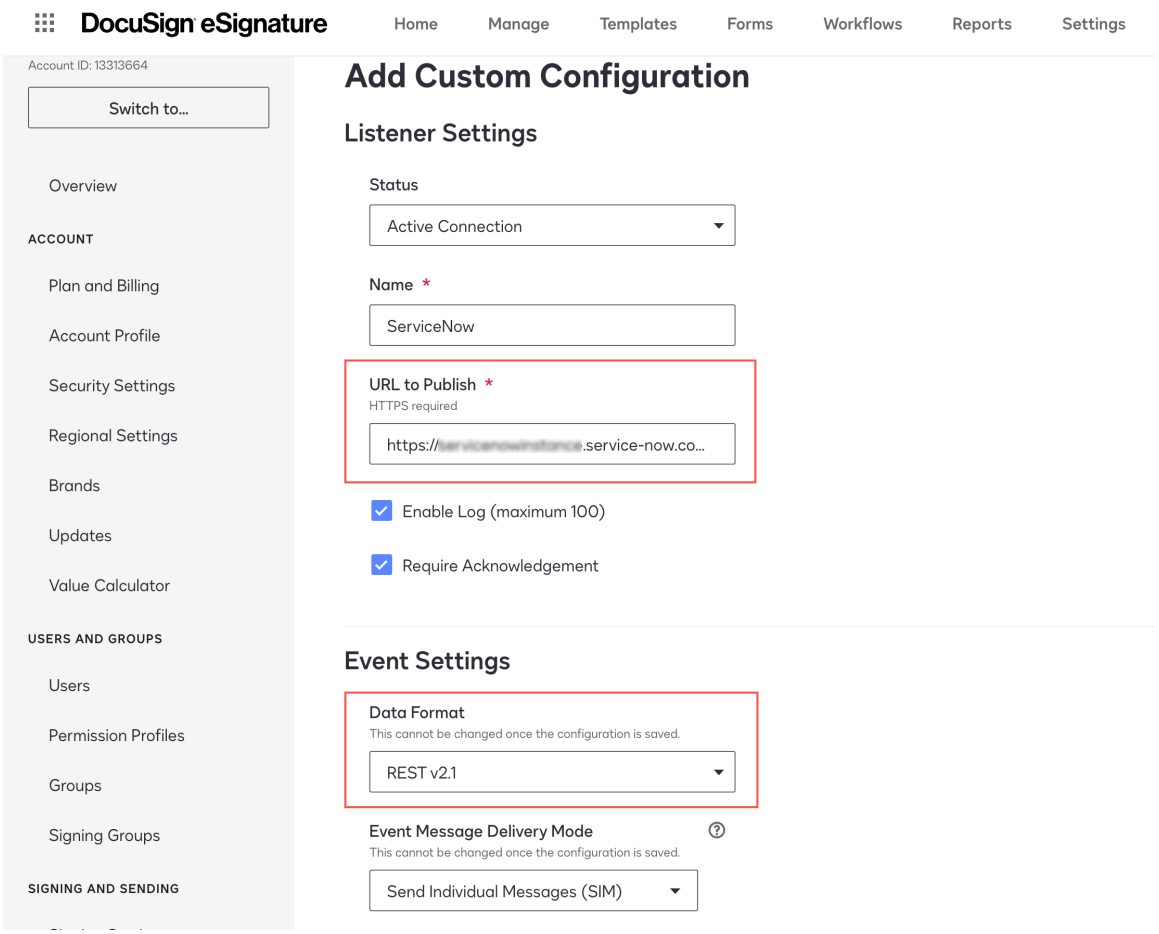
Field	Description
	Note: Ensure that this selection matches is accordance with the URL you provided in **URL to Publish**.



2. Under **Trigger Events**, enable Docusign to share envelope events with ServiceNow by selecting these events:

   - Envelope Sent
   - Envelope Delivered
   - Envelope Signed/Completed
   - Envelope Declined
   - Envelope Voided
   - Envelope Deleted
   - Recipient Sent
   - Recipient Auto Responded
   - Recipient Delivered
   - Recipient Signed/Completed

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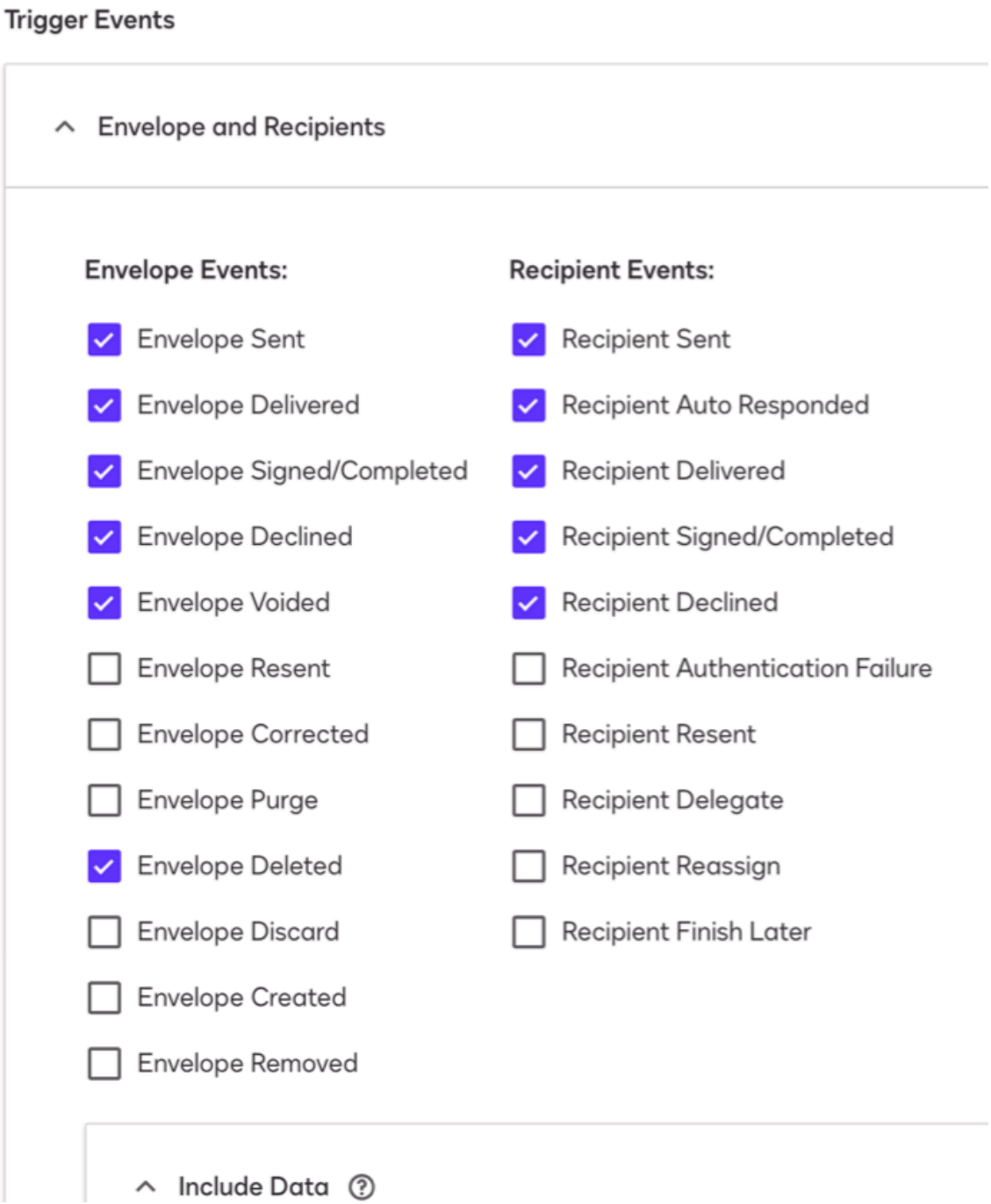
- Recipient Declined
- Recipient Delegate



3. Under **Include Data**, select the **Delegates** and **Recipients** options.

   Select other options as per your requirement.

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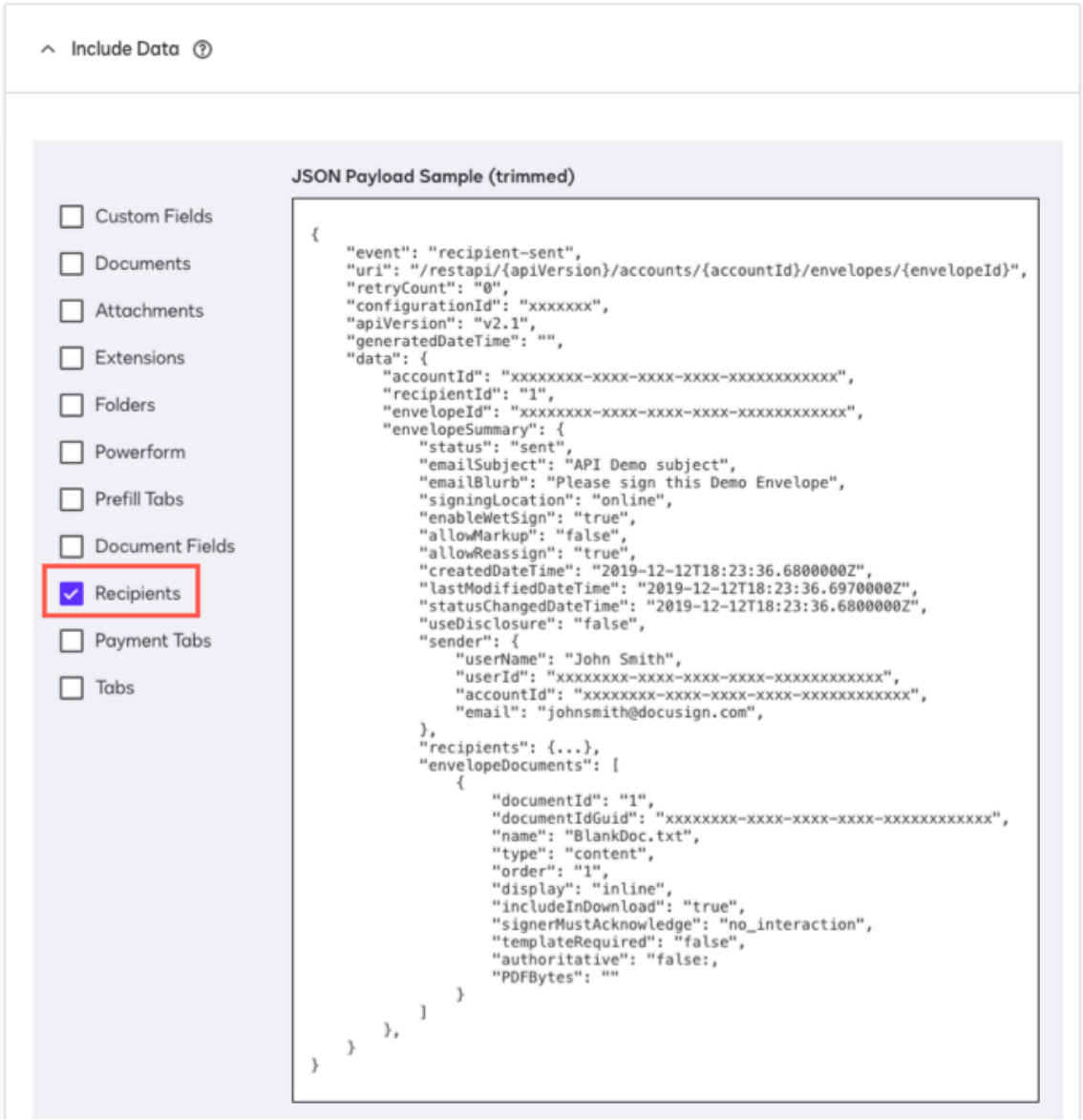

4. Select the **Include basic authorization** option in the header and provide your ServiceNow instance credentials.

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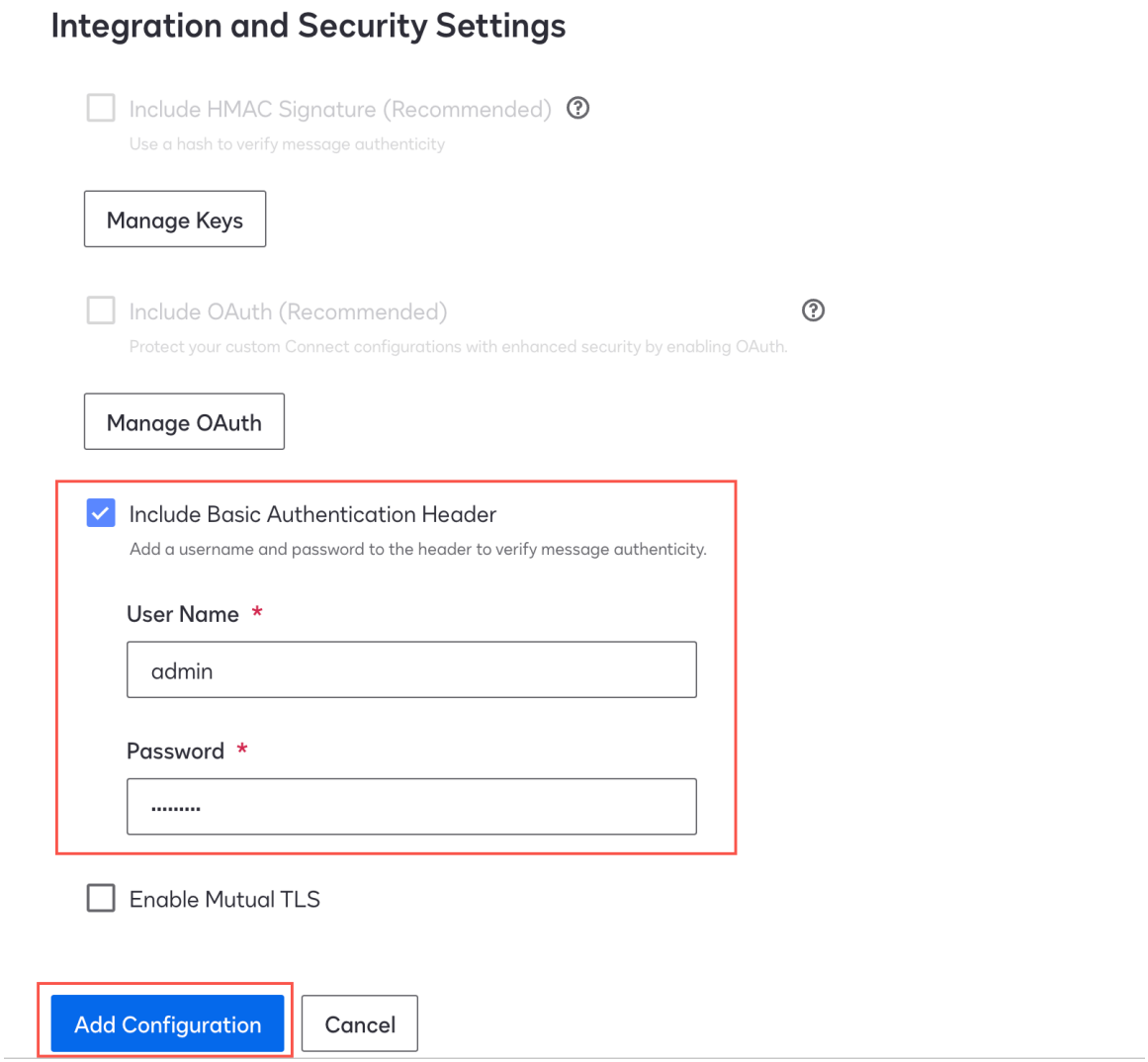

5. Click **Add Configuration**.

Synchronize Docusign with ServiceNow

Synchronize ServiceNow with Docusign to access Docusign accounts, templates, and envelopes from the Docusign spoke.

Before you begin

Role required: admin

- Request IntegrationHub subscription
- Activate Docusign spoke
- Set up Docusign eSignature spoke using JWT grant

About this task

Schedule a job to synchronize Docusign with your ServiceNow instance daily, or synchronize data as needed.

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Procedure

1. Schedule a job to synchronize Docusign data with your ServiceNow instance.

   a. Navigate to **Docusign** > **Scheduled Job**.
   The Get Accounts & Templates scheduled job opens.

   b. Select **Active**.

   The Docusign eSignature spoke synchronizes accounts, templates, and envelopes daily.
2. Synchronize Docusign data as needed with a UI action.

   a. Navigate to **Docusign** > **Accounts**.
   The Accounts [sn_docusign_spoke_accounts] table opens.

   b. Click the **Get Accounts** related link.

   The system synchronizes all accounts linked through an OAuth Credential record and populates the Templates and Envelopes tables with Docusign data. Use template and envelope records when constructing flows.

Activate Docusign eSignature spoke catalog items

Trigger events in Docusign when an item is requested in the Service Catalog. For example, The Send a Document for Digital Signature catalog item triggers a sample flow that sends a Docusign document to a designated recipient.

Before you begin

- Request IntegrationHub subscription
- Activate Docusign eSignature spoke
- Activate the Flow Designer support for the Service Catalog (com.glideapp.servicecatalog.flow_designer) plugin
- Role required: admin

About this task

The Docusign eSignature spoke adds catalog items for use with the Docusign eSignature spoke sample flows. Before triggering a Docusign eSignature spoke sample flow, activate these catalog items.

Catalog item	Description
Send a Document for Digital Signature	Sends a document for digital signature in Docusign.
Demonstrate Template - Send Job Offer to Candidate	Sends a job offer using a Docusign template.

Procedure

1. Navigate to **All** > **Service Catalog** > **Maintain Items**.
2. Search for and select **Send a Document for Digital Signature**.
3. Click **Activate**.

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4. Open the record, **Send a Document for Digital Signature**.
5. In the **Process Engine** tab, select **Send a Document for Digital Signature** for **Flow**.
6. Search for and select **Send employment offer to candidate using DocuSign template**.
7. Click **Activate**.
8. Open the record, **Send employment offer to candidate using DocuSign template**.
9. In the **Process Engine** tab, select **Send employment offer to candidate using DocuSign template** for **Flow**.

Result
When one of these items is requested in the Service Catalog, the associated Docusign eSignature spoke sample flow triggers and performs actions in DocuSign.

Change the Docusign API version

By default, the Docusign spoke sends REST API requests to Docusign API v2. For forward compatibility and to take advantage of Docusign's newer API, you can update a connection attribute to send API requests to Docusign API v2.1.

Before you begin
Role required: admin

About this task
To understand the difference between the two APIs, see the Docusign Developer site.

Procedure
1. Navigate to **All** > **Docusign** > **Connection Aliases**.
2. Open the connection alias that you want to update the version for.
   Only requests sent using this alias use the new API version. For example, if you want to update the API version for all requests and your implementation uses multiple connection aliases, you must update each connection alias.
3. In the **Connection Attributes** related list, add or edit the **API Version** record.

Field	Value
Type	String
Label	API Version
Column name	api_version
Default value	v2.1

4. Save or submit the record.

Result
When the Docusign spoke makes an API request, it uses the API version designated in the connection attribute **Default value** field.

How to automate on-demand signing requests

Send Docusign on-demand signing requests using information in your ServiceNow instance by creating flows in Flow Designer.

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Before you begin

- Request Integration Hub subscription
- Activate Docusign spoke
- Role required: admin
- Set up Docusign eSignature spoke using JWT grant or Set up Docusign eSignature spoke using authorization code grant

About this task

Note: Customize flows in Flow Designer based on your requirements.

Procedure

1. In Workflow Studio, create a flow.
2. Specify **TRIGGER** to initiate the flow.
3. Specify one of the following actions to be performed during the flow:
   - **Send Adhoc Signature Request To User**
   - **Send Adhoc Signature Request To Users - Inline**
4. **Optional:** To pause the flow until the specified document is signed or rejected, select the **Wait for Signature from Docusign** action.
5. Perform one of the following set of actions:
   - To send an embedded signing URL, select **Use Embedded Signing**, and **Embedded Signing Recipient [User]**.
   - To send a document for signing, provide details regarding Docusign account, PDF document, recipient, email, and envelope expiry.
   - The selected document or Embedded Signing URL is sent to the recipients for signing. While signing the document, the recipient details are auto-populated.
   - An envelope record is created in the **Envelopes** table. The Envelope status and other details are updated.

How to automate signing requests using templates

Send Docusign signing requests using Docusign templates and information in your ServiceNow instance by creating flows in Flow Designer. For example, `Send employee offer`.

Before you begin

Role required: admin

- Request Integration Hub subscription
- Activate Docusign eSignature spoke
- Set up Docusign eSignature spoke using JWT grant or Set up Docusign eSignature spoke using authorization code grant

About this task

Note: Customize flows based on your requirements.

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Procedure

1. In Docusign, create document templates and specify recipient roles, for example, `Candidate` and `Manager`.
   The system retrieves other recipient details such as name and email, when the flow is triggered.
2. In Workflow Studio, create a new flow.
3. Specify **TRIGGER** to initiate the flow.
4. Specify one of the following actions to be performed during the flow and provide recipient details:
   - **Create Draft Envelope from Template**
   - **Get Recipient ID by Role Name**
   - **Add Recipient to Envelope**
   - **Get Recipient ID by Role Name**
   - **Add Recipient to Envelope**
   - **Get Field ID**
   - **Set Field Value**
   - **Send Envelope**
   - **Get Field Value**
5. **Optional:** Pause the flow until the specified document is signed or rejected by selecting the **Wait for Signature from Docusign** action.
   - The selected document or Embedded Signing URL is sent to the recipients for signing. While signing the document, the recipient details are auto-populated.
   - An envelope record is created in the **Envelopes** table. The Envelope status and other details are updated.

How to separate Docusign account data

Restrict access to Docusign data based on a user's role. For example, your company may have one Docusign account used by the HR team and another used by the Legal team. To keep the data separate between these two accounts, you can create a role for each account and add it to the accounts record.

Before you begin

- Request Integration Hub subscription
- Activate Docusign eSignature spoke
- Create child aliases for additional Docusign accounts
- Set up Docusign eSignature spoke using JWT grant or Set up Docusign eSignature spoke using authorization code grant
- Role required: admin.

Procedure

1. Create a role for each Docusign account that you want to restrict access to.

   a. Navigate to **System Security** > **Users and Groups** > **Roles**.

   b. In the Roles [sys_user_role] table, select **New**.

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c. Check that the value of the **Application** field is **Docusign Spoke**.
If a different scope is listed, change the scope to **Docusign Spoke**.

d. In the **Suffix** field, add a name to indicate the account that the role is for, for example, `Legal`.

e. Save the record.

f. Note the name of the role you just created.
For example, **sn_docusign_spoke.legal**.

2. Add the role to the associated account in the accounts table.
   a. Navigate to **Docusign** > **Accounts**.
   b. Open the account record that you want to restrict access to.
   c. In the **Role** field, add the associated role.
   d. Select **Update**.
3. Grant the role to the desired users.
   a. Navigate to **System Security** > **Users and Groups** > **Users**.
   b. Open the record for the user that you want to provide access.
   c. Add the role that you created to the Roles related list.

Result
Only users with the designated role have access to Docusign data associated with the account.

Dropbox Business Spoke

Use Dropbox Business as file storage in place of attachments in ServiceNow. This spoke adds Dropbox storage to your ServiceNow instance and enables users to reference Dropbox files in ServiceNow records.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Dropbox Business spoke v1.1.0 is the latest version. For version history of the spoke, see Dropbox Business spoke release notes.

Supported versions

API version v2.

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Spoke subflows

The Dropbox Business spoke provides sample subflows in the draft state to demonstrate automating Dropbox tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Flow	Description
Process File Changes	Subflow to process file changes in Dropbox.
Process Team Member Changes	Subflow to process team member changes in Dropbox.

Spoke actions

The Dropbox Business spoke provides actions to perform Dropbox tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
File and Folder Management	Copy Dropbox File To Attachment	Copies a Dropbox file and attaches it to a ServiceNow record. If a ServiceNow incident record is supplied as input, the specified record is attached to it.
	Copy File or Folder	Creates a copy of the specified Dropbox file or folder in Dropbox.
	Create Folder	Creates a folder at the specified path in Dropbox.
	Delete File Or Folder	Deletes a file or folder at the specified path in Dropbox.
	Get File Changes - Webhook	Retrieves the file changes noticed in Dropbox.
	Look up Folder	Looks up the contents of a Dropbox folder and returns an object containing information about the folder
	Update Latest Cursor	Updates the latest cursor value for the corresponding team in the Team Details table.
	Upload Attachment to Dropbox	Copies a ServiceNow attachment to a Dropbox folder. It copies to the specified folder. To change the file name during the copy, use the optional file name.
User Management	Add Users To Group	Adds users to a specified group
	Add Users To Team	Adds users to a specified team.
	Get Admin Details	Retrieves details of the administrator account used to generate the access token.
	Get Current Account	Retrieves information about the current account.

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Category	Action	Description
	Get Team Members Info	Retrieves information on specified team members. Returns profile and role details.
	Look up Groups in Team	Lists all the groups in the team. Output includes group IDs, number of members, group name, and the role of users who manage the group.
	Look up Users in Group	Lists all the members in the specific group. Returns user profile data and role in the group.
	Look up Users in Team	List all the members in the team. Returns user profile data, membership type, and role.
	Remove User From Team	Removes user from a team. Options include user retains files, and access to team shares, keeps email account and unrestricted team shares, and to delete relevant data.
	Remove Users From Group	Removes one or more users from an existing group.

Dropbox Business spoke account requirements

The Dropbox Business spoke requires a custom app that you create in Dropbox Business.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Dropbox Business spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Dropbox alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server .

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up Dropbox Business spoke

Set up an outbound integration between a ServiceNow instance and a Dropbox Business application by setting up the connection and credential records.

Before you begin

- Request an Integration Hub subscription.
- Activate the Dropbox Business spoke.
- Role required: admin.

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Setting up the Dropbox Business spoke, includes actions in the Dropbox app console, in the ServiceNow AI Platform® user interface, and in the Workflow Studio. Setup is easier if you keep each of these pages open in separate tabs.

About this task

You must set up three connection and credential records for Team Management, File Access, and Content alias, in that order. The connection and credential forms contain the OAuth 2.0 credentials needed to establish a connection with the Dropbox business application. Before setting up the form, you must configure the data it needs by setting up an OAuth 2.0 authentication at the Dropbox Business application end. You must also ensure that you've already set up the alias and application registries.

Set up OAuth 2.0 authentication

Set up an OAuth 2.0 authentication between the Dropbox Business application and the ServiceNow instance by setting up a custom Dropbox Business application.

Before you begin

OAuth 2.0 setup requirements:

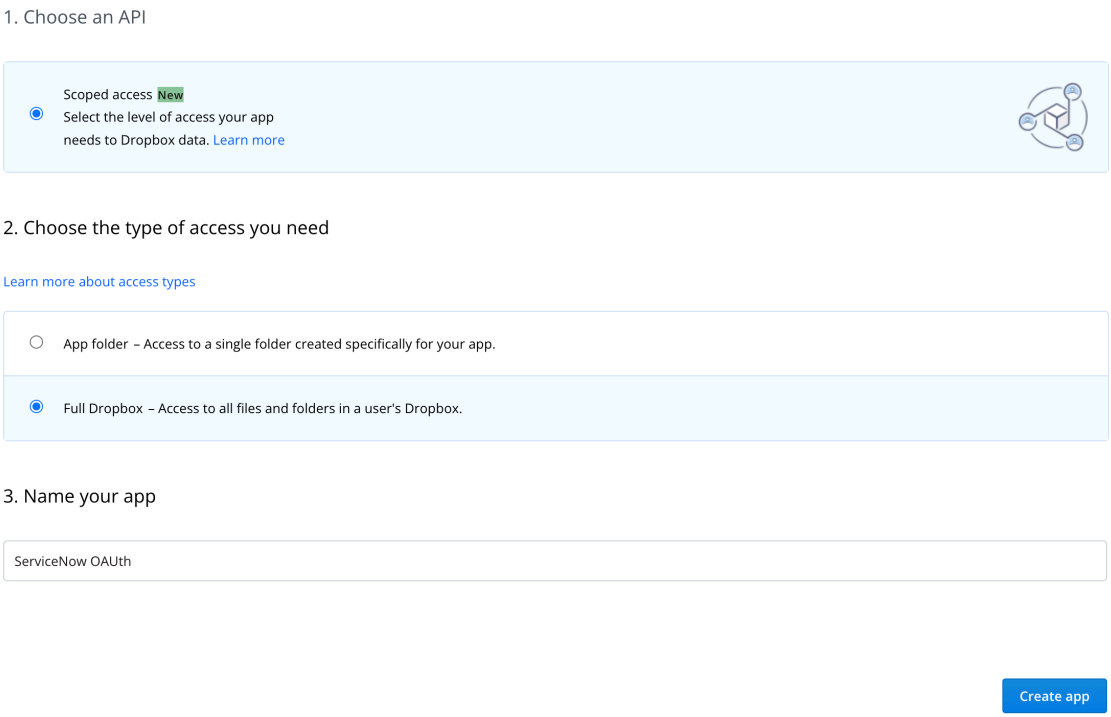
- A Dropbox Business account.
- Role required: team admin.

About this task

This procedure creates a custom application on the Dropbox Business account. The application provides the OAuth 2.0 credentials necessary to set up the connection and credential records for all three Dropbox Business aliases. For more information on setting up applications, see https://www.dropbox.com/developers/documentation.

Procedure

1. Log in to the Dropbox Professional My apps console, https://www.dropbox.com/developers/apps.
2. Select **Create app**.
3. On the Create a new app on the DBX Platform page, do the following



actions.

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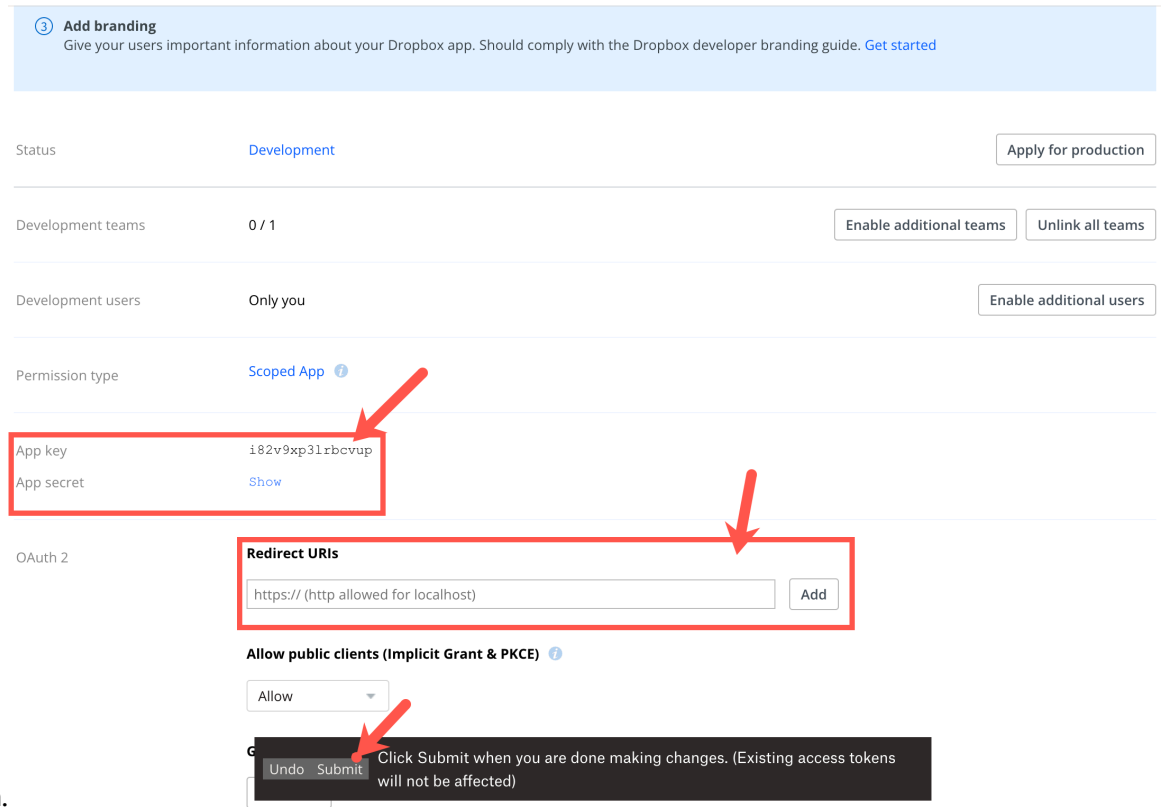
a. Under Choose an API, select Scoped access.

b. Under Choose the type of access that you need, select the appropriate access type.

c. Under Name your app, enter a custom name for the application.

d. Select **Create app**.
The custom application is created.

4. To set up the OAuth 2.0 application, do the following steps under the **Settings** tab of the custom application.



a. Copy and store the value under the App key.
Use the App key value in the Client ID field of the application registry on the ServiceNow instance.

b. Select Show under the App secret and then copy and store the value.

> **Tip:** You need both the App key and App secret values when you set up the application registries on the ServiceNow instance.

c. In the Redirect URIs field, enter the ServiceNow instance URL in the format https://instancename/oauth_redirect.do.

> **Note:** You can add multiple URIs.

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d. Optional: To add a redirect URI, select **Add** and then enter the ServiceNow instance URL.

e. Select **Submit**.

All three connection and credential records for the Dropbox Business application use the same App secret, App key, and Redirect URI that you set up in this step.

What to do next

Create Connection and Credential records for the Dropbox Business Team Management alias

Create Connection and Credential records for the Dropbox Business Team Management alias

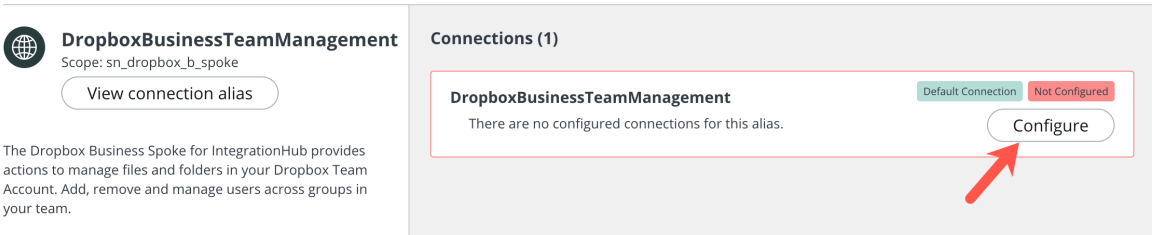
Create connection records to a Dropbox Business account. A connection alias resolves your Dropbox connection and credential at runtime. Only one connection is active per Connection Alias at a time.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select the Connections tab.
3. In the Search all connections field, enter `Dropbox`.
4. On the DropboxBusinessTeamManagement tile, select **View Details**.
5. Select **Configure**.



6. In the Configure Connection form, fill the details.

Configure connection

Field	Description
Connection Name	Name of the connection between the Dropbox Business application and the ServiceNow instance. **Note:** The default and read-only name is DropboxBusinessTeamManagement. To provide a custom name, create another connection and credential record.
Connection URL	The URL to connect to the Dropbox Business account. The URL is https://api.dropboxapi.com.
API Version	The version of the API.

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Field	Description
Credential Name	The custom name of the credential to access the Dropbox Business account.
OAuth Entity Name	The custom name of the OAuth entity that you created in the Dropbox Business account.
OAuth Client ID	The client ID that you generated in the custom Dropbox Business application. To learn how to generate, see Set up OAuth 2.0 authentication.
OAuth Client Secret	The client secret that you generated in the custom Dropbox Business application. To learn how to generate, see Set up OAuth 2.0 authentication.
OAuth Redirect URL	The redirect URI that you had provided in the Dropbox business application.

7. Select **Configure and Get OAuth Token**.
   A temporary OAuth token is generated.

What to do next
Create Connection and Credential records for the Dropbox Business File Access alias

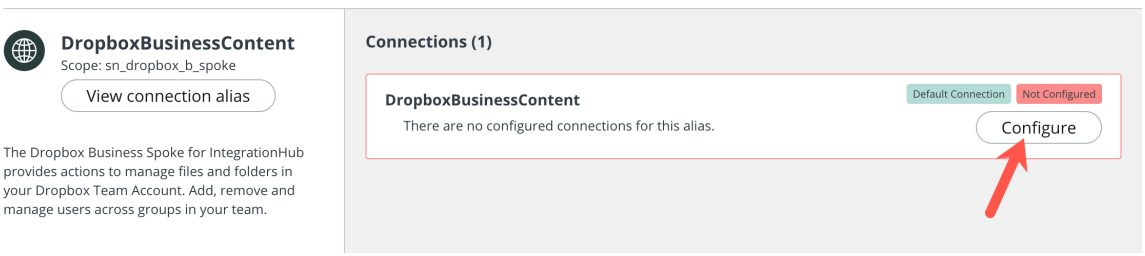
Create Connection and Credential records for the Dropbox Business File Access alias

Create connection records to a Dropbox Business account for the DropboxBusinessFileAccess alias. Connection aliases resolve your Dropbox connection and credential at runtime. Only one connection is active per Connection Alias at a time.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select the Connections tab.
3. In the Search all connections field, enter `Dropbox`.
4. On the DropboxBusinessFileAccess tile, select **View Details**.
5. Select



   Configure.
6. In the Configure Connection form, fill the details.

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Configure connection

Field	Description
Connection Name	Name of the connection between the Dropbox Business application and the ServiceNow instance. **Note:** The default and read-only name is DropboxBusinessFileAccess. To provide a custom name, create another connection and credential record.
Connection URL	The URL to connect to the Dropbox Business account. The URL is https://api.dropboxapi.com.
API Version	The version of the API.
Credential Name	The custom name of the credential to access the Dropbox Business account.
OAuth Entity Name	The custom name of the OAuth entity that you created in the Dropbox Business account.
OAuth Client ID	The client ID that you generated in the custom Dropbox Business application. To learn how to generate, see Set up OAuth 2.0 authentication.
OAuth Client Secret	The client secret that you generated in the custom Dropbox Business application. To learn how to generate, see Set up OAuth 2.0 authentication.
OAuth Redirect URL	The redirect URI that you had provided in the Dropbox business application.

7. Select **Configure and Get OAuth Token**.
   A temporary OAuth token is generated.

What to do next

Create Connection and Credential records for the Dropbox Content alias

Create Connection and Credential records for the Dropbox Content alias

Create connection records to a Dropbox Business account for the DropboxBusinessContent alias. Connection aliases resolve your Dropbox connection and credential at runtime. Only one connection is active per Connection Alias at a time.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select the Connections tab.

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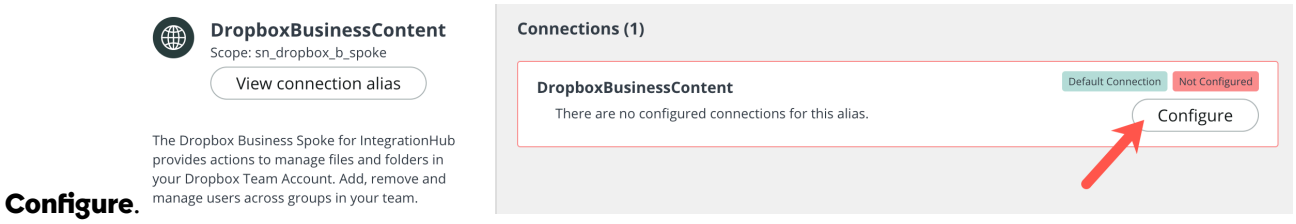
3. In the Search all connections field, enter `Dropbox`.
4. On the DropboxBusinessContent tile, select **View Details**.
5. Select



Configure.

6. In the Configure Connection form, fill the details.

Configure connection

Field	Description
Connection Name	Name of the connection between the Dropbox Business application and the ServiceNow instance. **Note:** The default and read-only name is DropboxBusinessContent. To provide a custom name, create another connection and credential record.
Connection URL	The URL to connect to the Dropbox Business account. The URL is https://api.dropboxapi.com.
API Version	The version of the API.
Credential Name	The custom name of the credential to access the Dropbox Business account.
OAuth Entity Name	The custom name of the OAuth entity that you created in the Dropbox Business account.
OAuth Client ID	The client ID that you generated in the custom Dropbox Business application. To learn how to generate, see Set up OAuth 2.0 authentication.
OAuth Client Secret	The client secret that you generated in the custom Dropbox Business application. To learn how to generate, see Set up OAuth 2.0 authentication.
OAuth Redirect URL	The redirect URI that you had provided in the Dropbox business application.

7. Select **Configure and Get OAuth Token**.
   A temporary OAuth token is generated.

Result

The Dropbox Business spoke is set up and integrated with the ServiceNow instance.

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Dun and Bradstreet DirectPlus Spoke

Manage comprehensive business data and analytics tasks in your Dun and Bradstreet account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Dun and Bradstreet DirectPlus spoke v1.1.0 is the latest version. For version history of the spoke, see Dun and Bradstreet DirectPlus Spoke release notes.

Supported versions

This spoke was built for Dun and Bradstreet DirectPlus v1, but may be compatible with later versions.

Spoke requirements

Dun and Bradstreet Direct+ account

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow Workflow Studio - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Dun and Bradstreet DirectPlus spoke provides sample flows to demonstrate automating the Dun and Bradstreet DirectPlus tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Look up Companies	Retrieves the supplier information and verifies if the supplier is in good business standing before creating a new supplier in the downstream system.

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Spoke actions

The Dun and Bradstreet DirectPlus spoke provides actions to automate data and analytics tasks tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Data Block Management	Look up Data Blocks by Duns Number	Retrieves information about the specified data block for the specified D-U-N-S (Data Universal Numbering System) number.
Profile Management	Look up Industry Detailed Profile	Retrieves detailed information about the requested industry, including industry indicators, challenges, financials, and industry forecast.
Report Management	Look up Company Report	Retrieves the Dun and Bradstreet(D&B)'s Business Information Report and Comprehensive Report that can be used for determining a company's profitability, stability, viability, and payment performance to evaluate the risk for both new or existing business relationships. **Note:** PDF reports are not available for all markets, including Canada. For better global coverage, use the HTML format of the report.
Search Management	Look up Company Typeahead Search	Retrieves the company records based on search term and other additional attributes of the company. **Note:** This action returns the top 25 matched results.
	Look up Identity Resolution Cleanse Match	Retrieves the best matches for provided search parameters using Dun & Bradstreet proprietary algorithms. **Note:** For Multi-Process, this action returns only one result. For a nationwide search in US, this action returns a maximum 100 results. In all other scenarios, this action returns the top 25 matched results.

Spoke module

The Dun and Bradstreet DirectPlus spoke adds the Dun and Bradstreet DirectPlus spoke application to your instance and includes these modules:

Module	Description
Companies	Lists all the available companies records.

Set up the Dun and Bradstreet DirectPlus spoke

Integrate the ServiceNow instance and Dun and Bradstreet Direct+ by using the client ID and client secret credentials to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate Dun and Bradstreet DirectPlus spoke.
- Role required: admin

Configure a connection for Dun and Bradstreet DirectPlus spoke

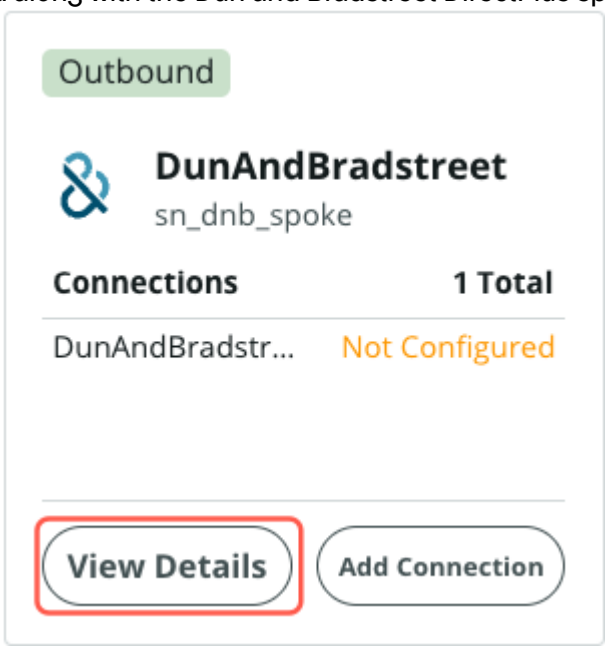
Add and configure a Dun and Bradstreet DirectPlus connection to authenticate ServiceNow requests.

Before you begin

- Get the client ID and client secret of your Dun and Bradstreet account from the account administrator.
- Role required: admin

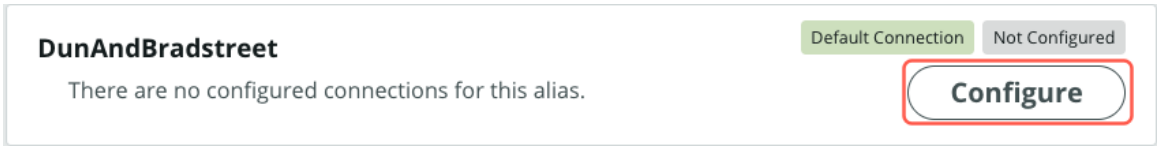
Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **DunAndBradstreet** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Dun and Bradstreet DirectPlus spoke, click **View Details**.



   - To manage more than one Dun and Bradstreet DirectPlus connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



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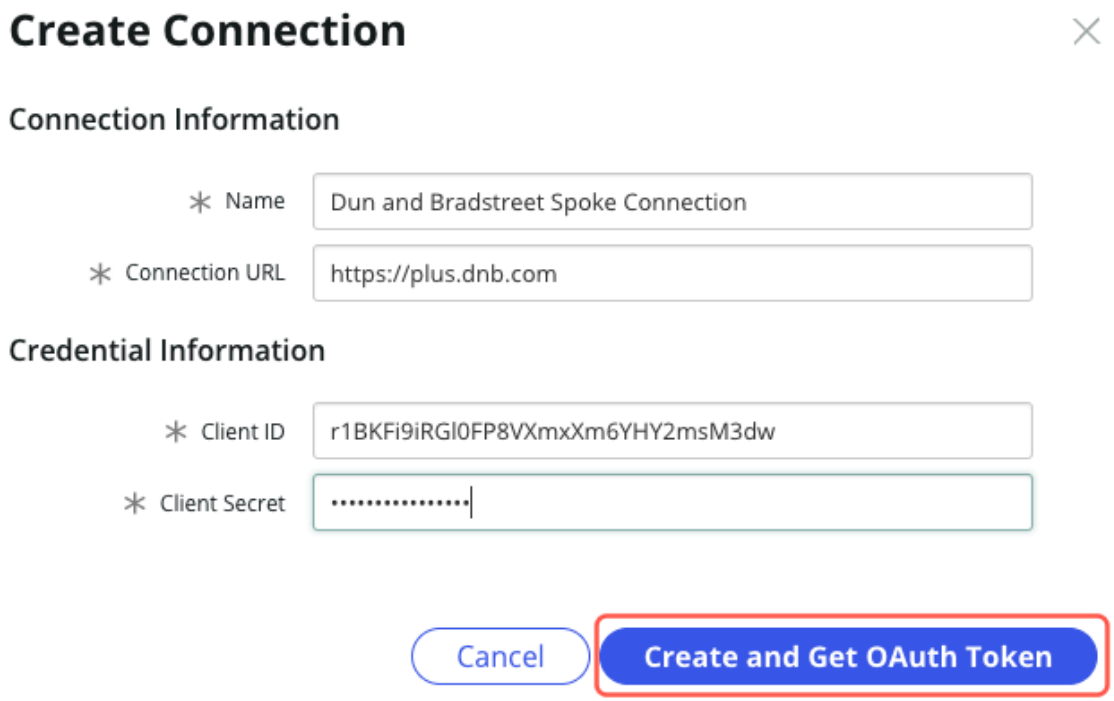
5. On the **Configure Connection** form, fill in the fields:

Field	Description
Name	Name to uniquely identify the connection record. For example, `Dun and Bradstreet Directplus connection`
Connection URL	URL of the Dun and Bradstree Direct+ instance. Enter `https://plus.dnb.com`.
Client ID	Client ID of your Dun and Bradstreet DirectPlus account.
Client Secret	Client secret of your Dun and Bradstreet DirectPlus account.



6. Click **Configure Configure and Get OAuth Token**.

Result
The spoke connection is configured and ready to be used.

Ethoca spoke

Integrate ServiceNow instance with your Ethoca account to manage card dispute resolution and prevent fraud. By using this spoke, you can access detailed merchant information and subscription control, view digital receipts, and manage their disputes.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Ethoca spoke v3.0.0 is the latest version. For version history of the spoke, see Ethoca Spoke release notes.

Supported versions

This spoke was built for Consumer Clarity and Issuer Alerts Management .

Key features

- Streamlines dispute resolution processes
- Facilitates collaboration between issuers and participating merchants through Ethoca Alerts during the dispute lifecycle
- Resolves cases at the pre-dispute stage, benefiting both issuers and cardholders
- Reduces the occurrence of disputes and chargebacks

Spoke requirements

- Integration Hub subscription
- Ethoca configuration details such as, certificate, key alias, consumer key, and keystore password

Spoke dependencies

Ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)

Note: If used outside the spoke implementation, some of these plugins are licensable features and need appropriate licenses.

Spoke actions

The Ethoca spoke provides actions to obtain enriched merchant and transaction information. Available actions include:

Category	Action	Description
Consumer Clarity	Look up Consumer Clarity	Enables cardholders to view their credit card transactions with clear merchant information and transaction details.
Issuer Alerts Management	Create Transaction Alert	Submits a batch of transactions (confirmed fraud or customer disputes) to Ethoca. These transactions are processed and delivered to merchants as alerts.

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Category	Action	Description
	Look up Transaction Alert Status by Batch	Returns the processing status of previously submitted transaction requests.
	Look up Alert Status	Provides the status of the alert delivered to the merchant.
	Look up Alert Outcome by Batch Stream	Retrieves a list of alerts and their outcomes based on the Batch ID provided by the Submit Batch endpoint or Ethoca Notification Callback. Results are paginated with up to 50 alerts per request and a maximum of 1000 alerts per batch. **Note:** To enable the Look up Alert Outcome by Batch Stream action, install the ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream) plugin.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Ethoca spoke

Set up Ethoca spoke

Integrate the ServiceNow instance with the Ethoca account using the using the OAuth protocol (version 1.0a) for the Consumer Clairty category and using Basic Auth credentials for the Issuers Alert Management category to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Ethoca spoke.
- Role required: admin.

For the Consumer Clarity category

Integrate the ServiceNow instance with the Ethoca account in the Consumer Clarity category using the OAuth protocol (version 1.0a) to securely authorize and authenticate ServiceNow requests.

Follow these steps:

- Attach a Ethoca certificate
- Create credential records
- Create connection records

Attach a Ethoca certificate

Use the certificate generated during the Ethoca account configuration to sign the request and payloads.

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Before you begin

- Valid Ethoca certificate
- Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Certificates**.
2. Click **New**.
3. On the form, fill in the fields:

X.509 Certificate form fields

Field	Description
Name	Enter a name to identify the certificate.
Type	Type of the certificate. Select `PKCS12 Key Store`.
Notify on expiration	Select the list of users to be notified when the certificate expires.
Warn in days to expire	Enter the number of days when a notification is sent to users before a certificate expires.
Key store password	Password to access the certificate. Use the destination keystore password specified when creating the certificate.
Active	Option to make the client certificate active.
Short description	Short description of the user client certificate.

4. Click the manage attachments icon ( ) and attach a Ethoca certificate.
5. Click **Validate Stores/Certificates** to validate the certificate.
6. Click **Submit**.

Create credential records

Create a credential record for your Ethoca account. The Ethoca spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select **New**.

   The system displays this message: `What type of Credentials would you like to create?`

3. Select **Ethoca Credential**.
   A blank Ethoca Credential form displays.
4. Enter these values.

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Field	Value required
Name	Enter any name to uniquely identify the record. For example, `Ethoca Credentials`.
Active	Enable
Key alias	Key alias associated with the Ethoca account.
Keystore password	Password associated with the certificate.
Consumer key	Consumer key that you generated during the Ethoca configuration.
Certificate	Select the newly created Ethoca certificate.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **Ethoca**. **Note:** Users are cautioned against directly modifying the default authentication algorithm.

5. Click **Submit**.

Create connection records

Create a connection record for your Ethoca account. The Ethoca spoke connection and credential aliases use these connections to perform actions in Ethoca.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open for the record for **Ethoca**.
3. On the **Connections** tab, click **New**.
4. On the form, fill these values.

Field	Value required
Connection URL	Base URL to connect to your Ethoca instance. Enter: `https://sandbox.api.ethocaweb.com/ethoca` .
Credential	Credential record that you created for Ethoca. For example, `Ethoca Credentials`.

5. Right-click the form header and click **Save**.

For the Issuer Alerts Management category

Integrate the ServiceNow instance with the Ethoca account in the Issuer Alerts Management category using Basic Auth credentials to authenticate ServiceNow requests.

Follow these steps:

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- Create basic auth credentials
- Create connection records

Create basic auth credentials

Create credentials to access a ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Navigate to **Connections & Credentials** > **Credentials**.
2. Click **New**.
3. Select **Basic Auth Credentials**.
4. On the form, fill in the fields.

Field	Description
Name	Unique name to identify the credential record. For example, `Ethoca Alerts Credentials`
User name	Name to identify the user.
Password	Password to use this credential.
Active	Option to actively use the credential record. Select the option.
Order	The order (sequence) in which the platform tries this credential while it attempts to log in to devices. Default value: `100`.

5. Select **Submit**.

Create connection records

Create a connection record for your Ethoca account. The Ethoca spoke connection and credential aliases use these connections to perform actions in Ethoca Alerts.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open for the record for **Ethoca Alerts**.
3. On the **Connections** tab, click **New**.
4. Fill the form.

Configure Connection

Field	Description
Connection Name	Name of the connection established with the Ethoca instance. The first connection's default name is automatically assigned to

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Field	Description
	match the name specified in the Connections and Credentials form on the Connection & Credential Aliases page.
Credential	Credential record you that created for Ethoca Alerts. For example, `Ethoca Alerts Credentials`.
Connection URL	Base URL to connect to your Ethoca instance. Enter: `https://sandbox.ethocaweb.com/ethoca-rest`.

5. Right-click the form header and click **Save**.

Equifax Spoke

Integrate the ServiceNow instance with the Equifax spoke to access important information about the credit history for a customer, fraud alerts, digital identity verification, transaction screening, and other relevant data.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Equifax Spoke v1.0.0 is the latest version. For version history of the spoke, see Equifax Spoke release notes.

Supported versions

Equifax spoke v1.0.0 supports Equifax OneView - 1.0.2212 (Consumer API).

Key features

Equifax spoke enables a flow designer to do the following tasks:

- Access customer information, such as the credit history for a customer, the credit score for a customer, and fraud alerts.
- Evaluate a customer's creditworthiness to make lending decisions faster.
- Verify customer identities to ensure that you have accurate information.

Spoke actions

The Equifax spoke provides actions (under the Equifax Credit Report category) to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Equifax Credit Report	Look up One View Credit Report	Provides the JSON response that gives the credit history of the customer.

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Category	Action	Description
	Look up One View Credit Report by Request ID	Provides the PDF report of the credit history for the customer.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Equifax spoke.

Set up Equifax spoke

Integrate the ServiceNow instance and Equifax spoke by using basic Auth or OAuth 2.0 authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Equifax spoke.
- Ensure that the dependent plugins are activated.
- Role required: admin.

Register Equifax as an OAuth provider

Use the information generated during the application configuration to register Equifax as an OAuth provider. OAuth provider registration enables the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

- Role required: admin
- Client ID and client secret generated from configuration of the third-party Equifax application

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Select **New**.
   The system displays this message: `What kind of OAuth application?`.
3. Select **Connect to a third party OAuth Provider**.
4. On the form, fill these values.

Application Registries form

Field	Description
Name	Name to uniquely identify the record. For example, enter: `Equifax OAuth`
Client ID	<Client ID> created during the Equifax account configuration.
Client Secret	<Client Secret> created during the Equifax account configuration.
Authorization URL	OAuth Server's authorization code flow endpoint. Required only for Authorization Code grant type.

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Field	Description
Token URL	OAuth Server's token endpoint. For example, `xxx.equifax.com`.
Token Revocation URL	OAuth server token revocation endpoint.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`
OAuth API Script	Script to customize the request and response.
Logo URL	URL that contains an image to use as the application logo.
Default Grant Type	Grant type used to establish the token. Select **Client Credentials**.
Refresh Token Lifespan	Time, in seconds, that the refresh token is valid. The default time is 1430 seconds.
PKCE required	Option to enable public clients to require PKCE for an authorization. **Note:** You can use only **Authorization Code** as the **Default Grant type** when **PKCE** is enabled.
Application	Application scope that contains this record.
Accessible from	Application scope that this registry is accessible from.
Active	Option to actively use the application registry.
Use mutual authentication	Option to use mutual authentication for token request and revocation. This option requires a mutual authentication profile to be specified.
Send credentials	Option for whether or how to send authentication information identifying the application and its authorized users to the OAuth server. Select **In Request Body**.

5. On the form header, select **Submit**.

Create OAuth 2.0 credential record for the Equifax spoke

Create credential records to the Equifax custom OAuth application you created during Equifax account configuration. The Equifax spoke connection and credential aliases use these credentials to authorize actions in Equifax application.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select **New**.

   The system displays this message: `What type of Credentials would you like to create?`

3. Select **OAuth 2.0 Credentials**.

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The pop-up window displays a blank OAuth 2.0 Credentials form.

4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `Equifax OAuth2.0 API Credentials`.
Active	Enable
OAuth Entity Profile	Select the OAuth profile you created when you registered the custom *Equifax* application as an OAuth provider. For example, select *Equifax* **OAuth default profile**.
Applies to	Select the MID Servers that can use this credential. For example, select **All MID Servers**.
Order	Select the order to apply this credential. For example, enter `100`.

5. Select **Submit**.
6. To generate the OAuth token, select the **Get OAuth Token** related link.

Create connection record for the Equifax spoke

Create a connection record for your Equifax application with the credential aliases provided. You need to select the credential record to the Equifax custom OAuth application you created during Equifax account configuration.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record, for example, *Equifax*.
3. From the **Connections** tab, select **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, *Equifax* `Connection`.
Credential	Basic Auth or OAuth 2.0 credential record created for *Equifax*. For example, *Equifax* `OAuth2.0 API Credentials`.
Connection alias	Alias record associated with this connection. For example, `sn_equifax_spoke.Equifax`
Connection URL	Base URL to connect to *Equifax*.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

5. Select **Submit**.

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Get Equifax OAuth token

Generate the Equifax access token.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select the Equifax spoke OAuth Credential record.

   Example
   For example, select **Equifax OAuth2.0 Credentials**.
3. From Related Links, select **Get OAuth Token**.

F5 BIG-IP Spoke

Manage servers and pools in the F5 BIG-IP system.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported version

BIG-IP 13.1.0.

Spoke version

F5 BIG-IP spoke v1.3.0 is the latest version. For version history of the spoke, see F5 BIG-IP spoke release notes.

Spoke flows

The F5 BIG-IP spoke provides sample flows in the draft state to demonstrate automating F5 tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

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Flow	Description
Local Traffic Management Using F5 Big-IP	Creates a virtual server, associates it to a pool, and adds pool member in the BIG-IP system from a ServiceNow Service Catalog request.

Spoke subflows

The F5 BIG-IP spoke provides sample subflows to demonstrate automating F5 tasks. Available sample subflows include:

Flow	Description
F5 Server - Pool Management	Creates a pool in the BIG-IP system and manages it.

Spoke actions

The F5 BIG-IP spoke provides actions to automate F5 tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Pool Management	Create Pool	Creates a pool in the BIG-IP system.
	Add Pool Member	Creates a pool member in the BIG-IP system.
	Check Pool	Checks pool health in BIG-IP system. Returns whether the pool is available, unavailable, offline, or if the status is unknown.
	Delete Pool	Deletes a pool from the BIG-IP system.
	Disable Pool Member	Disables a pool member in the BIG-IP system.
	Enable Pool Member	Enables a pool member of a specified pool in the BIG-IP system.
	Get Pool Members	Retrieves the list of members of a specified pool from the BIG-IP system.
	Remove Pool Member	Deletes a pool member in the BIG-IP system.
Server Management	Add Profile to Virtual Server	Adds a profile to a virtual server in the BIG-IP system. Profiles enable you to control network traffic. For example, you can enable HTTP connections to the virtual server.

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Category	Action	Description
	Create Virtual Server	Creates a virtual server in the BIG-IP system.
	Delete Virtual Server	Deletes a virtual server from the BIG-IP system.
	Update Virtual Server	Updates virtual server attributes in the BIG-IP system.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
F5 BIG-IP pool management AI agent	Manages (that is, adds a pool member, fetches pool members, disable a pool member, removes a pool member, creates a pool, deletes a pool, verifies a pool) pools in BIG-IP system.
F5 BIG-IP server management AI agent	Manages (that is, adds a profile to virtual server, deletes a virtual server, updates a virtual server, creates a virtual server) servers in BIG-IP system.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses this alias record to authorize actions.

Connection & Credential alias	Description	Connection alias requirements
F5_BIG_IP	Connection to the F5 BIG-IP system.	• Connection type: HTTP • Connection URL: URL of the host machine where the F5 server is installed.

To use the spoke connection alias, create an associated Connection record and an associated Credential record. For information about setting up the spoke, see Configure a connection for the F5 BIG-IP spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the F5 BIG-IP alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Configure a connection for the F5 BIG-IP spoke

Integrate the ServiceNow instance and F5 using basic authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the F5 BIG-IP spoke.
- Role required: admin.

Procedure

1. Navigate to **Process Automation** > **Flow Designer**.
2. Click the **Connections** tab.
3. Locate the **F5_BIG_IP** connection alias and click **View Details**.
4. Click **Edit**.
5. On the **Connection** form, fill in the fields.

Field	Description
Connection Name	Name to identify the F5 BIG-IP connection alias record.
Connection URL	URL of the host machine where the F5 BIG-IP server is installed.
User name	Your F5 BIG-IP user name.

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Field	Description
Password	Your F5 BIG-IP user name.

6. Click **Submit**.

First Advantage Spoke

Manage and track the background verifications of candidates using First Advantage from your ServiceNow instance. Manage users, accounts, candidates, invites, and orders in First Advantage from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

IntegrationHub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

First Advantage spoke v1.9.0 is the latest version. For version history of the spoke, see First Advantage spoke release notes.

Supported versions

This spoke was built for First Advantage API version v1.1, but may be compatible with later versions.

Spoke requirements

- First Advantage account
- API key

  Note: Contact the First Advantage team to obtain the API key.

- Account ID

  Note: Contact the First Advantage team to obtain the Account ID.

Spoke flows

The First Advantage spoke provides sample flows to demonstrate automating the First Advantage tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
First Advantage - Candidate Background Verification using Invite	Initiates background check of the candidate using invite. Sends a request to the candidate to complete an application. For information

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Flow	Description
	about creating a case, see Create a case in First Advantage from ServiceNow.
First Advantage - Candidate Background Verification using Order	Initiates background check of the candidate using order. An order record is created and request to provide essential details is sent to the candidate. For information about creating a case, see Create a case in First Advantage from ServiceNow.
First Advantage - (Order As) Candidate Background Verification using Order	Initiates background check of the candidate using order and places order on behalf of the required user.
First Advantage - (Order As) Candidate Background Verification using Invite	Initiates background check of the candidate using invite and places order on behalf of the required user.

Spoke subflows

The First Advantage spoke provides a sample subflow to demonstrate automating First Advantage tasks. To customize the sample subflow, copy it to a new application scope. Available sample subflow is, Get Packages. The subflow retrieves packages in First Advantage and stores the details in the Packages table.

Spoke actions

The First Advantage spoke provides actions manage accounts, candidates, invites, orders, and users when events occur in ServiceNow. Available actions include:

Category	Action	Description
Account Management	Get Account Details	Retrieves details of the First Advantage account.
	Get Account Packages	Retrieves the details of all the packages in an account.
	Get Account Profiles	Retrieves the details of all profiles in an account.
	Get Account Users	Retrieves the details of all users in an account.
Candidate Management	Create New Candidate	Creates a candidate profile for background verification.
	Get Candidate By Candidate ID	Retrieves the details of the required candidate.
	Get Documents For A Specific Candidate	Retrieves the documents associated with the required candidate.
	Get Monitoring Product Details For A Specific Candidate	Retrieves the details of the monitoring product for the required candidate.
	Update Candidate Details	Updates the details of a candidate profile.

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Category	Action	Description
Invite Management	Create Invite	Create an invite for the candidate to fill the application.
	Get Invite Status By Applicant ID	Retrieves the latest status of the invite for the required applicant.
	Get Invite View Link By Application ID	Retrieves a secure link to access the profile that the candidate must complete.
Order Management	Create Order	Creates a First Advantage screening order.
	Get Order Report By Order ID	Retrieves the completed order report for the required order.
	Get Order Status By Order ID	Retrieves the latest order status for the required order.
User Management	Activate User	Activates the required user.
	Create User	Creates a user profile.
	Deactivate User	Deactivates the required user.
	Update User Password	Updates the password of the required user.
	Update User Profile	Updates information in the profile of the required user.

Spoke module

The First Advantage spoke adds a First Advantage spoke module to your ServiceNow instance. The First Advantage spoke synchronizes and stores information about First Advantage cases, tasks, employee tasks, order tasks, and packages.

The First Advantage spoke includes these modules:

Module	Description
Accounts	Enables you to view the details of all accounts available in First Advantage. To view the account details, you must set up the spoke and synchronise the accounts.
FADV Webhook Client Details	Enables you to set up First Advantage webhook by providing key for the First Advantage webhook client.
Create New First Advantage Case	Enables you to initiate the background check of the required candidate using invite or order from ServiceNow.
First Advantage Cases	Enables you to view list of all First Advantage cases created using invite and order.
Packages	Enables you to view the details of all packages available in First Advantage. To view the package details, you must set up the spoke and synchronise the packages.
Order Tasks	Enables you to view list of all First Advantage order records.

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Module	Description
Employee Tasks	Enables you to view list of all First Advantage cases created using invite.

The First Advantage spoke includes the these tables:

- First Advantage Task [sn_fadv_spoke_first_advantage_task]
- First Advantage Employee Task [sn_fadv_spoke_first_advantage_employee_task_table]
- Packages [sn_fadv_spoke_packages]
- FADV Webhook Client Details [sn_fadv_spoke_webhook_client_details]

Table	Description
First Advantage Task	Details of all the First Advantage order records.
First Advantage Employee Task	Details of all the First Advantage invite records.
Packages	First Advantage packages that are synchronized with ServiceNow®.
FADV Webhook Client Details	Client details to set up the First Advantage webhook.

Spoke user roles

- First Advantage admin
- First Advantage user

Only users with the First Advantage admin role can view the **FADV Webhook Client Details** module.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the First Advantage spoke.

Set up the First Advantage spoke

Integrate the ServiceNow instance with your First Advantage account using an API key to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the First Advantage spoke.
- Role required: admin.

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Create Connection record for the First Advantage spoke

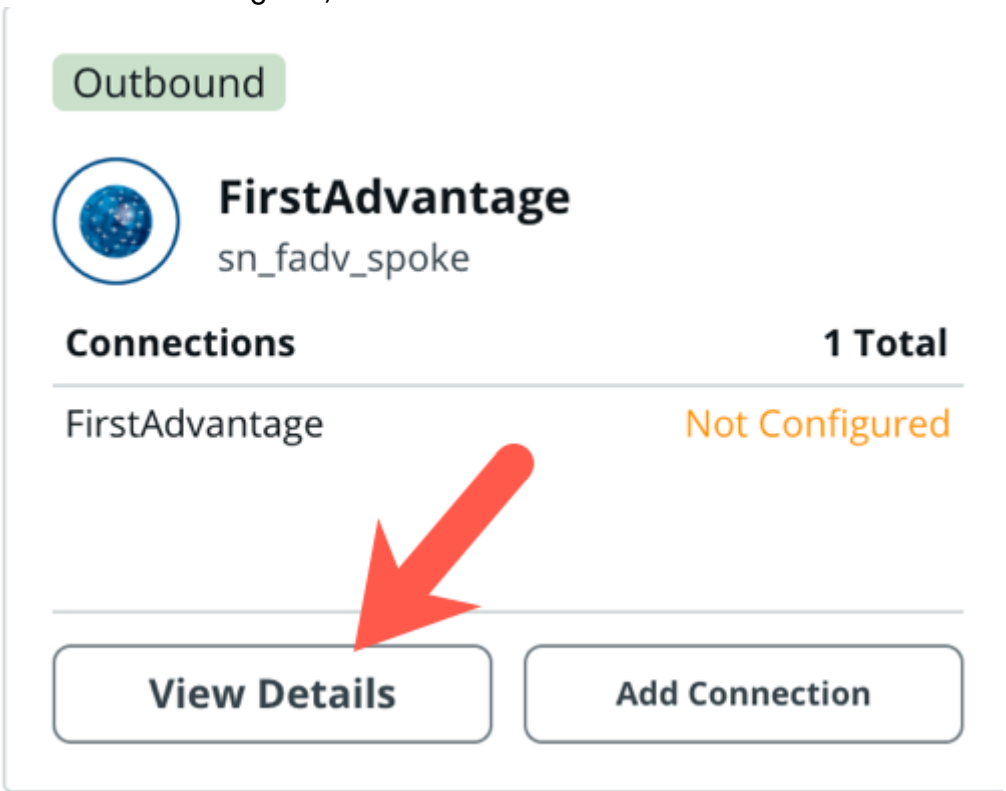
Create a connection record to integrate your ServiceNow instance and the First Advantage server. Your ServiceNow instance uses this connection record to perform the First Advantage spoke actions.

Before you begin
Role required: admin.

Acquire the API key from the First Advantage server.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select **Integrations**.
3. Select the **Connections** tab.
4. In the Search all connections field, enter `First Advantage`.
   Confirm that the **Outbound** tab is selected.
5. On the FirstAdvantage tile, select **View Details**.



6. Select **Configure**.
7. Fill the form.

First Advantage spoke connection form

Field	Description
Connection Name	Name of the connection. The default and read-only name of the first record is the same as that of the connection alias. You can provide a different name when you

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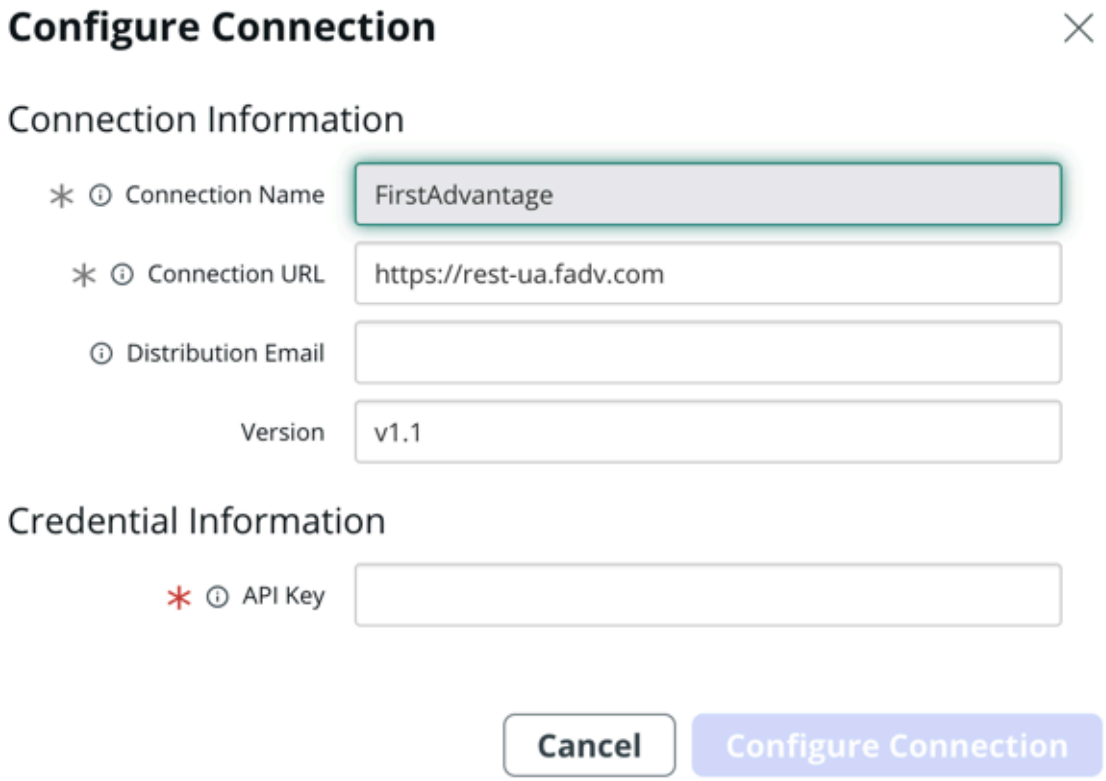
Field	Description
	create a connection record by clicking **Add Connection**.
Connection URL	Option to provide the connection URL to the First Advantage server. The URL is https://rest-ua.fadv.com.
Distribution Email	Option to provide a distribution email ID.
Version	Option to provide the version of the API.
API Key	Option to enter the API key that the First Advantage server uses to authenticate access requests.



8. Select **Configure Connection**.
   The connection record is configured.

Create First Advantage states in your ServiceNow instance

Create First Advantage states to be displayed in the **State** list in your ServiceNow instance.

Before you begin
Role required: admin

Create the Draft, Ready, and In Progress states

Create the Draft, Ready, and In Progress states in the Task [task] table.

Before you begin
Role required: admin.

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Procedure

1. In the Filter navigator, enter `sys_choice.list`.
   The records in the Choice [sys_choice] table are displayed.
2. Click **New**.
3. On the form, fill these values and create three records for the Draft state.

Record 1 - Draft state

Field	Value
Table	Task [task]
Element	state
Label	Draft
Value	137

Note:

- Ensure that you provide the exact numbers in the **Value** field as mentioned here. The spoke flows will not be triggered if there is any change in these numbers.
- Ensure that the record is created in the **Global** application.

4. Click **Submit**.
5. Similarly, create records for the Ready and In Progress states.

Record 2 - Ready state

Field	Value
Table	Task [task]
Element	state
Label	Ready
Value	173

Record 3 - In Progress state

Field	Value
Table	Task [task]
Element	state
Label	In Progress
Value	181

Note:

- Ensure that you provide the exact numbers in the **Value** field as mentioned here. The spoke flows will not be triggered if there is any change in these numbers.
- Ensure that the record is created in the **Global** application.

Result

The Draft, Ready, and In Progress states are created in the Task [task] table

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Create the Complete and Cancelled states

Create the Complete and Cancelled states in the First Advantage Task [sn_fadv_spoke_first_advantage_task] table.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **First Advantage Spoke** > **Order Tasks**.
2. Click **New**.

   Note: Ensure that the record is created in the **First Advantage** application.

3. Right-click **State** and click **Configure Choices**.
4. Perform these steps to create the Cancelled state:

   a. Enter `Cancelled` in **New item text**.

   b. Enter `149` in **Numeric value**.

   Note: Ensure that you provide the exact numbers in the **Numeric value** field as mentioned here. The spoke flows will not be triggered if there is any change in these numbers.

   c. Click **Add**.

   d. Click **Save**.

5. Perform these steps to create the Complete state:

   a. Enter `Complete` in **New item text**.

   b. Enter `127` in **Numeric value**.

   Note: Ensure that you provide the exact numbers in the **Numeric value** field as mentioned here. The spoke flows will not be triggered if there is any change in these numbers.

   c. Click **Add**.

   d. Click **Save**.

Result
The Complete and Cancelled states are created in the First Advantage Task [sn_fadv_spoke_first_advantage_task] table.

Create the Complete - Success and Complete - Deal Broken states

Create the Complete - Success and Complete - Deal Broken states in the First Advantage Employee Task [sn_fadv_spoke_first_advantage_employee_task_table] table.

Before you begin
Role required: admin.

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Procedure

1. Navigate to **All** > **First Advantage Spoke** > **Employee Task**.
2. Click **New**.

   Note: Ensure that the record is created in the **First Advantage** application.

3. Right-click **State** and click **Configure Choices**.
4. Perform these steps to create the Cancelled state:

   a. Enter `Complete - Success` in **New item text**.

   b. Enter `161` in **Numeric value**.

   Note: Ensure that you provide the exact numbers in the **Numeric value** field as mentioned here. The spoke flows will not be triggered if there is any change in these numbers.

   c. Click **Add**.

   d. Click **Save**.

5. Perform these steps to create the Complete state:

   a. Enter `Complete - Deal Broken` in **New item text**.

   b. Enter `117` in **Numeric value**.

   Note: Ensure that you provide the exact numbers in the **Numeric value** field as mentioned here. The spoke flows will not be triggered if there is any change in these numbers.

   c. Click **Add**.

   d. Click **Save**.

Result

The Complete - Success and Complete - Deal Broken states are created in the First Advantage Employee Task [sn_fadv_spoke_first_advantage_employee_task_table] table.

Set up First Advantage webhooks

Receive invite and order event updates at your ServiceNow instance by setting up the webhooks.

Before you begin

Role required: admin

Create authorization key for the First Advantage spoke

Create a authorization key to authorise requests from Jenkins.

Before you begin

Role required: admin

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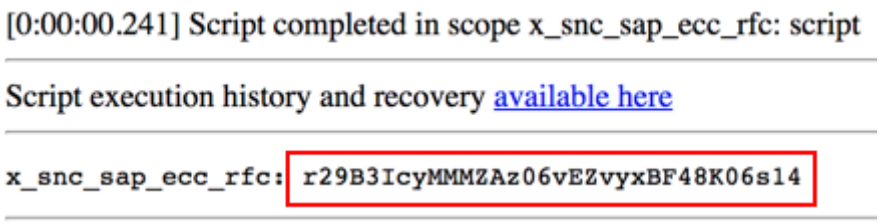
Procedure

1. Navigate to **All** > **System Definition** > **Scripts - Background**.
2. Enter this command in the **Run script (JavaScript executed on server)** text field:
   `gs.info(GlideSecureRandomUtil.getSecureRandomString(32));`
3. Click **Run Script**.
4. Copy and record the generated value for later use.



Provide key in your ServiceNow instance

Set up the First Advantage webhook by providing key for the First Advantage webhook client.

Before you begin

- Create authorization key for the First Advantage spoke and record the value.
- Role required: admin

Procedure

1. Navigate to **All** > **First Advantage Spoke** > **FADV Webhook Client Details**.
2. Click **New**.
3. On the form, fill these values.

Field	Description
Name	Name to uniquely identify the record.
Authorization Key	Authorization key you had generated. For more information, see Create authorization key for the First Advantage spoke.

4. Click **Submit**.

Access API endpoints

Access the API endpoint for the invite and order events and share the required details with First Advantage to set up the webhooks.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Web Services** > **Scripted REST APIs**.
2. Open the record for the First Advantage spoke, for example, **First Advantage Webhook**.
3. In the **Resources** tab:

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a. Open the record for the invite event, for example, **Invite Status**.

b. Copy and record the path provided in **Resource path**, for example, `/api/sn_fadv_spoke/fadv/invite_status`.

c. Open the record for the order event, for example, **Order Status**.

d. Copy and record the path provided in **Resource path**, for example, `/api/sn_fadv_spoke/fadv/order_status`.

What to do next

Contact First Advantage to setup webhooks for your ServiceNow instance. For this, share these details with First Advantage:

- Custom header in this format: `fadvKey <authorization-key>`.

Note:

- Ensure that the custom header is in this format only. The spoke flows will not be triggered if there is any change.
- Provide the same key you had earlier provided in **First Advantage Spoke** > **FADV Webhook Client Details**.
- Use the same case as mentioned here: `fadvKey`.

- API endpoint for the invite events in this format: `<ServiceNow-instance-URL>/api/sn_fadv_spoke/fadv/invite_status`
- API endpoint for the order events in this format: `<ServiceNow-instance-URL>/api/sn_fadv_spoke/fadv/order_status`

Synchronise First Advantage accounts and packages with ServiceNow

Store the details of the First Advantage accounts and packages by synchronizing First Advantage accounts and packages with ServiceNow.

Before you begin

Role required: First Advantage admin

Procedure

1. Navigate to **All** > **First Advantage Spoke** > **Accounts**.
2. Click **New**.
3. On the form, fill in the values.

Account form

Field	Description
Primary Account	Option to specify that the account is a primary account. Select the check box.
Account ID	ID of the primary account.
Account Name	Name of the primary account.

4. Click **Submit**.
   The primary account is created and the record is displayed.
5. Navigate to **First Advantage Spoke** > **Accounts**.

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6. Click the **Get Accounts** related list.
7. Navigate to **First Advantage Spoke** > **Packages**.
8. Click the **Get Packages** related link.

Result
The First Advantage account and package details are retrieved.

Note: Only users with the FADV admin role can synchronize the account and package details. Users with FADV user role can only view the retrieved details.

Create a case in First Advantage from ServiceNow

Initiate the background check of the required candidate using invite or order from ServiceNow.

Before you begin

- Set up the First Advantage spoke
- Synchronise First Advantage accounts and packages with ServiceNow
- Create users in the User [sys_user] table. Background check can be performed only for these users.
- Role required: First Advantage admin or First Advantage user

Procedure

1. Navigate to **All** > **First Advantage Spoke** > **Create New First Advantage Case**.
   Form to provide the First Advantage case details is displayed.
2. On the form, fill these values.

Field	Description
Use Distribution Email for getting invite email from First Advantage	Option to send invitation email to all users in the distribution email.
Select User	User in the User [sys_user] table.
First Name	First name of the selected user. The value is auto-populated based on the user selected in **Select User**.
Last Name	Last name of the selected user. The value is auto-populated based on the user selected in **Select User**.
Email	Email address of the selected user. The value is auto-populated based on the user selected in **Select User**.
Select An Account	First Advantage account to perform the background check.
Select A Package	First Advantage package to perform the background check.
Short Description	Brief description about the background check.
Agent Name	Agent to perform the background check.
Send Invite link	Option to send an invite email. When selected, a request to complete an application is sent to the candidate through an invite email.

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Field	Description
	If this option isn't selected, an order email is sent to the user. An order record is created and request to provide essential details is sent to the candidate. **Note:** ○ When the **Send Invite link** option is selected, an order is created only after the candidate has filled the application form. ○ When the **Send Invite link** option isn't selected, an order is immediately created. Events updates can be accessed in your ServiceNow instance .
Use "Order As"	Option to place order on behalf of the required user.
Email (Order As)	Email ID of the required user. This field is available only when the **Use "Order As"** check box is selected.
Account ID (Order As)	Account ID of the required user. This field is available only when the **Use "Order As"** check box is selected.
User ID (Order As)	User ID of the required user. This field is available only when the **Use "Order As"** check box is selected.

3. Click **Submit**.
   A First Advantage task is created in your ServiceNow instance with **State** as **Draft**. The case can be accessed by navigating to **First Advantage Spoke** > **First Advantage Cases**.

Initiate background verification in First Advantage from ServiceNow using invite

Initiate background verification of the required candidate by sending a request to complete an application through an invite email.

Before you begin

- Create a case in First Advantage from ServiceNow

  Note: Ensure that the **Send Invite link** option is selected and the **Use "Order As"** option isn't selected.

- Role required: First Advantage admin or First Advantage user

Procedure

1. Navigate to **All** > **First Advantage Spoke** > **First Advantage Cases**.
2. Search for the required task.
3. Ensure that the **Send Invite link** option is selected and the **Use "Order As"** option isn't selected.
4. Change the **State** of the task from **Draft** to **Ready**.
   - The First Advantage - Candidate Background Verification using Invite flow is triggered.
   - **State** is changed to **In Progress**.

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- In the **Employee Tasks** tab, a record is created and its details such as **Number**, **Invite ID** and so on, are populated. Open the record to access details such as **Invite URL**, **Candidate ID**, and so on. Also, real-time updates are displayed here.

  Note: The **Employee Tasks** tab displays all the invite records created for the user.

- In the **Order History** tab, a record is created and its details such as **Number**, **Short Description** and so on, are populated.

  Note: The **Order History** tab displays all the order records created for the user.

- Real-time updates and System Administrator events are displayed in the **Order Details** tab.

  Note: **Order ID** is populated only after the invite is executed successfully. For example, **Order ID** isn't populated if the candidate has declined to complete the application form.

- An invite email is sent to the candidate.

Result

After accessing the invite email, candidate can either complete the application form or decline. If candidate fills and submits the application form,First Advantage approves, cancels, or rejects the task after performing the background verification.

- The status and all other details can be accessed in real-time by navigating to **First Advantage Spoke** > **Employee Tasks**.
- Guest events are displayed in the respective First Advantage Employee Task record.

Note:

- You must set up the webhooks to receive the guest event updates. See Set up First Advantage webhooks for information on setting up the webhooks.
- If the candidate has declined the request for background verification, the Order record isn't created for the task.

Initiate background verification in First Advantage from ServiceNow using order

Initiate background verification of the required candidate by sending an email requesting for the essential information.

Before you begin

- Create a case in First Advantage from ServiceNow

  Note: Ensure that the **Send Invite link** and **Use "Order As"** options aren't selected.

- Role required: First Advantage admin or First Advantage user

About this task

An order is initiated when First Advantage has all basic information about the candidate and requires only some essential sensitive information.

Procedure

1. Navigate to **All** > **First Advantage Spoke** > **First Advantage Cases**.
2. Search for the required task.

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3. Ensure that the **Send Invite link** and **Use "Order As"** options aren't selected.
4. Change the **State** of the task from **Draft** to **Ready**.
   - The First Advantage - Candidate Background Verification using Order flow is triggered.
   - **State** is changed to **In Progress**.
   - In the **Order History** tab, a record is created and its details such as **Order ID**, **Number**, **Short Description** and so on, are populated.
   - Real-time updates and System Administrator events are displayed in the **Order Details** tab.

     Note: The **Order History** tab displays all the order records created for the user.

   - An order email is sent to the candidate.

Result

A mail is sent to candidate requesting only the sensitive information. Real-time updates and guest events are displayed in the **Order Details** tab. First Advantage approves, cancels, or rejects the task after performing the background verification.

Note: You must set up the webhooks to receive the guest event updates. See Set up First Advantage webhooks for information on setting up the webhooks.

Initiate background verification in First Advantage from ServiceNow using invite on behalf of another user

Initiate background verification of the required candidate by sending a request on behalf of another user to complete an application through an invite email.

Before you begin

- Create a case in First Advantage from ServiceNow

  Note: Ensure that the **Send Invite link** and **Use "Order As"** options are selected.

- Role required: First Advantage admin or First Advantage user

Procedure

1. Navigate to **All** > **First Advantage Spoke** > **First Advantage Cases**.
2. Search for the required task.
3. Ensure that the **Send Invite link** and **Use "Order As"** options are selected.
4. Change the **State** of the task from **Draft** to **Ready**.
   - The First Advantage - Candidate Background Verification using Invite flow is triggered.
   - **State** is changed to **In Progress**.
   - In the **Employee Tasks** tab, a record is created and its details such as **Number**, **Invite ID** and so on, are populated. Open the record to access details such as **Invite URL**, **Candidate ID**, and so on. Also, real-time updates are displayed here.

     Note: The **Employee Tasks** tab displays all the invite records created for the user.

   - In the **Order History** tab, a record is created and its details such as **Number**, **Short Description** and so on, are populated.

     Note: The **Order History** tab displays all the order records created for the user.

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- Real-time updates and System Administrator events are displayed in the **Order Details** tab.

  Note: **Order ID** is populated only after the invite is executed successfully. For example, **Order ID** isn't populated if the candidate has declined to complete the application form.

- An invite email is sent to the candidate.

Result

After accessing the invite email, candidate can either complete the application form or decline. If candidate fills and submits the application form, First Advantage approves, cancels, or rejects the task after performing the background verification.

- The status and all other details can be accessed in real-time by navigating to **First Advantage Spoke** > **Employee Tasks**.
- Guest events are displayed in the respective First Advantage Employee Task record.

Note:

- You must set up the webhooks to receive the guest event updates. See Set up First Advantage webhooks for information on setting up the webhooks.
- If the candidate has declined the request for background verification, the Order record isn't created for the task.

Initiate background verification in First Advantage from ServiceNow using order

Initiate background verification of the required candidate by sending an email requesting for the essential information on behalf of the required user.

Before you begin

- Create a case in First Advantage from ServiceNow

  Note: Ensure that the **Send Invite link** option isn't selected and the **Use "Order As"** option is selected.

- Role required: First Advantage admin or First Advantage user

About this task

An order is initiated when First Advantage has all basic information about the candidate and requires only some essential sensitive information.

Procedure

1. Navigate to **All** > **First Advantage Spoke** > **First Advantage Cases**.
2. Search for the required task.
3. Ensure the **Send Invite link** option isn't selected and the **Use "Order As"** option is selected.
4. Change the **State** of the task from **Draft** to **Ready**.
   - The First Advantage - Candidate Background Verification using Order flow is triggered.
   - **State** is changed to **In Progress**.
   - In the **Order History** tab, a record is created and its details such as **Order ID**, **Number**, **Short Description** and so on, are populated.
   - Real-time updates and System Administrator events are displayed in the **Order Details** tab.

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Note: The **Order History** tab displays all the order records created for the user.

- An order email is sent to the candidate.

Result
A mail is sent to candidate requesting only the sensitive information. Real-time updates and guest events are displayed in the **Order Details** tab. First Advantage approves, cancels, or rejects the task after performing the background verification.

Note: You must set up the webhooks to receive the guest event updates. See Set up First Advantage webhooks for information on setting up the webhooks.

FRISS Spoke

Integrate a ServiceNow instance with your FRISS account to leverage the fraud detection capabilities for claims and to detect fraud early in the claims process.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

FRISS Spoke v1.2.0 is the latest version. For version history of the spoke, see FRISS Spoke release notes.

Supported versions

This spoke was built for FRISS API version v 2.0 but may be compatible with later versions.

Key features

FRISS spoke enables a flow designer to do the following:

- Integrate with the FRISS API for Claims to save the scores returned by FRISS into the relevant claim data object.
- Detect fraud as you manage your claims cases.
- Get real-time scores of your claims data at different stages of the claims process.
- Use the user interface for portfolio monitoring.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

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Note:

- Some of these plugins may require the appropriate licensing if used outside the spoke implementation.
- The flow actions input parameter is provided for you to use. For more information on the sample input data structure and data types used in an array and object, see Complex data.

Spoke actions

The FRISS spoke provides actions that trigger FRISS Trust automation in response to events that occur within your ServiceNow instance. These actions are classified under the Claim Fraud Management category. Available actions include:

Action	Description
Look up History Stream by Claim ID	Retrieves all the screening results by the Claim ID.
Look up Fraud Indicator Score by Screening ID	Retrieves the fraud score, which has been calculated by FRISS, for a claim that has been identified by a screening ID.
Look up Screening ID	Sends a request to calculate a FRISS score for a claim and returns unique ID called screening ID.
Delete History by Claim ID	Deletes the screening that is associated with a Claim ID.
Delete History by Screening ID	Deletes the screening by the identifier of a screening by FRISS.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For more information about setting up the FRISS spoke, see Set up the FRISS spoke.

Set up the FRISS spoke

You can integrate a ServiceNow instance and FRISS account by using the API key and Tenant ID to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the FRISS spoke.
- Contact the FRISS support team and obtain the connection URL to connect to your FRISS account.
- Role required: admin.

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Procedure

1. Create a credential record for the FRISS spoke in your ServiceNow instance:

   a. Navigate to **Connections & Credentials** > **Credentials**.

   b. Select **New**.
   The system displays the message **What type of Credentials would you like to create?**

   c. Select **API Key Credentials**.
   An empty API Key Credentials form is displayed.

   d. On the form, fill in the fields.

   API Key Credentials form

Field	Description
Name	Name to identify the record. For example, enter `FRISS Spoke Credential`.
Active	Option to actively use the credential record.
API Key	FRISS token in this format: `<Value of ID+key>`.
Applies to	Option that is not applicable to this spoke.
Order	Order to apply this credential. For example, enter `100`.

   e. Select **Submit**.

2. Create a connection record for the FRISS spoke in your ServiceNow instance:

   a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

   b. Open the FRISS record.

   c. From the **Connections** tab, select **New**.
   The system displays an empty HTTP(s) Connection form.

   d. On the form, fill in these fields.

   HTTP(s) Connection form

Field	Description
Name	Name to identify the connection record. For example, enter `FRISS`.
Credential	Credential record that you created for FRISS. For example, select **FRISS Spoke Credential**.
Connection URL	Connection URL to connect to FRISS account.
Attributes	Subsequent calls that you can authorize to the FRISS API. To authorize calls, use the following two parameters:

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Field	Description
	▪ **tenant_id**: An identifier of the tenant, as defined in the FRISS Identity. This identifier is provided to you by FRISS. ▪ **api_version**: The API version key that was retrieved from the FRISS Identity by the earlier request. **Note:** This API version key is short-lived, so each time it expires, you must generate a new one.

e. Select **Submit**.

GitHub Spoke

Manage distributed version control and source code in GitHub from your ServiceNow instance. Create flows in ServiceNow to manage collaborative features such as tracking bugs, feature requests, tasks and so on, for projects in GitHub. View and analyze meaningful usage data for GitHub Enterprise Cloud and GitHub Enterprise Server software subscriptions so that you can reclaim stale licenses.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

GitHub spoke v3.6.4 is the latest version. For version history of the spoke, see GitHub spoke release notes.

Supported versions

This spoke was built for GitHub API version v3, but may be compatible with later versions.

Spoke requirements

- GitHub account
- User with admin credentials
- Token to authenticate the ServiceNow instance

See the GitHub documentation for instructions on creating a GitHub account and generating a token.

GitHub Webhooks module

Bi-directional webhooks can be set up to be notified about the required events. Routing policy defines conditions that must be met to notify the ServiceNow app. These conditions are based on the events in GitHub for which you want to be notified about. When the conditions are met, the routing policy triggers the associated subflow, which in turn automates the GitHub tasks.

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The bi-directional webhooks require separate setup and can be used independently without using the spoke actions. By default, the GitHub Webhooks application is available in the GitHub spoke and has the following modules:

- GitHub Webhook Registries
- GitHub WebHook Routing Policies

Use the GitHub Webhook Registries module to assign a token and provide the API path. You must generate a Callback URL here and provide this URL in GitHub. A default routing policy is provided in the GitHub WebHook Routing Policies module. The default routing policy supports these GitHub fields:

Supported GitHub fields		
Action	Project Card Creator	Ref
Base Ref	Project Card Note	Ref Type
Commit Comment Body	Project Card Previous Note	Release Assets
Commit Comment Created At	Project Card Updated At	Release Author
Commit Comment Path	Project Column Created At	Release Body
Commit Comment Updated At	Project Column Name	Release Created At
Commit Comment User	Project Column Previous Name	Release Draft
Force Push	Project Column Updated At	Release Name
GitHub Instance URL	Project Created At	Release Published At
Issue Assigned To	Project Name	Release Tag Name
Issue Assignees	Project Previous Body	Release Target Commits
Issue Body	Project Previous Name	Repository Archived
Issue Closed At	Project State	Repository Created At
Issue Comment	Project Updated At	Repository Description
Issue Comment Count	Pull Request Assigned To	Repository inactive
Issue Comment Created At	Pull Request Assignees	Repository Full Name
Issue Comment Updated At	Pull Request Body	Repository Has Issues
Issue Created At	Pull Request Closed At	Repository Has Projects
Issue Labeled To	Pull Request Comment Count	Repository Import Status
Issue Labels	Pull Request Created At	Repository License
Issue Locked	Pull Request Draft	Repository Open Issues Count
Issue Milestone	Pull Request Labeled To	Repository Owner

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Supported GitHub fields		
Issue Previous Body	Pull Request Labels	Repository Private
Issue Previous Comment	Pull Request Locked	Repository Pushed At
Issue Previous Milestone	Pull Request Mergeable	Repository Starred At
Issue Previous Title	Pull Request Merged	Repository Updated At
Issue Previously Assigned To	Pull Request Merged At	Repository Vulnerability Alert Affected Range
Issue Previously Labeled To	Pull Request Milestone	Repository Vulnerability Alert External Identifier
Issue State	Pull Request Previous Body	Repository Vulnerability Alert Fixed In
Issue Title	Pull Request Previous Title	Repository Vulnerability Alert Package Name
Issue Updated At	Pull Request Previously Assigned To	Security Advisory Description
Issue User	Pull Request Previously Labeled To	Security Advisory ID
Milestone Closed At	Pull Request Rebaseable	Security Advisory Published At
Milestone Created At	Pull Request Review Body	Security Advisory Severity
Milestone Creator	Pull Request Review Comment	Security Advisory Summary
Milestone Description	Pull Request Review Comment Count	Security Advisory Updated At
Milestone Due On	Pull Request Review Comment Created At	Security Advisory Withdrawn At
Milestone State	Pull Request Review Comment File Path	Sender login
Milestone Title	Pull Request Review Comment Previous Comment	Status Commit Message
Milestone Updated At	Pull Request Review Comment Updated At	Status Context
Organization Description	Pull Request Review Previous Body	Status Created At
Organization Login	Pull Request Review State	Status Description
Pre-Release	Pull Request State	Status Name
Project Body	Pull Request Title	Status State
Project Card Archived	Pull Request Updated At	Status Updated At
Project Card Created At	Pull Request User	Webhook Event

To use other conditions in the routing policy, create a routing policy in the GitHub WebHook Routing Policies module and specify conditions according to your requirement. See Set up bi-

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directional webhook for the GitHub spoke for information regarding setting up and configuring the webhooks.

Spoke triggers

ServiceNow supports specific events on GitHub that create triggers. You must first configure a flow with a supported trigger definition. When an event, for example, a push request, occurs on the GitHub, it sends the payload via a webhook to the ServiceNow instance. After that, the flow that you configured is triggered at the ServiceNow instance to automate a workflow. The supported events are:

Category	Trigger	Description
Branch Management	Branch Created	Flow is triggered when you create a branch on GitHub.
Repository Management	Pull Request Opened	Flow is triggered when you initiate a new pull request on GitHub.
	Pull Request Edited	Flow is triggered when you update a pull request on GitHub.
	Pull Request Closed	Flow is triggered when you close a pull request on GitHub.
	Pull Request Assigned	Flow is triggered when you assign a pull request to a user on GitHub.
	Pull Request Reopened	Flow is triggered when you reopen a pull request on GitHub.
	Repository Fork	Flow is triggered when you fork a repository on GitHub.
	Repository Push	Flow is triggered when you push to a repository on GitHub.
Release Management	Release Created	Flow is triggered when the details of a release are created on GitHub.
	Release Edited	Flow is triggered when the details of a release are updated on GitHub.
	Release Deleted	Flow is triggered when a release is removed on GitHub.
	Release Released	Flow is triggered when a release is released on GitHub.

For information about setting up the triggers for the GitHub spoke, see Activate the trigger definition on ServiceNow instance. For more information about inbound integration, see Conditional and event-driven inbound integration.

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Spoke subflows

The GitHub spoke provides a sample subflow to handle various GitHub webhook events. Available sample subflows are:

Spoke subflows

Subflow	Description	Supported GitHub Event
Process GitHub Branch and Tag Webhook Events	Handles branch and tag webhook events.	Branch and Tag
Process GitHub Commit Webhook Events	Handles commit webhook events.	Commit
Process GitHub Issue Webhook Events	Handles issue webhook events.	Issue
Process GitHub Milestone Webhook Events	Handles milestone webhook events.	Milestone
Process GitHub Project Webhook Events	Handles project webhook events.	Project
Process GitHub Pull Request Webhook Events	Handles pull request webhook events.	Pull Request
Process GitHub Push Webhook Events	Handles push request webhook events.	Push Request
Process GitHub Release Webhook Events	Handles release webhook events.	Release
Process GitHub Repository Webhook Events	Handles repository webhook events.	Repository
Process GitHub Security Webhook Events	Handles security webhook events.	Security

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Spoke subflows (continued)

Subflow	Description	Supported GitHub Event
Process GitHub Webhook Events	Handles all GitHub webhook events.	**Note:** This subflow handles all GitHub events. You can customize this subflow to handle other GitHub webhook events that are not supported by default.

To create subflows to handle other GitHub webhook events or handle the supported GitHub webhook events differently, customize the Process GitHub Webhook Events subflow. For this, you must a create a copy of the subflow, parse the payload, and customize the subflow according to your requirement. Payload is one of the inputs to the subflow.

While customizing subflows, you must confirm that the subflows are configured to avoid infinite loops.

Note:

- You must configure webhooks to use the spoke subflow. See Set up bi-directional webhook for the GitHub spoke for information regarding setting up and configuring the webhook.
- The sample subflows run as a user by default. It can be configured to run as a system.
- GitHub spoke supports application/json payload. Configure the GitHub webhook accordingly. See the GitHub Developer documentation for instructions on creating and configuring a webhook.

Spoke actions

The GitHub spoke provides actions manage branches, issues, repositories, and source code when events occur in ServiceNow. Available actions include:

Category	Action	Description
Branch Management	Create Branch	Creates a branch in GitHub based on a specific commit SHA.
	Delete Branch	Deletes a branch from the GitHub repository.
	Look up Branch	Retrieves the details of a branch in the GitHub repository.
	Look up Branch Protection	Retrieves the restriction details of the required branch.
	Look up Branches	Retrieves the list of all branches in a repository.
	Remove Branch Protection	Removes protection on the required branch.
	Update Branch Protection	Updates protection on the required branch.
Issue Management	Create Comment on Issue	Creates comment on a required issue.
	Create Issue	Creates issue for the required repository.
	Delete Comment on Issue	Deletes comment on a required issue.

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Category	Action	Description
	Lock Issue	Locks the required issue. This limits the conversation to collaborators only.
	Look Up Comments on Issue Stream	Retrieves the list of comments on an issue.
	Look Up Issues Stream	Retrieves the list of issues for a repository.
	Unlock Issue	Unlocks the required issue. This opens conversation to all users.
	Update Comment on Issue	Updates a comment on an issue.
	Update Issue	Updates the details of the required issue.
Metadata Retrieval	Look up Fields by Action	Retrieves the list of fields for an action filter in the GitHub Fields table.
	Look up Branches Metadata	Retrieves metadata of the branches.
	Look up Issues Metadata	Retrieves metadata of the issues.
	Look up Milestones Metadata	Retrieves metadata of the milestones.
	Look up Pull Requests Metadata	Retrieves metadata of the pull requests.
Organization Management	Look up Organization Plan	Retrieves the plan name of an organization.
	Look up Organization Members Stream	Retrieves the list of all members within an organization.
	Look up Organization Repositories Stream	Retrieves the list of all repositories within an organization.
	Remove Organization Member	Removes a user from an organization.
	Look up Organization Events Stream	Retrieves the list of events in an organization based on the provided look back date.
	Look up Organization Outside Collaborators Stream	Retrieves the list of all Outside Collaborators within an organization.
	Remove Organization Outside Collaborator	Removes an outside collaborator from an organization.
	Look up Organization Pending Outside Collaborators Stream	Retrieves a list of pending collaborators within a repository.
	Look up Organization Invitations Stream	Retrieves a list of invitations within an organization.
	Look up Organization Audit Log Stream	Retrieves a list of organization audit log events for a specified look-back date.
Repository Management	Add Collaborator	Adds collaborator to the required repository.
	Delete Repository	Deletes a repository from GitHub.
	Create Comment on Pull Request	Create review comments on a pull request.
	Create Milestone	Creates milestone for the required repository.
	Create Pull Request	Creates a pull request for a repository.

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Category	Action	Description
	Create Reply on Pull Request Review Comment	Creates reply to a review comment for a pull request.
	Create Repository	Creates a repository in GitHub.
	Delete Comment on Pull Request	Deletes review comment on a pull request.
	Delete Milestone	Deletes milestone from the required repository.
	Look up Comments on Pull Request Stream	Retrieves the list of all review comments on a pull request.
	Look up Milestones Stream	Retrieves the list of all milestones in a repository.
	Look up Repository Events Stream	Retrieves the list of events across a repository.
	Look Up Pull Requests Stream	Retrieves the details of pull requests for a repository.
	Look Up Repositories Stream	Retrieves the details of repositories based on a specific user or organization.
	Look up Repository Details	Retrieves the details of the specified repository.
	Merge Pull Request	Merges the pull request to a repository.
	Remove Collaborator	Removes collaborator from a repository.
	Update Comment on Pull Request	Updates review comments provided for a pull request.
	Update Milestone	Updates the details of a milestone in a repository.
	Update Pull Request	Updates the details of a pull request in a repository.
	Update Repository	Updates the details of a repository in GitHub.
Source Code Management	Create Comment on Commit	Creates a comment for the required commit using its SHA.
	Create or update a file	Creates a file or updates an existing file in a repository.
	Look up Comments by Commit ID Stream	Retrieves comments provided for a single commit.
	Look up Commit Information By ID	Retrieves the contents of the required commit reference.
	Look up File Content	Retrieves the contents of a file in a repository. **Note:** This action supports files with file size up to 1 MB.

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Category	Action	Description
	Look up Commits on a Repository	Retrieves the details of all commits made on a repository.
User Management	Look up All Users for Enterprise Server	Retrieves the list of all GitHub Enterprise Server users.
	Look up Organizations for the Authenticated User Stream	Retrieves the list of organizations that the logged-in user is a member of.
	Suspend User	Suspends a GitHub user account.
	Look up Authenticated User	Retrieves information about the authenticated user.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
GitHub branch management AI agent	Manages and maintains the GitHub branches. Also, retrieves information about the GitHub branches.
GitHub issue management AI agent	Manages and automates GitHub-related tasks in Integration Hub.
GitHub repository management AI agent	Manages the GitHub repositories by handling the repository operations, pull requests, comments on pull request and milestones.
GitHub source code management AI agent	Manages source code and handles the repository files, commits, and comments.
GitHub Code Automation Agent	Manages code changes and GitHub operations from your ServiceNow instance. This agent interprets your requests, asks clarifying questions, and analyzes context to deliver well-integrated code updates. It also performs GitHub tasks such as creating

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AI agent	Description
	branches, committing changes, and opening pull requests.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke modules

The GitHub spoke adds these modules to your ServiceNow instance.

Module	Description
GitHub Owner	Displays the GitHub owner records that you had created.
GitHub Repositories	Displays the details of the GitHub repositories associated with the GitHub owners.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the GitHub spoke.

Set up the GitHub spoke

Integrate your ServiceNow instance with the GitHub and GitHub Enterprise Server to automate flows and perform actions on GitHub and GitHub Enterprise Server. For example, create a flow that creates a branch on GitHub and retrieves its details.

https://player.vimeo.com/video/958553772?badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

- Request an Integration Hub subscription.
- Activate the GitHub spoke.
- An account with GitHub to create personal access tokens.
- If you are using GitHub Enterprise server, an account to create personal access tokens.
- Role required: admin.

Procedure

1. Generate a personal access token in GitHub account.

   a. Log in to https://github.com/.

   b. On the dashboard, select your profile icon.

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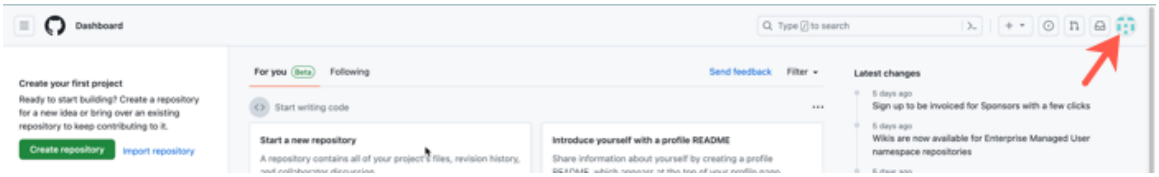


c. Select **Settings**.

d. In the Settings page, on the left panel, select **Developer settings**.

e. In the Developer settings page, on the left panel, navigate to **Personal access tokens** > **Tokens (classic)**.

f. Select **Generate new token** > **Generate new token (classic)**.

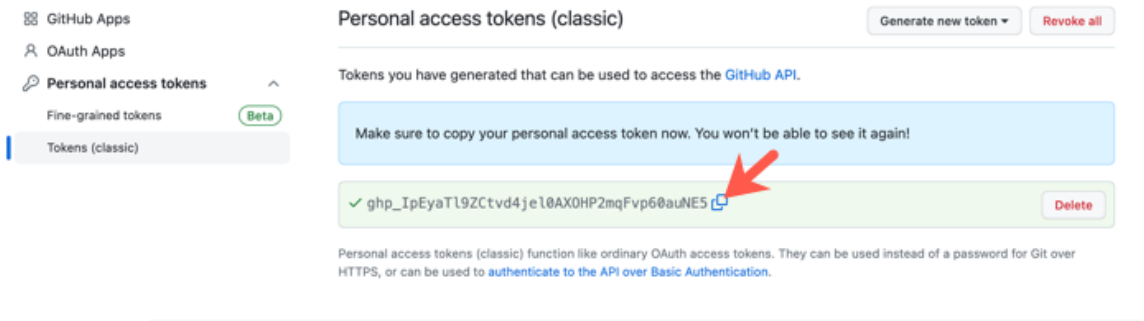
g. In **Note**, enter a description or purpose of the personal access token.

h. In **Expiration**, set the expiry period of the token or select No expiration.

i. Under the **Select scopes** heading, select the scopes that define the access for the personal access token you're generating.

j. Select **Generate token**.
The personal access token is generated.

k. To copy the personal access token, select the copy button.



Important: Keep the personal access token at a secure place. You'll need it when you create a connection record for GitHub.

2. Configure the connection record that connects your ServiceNow instance with GitHub.

a. Log in to your ServiceNow.

b. Navigate to **All** > **Process Automation** > **Workflow Studio**.

c. Click the **Integrations** tab.

d. Under **Connections**, toggle and enable the **Outbound** connections.

e. Locate the **GitHub** connection alias and click **View Details**.
If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.

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f. On the form, fill the details.

Configure Connection form

Field	Description
Connection Name	Name of the connection. **Note:** The default and read-only name of the first connection record is **GitHub**.
Connection URL	URL to connect to GitHub. Enter https://api.github.com.
Use Mid Server	▪ Enter `1` if your ServiceNow instance requires a MID Server to connect with GitHub. ▪ Enter `0` if your ServiceNow instance does not require a MID Server to connect with GitHub. **Important:** To enable this option, you must already have a MID Server set up on your instance. See MID Server for detailed instructions.
API Key	Personal access token that you had generated on GitHub.

g. Select **Create Connection**.
The GitHub connection record is created.

3. If you are using GitHub Enterprise server, configure the **GitHub Server** connection.

Important: Generate a personal access token on the GitHub Enterprise server.

To learn to generate a personal access token on the GitHub Enterprise server, see Integrate with GitHub Enterprise Server.

a. Select the GitHub Server connection card.

b. Select **View Details**.

c. Fill the form.

Configure Connection form

Field	Description
Connection Name	The name of the connection.

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Field	Description
	Note: The default and read-only name of the first connection record is GitHub Server. To create a connection with your custom name, select **Add Connection** and fill the form.
Connection URL	URL of your GitHub instance.
Use Mid Server	▪ Enter `1` if your ServiceNow instance requires a MID Server to connect with the GitHub Enterprise server. ▪ Enter `0` if your ServiceNow instance does not require a MID Server to connect with the GitHub Enterprise server. **Important:** To enable this option, you must already have a MID Server set up on your instance. See MID Server for detailed instructions.
API Key	Personal access token that you had generated on the GitHub Enterprise Server.

d. Select **Create Connection**.
The GitHub Enterprise Server connection record is configured.

Set up bi-directional webhook for the GitHub spoke

Configure webhook to subscribe to GitHub with a ServiceNow callback URL.

https://player.vimeo.com/video/1125629681?h=17672b2593&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

- Request Integration Hub subscription
- Activate the GitHub spoke
- Role required: admin

Register GitHub webhook in ServiceNow

Register a GitHub in ServiceNow to notify the ServiceNow app when certain events occur in GitHub.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **GitHub Webhooks** > **GitHub Webhook Registries**.
2. Click **New**.
3. On the form, fill in the fields.

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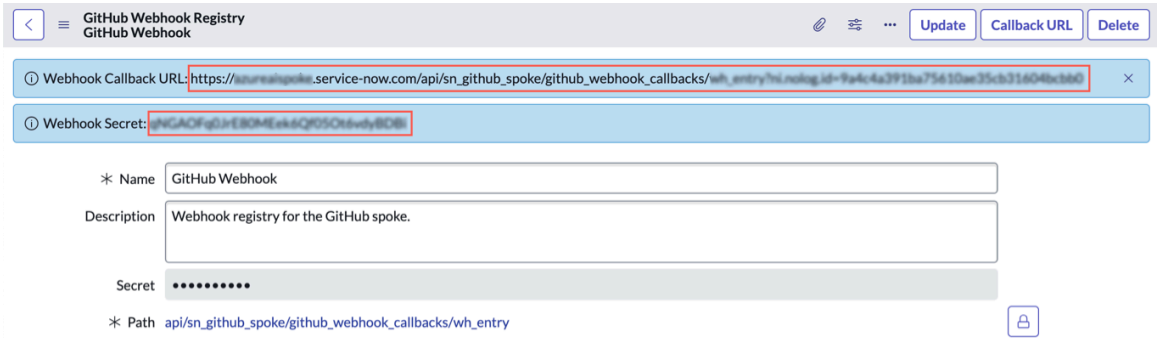
GitHub Webhook Registry form

Field	Description
Name	Unique name to identify the record. For example, `GitHub webhook`.
Description	Description of the record.

4. Right-click the form header and click **Save**.
5. Click **Callback URL**.
   The system displays the **Webhook Callback URL** and **Webhook Secret**.



6. Copy and record the values of **Webhook Callback URL** and **Webhook Secret**.

Result
The GitHub webhook is registered in your ServiceNow instance.

Add Callback URL in GitHub

Provide Webhook Callback URL in GitHub account to create webhook.

Before you begin
Role required: admin

Procedure

1. Log in to your GitHub account.
2. Navigate to the required repository.
3. Select **Settings**.
4. On the left panel, select, **Webhooks**.
5. Select **Add Webhook**.
6. Enter Webhook Callback URL in **Payload URL** and Secret in **Secret**.

   See the GitHub Developer documentation for instructions on creating and configuring a webhook.

   Note: GitHub spoke supports **application/json** payload. Configure the GitHub webhook accordingly. See the GitHub Developer documentation for instructions on creating and configuring a webhook.

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Result
The Callback URL is added in the GitHub account. You can create routing policies and subflows as per your requirement. See Customize a bi-directional webhook for information regarding creating new routing policies and subflows.

Customize bi-directional webhook in the GitHub spoke

Create webhook routing policy and subflow as per your requirement in the GitHub spoke.

Before you begin
Role required: admin

About this task
The default routing policy in the GitHub WebHook Routing Policies modules triggers the relevant GitHub subflow and notifies the ServiceNow app when certain events occur in GitHub. See GitHub Spoke for information about the GitHub fields that the default routing policy supports and the GitHub events that the subflows support. To use any other fields in your custom subflow and customize conditions in the routing policy, perform these steps.

Procedure
1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click **Subflows**.
3. Create a copy of the required subflow.
4. Customize the required subflow as per your requirement and publish it.
   See Building subflows for more information about creating and using subflows and GitHub Spoke for information about the GitHub fields that the default routing policy supports and the GitHub events that the subflows support.
5. Navigate to **GitHub Webhooks** > **GitHub WebHook Routing Policies**.
6. Click **New**.
7. On the form, fill in the fields.

Decision form

Field	Description
Label	Unique label to identify the routing policy.
Default answer	Option to specify if this is the default answer. Default answer is applicable when the conditions are not met.
Condition	Conditions to be met when the required events occur in GitHub. See GitHub Spoke for information about the supported fields.
Answer	Subflow that has to be triggered when the specified conditions are met. **a.** Click the Lookup icon. **b.** Select the required subflow from the **Document:** list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow]`.

8. Click **Submit**.

Note: These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

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Result
Routing policy and subflow are created.

Set up triggers for the GitHub spoke

Set up the trigger to generate the secret and callback URL on your ServiceNow instance.

https://player.vimeo.com/video/1122004833?h=f5acab7f7a&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

- Request an Integration Hub subscription.
- Activate and set up the GitHub spoke.
- Role required: admin.

Activate the trigger definition on ServiceNow instance

Activate the trigger definition to generate the secret and callback URL on your ServiceNow instance.

Before you begin
Role required: flow_designer and connection_admin.

About this task
GitHub uses the secret and callback URL to securely send the payload to the ServiceNow instance. The ServiceNow instance verifies the secret that GitHub sends and accepts the payload.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. Toggle and enable the **Inbound** tab.
4. Locate the GitHub Spoke card and select **View Details**.
5. Select **Configure**.
6. In the User field, select the user name on whose behalf the inbound session or flow is triggered.
7. Select **Generate secret** to generate the secret.
   The secret is used to sign the payload of the webhook. You must configure the secret on GitHub.
   The secret is generated on the Secret field.
8. Select **Activate**.
   The callback URL is generated in the URL field.

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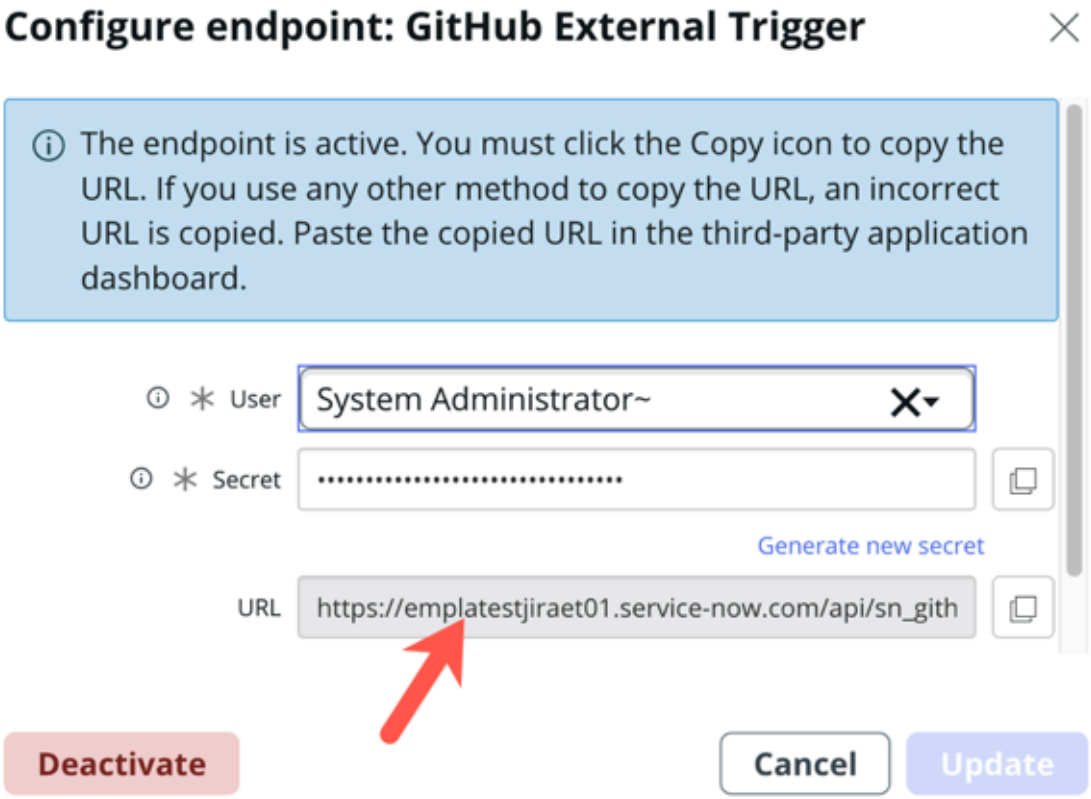

9. Copy the values of **Secret** and **URL** for later use.
10. Close the window.

What to do next

Configure secret and callback URL on GitHub

Configure secret and callback URL on GitHub

Set the secret and callback URL to enable GitHub to securely send webhooks to your ServiceNow instance.

Before you begin

Role required: Admin

Procedure

1. Log in to the GitHub account.
2. Navigate to the required repository.
3. Select **Settings**.
4. On the left panel, select, **Webhooks**.
5. Select **Add Webhook**.
6. Fill the form.

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Webhook trigger

Field	Description
Payload URL *	Option to provide GitHub the payload URL that GitHub uses to send the payload via the webhook. Enter the URL that you have generated while activating the trigger. See Activate the trigger definition on ServiceNow instance.
Content type *	Option to select the payload content format. Select **application/json**.
Secret	Option to provide the secret that the ServiceNow verifies when it receives the webhook from GitHub. Enter the secret that you have generated while activating the trigger. See Activate the trigger definition on ServiceNow instance.
Which events would you like to trigger this webhook?	Option to specify the event that triggers the webhook. Choose from the following options. ○ Just the push event: Triggers the webhook when there's a push event on GitHub. ○ Send me everything: Triggers webhooks whenever an event occurs. ○ Let me select individual events: Triggers the webhook when you specify an event.

7. Select **Add Webhook**.

GitLab Spoke

Manage the DevOps lifecycle in GitLab from your ServiceNow instance. Create flows in ServiceNow to manage branches, groups, issues, merge requests, projects, and source code in GitLab.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

GitLab spoke v2.5.3 is the latest version. For version history of the spoke, see GitLab spoke release notes.

Compatible versions

This spoke was built for GitLab API version v4, but may be compatible with later versions.

Spoke requirements

- GitLab account
- An application in GitLab configured to integrate with ServiceNow
- **Application ID** and **Secret** of the GitLab application

See the https://docs.gitlab.com/ee/integration/oauth_provider.html documentation for instructions on creating and configuring applications.

Spoke actions

The GitLab spoke provides actions to automate GitLab tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Branch Management	Compare Branches Tags or Commits	Compares branches, tags, or commits.
	Create Branch	Creates a branch in the required project.
	Delete Branch	Deletes the required branch from a project.
	Delete Merged Branches	Deletes the required merged branch from a project.
	Look up Branch	Retrieves the details of the required branch.
	Look up Branches Stream	Retrieves a list of branches and the branch details in a project.
	Protect Branch	Protects a branch in a project with access levels.
	Unprotect Branch	Unprotects a branch in a project with access levels.
Group Management	Add User To A Group	Adds user to a GitLab group.
	Remove User From A Group	Removes user from a GitLab group.
Issue Management	Create Issue	Creates an issue in the required project.
	Create Issue Note	Creates an issue note for the required issue.
	Delete Issue Note	Deletes an issue note for the required issue.
	Look up Issue Notes Stream	Retrieves all issue notes in an issue.
	Look up Issues Stream	Retrieves a list of issues and issue details.

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Category	Action	Description
	Update Issue	Updates details of the required issue.
	Update Issue Note	Updates an issue note in a project.
Merge Request Management	Accept Merge Request	Approves a merge request in GitLab.
	Create Merge Request	Creates a merge request in GitLab.
	Create Merge Request Note	Creates a note for the required merge request.
	Delete Merge Request Note	Deletes a note for the required merge request.
	Look up all Merge Requests Stream	Retrieves the list of merge requests in a project.
	Look up Merge Request Notes	Retrieves the list of merge request notes in a project.
	Update Merge Request	Updates details of the required merge request.
	Update Merge Request Note	Updates details of the required merge request note.
Package Management	Delete Package File	Deletes a package file from the project package registry.
	Delete Project Package	Deletes a package from the project package registry.
	Delete Registry Repository	Removes a registry repository from a project.
	Delete Registry Repository Tags	Removes registry repository tags in a batch from a project.
	Look up Details of a Registry	Retrieves details of a registry repository for a specified project.
	Look up Package Files Stream	Retrieves list of package files of a single package.
	Look up Packages within Group Stream	Retrieves a list of project packages and package details at the group level.
	Look up Packages within Project Stream	Retrieves a list of project packages and package details.
	Look up Project Package	Retrieves the details of the specified package for a specified project.
	Look up Registry Repositories	Retrieves a list of registry repositories for a specified project.
Pipeline Management	Look up Project Pipeline by ID	Retrieves the details of a specified pipeline for a specified project.
	Look up Project Pipeline Jobs Stream	Retrieves the list of jobs in a project pipeline.
	Look up Project Pipeline Test Report	Retrieves the test report of the specified pipeline for the specified project.

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Category	Action	Description
	Look up Project Pipelines Stream	Retrieves the list of pipelines in a project.
Project Hook Management	Create Project Hook	Creates a hook to a project.
	Delete Project Hook	Removes a hook from a project.
	Look up Project Hook	Retrieves details of a specified hook in a project.
	Look up Project Hooks	Retrieves details of all the hooks in a project.
	Update Project Hook	Updates details of a hook for a specified project.
Project Management	Add User To A Project	Adds user to a project in GitLab.
	Archive Project	Archives a project in GitLab.
	Create Milestone	Creates milestone in a GitLab project.
	Create Project	Creates a project in GitLab.
	Delete Milestone	Deletes milestone in a GitLab project.
	Delete Project	Deletes a project in GitLab.
	Look up Milestones Stream	Retrieves the details of the milestones GitLab.
	Look up Project	Retrieves details of the specified project.
	Look up Project Jobs Stream	Retrieves the project jobs details.
	Look up Projects Stream	Retrieves the details of the projects.
	Remove User from a Project	Removes user from a project in GitLab.
	Share Project With Group	Shares a project with a group in GitLab.
	Unarchive Project	Unarchives a project in GitLab.
	Unshare Project With Group	Unshares a project with a group in GitLab.
	Update Milestone	Updates details of a milestone in a project.
	Update Project	Updates details of a project.
Source Code Management	Get Commit	Retrieves a details of a commit in GitLab.
	Add New File To Repository	Adds a file to a repository in GitLab.
Token Management	Look up Personal Access Tokens	Retrieves a list of personal access tokens.
	Revoke Personal Access Token	Revokes a personal access token.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

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This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
GitLab pipeline management AI agent	Manages pipeline tasks (that is, looks up project pipelines by ID, retrieves pipeline test reports, streams project pipeline jobs and streams project pipeline data) in GitLab.
GitLab branch management AI agent	Manages branch management (that is, compare branches, tags, or commits, creates and deletes branches, manages branch protection, and looks up branch details or streams) in GitLab.
GitLab merge request management AI agent	Manages merge requests (creates, updates, accepts, and deletes merge request notes, and retrieves information about merge request notes) in GitLab.
GitLab package management AI agent	Manages package management (that is, deletes project packages, manages registry repositories, and performs detailed lookups for packages and files) in GitLab.
GitLab token management AI agent	Manages token management (that is, looks up and revokes personal access tokens) in GitLab.
GitLab issue management AI agent	Manages issue management tasks (that is, creates, updates, and manages issues and the related notes) in GitLab.
GitLab project management AI agent	Manages project management tasks (that is, creates, updates, and deletes projects and milestones, manages user and group access, and retrieves project and milestone streams) in GitLab.
GitLab source code management AI agent	Manages source code tasks (that is, looks up commit difference, adds new file to repository, and looks up commit by project ID) in GitLab.
GitLab group management AI agent	Manages user-group tasks (that is, adds and removes users from groups) in GitLab.

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There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke flows

The GitLab spoke provides sample flows to demonstrate automating the GitLab tasks. To customize a sample flow, copy it to a new application scope.

Flow	Description
Archive projects older than 6 months	Archives the projects which are inactive for the last six months.

Spoke subflows

The GitLab spoke provides sample flows to demonstrate automating the GitLab tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflows	Description
Process GitLab Deployment Webhook Events	Processes deployment webhooks in GitLab.
Process GitLab Job Webhook Events	Processes job webhook events in GitLab.
Process GitLab Merge Request Webhook Events	Processes merge request webhook events in GitLab.
Process GitLab Pipeline Webhook Events	Processes pipeline webhook events in GitLab.
Process GitLab Push Webhook Events	Processes push webhook events in GitLab.

Spoke webhooks

Bi-directional webhooks can be setup to be notified about the required events. Routing policy defines conditions that must be met to notify the ServiceNow app. These conditions are based on the events in GitLab for which you wish to be notified about. When the conditions are met, routing policy triggers the associated subflow, which in turn automates the GitLab tasks.

The bi-directional webhooks requires separate setup and can be used independently without using the spoke actions. By default, the GitLab Webhooks application is available in the GitLab spoke and has the following modules:

Webhook	Description
GitLab Webhook Registries	Displays the list of available webhook registries.
GitLab Webhook Routing Policies	Displays the list of available webhook routing policies.

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Spoke module

The GitLab spoke provides Gitlab Token Management application that includes the Gitlab Token Managements module. You should record here to authenticate requests from your ServiceNow instance.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the GitLab spoke.

Set up the GitLab spoke

Integrate your ServiceNow instance and the GitLab by creating a custom OAuth application in the GitLab.

Before you begin

- Request an Integration Hub subscription.
- Activate the GitLab spoke.
- Create an account with GitLab at https://gitlab.com/users/sign_in .
- Role required: admin.

Add GitLab token

Add GitLab token to authenticate requests from your ServiceNow instance.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **GitLab Token Management** > **GitLab Token Managements**.
2. Click **New**.
3. On the form, fill these values.

Gitlab Token Management form

Field	Description
Secret	Secret created during the GitLab application configuration.
Name	Name to identify the record.
OAuth Entity Profile	Leave the field empty. System auto-assigns the default entity profile after the connection is configured.

4. Right-click the form header and click **Save**.
5. Click **Generate Secure Token**.
   Value of the generated secure token is displayed.
6. Copy and record the value of the secure token for later use.
7. Click **Update**.

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Create OAuth application in GitLab account

Create a custom OAuth application from your GitLab account to enable OAuth 2.0 authentication with the GitLab spoke.

Before you begin

- GitLab account
- Role required: GitLab admin.

About this task

Complete these steps from your GitLab account. See the GitLab documentation for instructions on creating and configuring applications.

Procedure

1. From your GitLab account, create an application.
2. Enter ServiceNow instance URL in **Redirect URI**.
   The format of the redirect URL is: `https://<instance-name>.service-now.com/api/sn_gitlab_spoke/gitlab_oauth_redirect/oauth?secureToken=<Secure-Token>`.

   Replace **<Instance-Name>** with the name of your ServiceNow instance and replace **<Secure-Token>** with the secure token you had generated in the ServiceNow instance.
3. Copy and record the **Application Id** and **Secret** for later use.
   These details are required to register the application as a third-party OAuth provider on your ServiceNow instance.

Result

The custom OAuth application from your GitLab account is created and can be integrated with the ServiceNow instance.

Configure a connection for the GitLab spoke

Add and configure a GitLab connection to authenticate ServiceNow requests in GitLab spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, the **Outbound** connections are displayed by default.
4. Locate the **GitLab** connection alias and click **View Details**.
5. Click **Edit** or if you are configuring the spoke for the first time, click **Configure**.
6. On the **Connection** form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection.
Connection URL	Enter `https://gitlab.com/api`.

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Field	Description
	Note: If you have installed GitLab on an on-premise server, enter the URL in this format: `https://<gitlab-hosted-instance>.com/api`
OAuth Entity Name	Name to identify the OAuth entity record.
OAuth Client ID	Application ID created during the GitLab application configuration.
OAuth Client Secret	Secret created during the GitLab application configuration.
OAuth Redirect URL	OAuth callback endpoint. The format of the redirect URL is: `https://<instance-name>.service-now.com/api/sn_gitlab_spoke/gitlab_oauth_redirect/oauth?secureToken=<Secure-Token>`. Replace **<Instance-Name>** with the name of your ServiceNow instance and replace **<Secure-Token>** with the secure token you had generated in the ServiceNow instance.

7. Click **Configure and Get OAuth Token**.

Set up bi-directional webhook for the GitLab spoke

Configure a webhook to subscribe to GitLab with a ServiceNow callback URL.

Before you begin

- Request Integration Hub subscription
- Activate the GitLab spoke
- Role required: admin

Register GitLab webhook in ServiceNow instance

Register GitLab in ServiceNow to notify the ServiceNow app when certain events occur in GitLab.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **GitLab Webhooks** > **GitLab Webhook Registries**.
2. To retrieve the existing webhooks GitLab account, click **Get All Webhooks**.
3. To create a webhook, click **New**.
4. On the form, fill in the fields:

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Fields	Description
Name	Name of the webhook. For example, `Job webhook`.
Description	Description of the record.
Project ID	Unique identifier of the project for which the webhook should be created.
Trigger and SSL	Events in the projects you want to subscribe to. When one of these events occurs, the webhook is triggered.

5. Click the **Generate Secret Token** related link.
   The secret token is generated and displayed. Also, the date on which the secret expires is populated in **Secret Expires**.

   Note: The secret is regenerated and updated every 30 days. This secret is also updated in GitLab.

6. Right-click the form header and click **Save**.
7. Click **Create Webhook**.
   The webhook is created in GitLab and its ID is populated in **Webhook ID**.

What to do next
To update details of the webhooks or change the subscribed events, click **Update Webhook**.

Customize a bi-directional webhook in the GitLab spoke

Create webhook routing policy and subflow as per your requirement in the GitLab spoke.

Before you begin
Role required: admin

About this task
The default routing policy in the GitLab WebHook Routing Policies modules triggers the relevant GitLab subflow and notifies the ServiceNow app when certain events occur in GitLab. To use any other fields in your custom subflow and customize conditions in the routing policy, perform these steps.

Procedure
1. Navigate to **All** > **Flow Designer** > **Designer**.
2. Click **Subflows**.
3. Create a copy of the required subflow.
4. Customize the required subflow as per your requirement and publish it.
   See Building subflows for more information about creating and using subflows and GitLab spoke for information about the GitLab fields that the default routing policy supports and the GitLab events that the subflows support.
5. Navigate to **All** > **GitLab Webhooks** > **GitLab Webhook Routing Policies**.
   Five routing policies are available along with the spoke. You can configure them as per your requirement or create a routing policy.
6. To create a routing policy, click **New**.

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7. On the form, fill in the fields.

Field	Description
Label	Unique label to identify the routing policy.
Default answer	Option to specify if this is the default answer. Default answer is applicable when the conditions are not met. a. Click the Lookup icon. b. Select the required subflow from the **Document:** list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow]`.
Condition	Conditions to be met when the required events occur in GitLab.
Answer	Subflow that has to be triggered when the specified conditions are met.

8. Click **Submit**.

Note: These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

Result
Routing policy and subflow are created.

Gmail Spoke

Set up an outbound integration between the ServiceNow instance and the Google APIs.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

API version v1.

Spoke version

Gmail spoke v1.3.3 is the latest version. For version history of the spoke, see Gmail spoke release notes.

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Spoke subflows

The Gmail spoke provides sample subflows in the draft state to demonstrate automating Gmail tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Move a ServiceNow attachment to Gmail	Copies an attachment from ServiceNow to Gmail.

Spoke actions

The Gmail spoke provides actions to automate Gmail tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Label Management	Add Label to Email	Add a label to an email.
	Create New Label	Create a label in your Gmail account.
	Lookup Label ID By Name	Retrieve details of a specified Label ID.
	Remove Label From Email	Remove the specified label from an email.
Email Management	Add Attachment To ServiceNow Record	Add an attachment from an email in your Gmail account to a ServiceNow record.
	Get Email Details	Retrieve details of a specified email.
	Look Up Emails	Retrieve details of specified emails.
	Reply To Email	Send a reply to an email.
	Send Email	Send email from your Gmail account to specified recipients.
	Delete Email	Delete the specified email.
	Undelete Email	Retrieve the specified email from the Bin.

Gmail spoke account requirements

The Gmail spoke requires a custom app that you create in the Google Developers Console.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Gmail spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Gmail alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

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To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Gmail spoke

Set up an outbound integration between the ServiceNow instance and the Google APIs.

Before you begin

- Request an Integration Hub subscription.
- Install the Gmail spoke plugin on the ServiceNow instance.
- Role required: admin.

About this task

To establish an outbound integration, you must complete these steps.

- Set up an OAuth 2.0 client ID
- Configure a connection for the Gmail spoke

Set up an OAuth 2.0 client ID

Create a custom OAuth application to enable OAuth 2.0 authentication of the ServiceNow by the Google APIs.

Before you begin

Google Tasks integration requirements:

- A domain and an email address associated with the domain. For example, www.mydomain.com and jane-admin@mydomain.com. You can only register one email address per domain in G Suite.
- A Google G Suite or Gmail login created with the domain.

Role required: admin.

Procedure

1. Navigate to https://console.developers.google.com, create a project with your G Suite administrator credentials, and open the project.
2. From the APIs & Services menu, select **OAuth consent screen**.
3. Enter the application name, and specify the Authorized domain `service-now.com`.
4. Click **Save**.
5. From the APIs & Services menu, select **Credentials**, and select **Create OAuth client ID** from the **Create credentials** list.
6. Select the application type **Web application**.
7. Enter the following Authorized redirect URI: `https://<instance>.service-now.com/oauth_redirect.do` and select **Create**.
8. Copy the Client ID and the Client Secret to a text file.

Configure a connection for the Gmail spoke

Configure the Gmail connection record to establish a connection between the ServiceNow instance and the Google APIs.

Before you begin

Role required: admin.

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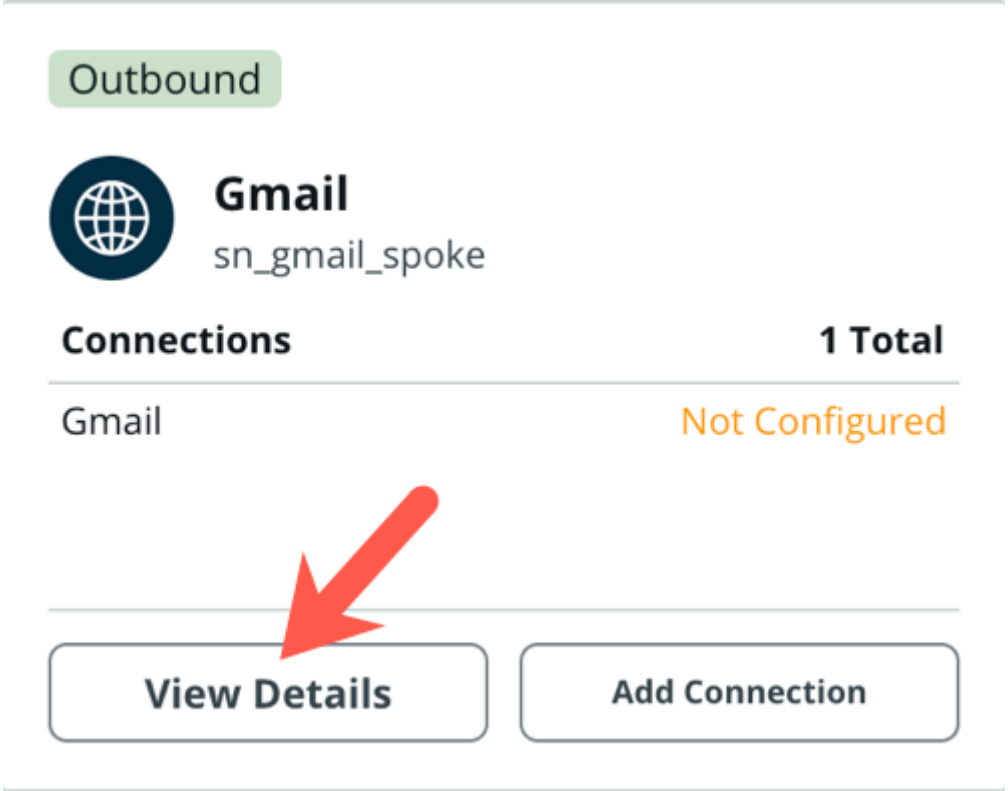
About this task

The connection and credentials contain the details such as the client ID, client secret, and the redirect URL that the Google Workspace must authenticate the ServiceNow instance.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. Select the **Connections** tab.
4. In the Search all connections field, enter `Gmail`.
5. Select **View Details**.



6. Select **Configure**.



7. Fill the form with the details given in the table.

Configure connection form

Field	Description
Connection Name	Name of the connection between the Google Workspace and the ServiceNow instance. **Note:** The default name is Gmail and it's read-only. However, you can provide custom names when you set up more connection and credential records after this record.

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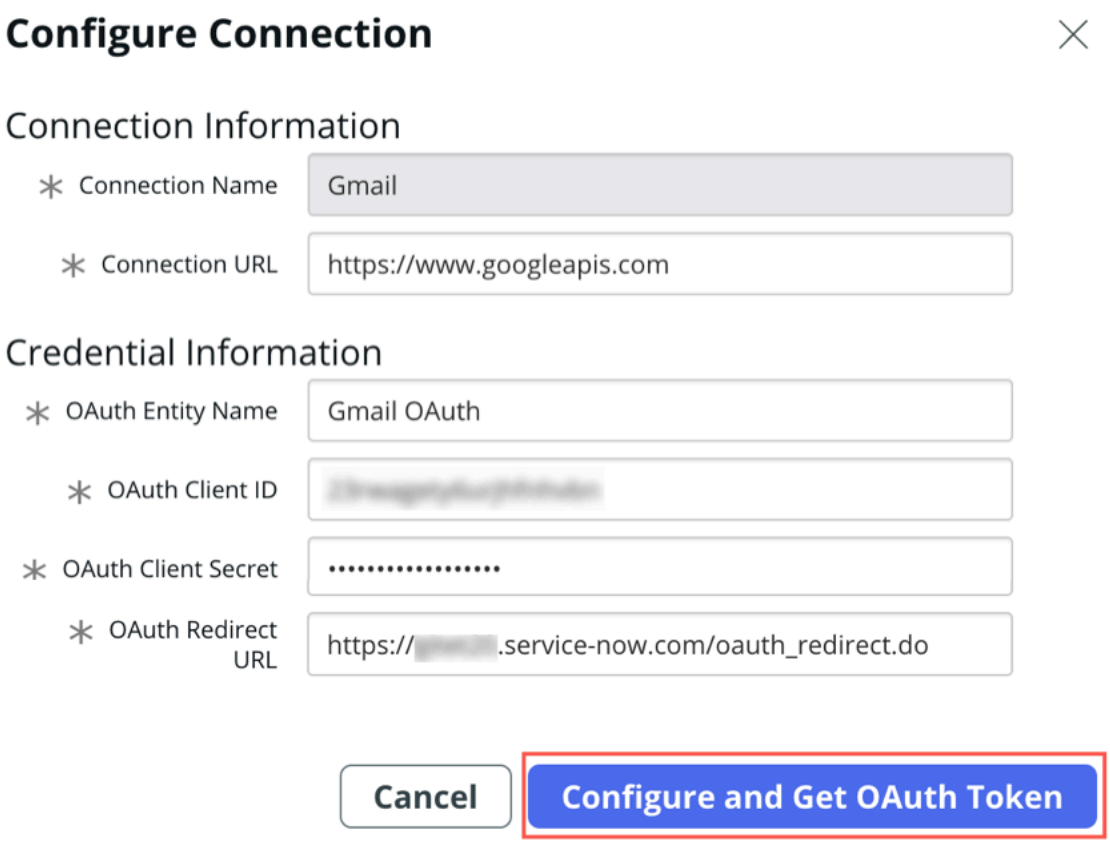
Field	Description
Connection URL	Enter the URL `https://www.googleapis.com` **Note:** Make sure that you don't include spaces before or after this URL. If there are spaces, the connection fails. .
OAuth Entity Name	Name to identity the OAuth entity record.
OAuth Client ID	The OAuth client ID generated when you created the OAuth client ID.
OAuth Client Secret	The OAuth client secret generated when you created the OAuth client ID.
OAuth Redirect URL	The OAuth redirect URL. It must be in the format: `https://<instance-name>.service-now.com/oauth_redirect.do`.



8. Select **Configure and Get OAuth Token**.
   You must log into Gmail after the OAuth token is issued.

Google Calendar Spoke

Use ServiceNow to create and update events and attendees in Google Calendar.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Calendar spoke v2.7.0 is the latest version. For version history of the spoke, see Google Calendar Spoke release notes.

Supported versions

API version v1.

Spoke actions

The Google Calendar spoke provides actions to perform Google Calendar tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Attendee Management	Add Attendees To Event	Updates an event by adding to the list of attendees. Values you specify replace the existing values. Fields that you don't specify in the request do not change.
	Remove Attendees From Event	Updates an event by removing specified attendees. Values you specify replace the existing values. Fields that you don't specify in the request do not change.
Event Management	Create Event	Creates an event on the specified calendar.
	Update Event	Edit event information. Values you specify replace the existing values. Fields that you don't specify in the request do not change.
	Look up Event By ID	Retrieves details of the specified event.
	Delete Event	Removes a specified event from a calendar.
	Look up Events Stream	Retrieves events on a specified calendar based on start time, end time, or search terms.
	Look up Events by Calendar ID	Retrieves events on the specified calendar.
	Look up Free or Busy Schedules	Retrieves the free or busy information for the specified set of calendars.
	Move Event	Moves the specified event to another calendar.
Access Control List Management	Create Access Control List	Creates an access control rule.

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Category	Action	Description
	Delete Access Control List	Deletes the specified access control rule.
	Look up Access Control List by Calendar ID	Retrieves details of the required access control rule.
	Look up Access Control List Stream	Retrieves the rules in the access control list for the calendar.
	Update Access Control List	Updates details of the required access control rule.
Calendar List Management	Add Calendar to Calendar List	Inserts an existing calendar into the user's calendar list.
	Delete Calendar from Calendar List	Removes a calendar from the user's calendar list.
	Look up Calendar from Calendar List by ID	Retrieves calendar from the user's calendar list.
	Look up Calendars from Calendar List Stream	Retrieves calendars on the user's calendar list.
	Update Calendar from Calendar List	Updates an existing calendar on the user's calendar list.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

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AI agents	Description
Google Calendar event manager AI agent	Manages event manager tasks (that is, look up an event by an event ID, look up an events stream, look up busy slots by a calendar ID, move an event, create an event, look up events by a calendar ID, delete an event, update an event) in Google Calendar.
Google Calendar list manager AI agent	Manages calendar list tasks (that is, delete a calendar from a calendar list, look up a calendar from a calendar list by an ID, look up calendars from a calendar list stream) in Google Calendar.
Google Calendar access control list manager AI agent	Manages access control list tasks (that is, update an access control list, delete an access control list, look up an access control list stream, look up an access control list by a calendar ID) in Google Calendar.
Google Calendar metadata manager AI agent	Retrieves time zones metadata (that is, look up time zones metadata) from Google Calendar.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke module

The Google Calendar spoke adds a Google Calendars module to your ServiceNow instance. The Google Calendars module displays the details of the calendar lists.

Google Calendar Online account requirements

The Google Calendar spoke requires a custom app that you create in Google G Suite.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Calendar spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Google Calendar alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

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Set up the Google Calendar spoke

Set up an outbound integration between your ServiceNow instance and the Google Calendar Application Programming Interfaces (API) by setting up a connection and credential record.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Calendar spoke.
- Ensure that you have a Google Workspace account.
- Ensure that you have a domain and an email address related with the domain. For example, www.mydomain.com and jane-admin@mydomain.com.

  Note: you can only register one email address per domain in Google Workspace.

- Role required: admin.

Create OAuth application on Google Calendar

Create an OAuth application on the Google Calendar that authenticates requests to access the Google Calendar APIs from your ServiceNow instance. After successful authentication, you can generate an OAuth token that your ServiceNow can use to access the Google Calendar APIs.

Before you begin

Google Calendar spoke integration requirements:

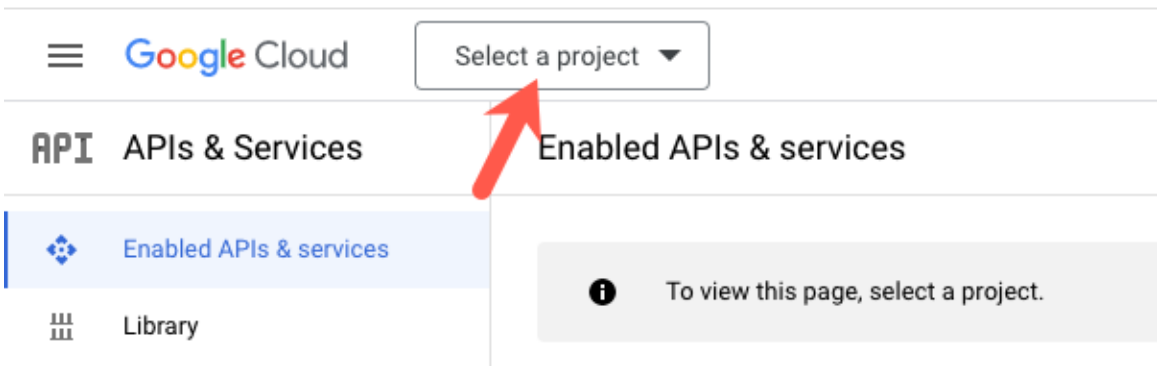
- A domain and an email address associated with the domain. For example, www.mydomain.com and jane-admin@mydomain.com. Note that you can only register one email address per domain in Google Workspace.
- Google Workspace login credentials created with the same domain.

Role required: admin.

Procedure

1. Log in to https://console.developers.google.com with your Google Workspace credentials.
2. Create a project on Google Workspace.
   The project provides the OAuth application and the permissions to access the Google Calendar APIs from your ServiceNow instance.

   a. Select the button.



   b. On the Select a Project window, select **NEW PROJECT**.

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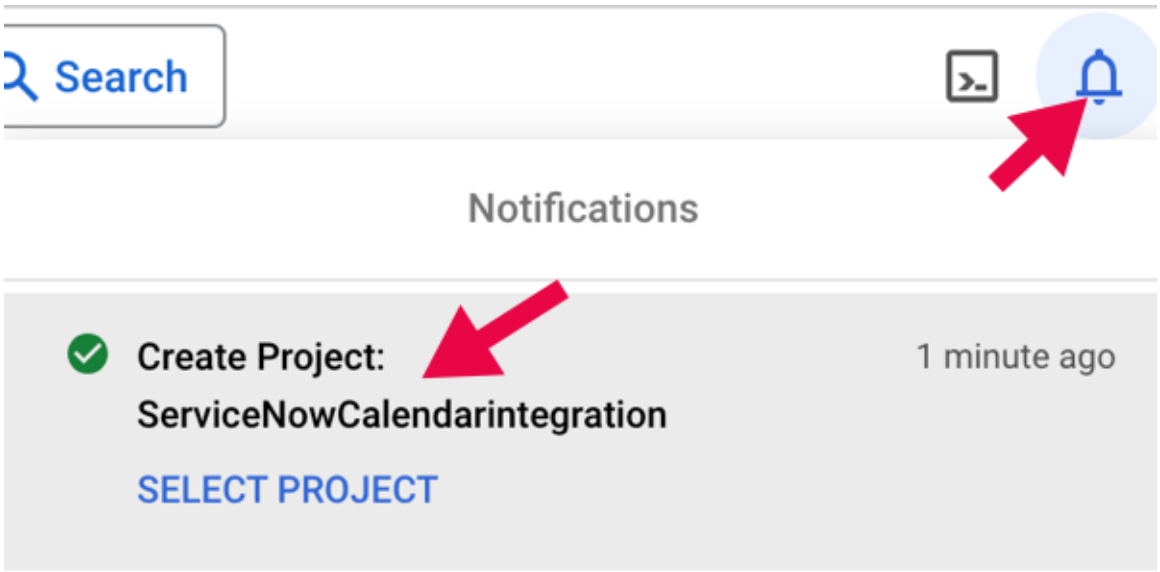
c. In the Project name field, enter a unique name for the project.

d. In the Location field, select BROWSE to select an organization.

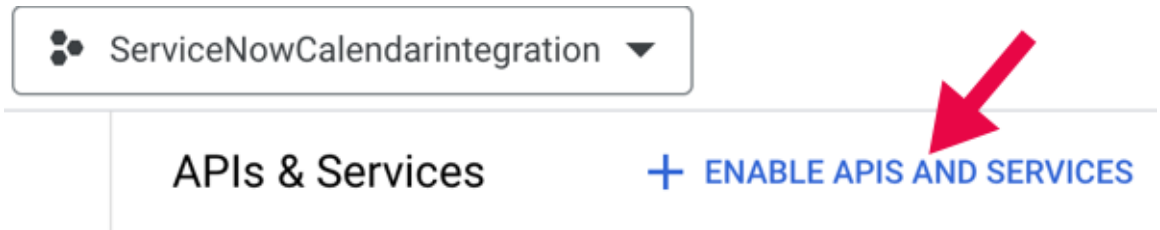
e. Select **CREATE**.
The Notifications window confirms that the project is created.



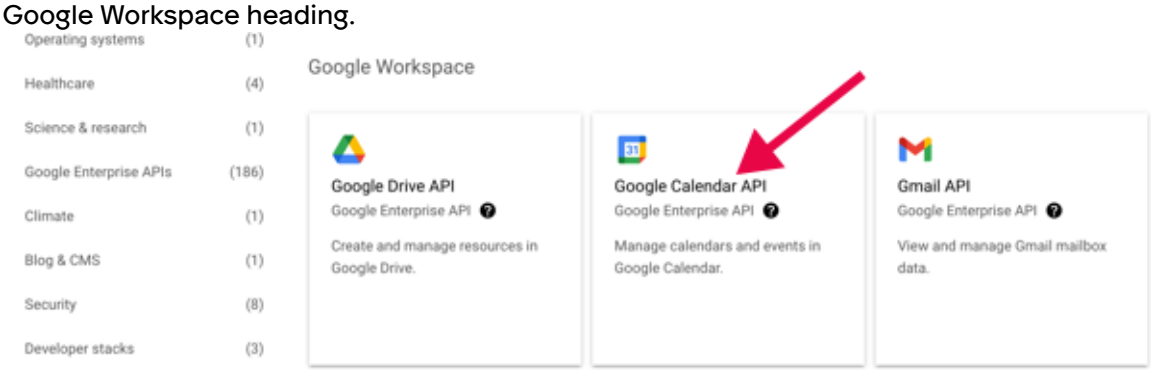
f. Select SELECT PROJECT.

3. Enable the Google Calendar API permissions.

a. Select **+ ENABLE APIS AND SERVICES**.



b. On the Welcome to the API Library page, navigate to the Google calendar API card under the Google Workspace heading.



c. Select **Google Calendar API**.

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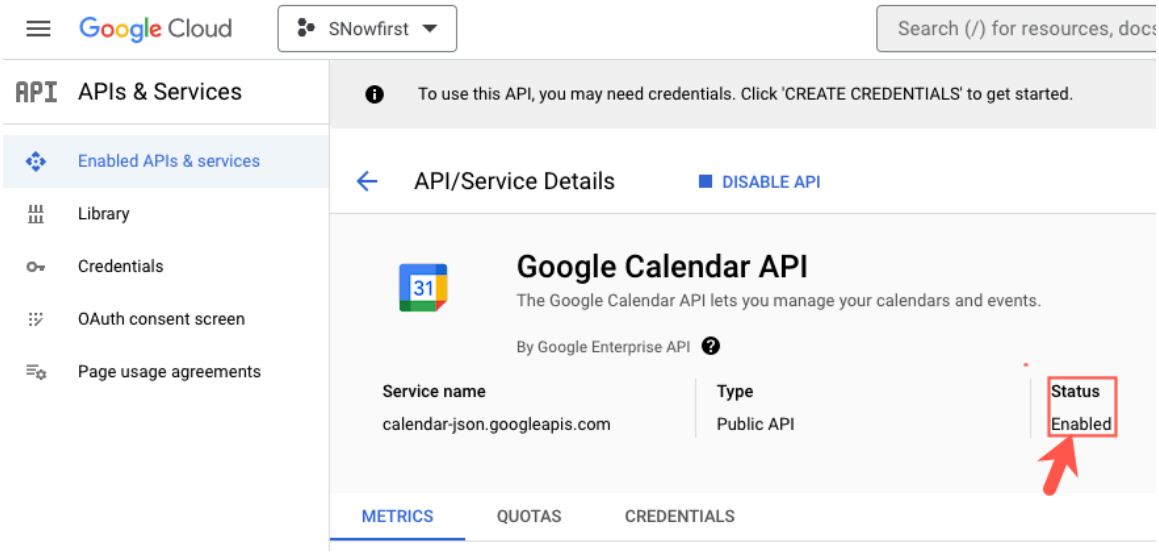
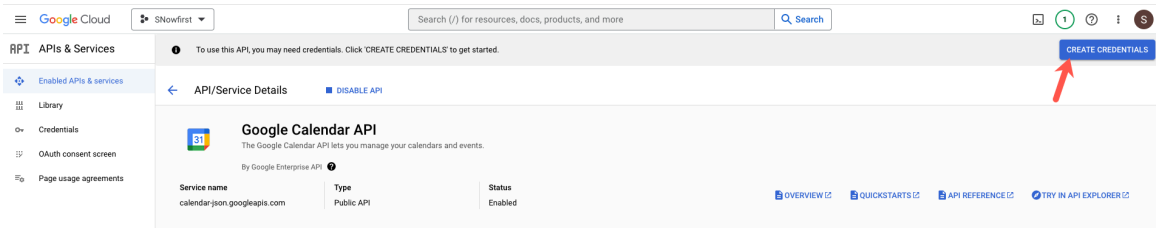
d. Select **ENABLE**.
The Google calendar API is enabled on your project.



4. Create the credentials that the connection and credential form will store.

a. Select **CREATE CREDENTIALS**.



b. Fill the form.

Google Calendar API credentials

Select an API	Name of the API that your ServiceNow instance accesses. **Note:** Ensure that the Google Calendar API option is chosen.
What data will you be accessing? *	Type of data that your ServiceNow instance accesses from the Google Calendar application. **Tip:** To create an OAuth application, select User data.

c. Select **NEXT**.

d. In the OAuth Consent Screen section, fill the form.

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OAuth Consent Screen form

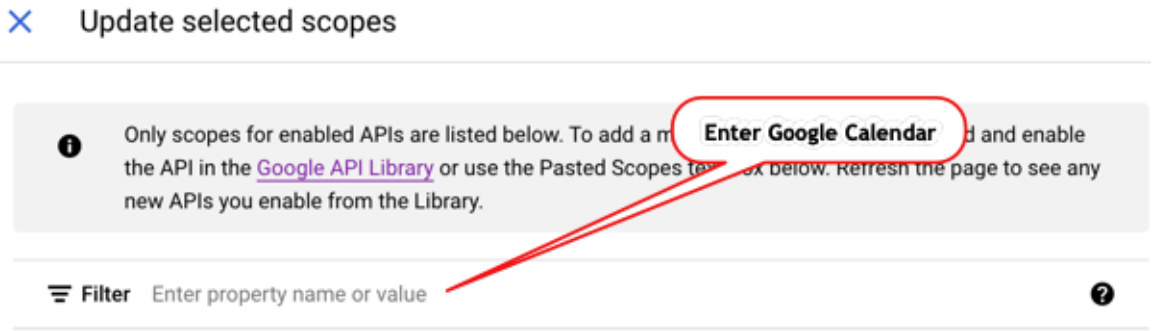
Field	Description	Mandatory?
App name	Custom name of the OAuth app.	Yes
User support email	Users of the OAuth app can send their queries on consent to this email.	Yes
App logo	Logo of the OAuth app,	No
Developer contact information	Google uses this email ID to inform you about any changes to the project.	Yes

e. Select **SAVE AND CONTINUE**.

5. **Optional:** Specify the permissions to access specific Google Calendar API.

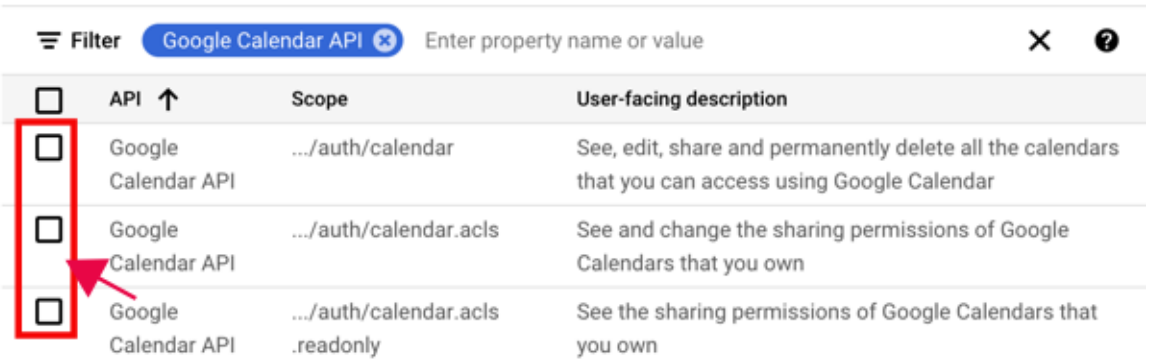
a. Under the SCOPES heading, select **ADD OR REMOVE SCOPES**.

b. In the Update selected scopes window, enter `Google Calendar` in the Enter property name or value field.



c. From the list, select Google Calendar API.

d. Select the required APIs from the list.



e. Select **UPDATE**.

6. Generate the OAuth Client ID and related details.
You must enter the OAuth Client ID and related details in the connection and credential form.

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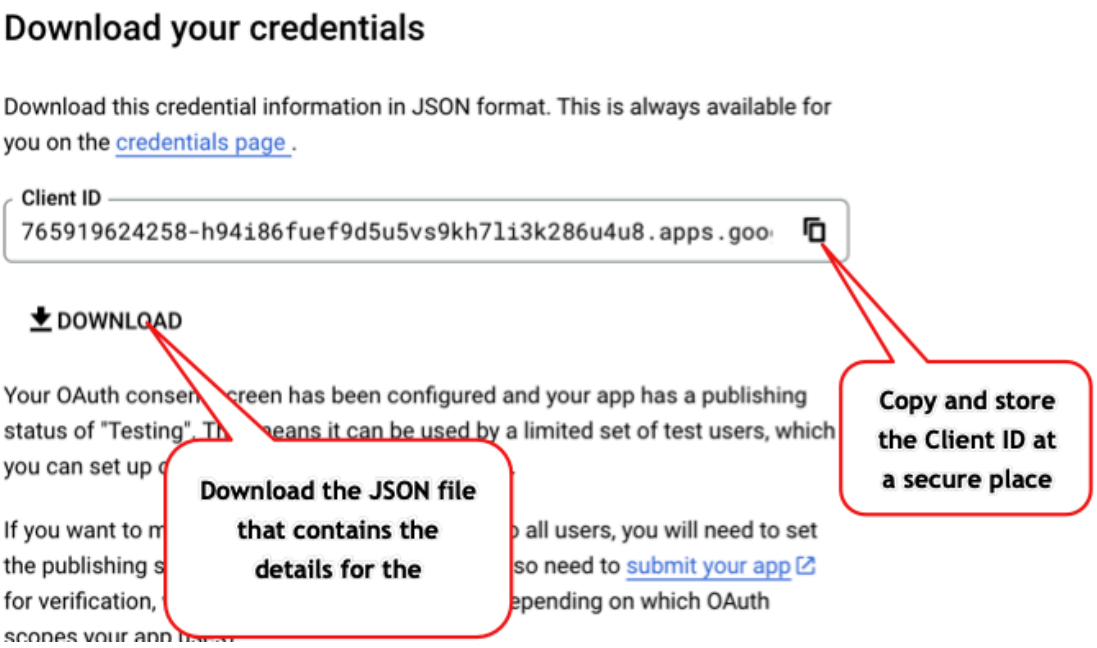
a. In the Application type field, select `Web application`.

b. In the Name field, enter a custom name for the application.

c. To add a redirect URL, under the Authorised redirect URIs heading, select **+ ADD URI**.

d. Enter the URL of your ServiceNow instance.

e. Select **CREATE**.
The credentials for the OAuth application are created, as shown in the image.



7. Select **DONE**.

Create Connection and Credential record for the Google Calendar spoke

Create a connection and credential record that enables your ServiceNow instance to integrate with the Google Calendar Application Programming Interface (API).

Before you begin
Role required: admin.

About this task
The connection and credential record includes the details that you had set up when you created the OAuth app. See Create OAuth application on Google Calendar.

Procedure
1. Navigate to **All** > **Process Automation** > **Workflow Studio**.

2. Click the **Integrations** tab.

3. Under **Connections**, toggle and enable the **Outbound** connections.

4. Locate the alias for **Google Calendar** and click **View Details**.

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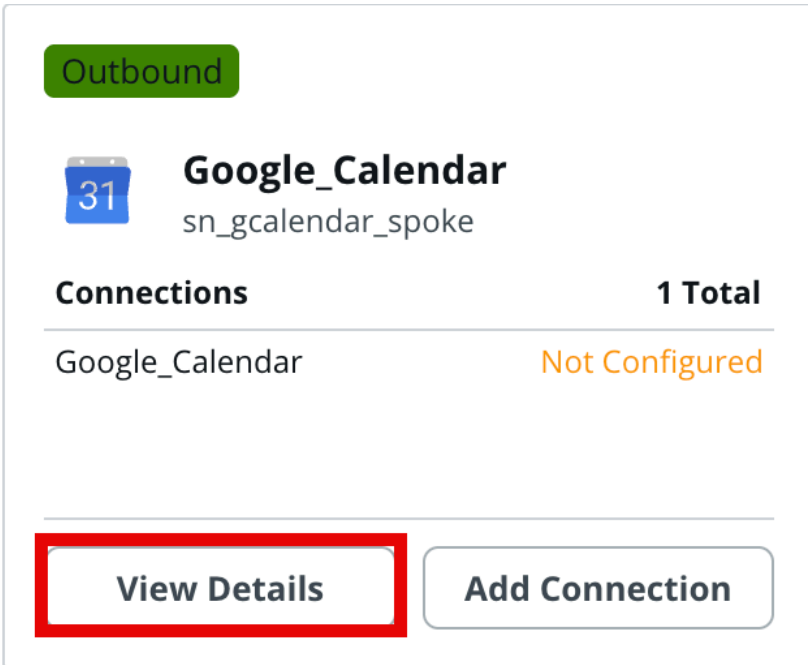
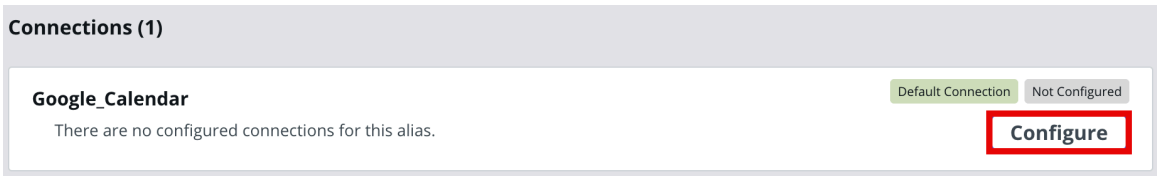
- To configure the default connection and credential alias record that is shipped along with the Google Calendar spoke, click **View Details**.



- To manage more than one Google Calendar spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the form, fill in these fields:

Field	Value required
Connection Information	
Name	Auto-generated name to identify the connection record.
URL	Auto-generated URL for the Google APIs website.
API Version	Auto-generated input of the current API version.
Credential Information	
OAuth Client ID	Client ID you created during the Google Calendar application registration.
OAuth Client Secret	Key value you created during the Google Calendar application registration.

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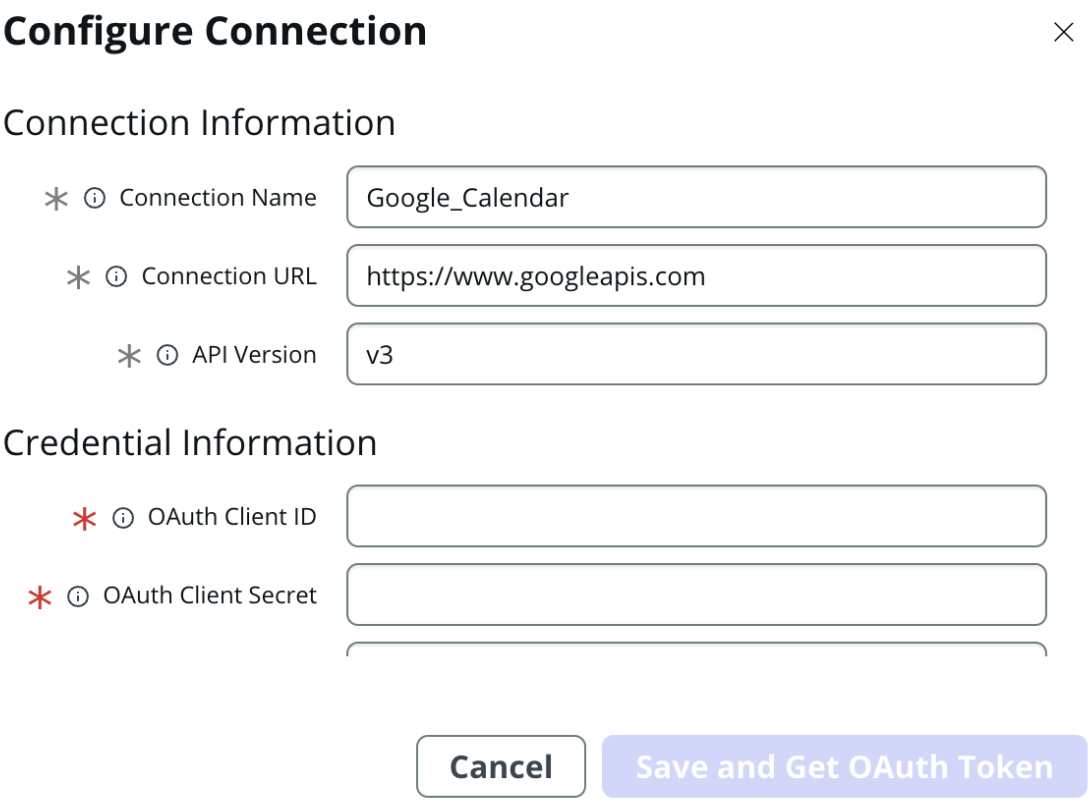
Field	Value required
OAuth Redirect URL	Redirect URL of your ServiceNow instance in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`.
Auth URL	Authorization URL for your Google Calendar configuration.
Token URL	Token URL for your Google Calendar configuration.



6. Click **Save and Get OAuth Token**.

Google Chat spoke

Manage communication within your Google Chat spaces directly from your ServiceNow instance using Google Chat spoke. Create flows in your ServiceNow instance to manage media, members, messages, and spaces in Google Chat.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Google Chat spoke v1.2.0 is the latest spoke version. For version history of the spoke, see Google Chat Spoke release notes.

Supported versions

This spoke was built for Google Chat API v1, but may be compatible with later versions.

Spoke requirements

- Google Chat API access
- Google Cloud console access

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Google Chat spoke provides actions to automate Google Chat tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description	Required Scopes (at least one scope is required)
Media Management	Download Media	Downloads the uploaded media from Google Chat and attaches to the specified incident record. This action does not download the media uploaded to Google Drive.	• https://www.googleapis.com/auth/chat.messages.readonly • https://www.googleapis.com/auth/chat.messages
Member Management	Add Current Application to Space	Adds the current calling application to the specified space.	• https://www.googleapis.com/auth/chat.memberships.app • https://www.googleapis.com/auth/chat.memberships

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Category	Action	Description	Required Scopes (at least one scope is required)
	Add Member to Space	Adds the specified member to the specified space.	https://www.googleapis.com/auth/chat.memberships
	Look up Space Member	Retrieves details of the specified member for the specified space.	• https://www.googleapis.com/auth/chat.memberships.readonly • https://www.googleapis.com/auth/chat.memberships
	Look up Space Members Stream	Retrieves members of the specified space to which you have access.	• https://www.googleapis.com/auth/chat.memberships.readonly • https://www.googleapis.com/auth/chat.memberships
	Remove Current Application from Space	Removes the current calling application from the specified space.	• https://www.googleapis.com/auth/chat.memberships.app • https://www.googleapis.com/auth/chat.memberships
	Remove Member from Space	Removes the specified member from the specified space.	https://www.googleapis.com/auth/chat.memberships
Message Management	Create Message Thread	Creates a message thread in the specified space.	• https://www.googleapis.com/auth/chat.messages.create • https://www.googleapis.com/auth/chat.messages
	Delete Message	Deletes the specified message from the specified space. All the threaded replies of the message are also deleted.	https://www.googleapis.com/auth/chat.messages
	Look up Message	Retrieves details about the specified message from the specified space.	• https://www.googleapis.com/auth/chat.messages.readonly • https://www.googleapis.com/auth/chat.messages

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Category	Action	Description	Required Scopes (at least one scope is required)
	Look up Messages Stream	Retrieves messages from the specified space in which you are a member.	• https://www.googleapis.com/auth/chat.messages.readonly • https://www.googleapis.com/auth/chat.messages
	Send Message to Thread	Creates a message in the specified thread of the specified space.	https://www.googleapis.com/auth/chat.messages
Space Management	Create Space	Creates a named space in Google Chat.	• https://www.googleapis.com/auth/chat.spaces.create • https://www.googleapis.com/auth/chat.spaces
	Delete Space	Deletes the specified Google Chat space.	https://www.googleapis.com/auth/chat.delete
	Look up Space	Retrieves information about the specified Google Chat space.	• https://www.googleapis.com/auth/chat.spaces.readonly • https://www.googleapis.com/auth/chat.spaces
	Look up Spaces Stream	Retrieves a stream of Google Chat spaces in which you are a member.	• https://www.googleapis.com/auth/chat.spaces.readonly • https://www.googleapis.com/auth/chat.spaces
	Update Space	Updates the specified Google Chat space.	https://www.googleapis.com/auth/chat.spaces

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

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- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Google Chat member management AI agent	Performs actions for managing members(adds current application to a space, removes current application from a space, adds member to a space, removes member from a space, look up a space member) in Google Chat.
Google Chat space management AI agent	Performs actions for managing(looks up a space, deletes a space, creates a space, updates a space) spaces in Google Chat.
Google Chat message management AI agent	Performs actions for managing(deletes a message, creates a message thread, looks up a message, sends a message to thread) messages in Google Chat.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Set up the Google Chat spoke

Integrate the ServiceNow instance and Google Chat by creating a custom OAuth application in Google Cloud console to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Chat spoke.
- Role required: admin.

Create OAuth credentials in Google Cloud console for Google Chat spoke

Create credentials in Google Cloud console account to enable OAuth 2.0 authentication with the Google Chat spoke.

About this task

Complete these steps from the Google Cloud console.

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Before you begin

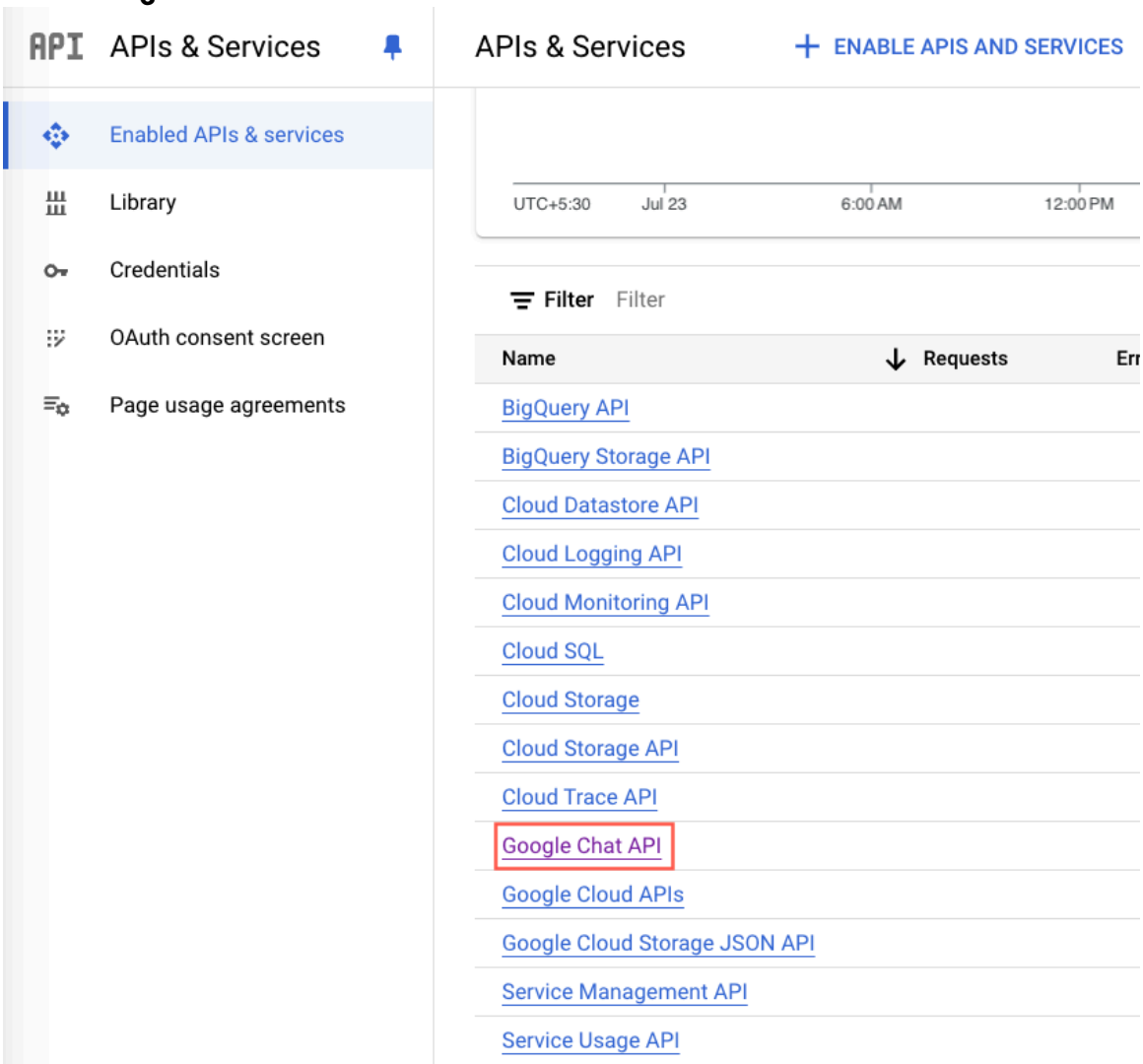
- Create a Google Chat application. For more information, see Develop Google Chat apps and Google Apps Script Chat app quickstart.
- Role required: none

Procedure

1. In the Google Cloud console, navigate to **Main menu** > **IAM & Admin** > **Create a Project**.
   You can also directly go to https://console.cloud.google.com/projectcreate
2. Enter a descriptive name for your project in the **Project Name** field.

   Note: The project ID can't be changed after the project is created, so choose an ID that meets your needs for the lifetime of the project.

3. After creating a Google Chat app, get the deployment ID of the app and record it.
   You need to provide the deployment ID for connection configuration. For more information, see Find a deployment ID.
4. Navigate to **Navigation Menu** > **APIs & Services** > **Enabled APIs & Services**.
5. Select **Google Chat API** from the list.



6. Click on the **CREDENTIALS** tab.
7. Click on **+ CREATE CREDENTIALS** and select **OAuth client ID.**

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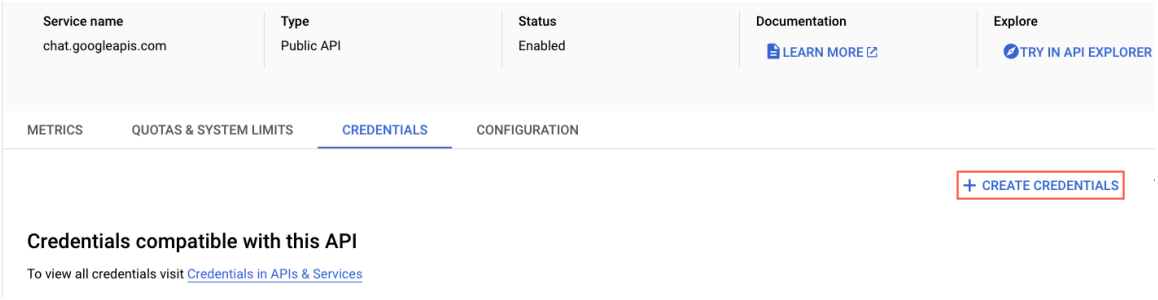

8. On the **Create OAuth client ID** form, fill in the fields.

Field	Description
Application	Select Web application from the list.
Name	Enter a unique name to identify the OAuth 2.0 client.
Authorized JavaScript origins URI	Enter the URI of your ServiceNow instance. For example, `https://<your-instance-name>.servicen-now.com`
Authorized redirect URIs	Enter the redirect URI of your ServiceNow instance. For example, `https://<your-instance-name>.servicen-now.com/oauth_redirect.do`

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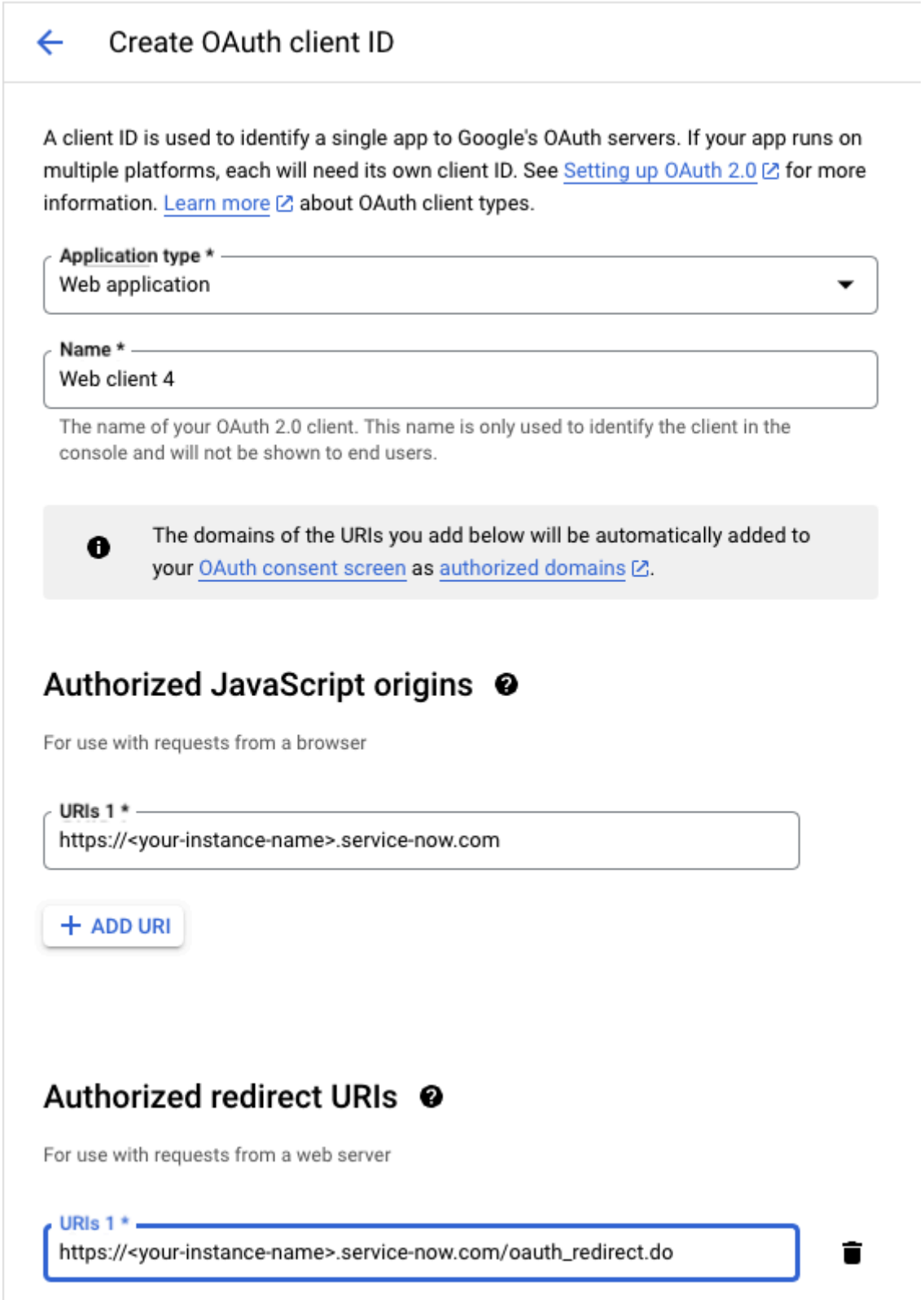

9. Click **CREATE**.
   An OAuth client is created with client ID and client secret. Record the client ID and client secret.
10. Click on the **CONFIGURATION** tab and fill in the fields.

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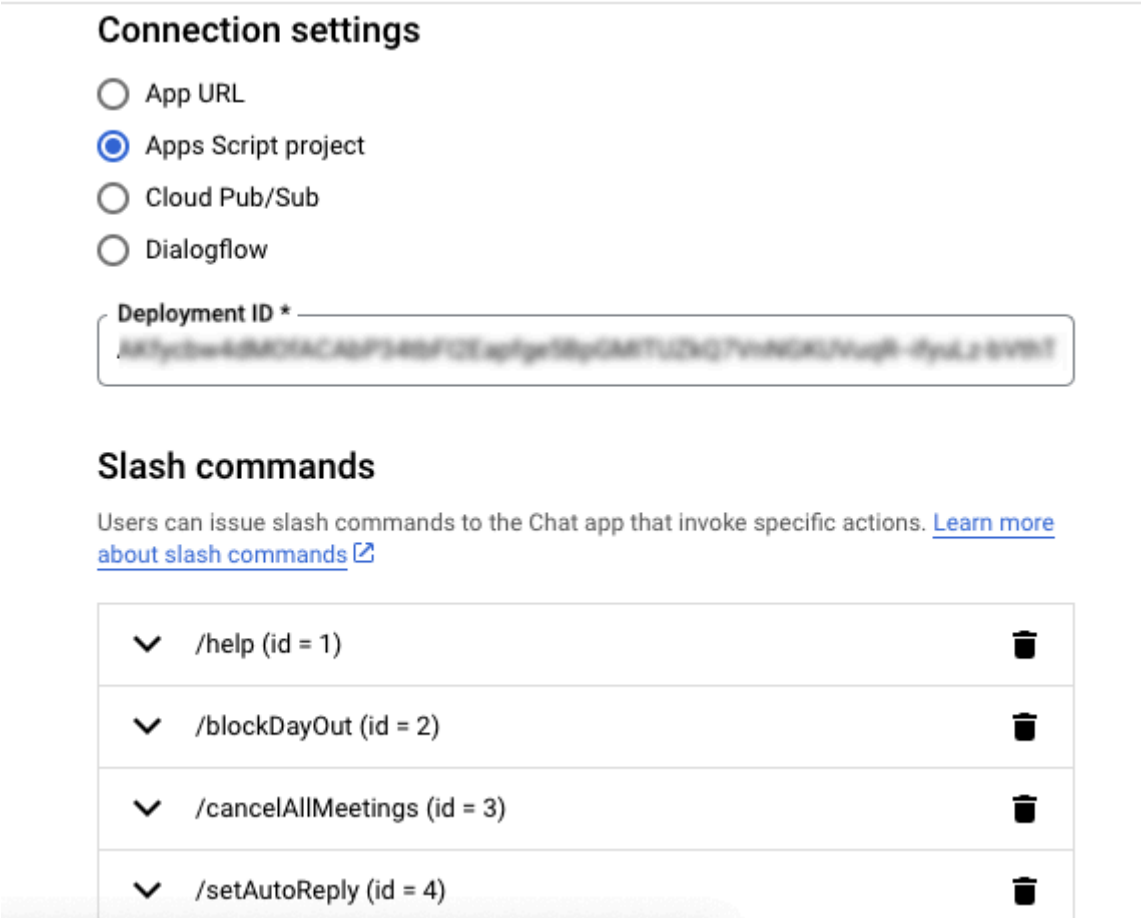
Field	Description
App name	Enter a name for your application.
Avatar URL	Specify an HTTPS URL for your app's avatar image.
Description	Enter a description for your application.

11. In **Connection** settings, specify the deployment ID of the Google Chat app from Step 4 in the **Deployment ID** field.

Note: If you have created any Slash commands while creating the app, specify them.



12. Save the configuration of your app in Google Cloud console.

Configure a connection for Google Chat spoke

Add and configure a Docker connection to authenticate ServiceNow requests in Docker spoke.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Click the **Connections** tab.

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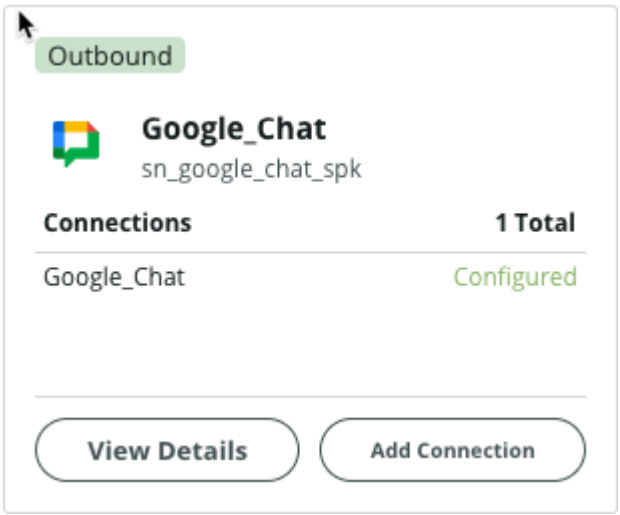
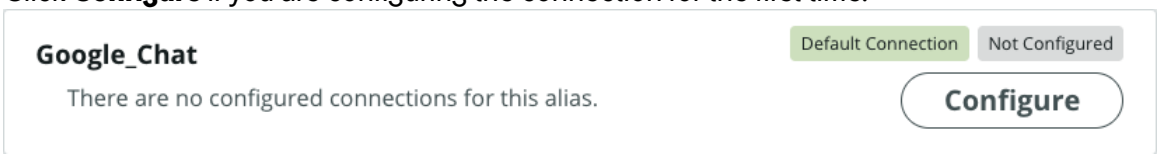
3. Locate the alias for **Google_Chat** and and click **View Details**.

   Note: Don't click**Add Connection**.



4. Click **Configure** if you are configuring the connection for the first time.



5. On the **Configure Connection** form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection record.
Connection URL	URL to Google Chat APIs. Enter `https://chat.googleapis.com`
API Version	Google Chat API version. Enter `v1`.
OAuth Client ID	OAuth client ID of Google Chat app in Google Cloud console.
OAuth Client Secret	OAuth client secret of Google Chat app in Google Cloud console.
OAuth Redirect URL	OAuth redirect URL of your ServiceNow instance. Enter in this format`https://<your-instance-name>.service-now.com/oauth_redirect.do`

6. Click **Configure and Get OAuth Token**.
   You will be redirected to Google accounts login page.
7. Enter your Google Chat API credentials.

Result

An OAuth token is generated and configured for the Google Chat spoke.

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Google Cloud Datastore Spoke

Manage the NoSQL database services in Google Cloud Datastore from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Cloud Datastore spoke v1.0.2 is the latest version. For version history of the spoke, see Google Cloud Datastore spoke release notes.

Supported versions

This spoke was built for Google Cloud Datastore v1, but may be compatible with later versions.

Spoke requirements

Google Cloud Datastore account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

IntegrationHub (com.glide.hub.integrations)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Google Cloud Datastore spoke provides actions to automate Google Cloud Datastore tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Entity Management	Entity Export	Exports a copy of all or a subset of entities from Google Cloud Datastore to another storage system.
	Entity Import	Imports entities into Google Cloud Datastore.
Index Management	Create Index	Creates the specified index.
	Delete Index	Deletes an existing index.
	Get Index	Gets an index.

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Category	Action	Description
	Look up Index	Retrieves the list of indexes that match the specified filters.
Operation Management	Cancel Operation	Starts asynchronous cancellation on a long-running operation.
	Delete Operation	Deletes a long-running operation.
	Get Operation	Gets the latest state of a long-running operation.
	Look up Operation	Retrieves the list of operations that match the specified filter in the request.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Google Cloud Datastore spoke.

Set up the Google Cloud Datastore spoke

Integrate the ServiceNow instance and Google Cloud Datastore spoke using Google Cloud Platform credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Cloud Datastore spoke.
- Role required: admin.

Create a custom application

Create a custom OAuth application in your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Cloud Datastore spoke.

Before you begin

Role required: admin

About this task

Complete these steps from the Google Cloud Platform. See the Google Cloud Platform product documentation for instructions on creating and configuring custom applications.

Procedure

1. Register a new custom application by navigating to https://console.cloud.google.com/.
2. Create a project with your administrator credentials, and open the project.
3. From the APIs & Services menu, select **OAuth consent screen**, enter the application name, and specify the Authorized domain `service-now.com`.
4. Click **Save**.

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5. From the APIs & Services menu, select **Credentials**, and select **Create OAuth client ID** from the **Create credentials** list.
6. Select the application type **OAuth client ID**.
7. Enter the following **Authorized redirect URI**: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
   The OAuth client window shows your client ID and client secret.
8. Copy these two values to a text file so that you can use them when you Register Google Cloud Datastore as an OAuth provider.
   The client ID and secret can always be accessed in the Google APIs & Services interface. Click **Credentials** and select the OAuth 2.0 client ID name.

Register Google Cloud Datastore as an OAuth provider

Register G suite as the OAuth provider so that the ServiceNow instance can request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **System OAuth** > **Application Registry**.
2. Open for the record, **Google Cloud Datastore**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Client ID of the Google Cloud Datastore application.
Client Secret	Client Secret of the Google Cloud Datastore application.
OAuth API Script	**OAuthGoogleDatastoreUtils** is selected by default.
Authorization URL	The OAuth authorization code endpoint: `https://accounts.google.com/o/oauth2/auth`.
Token URL	The OAuth server token endpoint: `https://oauth2.googleapis.com/token`.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`. If left blank, the instance auto-generates the URL.

4. Right-click the form header, and click **Save**.

Create a credential record for the Google Cloud Datastore spoke

Create a credential record for the Google Cloud Datastore custom application. The Google Cloud Datastore Spoke connection and credential alias uses this credential to authorize actions.

Before you begin

Role required: admin.

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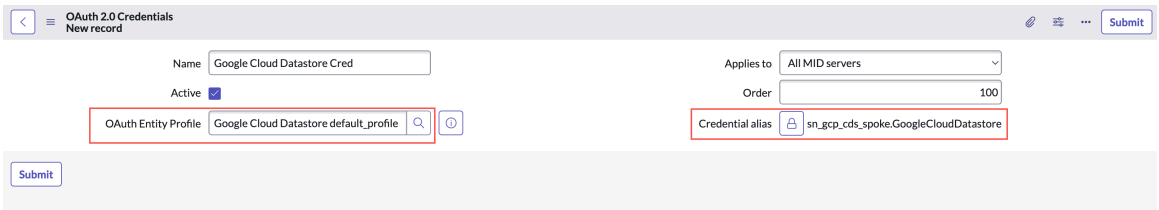
Procedure

1. Navigate to **All** > **Integration Hub** > **Connections & Credentials**.
2. Open the record, **GoogleCloudDatastore**.
3. In the **Credentials** tab, click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
4. Select **OAuth 2.0 Credentials**.
5. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to identify the credential record. For example, `Google Cloud Datastore Cred`.
OAuth Entity Profile	Select the default OAuth entity profile, **Google Cloud Datastore default_profile**.
Credential alias	Credential alias associated with this record. The default alias record, **sn_gcp_cds_spoke.GoogleCloudDatastore** is selected.



6. Right-click the form header and click **Save**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

Google Cloud DNS Spoke

Manage public zones and private managed DNS zones in using Google Cloud DNS account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for Google Cloud DNS API version v1, but may be compatible with later versions.

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Spoke version

Google Cloud DNS Spoke version is 1.0.2. For version history of the spoke, see Google Cloud DNS spoke release notes.

Spoke requirements

The Google Cloud DNS spoke requires a custom app that you create in Google Cloud Platform.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Google Cloud Virtual Network Spoke
- Google Identity and Access Spoke

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Google Cloud DNS spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Change Management	Create Change	Updates the resource record set collection.
	Get Change	Retrieves the details of an existing change.
	Look up Changes	Retrieves list of changes to a resource record set collection available with in the specified managed zone.
DNS Key Management	Get DNS Key	Retrieves details about an existing DNS key.
	Look up DNS Keys	Retrieves list of DNS keys to a resource record set collection available with in the specified managed zone.
Managed Zone Management	Create Managed Zone For Private	Creates a managed private zone with private DNS records.
	Create Managed Zone For Public	Creates a managed public zone.
	Delete Managed Zone	Deletes the specified existing managed zone.
	Get Managed Zone	Retrieves the details of the specified managed zone.

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Category	Action	Description
	Look up Managed Zones	Retrieves list of managed zones available in the specified project.
	Update Managed Zone For Private	Updates the details of the specified managed zone.
	Update Managed Zone For Public	Updates the details of the specified managed zone.
Operation Management	Get Operation	Retrieves the details of an existing operation.
	Look up Operations	Retrieves list of operations available with in the specified managed zone.
Policy Management	Create Policy	Creates a policy.
	Delete Policy	Deletes the specified policy.
	Get Policy	Retrieves the details about the specified policy.
	Look up Policies	Retrieves list of policies available with in the specified project.
	Update Policy	Updates details of the specified policy.
Project Management	Get Project	Retrieves the details about the specified project.
Resource Record Set Management	Look up Resource Record Sets	Retrieves list of resource record set collections available with in the specified managed zone.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Cloud DNS spoke.

Set up the Google Cloud DNS spoke

Integrate the ServiceNow instance and Google Cloud DNS account by creating a custom OAuth application in Google Cloud Platform to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Cloud DNS spoke.
- Role required: admin.

Create a custom application

Create a custom OAuth application in your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Cloud DNS spoke.

Before you begin

Role required: admin.

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About this task

Complete these steps from the Google Cloud Platform. See the Google Cloud Platform product documentation for instructions on creating and configuring custom applications.

Procedure

1. Register a new custom application by navigating to https://console.cloud.google.com/.
2. Create a project with your administrator credentials, and open the project.
3. From the APIs & Services menu, select **OAuth consent screen**, enter the application name, and specify the Authorized domain `service-now.com`.
4. Click **Save**.
5. From the APIs & Services menu, select **Credentials**, and select **Create OAuth client ID** from the **Create credentials** list.
6. Select the application type **OAuth client ID**.
7. Enter the following **Authorized redirect URI**: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
   The OAuth client window shows your client ID and client secret.
8. Copy these two values to a text file so that you can use them when you Register Google Cloud DNS as an OAuth provider.
   The client ID and secret can always be accessed in the Google APIs & Services interface. Click **Credentials** and select the OAuth 2.0 client ID name.

Register Google Cloud DNS as an OAuth provider

Use the information generated during the Google Cloud DNS application configuration to register Google Cloud DNS as an OAuth provider and allow the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **System OAuth** > **Application Registry**.
2. Open for the record, **Google Cloud DNS**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Client ID of the Google Cloud DNS application.
Client Secret	Client Secret of the Google Cloud DNS application.
OAuth API Script	**OAuthGoogleCloudDNSUtils** is selected by default.
Authorization URL	The OAuth authorization code endpoint: `https://accounts.google.com/o/oauth2/auth`.
Token URL	The OAuth server token endpoint: `https://oauth2.googleapis.com/token`.

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Field	Description
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`. If left blank, the instance auto-generates the URL.

4. Right-click the form header, and click **Save**.

Create a credential record for the Google Cloud DNS spoke

Create a default credential record for the Google Cloud DNS application. The Google Cloud DNS spoke connection and credential alias uses this credential to authorize actions.

Before you begin

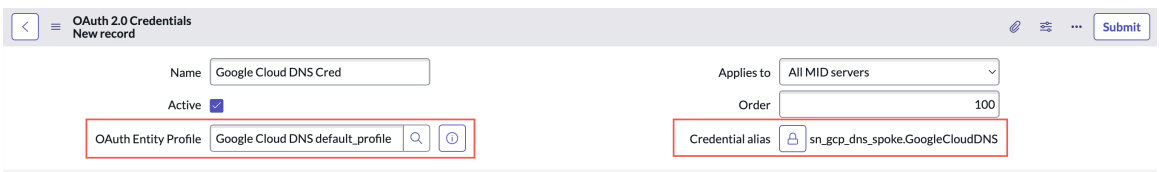
Role required: admin.

Procedure

1. Navigate to **All** > **Integration Hub** > **Connections & Credentials**.
2. Open the record, **GoogleCloudDNS**.
3. In the **Credentials** tab, click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
4. Select **OAuth 2.0 Credentials**.
5. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to identify the credential record. For example, `Google Cloud DNS Cred`.
OAuth Entity Profile	Select the default OAuth entity profile, **Google Cloud DNS default_profile**.
Credential alias	Credential alias associated with this record. The default alias record, **sn_gcp_dns_spoke.GoogleCloudDNS** is selected.



6. Right-click the form header and click **Save**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

Google Cloud Functions Spoke

Manage functions that are attached to events, using your Google Cloud Functions account from ServiceNow instance.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Cloud Functions v1.0.3 is the latest version. For version history of the spoke, see Google Cloud Functions spoke release notes.

Supported versions

This spoke was built for the Google Cloud Functions API version v1, but may be compatible with later versions.

Google Cloud Functions spoke requirements

The Google Cloud Functions spoke requires a custom app that you create in Google Cloud Platform.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Google Identity and Access Spoke
- Google Cloud VPC Access Spoke
- Google Cloud Storage Spoke
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Google Cloud Functions spoke provides actions to automate Google Cloud Functions tasks when events occurs in the ServiceNow AI Platform. Available actions include:

Category	Action	Description
Function Management	Create Function For Event	Creates a function for an event.

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Category	Action	Description
	Create Function For HTTP	Create a function to process an HTTP request.
	Delete Function	Deletes the specified function.
	Generate Download URL	Retrieves details of a signed URL to download source code of the deployed function.
	Generate Upload URL	Retrieves details of a signed URL for uploading source code of the deployed function.
	Get Function	Retrieves information about the specified function.
	Get IAM Policy	Retrieves details of IAM access control policy for a function.
	Look up Functions	Retrieves a list of functions available in the specified location.
	Set IAM Policy	Sets the IAM access control policy for the specified function.
	Update Function	Updates details of the specified function.
Location Management	Look up Locations	Retrieves a list of locations available in the specified project.
Operation Management	Get Operation	Retrieves details of the specified operation.
	Look up Operations	Retrieves the list of operations available in the specified project.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Cloud Functions spoke.

Set up the Google Cloud Functions spoke

Integrate the ServiceNow instance and Google Cloud Functions account by creating a custom OAuth application in Google Cloud Platform to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Cloud Functions spoke.
- Role required: admin.

Configure the Google Cloud Functions application

Create a custom OAuth application in your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Cloud Functions spoke.

About this task

Complete these steps from the Google Cloud Platform. See the Google Cloud Platform product documentation for instructions on creating and configuring custom applications.

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Procedure

1. Register a new custom application by navigating to https://console.cloud.google.com/ and creating a project with your administrator credentials.
2. Open your new project and, in the APIs & Services menu, select **OAuth consent screen**.
3. Enter the application name, specify the Authorized domain `service-now.com`, and select **Save**.
4. From the APIs & Services menu, select **Credentials**, and select **Create OAuth client ID** from the **Create credentials** list.
5. Select the application type **OAuth client ID**.
6. Enter the following **Authorized redirect URI**: `https://<instance>.service-now.com/oauth_redirect.do` and select **Create**.
7. Copy your client ID and client secret from the OAuth client window to a text file so that you can use them when you Register Google Cloud Functions as an OAuth provider.
   The client ID and secret can be accessed in the Google APIs & Services interface. Select **Credentials** and select the OAuth 2.0 client ID name.

Register Google Cloud Functions as an OAuth provider

Use the information generated during the Google Cloud Functions application configuration to register Google Cloud Functions as an OAuth provider and allow the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Open for the record, **Google Cloud Functions**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Client ID of the Google Cloud Functions application.
Client Secret	Client Secret of the Google Cloud Functions application.
OAuth API Script	**OauthGoogleCloudFunctionsUtils** is selected by default.
Authorization URL	The OAuth authorization code endpoint: `https://accounts.google.com/o/oauth2/auth`.
Token URL	The OAuth server token endpoint: `https://oauth2.googleapis.com/token`.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`. If left blank, the instance auto-generates the URL.

4. Right-click the form header, and click **Save**.

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Create a credential record for the Google Cloud Functions spoke

Create a credential record for the Google Cloud Functions application. The Google Cloud Functions spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

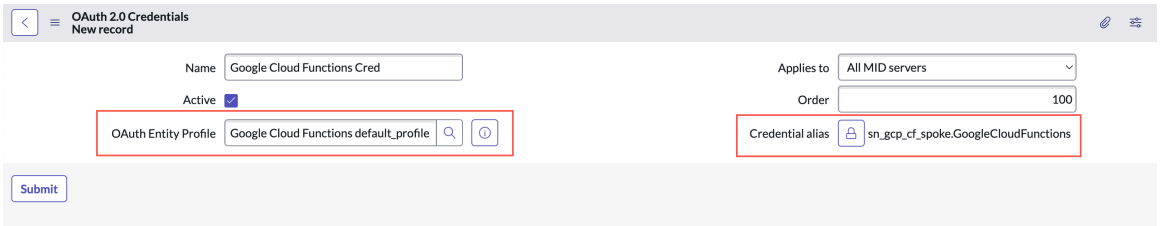
Role required: admin.

Procedure

1. Navigate to **All** > **Integration Hub** > **Connections & Credentials**.
2. Open the record, **GoogleCloudFunctions**.
3. In the **Credentials** tab, click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
4. Select **OAuth 2.0 Credentials**.
5. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to identify the credential record. For example, `Google Cloud Functions Cred`.
OAuth Entity Profile	Select the default OAuth entity profile, **Google Cloud Functions default_profile**.
Credential alias	Credential alias associated with this record. The default alias record, **sn_gcp_cf_spoke.GoogleCloudFunctions** is selected.



6. Right-click the form header and click **Save**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

Google Cloud Load Balancer Spoke

Manage load balancing of your external or internal Virtual Private Cloud (VPC) network from ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Cloud Load Balancer spoke v1.0.1 is the latest version. For version history of the spoke, see Google Cloud Load Balancer spoke release notes.

Supported versions

This spoke was built for Google Cloud Load Balancer v1, but may be compatible with later versions.

Spoke requirements

Google Cloud Platform (GCP) account with access to Google Compute Engine and Google Virtual Private Network.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- Google Compute Engine spoke (sn_gcompute_spoke)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke subflows

The Google Cloud Load Balancer Spoke provides subflows to automate Google Cloud Load Balancer tasks when events occurs in your ServiceNow instance. Available subflows include:

Categotry	Action	Description
HTTPS Load Balancer Management	Create HTTPS Load Balancer For A New Backend Service	Creates a HTTPS load balancer for a new backend service in the specified project.
	Create HTTPS Load Balancer For An Existing Backend Service	Creates a HTTPS load balancer for an existing backend service in the specified project.
	Delete HTTPS Load Balancer	Deletes the components of the specified load balancer.

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Categotry	Action	Description
	Look up Components Of HTTPS Load Balancer	Retrieves a list of names of all the components associated with a HTTPS load balancer.
HTTP Load Balancer Management	Create A HTTP Load Balancer For A New Backend Service	Creates a HTTP load balancer for a new backend service in the specified project.
	Create HTTP Load Balancer For An Existing Backend service	Creates a HTTP load balancer for an existing backend service in the specified project.
	Delete HTTP Load Balancer	Deletes the components of a HTTP load balancer.
	Look up Components Of HTTP Load Balancer	Retrieves a list of names of all the components associated with a HTTP load balancer.

Spoke actions

The Google Cloud Load Balancer Spoke provides actions to automate Google Cloud Load Balancer tasks when events occurs in your ServiceNow instance. Available actions include:

Spoke actions

Category	Action	Description
Backend Service Management	Create Backend Service	Creates a backend service.
	Delete Backend Service	Deletes the specified backend service
	Get Backend Service	Retrieves the details of the specified backend service.
	Get Health Of Backend Service	Retrieves the health details of the specified backend service.
	Look up Backend Services	Retrieves a list of all backend services.
	Update Backend Service	Updates the details of the specified backend service.
Global Address Management	Create A Global Address	Creates a global address.
	Delete A Global Address	Deletes the specified global address.
	Get Global Address	Retrieves the details of all the global addresses.
	Look up Global Addresses	Retrieves a list of all global addresses.
Global Forwarding Rule Management	Create Global Forwarding Rule	Creates a global forwarding rule.

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Spoke actions (continued)

Category	Action	Description
	Delete Global Forwarding Rule	Deletes the specified global forwarding rule.
	Get Global Forwarding Rule	Retrieves the details of a global forwarding rule.
	Look up Global Forwarding Rules	Retrieves a list of all global forwarding rules.
	Set Target For Global Forwarding Rule	Assigns target information to the specified global forwarding rule.
HTTP Health Check Management	Create A HTTP Health Check	Creates a HTTP health check.
	Delete A HTTP Health Check	Deletes the specified HTTP health check.
	Get HTTP Health Check	Retrieves the details of the specified HTTP health check.
	Look up HTTP Health Checks	Retrieves a list of all HTTP health checks.
	Update A HTTP Health Check	Updates the details of the specified HTTP health check.
HTTP Load Balancer Management	Get Resource Name	Retrieves the name of the resource from a resource URL.
HTTPS Health Check Management	Create A HTTPS Health Check	Creates a HTTPS health check.
	Delete A HTTPS Health Check	Deletes the specified HTTPS health check.
	Get HTTPS Health Check	Retrieves the details of the specified HTTPS health check.
	Look up HTTPS Health Checks	Retrieves a list of HTTPS health checks.
	Update A HTTPS Health Check	Updates the details of the specified HTTPS health check.
Instance Group Manager Management	Create An Instance Group Manager	Creates an instance group manager.
	Create Instance In Instance Manager Group	Creates an instance in the specified instance group manager.
	Delete An Instance Group Manager	Deletes the specified instance group manager.
	Get Instance Group Manager	Retrieves the details of a specified instance group manager.
	Look up Instance Group Managers	Retrieves a list of managed instance groups.

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Spoke actions (continued)

Category	Action	Description
	Look up Managed Instances In An Instance Group Manager	Retrieves a list of managed instances in a specified managed instance group.
	Resize An Instance Group Manager	Resizes the number of instances in a specified instance group manager.
	Update Instance Template Of An Instance Group Manager	Assigns the details of instance template to the specified instance group manager.
Target HTTP Proxy Management	Create Target HTTP Proxy	Creates a target HTTP proxy.
	Delete Target HTTP Proxy	Deletes the specified target HTTP proxy.
	Get Target HTTP Proxy	Retrieves the details of the specified target HTTP proxy.
	Look up Target HTTP Proxies	Retrieves a list of all target HTTP proxies.
	Update URL Map Of Target HTTP Proxy	Assigns the URL map information to the specified target HTTP proxy.
Target HTTPS Proxy Management	Create Target HTTPS Proxy	Creates a target HTTPS proxy.
	Delete Target HTTPS Proxy	Deletes the specified target HTTPS proxy.
	Get Target HTTPS Proxy	Retrieves the details of the specified target HTTPS proxy.
	Look up Target HTTPS Proxies	Retrieves a list of the target HTTPS proxies.
	Set SSL Certificates To Target HTTPS Proxy	Assigns SSL certificates to the specified target HTTPS proxy.
	Set URL Map To Target HTTPS Proxy	Assigns URL map information to the specified target HTTPS proxy.
URL Map Management	Create URL Map	Creates a URL map.
	Delete URL Map	Deletes the specified URL map.
	Get URL Map	Retrieves the details of the specified URL map.
	Look up URL Maps	Retrieves the details of all URL maps.
	Update URL Map	Updates the details of the URL map.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Google Cloud Load Balancer Spoke.

Set up the Google Cloud Load Balancer Spoke

Integrate the ServiceNow instance and Google Cloud Load Balancer by creating a custom OAuth application in Google Cloud Storage to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Cloud Load Balancer spoke.
- Role required: admin.

Create a custom application

Create a custom OAuth application in your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Cloud Load Balancer spoke.

Before you begin

Role required: admin

About this task

Complete these steps from the Google Cloud Platform. See the Google Cloud Platform product documentation for instructions on creating and configuring custom applications.

Procedure

1. Register a new custom application by navigating to https://console.cloud.google.com/.
2. Create a project with your administrator credentials, and open the project.
3. From the APIs & Services menu, select **OAuth consent screen**, enter the application name, and specify the Authorized domain `service-now.com`.
4. Click **Save**.
5. From the APIs & Services menu, select **Credentials**, and select **Create OAuth client ID** from the **Create credentials** list.
6. Select the application type **OAuth client ID**.
7. Enter the following **Authorized redirect URI**: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
   The OAuth client window shows your client ID and client secret.
8. Copy these two values to a text file so that you can use them when you Register Google Cloud Load Balancer as an OAuth provider.
   The client ID and secret can always be accessed in the Google APIs & Services interface. Click **Credentials** and select the OAuth 2.0 client ID name.

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Register Google Cloud Load Balancer as an OAuth provider

Use the information generated during the Google Cloud Storage application configuration to register Google Cloud Load Balancer as an OAuth provider and allow the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Open for the record, **Google Cloud Load Balancer**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Client ID of the Google Cloud Load Balancer application.
Client Secret	Client Secret of the Google Cloud Load Balancer application.
OAuth API Script	**OAuthGoogleCloudLoadBalancerUtil** is selected by default.
Authorization URL	The OAuth authorization code endpoint: `https://accounts.google.com/o/oauth2/auth`.
Token URL	The OAuth server token endpoint: `https://oauth2.googleapis.com/token`.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`. If left blank, the instance auto-generates the URL.

4. Right-click the form header, and click **Save**.

Create a credential record for the Google Cloud Load Balancer Spoke

Create a credential record for the Google Cloud Load Balancer custom application. The Google Cloud Load Balancer Spoke connection and credential alias uses these credentials to authorize actions.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Integration Hub** > **Connections & Credentials**.
2. Open the record, **GoogleCloudLoadBalancer**.
3. In the **Credentials** tab, click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
4. Select **OAuth 2.0 Credentials**.
5. On the form, fill these values.

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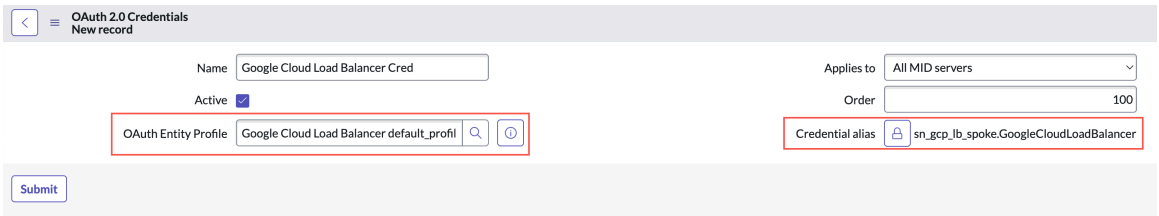
OAuth 2.0 Credentials form

Field	Description
Name	Name to identify the credential record. For example, `Google Cloud Load Balancer Cred`.
OAuth Entity Profile	Select the default OAuth entity profile, **Google Cloud Load Balancer default_profile**.
Credential alias	Credential alias associated with this record. The default alias record, **sn_gcp_lb_spoke.GoogleCloudLoadBalancer** is selected.



6. Right-click the form header and click **Save**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

Google Cloud Pub Sub Spoke

Manage Google Cloud Pub/Sub messaging service from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for Google Cloud Pub Sub v1, but may be compatible with later versions.

Spoke version

Google Cloud Pub Sub spoke v1.0.4 is the latest version. For version history of the spoke, see Google Cloud Pub Sub spoke release notes.

Spoke requirements

Google Cloud account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- Google Identity And Access Spoke (sn_gcp_id_acc_spk)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke subflows

The Google Cloud Pub Sub Spoke provides sample subflows to demonstrate automating Google Cloud Pub/Sub tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Google PubSub Messages	Receives messages from a sub topic and displays the messages in logs.

Spoke actions

The Google Cloud Pub Sub Spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Snapshot Management	Create Snapshot	Creates a snapshot from the requested subscription.
	Delete Snapshot	Removes the specified existing snapshot.
	Get Snapshot IAM Policy	Retrieves the IAM policy of the snapshot.
	Look up Snapshots	Retrieves a list of existing snapshots.
	Set Snapshot IAM Policy	Assigns the access control policy to the specified snapshot.
	Update Snapshot	Updates an existing snapshot.
Subscription Management	Acknowledge	Acknowledges the messages associated with the acknowledge IDs in the acknowledge request.
	Acknowledge Deadline	Updates the acknowledge deadline in seconds for a specific message.
	Create Pull Subscription	Creates a pull subscription to the specified topic.

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Category	Action	Description
	Create Push Subscription	Creates a push subscription to the specified topic.
	Delete Subscription	Deletes an existing subscription for the specified project.
	Get Subscription	Retrieves the configuration details of the specified subscription.
	Get Subscription IAM Policy	Retrieves the access control policy for the specified subscription.
	Look up Subscriptions	Retrieves a list of subscriptions.
	Pull Messages	Pulls message asynchronously for the specified project.
	Seek Subscription	Seeks an existing subscription to a point in time or to a specified snapshot.
	Set Subscription IAM Policy	Assigns the access control policy to the specified subscription.
	Update Push Configuration	Updates the push configuration for the specified subscription.
	Update Subscription	Updates the specified existing subscription.
Topic Management	Create Topic	Creates a topic with the specified name.
	Delete Topic	Deletes the specified topic.
	Get IAM Policy	Retrieves the specified access control policy of a resource.
	Get Topic	Retrieves the configuration details of the specified topic.
	Look up Topics	Retrieves a list of topics.
	Publish Messages	Adds one or more messages to the specified topic.
	Set IAM Policy	Assigns the access control policy to the specified resource.
	Update Topic	Updates the specified topic.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Google Cloud Pub Sub Spoke.

Set up the Google Cloud Pub Sub Spoke

Integrate the ServiceNow instance and Google Cloud Pub Sub by creating a custom OAuth application in Google Cloud account to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Google Cloud Pub Sub spoke.
- Role required: admin.

Create a custom application

Create a custom OAuth application in your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Cloud Pub Sub spoke.

Before you begin

Role required: admin

Procedure

1. Register a new custom application by navigating to https://console.cloud.google.com/.
2. Create a project with your administrator credentials, and open the project.
3. From the APIs & Services menu, select **OAuth consent screen**, enter the application name, and specify the Authorized domain `service-now.com`.
4. Click **Save**.
5. From the APIs & Services menu, select **Credentials**, and select **Create OAuth client ID** from the **Create credentials** list.
6. Select the application type **OAuth client ID**.
7. Enter the following **Authorized redirect URI**: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
   The OAuth client window shows your client ID and client secret.
8. Copy these two values to a text file so that you can use them when you Register Google Cloud Pub Sub as an OAuth provider.
   The client ID and secret can always be accessed in the Google APIs & Services interface. Click **Credentials** and select the OAuth 2.0 client ID name.

Register Google Cloud Pub Sub as an OAuth provider

Use the information generated during the Google Cloud Pub Sub application configuration to register Google Cloud as an OAuth provider and allow the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin.

Configure the Google Identity and Access Spoke.

Procedure

1. Navigate to **System OAuth** > **Application Registry**.
2. Open for the record, **Google Cloud Pub Sub**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Client ID of the Google Cloud Pub Sub application.

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Field	Description
Client Secret	Client Secret of the Google Cloud Pub Sub application.
OAuth API Script	**OauthGooglePubSubUtils** is selected by default.
Authorization URL	The OAuth authorization code endpoint: `https://accounts.google.com/o/oauth2/auth`.
Token URL	The OAuth server token endpoint: `https://oauth2.googleapis.com/token`.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`. If left blank, the instance auto-generates the URL.

4. Right-click the form header, and click **Save**.

Create a credential record for the Google Cloud Pub Sub spoke

Create a credential record for the Google Cloud account. The Google Cloud Pub Sub spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Integration Hub** > **Connections & Credentials**.
2. Open the record, **GoogleCloudPubSub**.
3. In the **Credentials** tab, click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
4. Select **OAuth 2.0 Credentials**.
5. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to identify the credential record. For example, `Google Cloud Pub Sub Cred`.
OAuth Entity Profile	Select the default OAuth entity profile, **Google Cloud Pub Sub default_profile**.
Credential alias	Credential alias associated with this record. The default alias record, **sn_gc_pubsub_spoke.GoogleCloudPubSub** is selected.

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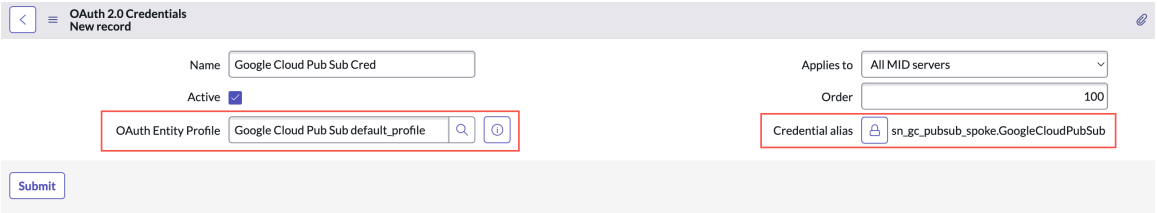

6. Right-click the form header and click **Save**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

Google Cloud SQL Spoke

Mange provisioning of MySQL and PostgreSQL in Google Cloud SQL from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Cloud SQL spoke v1.0.1 is the latest version. For version history of the spoke, see Google Cloud SQL spoke release notes.

Supported versions

This spoke was built for Google Cloud SQL v1beta4, but may be compatible with later versions.

Spoke requirements

- Google Cloud Platform account
- Google Identity and Access spoke (sn_gcpcloudsql_spk)

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- • ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- • ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- • ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- • ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- • Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke actions

The Google Cloud SQL provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description	Required Permission
Back up Run Management:	Create Backup	Creates a backup.	cloudsql.backupRuns.create
	Delete Backup Run	Deletes a backup.	cloudsql.backupRuns.delete
	Get Backup Run	Retrieves details of the backup.	cloudsql.backupRuns.get
	Look up Backup Runs	Retrieves a list of the backup runs.	cloudsql.backupRuns.list
Database Management	Create Database	Creates a database.	cloudsql.databases.create
	Delete Database	Deletes a database.	cloudsql.databases.delete
	Get Database	Retrieves details of the instance.	cloudsql.databases.get
	Look up Databases	Retrieves a list of the databases.	cloudsql.databases.list
	Update Database	Updates a database.	cloudsql.databases.update
Instance Management	Clone Instance	Clones an instance.	cloudsql.instances.clone
	Create Instance	Creates an instance.	cloudsql.instances.create
	Delete Instance	Deletes an instance.	cloudsql.instances.delete
	Get Instance	Retrieves details of the instance.	cloudsql.instances.get
	Look up Instances	Retrieves a list of the instances.	cloudsql.instances.clone
	Restart Instance	Restarts an instance.	cloudsql.instances.restart
	Update Instance	Updates an instance.	cloudsql.instances.update
Operations	Get Operation	Retrieves details of the operation.	N/A
	Look up Operations	Retrieves a list of the operations.	N/A
Tiers	Look up Tiers	Retrieves a list of the tiers.	N/A
User Management	Create User	Creates a user.	cloudsql.users.create
	Delete User	Deletes a user.	cloudsql.users.delete

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Category	Action	Description	Required Permission
	Look up User	Retrieves a list of the users.	cloudsql.users.list
	Update User	Updates a user.	cloudsql.users.update

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Cloud SQL spoke.

Set up the Google Cloud SQL spoke

Integrate the ServiceNow instance and Google Cloud SQL spoke using Google Cloud Platform credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Cloud SQL spoke.
- Role required: admin.

Configure the Google Cloud SQL application

Create a custom OAuth application from your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Cloud SQL spoke.

Before you begin

Google Identity and Access integration requirements:

- Google Cloud SQL account.
- Role required: admin.

About this task

Complete these steps from the Google Cloud Platform.

Procedure

1. Register a new custom application and open it.
   a. Navigate to https://console.developers.google.com.
   b. Create a project with your Google Cloud Platform administrator credentials.
   c. Open the project.
2. Provide the OAuth authorized domain name.
   a. From the APIs & Services menu, select **OAuth consent screen**.
   b. Enter the application name.
   c. Specify the Authorized domain `service-now.com`.
   d. Click **Save**.
3. Create the credentials.

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a. From the APIs & Services menu, select **Credentials**.

b. Select **Create OAuth client ID** from the **Create credentials** list.

4. Select the application type **Web application**.
5. Enter the following Authorized redirect URI: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
6. Copy your client ID and client secret to a text file so that you can use them when you register Google Cloud SQL as an OAuth provider.

Tip: You can always access the client ID and secret in the Google APIs & Services interface by clicking **Credentials** and selecting the OAuth 2.0 client ID name.

Register Google Cloud SQL as an OAuth provider

Use the information generated during Google Cloud SQL account configuration to register the Google Cloud SQL application as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. In ServiceNow instance, navigate to **System OAuth** > **Application Registry**.
2. Open the record, **Google Cloud SQL**.
3. On the form, fill these fields:

Field	Description
Client ID	Client ID of the Google Cloud SQL application.
Client Secret	Client Secret you generated when you create the application.
OAuth API Script	Script to customize the request and response. Select `OAuthGCPSQLUtil`.
Default Grant type	Grant type used to establish the token. Select **Authorization Code**.
Authorization URL	OAuth authorization code endpoint. Enter `https://accounts.google.com/o/oauth2/v2/auth`.
Token URL	OAuth server token endpoint. Enter `https://oauth2.googleapis.com/token`.
Redirect URL	URL of the ServiceNow instance in this format: `https://<instance>.service-now.com/oauth_redirect.do`.

4. Right-click the form header, and click **Save**.
The system validates the OAuth credentials.

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Create a credential record for the Google Cloud SQL spoke

Create a credential record to connect the Google Cloud custom application you created during account configuration. The Google Cloud SQL spoke connection and credential aliases use these credentials to authorize actions.

Before you begin

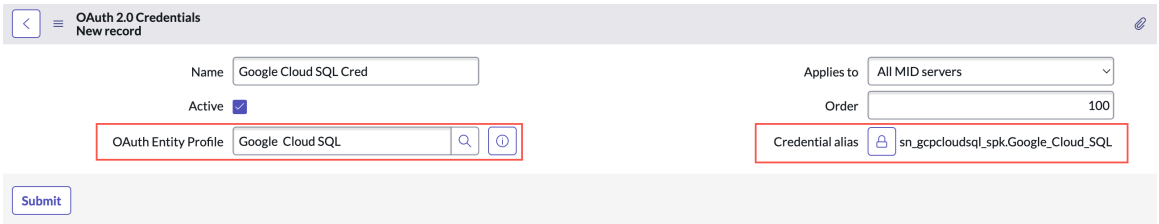
Role required: admin

Procedure

1. Navigate to **All** > **Integration Hub** > **Connections & Credentials**.
2. Open the record, **Google_Cloud_SQL**.
3. In the **Credentials** tab, click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
4. Select **OAuth 2.0 Credentials**.
5. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to identify the credential record. For example, `Google Cloud SQL Cred`.
OAuth Entity Profile	Select the default OAuth entity profile, **Google Cloud SQL**.
Credential alias	Credential alias associated with this record. The default alias record, **sn_gcpcloudsql_spk.Google_Cloud_SQL** is selected.



6. Right-click the form header and click **Save**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

Google Cloud Storage Spoke

Manage storage and retrieval of data in Google Cloud from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Cloud Storage spoke v1.1.1 is the latest version. For version history of the spoke, see Google Cloud Storage spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Google Cloud Storage account requirements

The Google Cloud Storage spoke requires a custom app that you create in Google Cloud Platform.s

Supported versions

This spoke was built for API version v1, but may be compatible with later versions.

Spoke subflows

The Google Cloud Storage spoke provides sample subflows to demonstrate automating Google Cloud Storage tasks. To customize the sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Move An Object	Moves an object from the source bucket to destination bucket.
Rename An Object	Renames the specified object.

Spoke actions

The Google Cloud Storage spoke provides actions to automate Google Cloud Storage when events occur in ServiceNow. For the spoke actions to be performed, you must ensure that your project or organization in Google Cloud Platform has the mentioned permissions. Available spoke actions include:

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Category	Action	Description	Permissions Required
Bucket Access Control Management	Create/Update Bucket Access Control	Creates or updates a bucket access control.	• storage.buckets.get • storage.buckets.getIamPolicy • storage.buckets.setIamPolicy • storage.buckets.update
	Delete Bucket Access Control	Deletes the specified bucket access control.	• storage.buckets.get • storage.buckets.getIamPolicy • storage.buckets.setIamPolicy • storage.buckets.update
	List All Bucket Access Controls	Retrieves the list of all bucket access controls.	• storage.buckets.get • storage.buckets.getIamPolicy
Bucket Management	Create Bucket	Creates a bucket in Google Cloud Storage.	storage.buckets.create
	Delete A Bucket	Deletes the specified bucket in Google Cloud Storage.	storage.buckets.delete
	Get Bucket Details	Retrieves details of the specified bucket in Google Cloud Storage.	• storage.buckets.get • storage.buckets.getIamPolicy
	Get Bucket Labels	Retrieves labels of the specified bucket in Google Cloud Storage.	• storage.buckets.get • storage.buckets.getIamPolicy
	Get IAM Policy	Retrieves IAM policy of the specified bucket in Google Cloud Storage.	storage.buckets.getIamPolicy
	List All Buckets	Retrieves details of all buckets in Google Cloud Storage.	• storage.buckets.list • storage.buckets.getIamPolicy
	Update Bucket Details	Updates details of the specified bucket in Google Cloud Storage.	• storage.buckets.update • storage.buckets.setIamPolicy
	Update Bucket IAM Policy	Updates IAM policy of the specified bucket in Google Cloud Storage.	storage.buckets.setIamPolicy
Object Access Control Management	Create/Update Object Access Control	Creates or updates a object access control.	• storage.objects.get • storage.objects.getIamPolicy

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Category	Action	Description	Permissions Required
			• storage.objects.setIamPolicy • storage.objects.update
	Delete Object Access Control	Deletes the specified object access control.	• storage.objects.get • storage.objects.getIamPolicy • storage.objects.setIamPolicy • storage.objects.update
	List All Object Access Controls	Retrieves the list of all object access controls.	• storage.objects.get • storage.objects.getIamPolicy
Object Management	Copy Object	Copies an object from one bucket to another bucket.	• storage.objects.create (for the destination bucket) • storage.objects.delete (for the destination bucket) • storage.objects.get (for the source bucket)
	Delete An Object	Deletes an object in a bucket.	storage.objects.delete
	Download Object To ServiceNow	Downloads the specified object to ServiceNow.	• storage.objects.get • storage.objects.getIamPolicy
	Get Object Details	Retrieves the details of the specified object.	• storage.objects.get • storage.objects.getIamPolicy
	List All Objects	Retrieves list of all objects in the specified bucket.	• storage.objects.list • storage.objects.getIamPolicy
	Rewrite An Object	Rewrites an object from the source bucket to destination bucket.	• storage.objects.create (for the destination bucket) • storage.objects.delete (for the destination bucket) • storage.objects.get (for the source bucket)
	Update Object Details In A Bucket	Updates details of the specified object in a bucket.	• storage.objects.update • storage.objects.setIamPolicy

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Category	Action	Description	Permissions Required
	Update Object Storage Class	Updates storage class of the specified object.	• storage.objects.update • storage.objects.setIamPolicy
	Upload An Object	Uploads an object to the specified bucket.	• storage.objects.create • storage.objects.delete

For more information about the required permissions, see IAM permissions reference.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Google Cloud Storage object management AI agent	Manages object management tasks (that is, object management, storage class updates, and object transfers) in Google Cloud Storage.
Google Cloud Storage object access control management AI agent	Manages object access control management tasks (that is, object access controls, deletes, lists, and creates or updates access control settings) in Google Cloud Storage.
Google Cloud Storage bucket management AI agent	Manages bucket management (that is, creates, updates, and deletes buckets, retrieves bucket details, manages IAM policies, lists all available buckets) in Google Cloud Storage.
Google Cloud Storage bucket access AI agent	Manages bucket access (that is, bucket access controls, create or update bucket access controls, and delete bucket access controls) in Google Cloud Storage.

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There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Cloud Storage spoke.

Set up the Google Cloud Storage spoke

Integrate the ServiceNow instance and Google Cloud Storage spoke by using G Suite credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Cloud Storage spoke.
- Access to Google Cloud Platform.
- Role required: admin.

Configure the Google Cloud Storage application

Create a custom OAuth application from your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Cloud Storage spoke.

Before you begin

Role required: admin.

About this task

Complete these steps from the Google Cloud Platform. See the Google Cloud Platform product documentation for instructions on creating and configuring custom applications.

Procedure

1. Register a new custom application and open it.
   a. Navigate to https://console.cloud.google.com.
   b. Create a project with your administrator credentials.
   c. Open the project.
2. Provide the OAuth authorized domain name.
   a. From the APIs & Services menu, select **OAuth consent screen**.
   b. Enter the application name.
   c. Specify the Authorized domain `service-now.com`.
   d. Click **Save**.
3. Create the credentials.
   a. From the APIs & Services menu, select **Credentials**.
   b. Select **Create OAuth client ID** from the **Create credentials** list.

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4. Select the application type **Web application**.
5. Enter the following Authorized redirect URI: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
6. Copy your client ID and client secret to a text file so that you can use them when you Register Google Cloud Storage as an OAuth provider.

> **Tip:** You can always access the client ID and secret in the Google APIs & Services interface by clicking **Credentials** and selecting the OAuth 2.0 client ID name.

Register Google Cloud Storage as an OAuth provider

Use the information generated during Google Cloud Storage account configuration to register the Google Cloud Storage application as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **System OAuth** > **Application Registry**.
2. Open for the record, **Google Cloud Storage**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Client ID of the Google Cloud Storage application.
Client Secret	Client Secret of the Google Cloud Storage application.
OAuth API Script	**OAuthGoogleCloudStorageUtils** is selected by default.
Authorization URL	The OAuth authorization code endpoint: `https://accounts.google.com/o/oauth2/auth`.
Token URL	The OAuth server token endpoint: `https://oauth2.googleapis.com/token`.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`. If left blank, the instance auto-generates the URL.

4. Right-click the form header, and click **Save**.

Create a credential for the Google Cloud Storage spoke

Create a credential record to connect the Google Cloud Storage custom OAuth application you created during account configuration. The Google Cloud Storage spoke connection and credential aliases use these credentials to authorize actions.

Before you begin

Role required: admin.

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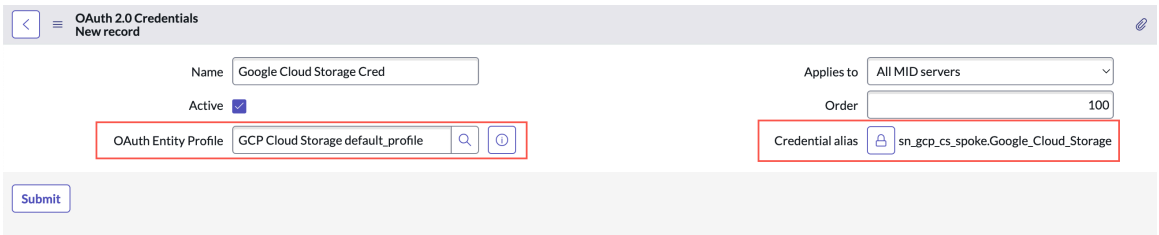
Procedure

1. Navigate to **All** > **Integration Hub** > **Connections & Credentials**.
2. Open the record, **Google_Cloud_Storage**.
3. In the **Credentials** tab, click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
4. Select **OAuth 2.0 Credentials**.
5. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to identify the credential record. For example, `Google Cloud Storage Cred`.
OAuth Entity Profile	Select the default OAuth entity profile, **GCP Cloud Storage default_profile**.
Credential alias	Credential alias associated with this record. The default alias record, **sn_gcp_cs_spoke.Google_Cloud_Storage** is selected.



6. Right-click the form header and click **Save**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

Google Cloud Translator Service Spoke

Provides subflows and actions to dynamically translate the user-entered text, and to detect the language of the text using the Google translation service.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Subscription

This spoke requires one of the following subscriptions:

- Any ServiceNow subscription that is Professional or above, and includes Dynamic Translation.
- Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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See the Google Cloud Translator Service Spoke in ServiceNow Store.

Spoke version

Google Cloud Translator Service Spoke v3.2.8 is the latest version. For version history of the spoke, see Google Cloud Translator Service spoke release notes.

Supported versions

Google Translate API version v3.

Scope of the spoke in the Dynamic Translation framework

To use Google Cloud Translator Service spoke in the Dynamic Translation framework, ensure that the spoke is installed in ServiceNow Store and the Dynamic Translation plugin is active. For more information, see Dynamic Translation.

Spoke flows

This spoke has no sample flows.

Spoke subflows

The Google Cloud Translator Service spoke provides subflows in the Published state to integrate with the Google translation service. These subflows can be used as part of other subflows and flows.

Subflow	Description
Detect Language	Contains a set of inputs, actions, and outputs to detect the language of the input text.
Translate Text To Multiple Languages	Contains a set of inputs, actions, and outputs to translate the input text to multiple languages.

Spoke actions

The Google Cloud Translator Service spoke provides actions to integrate with the Google translation service. Available actions include:

Action	Description
Detect Language	Detects the language of the input text.
Translate Text To Single Language	Translates the input text to a single language.
Translate Text To Multiple Languages	Translates the input text to multiple languages.

Google account requirements

The Google Cloud Translator Service spoke requires configuring your Google Cloud account to generate an OAuth 2.0 JWT Bearer Grant token.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the GoogleTranslation alias record (sn_google_trans.GoogleTranslation) to authorize actions. For information about setting up the spoke, see Set up the Google Cloud Translator Service spoke.

Set up the Google Cloud Translator Service spoke

Integrate your Google account with your ServiceNow instance.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Cloud Translator Service spoke.
- Create a service account on Google Cloud, generate a service account key of JSON type and download it. For information on creating the service account key, see the Google documentation.
- Enable the Cloud Translation API service. For information on enabling a service, see the Google documentation.
- Role required: admin

Create a Java KeyStore certificate

Encrypt the security certificates obtained from Google by creating a Java KeyStore (JKS) file.

Before you begin

- Role required: admin
- Download a JSON file containing the service account key from Google. For information on downloading the JSON file, see the Google documentation. Following is a sample JSON file:

```
{
  "type": "service_account",
  "project_id": "primeval-nectar-242610",
  "private_key_id": "0c6c7b1511f1c236c1300c5933d528bbf45314e5",
  "private_key": "-----BEGIN PRIVATE KEY-----\n...\n-----END
 PRIVATE KEY-----\n",
  "client_email":
 "service-now-google-trans-v3@primeval-nectar-242610.iam.gservi
ceaccount.com",
  "client_id": "113255944370425109391",
  "auth_uri": "https://accounts.google.com/o/oauth2/auth",
  "token_uri": "https://oauth2.googleapis.com/token",
  "auth_provider_x509_cert_url":
 "https://www.googleapis.com/oauth2/v1/certs",
  "client_x509_cert_url":
 "https://www.googleapis.com/robot/v1/metadata/x509/service-n
ow-google-trans-v3%40primeval-nectar-242610.iam.gserviceaccount
.com"
}
```

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Procedure

1. In the JSON file, perform the following for the `private_key` value.
   a. Unescape the `\n` characters.

      Tip: To unescape characters in a JSON file, you can parse a JSON string into a JavaScript object.

   b. Store the private key in a file with .pem extension.
2. In the JSON file, perform the following for the `client_x509_cert_url` value.
   a. Open the link specified for `client_x509_cert_url`.
   b. Unescape the `\n` characters for the certificate associated with the private_key_id mentioned in the JSON file.
   c. Store the certificate value in a file with .pem extension.
3. Use the openssl command to create a PKCS 12 file using the recently created private key and certificate files.

   ```
   openssl pkcs12 -export -in [path to certificate] -inkey
    [path to private key] -certfile [path to certificate ] -out
    testkeystore.p12
   ```

   For example, if certificate.pem is the certficate and privatekey.pem is the private key:

   ```
   openssl pkcs12 -export -in certificate.pem -inkey
    privatekey.pem -certfile certificate.pem -out testkeystore.p12
   ```

   A PKCS 12 file, testkeystore.p12, is created.
4. Specify an export password or source keystore password.

   Note: You should specify this password when creating a JWT key for Google Cloud Translator Service spoke.

5. Use the keytool command to create a JKS file from the PKCS 12 file.

   ```
   keytool -importkeystore -srckeystore testkeystore.p12
    -srcstoretype pkcs12 -destkeystore wso2carbon.jks
    -deststoretype JKS
   ```

   Note: testKeyStore.p12 is the PKCS 12 file and wso2carbon.jks is the JKS file.

6. Specify a destination keystore password.

   Note: You should specify this password when attaching a JKS certificate to Google Cloud Translator Service spoke.

Attach a Java KeyStore certificate to Google Cloud Translator Service spoke

Enable the JWT client authentication by attaching a valid Java KeyStore (JKS) certificate to Google Cloud Translator Service spoke.

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Before you begin

- Role required: admin
- Valid Java KeyStore certificate

Procedure

1. Navigate to **All** > **System Definition** > **Certificates**.
2. Click **New**.
3. On the form, fill in the fields.

X.509 Certificate form fields

Field	Description
Name	Identifier of the certificate.
Notify on expiration	Users to be notified when the certificate expires.
Warn in days to expire	Number of days to send a notification before the certificate expires.
Active	Option to activate the certificate.
Type	Type of the certificate. Select **Java Key Store**.
Expires in days	Number of days until the certificate expires.
Key store password	Password to access the certificate. Use the destination keystore password specified when creating the JKS certificate. For more information on this password, see Create a Java KeyStore certificate.
Short description	Summary about the certificate.

4. Click the manage attachments icon ( ) and attach a JKS certificate.
5. To validate the JKS certificate, click **Validate Stores/Certificates**.
6. Click **Submit**.

Create a JWT signing key for Google Cloud Translator Service spoke

Assign a JSON Web Token (JWT) signing key to your Java KeyStore certificate.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **JWT Keys**.
2. Click **New**.
3. On the form, fill in the fields.

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JWT Keys form fields

Field	Description
Name	Identifier of the JWT signing key.
Signing Keystore	Valid JKS certificate for which you want to assign the key.
Key Id	Key ID to identify which key is used when multiple keys are used to sign tokens.
Signing Algorithm	Algorithm to sign with the key.
Signing Key Password	Password associated with the key. Use the export password or the source keystore password specified when creating the JKS certificate. For more information on this password, see Create a Java KeyStore certificate.
Active	Option to activate the key.

4. Click **Submit**.

Create a JWT provider for Google Cloud Translator Service spoke

Add a JSON Web Token (JWT) provider to Google Cloud Translator Service spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **JWT Providers**.
2. Click **New**.
3. On the form, fill in the fields.

JWT Provider form fields

Field	Description
Name	Identifier of the JWT provider.
Expiry Interval (sec)	Number of seconds that indicate the lifespan of the JWT provider token. Specify `3600`.
Signing Configuration	JWT signing key.

4. Right-click the form header, and click **Save**.
5. In the Standard Claims related list, enter the values for these claims.

Claim

Claim name	Claim value
aud	https://www.googleapis.com/oauth2/v4/token
iss	*`client_email`* value from the JSON file.

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6. In the Custom Claims related list, create the **scope** claim and enter its value as `https://www.googleapis.com/auth/cloud-translation`.
7. Click **Update**.

Configure the credential for the GoogleTranslation alias

Authorize actions of Google Cloud Translator Service spoke by configuring the Google OAuth 2.0 credential.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select the Google OAuth 2.0 credential.
3. Open the record specified in the **OAuth Entity Profile** field.
4. In the **JWT Provider** field, specify the JWT provider that you want to use.
5. Click **Update**.
6. To verify if an OAuth Access token is generated to connect to Google's translation services, click the **Get OAuth Token** related link of the Google OAuth 2.0 credential.

Configure the connection attributes for the GoogleTranslation alias

Connect to the Google's translation service by configuring the Google connection. Provide information that is used by HTTP(s) actions or activities to connect to that service.

Before you begin
Role required: connection_admin

Procedure
1. Navigate to **All** > **Connections & Credentials** > **Connections**.
2. Open for the record for **Google**.
3. In the Attributes related list of the HTTP(S) Connection form, fill in the fields.

HTTP(S) Connection form fields

Field	Value required
location	Location of the customer. If the value is not specified when creating an account on Google Cloud, then specify `global`.
project_id	Identifier of a project. Specify the *`project_id`* value from the JSON file.
version	API version that the related spokes are built for. The default value is `v3beta1`. Because Google now supports the v3 version, you can override this value as `v3`.

4. Right-click the form header and click **Save**.

Google Cloud Virtual Network Spoke

Manage firewall, network, subnetwork, and IP address in Google Cloud Virtual Network from your ServiceNow instance.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Cloud Virtual Network spoke v1.0.4 is the latest version. For version history of the spoke, see Google Cloud Virtual Network spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- Google Persistent Disk Spoke (sn_gpdisk_spoke)
- Google Compute Engine Spoke (sn_gcompute_spoke)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Google Cloud Virtual Network account requirements

The Google Cloud Virtual Network spoke requires a custom app that you create in the Google Cloud Platform.

Supported versions

This spoke was built for API version v1, but may be compatible with later versions.

Spoke actions

The Google Cloud Virtual Network spoke provides actions to automate Google Cloud Virtual Network when events occur in ServiceNow. For the spoke actions to be performed, you must ensure that your project or organization in Google Cloud Platform has the mentioned permissions. Available spoke actions include:

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Category	Action	Description	Permissions required
Address Management	Create IP Address For Region	Creates an address resource in the specified project by using the data included in the request.	compute.addresses.create
	Delete IP Address	Deletes the specified address resource.	compute.addresses.delete
	Get IP Address	Retrieves details of the specified address resource.	compute.addresses.get
Firewall Management	Create Firewall For Egress	Creates a firewall for egress rule in the specified project.	compute.firewalls.create
	Create Firewall For Ingress	Creates a firewall for an ingress rule in the specified project.	compute.firewalls.create
	Delete Firewall	Deletes the specified firewall.	compute.firewalls.delete
	Get Firewall	Retrieves details of the specified firewall.	compute.firewalls.get
	Update Firewall For Egress	Updates a firewall for the egress rule in the specified project.	compute.firewalls.update
	Update Firewall For Ingress	Updates a firewall for the ingress rule in the specified project.	compute.firewalls.update
Metadata Retrieval Management	List Addresses	Retrieves a list of addresses contained within the specified region.	compute.addresses.list
	List Firewalls	Retrieves a list of firewalls available to the specified project.	compute.firewalls.list
	List Networks	Retrieves a list of networks available to the specified project.	compute.networks.list
	List Subnetworks	Retrieves a list of subnetworks available to the specified project.	compute.subnetworks.list
Network Management	Create Network	Creates a network in the specified project.	compute.networks.create
	Delete Network	Deletes the specified network.	compute.networks.delete

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Category	Action	Description	Permissions required
	Get Network	Retrieves details of the specified network.	compute.networks.get
Subnetwork Management	Create Subnetwork	Creates a subnetwork in the specified project.	compute.subnetworks.create
	Delete Subnetwork	Deletes the specified subnetwork.	compute.subnetworks.delete
	Expand IP CIDR Range	Expands the IP CIDR range of the subnetwork to a specified value.	compute.subnetworks.expandIpCidrRange
	Get IAM Policy	Retrieves details of the access control policy for a resource.	compute.subnetworks.getIamPolicy
	Get Subnetwork	Retrieves details of the specified subnetwork.	compute.subnetworks.get
	Set IAM Policy	Sets the access control policy on the specified resource.	compute.subnetworks.setIamPolicy

For more information about the required permissions, see IAM permissions reference.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Cloud Virtual Network spoke.

Set up the Google Cloud Virtual Network spoke

Integrate the ServiceNow instance and Google Cloud Virtual Network spoke by using OAuth 2.0 credentials to authenticate ServiceNow requests.

Before you begin

- Request Integration Hub subscription.
- Activate and set up the Google Compute Engine Spoke.
- Activate the Google Cloud Virtual Network spoke.
- Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Credentials**.
2. Open the record for the Google Compute Engine spoke, for example, `Google Compute Cred`.

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3. For **Credential alias**, select the Connection and Credential alias record of the Google Cloud Virtual Network spoke.
4. Right-click the form header and click **Save**.
5. Click **Get OAuth Token**.

Google Cloud VPC Access Spoke

Manage connector and operations in your Google Cloud VPC Access account from ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

The current Google Cloud VPC Access spoke version is 1.0.1. For version history of the spoke, see Google Cloud VPC Access spoke release notes.

Supported versions

This spoke was built for the Google Cloud VPC Access API version v1, but may be compatible with later versions.

Google Cloud VPC Access spoke requirements

The Google Cloud VPC Access spoke requires a custom app that you create in Google Cloud Platform.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Google Identity and Access Spoke
- Google Cloud Virtual Network Spoke
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke actions

The Google Cloud VPC Access spoke provides actions to automate Google Cloud VPC Access tasks when events occurs in the ServiceNow AI Platform. Available actions include:

Category	Action	Description
Connector Management	Create Connector	Creates a connector in the specified project.
	Delete Connector	Deletes the specified VPC Access connector.
	Get Connector	Retrieves the specified VPC Access connector.
	Look up Connectors	Retrieves the list of VPC Access connectors available in the specified location.
Location Management	Look up Locations	Retrieves the list of locations available in the specified project.
Operation Management	Get Operation	Retrieves details of the specified operation.
	Look up Operations	Retrieves a list of operations available with in the specified location.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Google Cloud VPC Access spoke.

Set up the Google Cloud VPC Access spoke

Integrate the ServiceNow instance and Google Cloud VPC Access account by creating a custom OAuth application in Google Cloud Platform to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Cloud VPC Access spoke.
- Role required: admin.

Configure the Google Cloud VPC Access application

Create a custom OAuth application in your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Cloud VPC Access spoke.

Before you begin

- Complete these steps from the Google Cloud Platform. See the Google Cloud Platform product documentation for instructions on creating and configuring custom applications.
- Role required: admin.

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Procedure

1. Register a new custom application and open it.
   a. Navigate to https://console.developers.google.com.
   b. Create a project with your administrator credentials.
   c. Open the project.
2. Provide the OAuth authorized domain name.
   a. From the APIs & Services menu, select **OAuth consent screen**.
   b. Enter the application name.
   c. Specify the Authorized domain `service-now.com`.
   d. Click **Save**.
3. Create the credentials.
   a. From the APIs & Services menu, select **Credentials**.
   b. Select **Create OAuth client ID** from the **Create credentials** list.
4. Select the application type **OAuth client ID**.
5. Enter the following **Authorized redirect URI**: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
6. Copy your client ID and client secret to a text file so that you can use them when you register Google Cloud VPC Access as an OAuth provider.

> **Tip:** You can always access the client ID and secret in the Google APIs & Services interfaceby clicking **Credentials** and selecting the OAuth 2.0 client ID name.

Register Google Cloud VPC Access as an OAuth provider

Use the information generated during the Google Cloud VPC Access application configuration to register Google Cloud VPC Access as an OAuth provider and allow the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Open for the record, **Google Cloud VPC Access**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Client ID of the Google Cloud VPC Access application.
Client Secret	Client Secret of the Google Cloud VPC Access application.
OAuth API Script	**OAuthGoogleVPCAccessUtils** is selected by default.
Authorization URL	The OAuth authorization code endpoint: `https://accounts.google.com/o/oauth2/auth`.

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Field	Description
Token URL	The OAuth server token endpoint: `https://oauth2.googleapis.com/token`.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`. If left blank, the instance auto-generates the URL.

4. Right-click the form header, and click **Save**.

Create a credential record for the Google Cloud VPC Access spoke

Create a credential record for the Google Cloud VPC Access application. The Google Cloud VPC Access spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

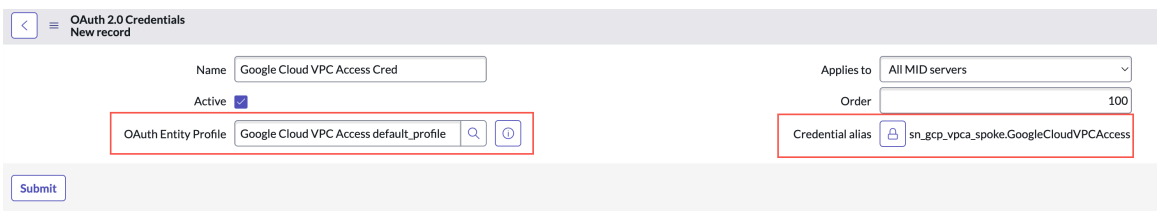
- Register Google Cloud VPC Access as an OAuth provider
- Role required: admin

Procedure

1. Navigate to **All** > **Integration Hub** > **Connections & Credentials**.
2. Open the record, **GoogleCloudVPCAccess**.
3. In the **Credentials** tab, click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
4. Select **OAuth 2.0 Credentials**.
5. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to identify the credential record. For example, `Google Cloud VPC Access Cred`.
OAuth Entity Profile	Select the default OAuth entity profile, **Google Cloud VPC Access default_profile**.
Credential alias	Credential alias associated with this record. The default alias record, **sn_gcp_vpca_spoke.GoogleCloudVPCAccess** is selected.



6. Right-click the form header and click **Save**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

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Google Compute Engine Spoke

Launch and manage virtual machines in Google Compute Engine spoke from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Compute Engine spoke v1.0.5 is the latest version. For version history of the spoke, see Google Compute Engine spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- Google Persistent Disk Spoke (sn_gpdisk_spoke)
- Google Cloud Virtual Network Spoke (sn_gcp_vpc_spoke)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Google Compute Engine spoke account requirements

The Google Compute Engine spoke requires a custom app that you create in Google Cloud Platform.

Supported versions

This spoke was built for API version v1, but may be compatible with later versions.

Spoke actions

The Google Compute Engine spoke provides actions to automate Google Compute Engine when events occur in ServiceNow. For the spoke actions to be performed, you must ensure that your project or organization in Google Cloud Platform has the mentioned permissions. Available spoke actions include:

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Category	Action	Description	Permissions Required
Instance Template Management	Create Instance Template	Creates an instance template.	compute.instanceTemplates.create
	Create Instance Template From Instance	Creates an instance template from instance.	compute.instanceTemplates.create
	Delete Instance Templates	Deletes the specified instance template.	compute.instanceTemplates.delete
	Get Instance Template	Retrieves details of the specified instance template.	compute.instanceTemplates.get
Machine Types Management	Get Machine Type By Zone	Retrieves details of the specified machine type by zone.	compute.machineTypes.get
Metadata Retrieval Management	List Instance Templates	Retrieves a list of instance templates available to the specified project.	compute.instanceTemplates.list
	List Machine Types By Zone	Retrieves a list of machine types available to the specified project.	compute.machineTypes.list
	List Regions	Retrieves a list of regions available to the specified project.	compute.regions.list
	List VM Instances By Zone	Retrieves a list of VM instances available to the specified project.	compute.instances.list
	List Zones	Retrieves a list of zones available to the specified project.	compute.zones.list
Region Management	Get Region	Retrieves the specified region resource.	compute.regions.get
VM Instance Management	Attach Disk	Attaches an existing Disk resource to an instance.	compute.instances.attachDisk
	Create Instance	Creates an instance resource in the specified project.	compute.instances.create
	Delete Instance	Deletes the specified instance.	compute.instances.delete
	Detach Disk	Detaches a disk from an instance.	compute.instances.detachDisk
	Get IAM Policy	Retrieves the access control policy for a resource.	compute.instances.getIamPolicy

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Category	Action	Description	Permissions Required
	Get Instance By Zone	Retrieves the specified Instance by zone.	compute.instances.get
	Reset Instance	Performs a reset on instance.	compute.instances.reset
	Set IAM Policy	Sets the access control policy on the specified resource.	compute.instances.setIamPolicy
	Set Labels On Instance	Sets labels on an instance.	compute.instances.setLabels
	Set Tags On Instance	Sets tags for the specified instance.	compute.instances.setTags
	Start Instance	Starts an instance.	compute.instances.start
	Stop Instance	Stops an instance.	compute.instances.stop
Zone Management	Get Zone	Retrieves information about the specified zone.	compute.zones.get

For more information about the required permissions, see IAM permissions reference.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Compute Engine spoke.

Set up the Google Compute Engine spoke

Integrate the ServiceNow instance and Google Compute Engine spoke by using OAuth 2.0 credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Compute Engine spoke.
- Access to Google Cloud Platform.
- Role required: admin.

Note: This procedure outlines steps to configure the custom app using OAuth. You can also configure the custom app using Service Account associated with JWT tokens. For more information about setting up the spoke using JWT tokens, see Choosing an Authentication Method - Service accounts and Set up OAuth provider with JWT Bearer grant type.

Configure the Google Compute Engine application

Create a custom OAuth application from your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Compute Engine spoke.

Before you begin

Role required: admin.

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About this task

Complete these steps from the Google Cloud Platform. See the Google Cloud Platform product documentation for instructions on creating and configuring custom applications.

Procedure

1. Register a new custom application and open it.
   a. Navigate to https://console.developers.google.com.
   b. Create a project with your administrator credentials.
   c. Open the project.
2. Provide the OAuth authorized domain name.
   a. From the APIs & Services menu, select **OAuth consent screen**.
   b. Enter the application name.
   c. Specify the Authorized domain `service-now.com`.
   d. Click **Save**.
3. Create the credentials.
   a. From the APIs & Services menu, select **Credentials**.
   b. Select **Create OAuth client ID** from the **Create credentials** list.
4. Select the application type **Web application**.
5. Enter the following Authorized redirect URI: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
6. Copy your client ID and client secret to a text file so that you can use them when you Register Google Compute Engine as an OAuth provider.

Tip: You can always access the client ID and secret in the Google APIs & Services interface by clicking **Credentials** and selecting the OAuth 2.0 client ID name.

Register Google Compute Engine as an OAuth provider

Use the information generated during Google Compute Engine account configuration to register the Google Compute Engine application as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. In ServiceNow, navigate to **System OAuth** > **Application Registry**.
2. Open the record for **Google Compute Engine**.
3. Fill these values in the Application Registries form:

Field	Value required
Name	Name to uniquely identify the record, for example `Google Compute Engine`.
Client ID	Client ID of the Google Compute Engine application you created in G Suite.
Client Secret	Client Secret you generated when you created the application in G Suite.

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Field	Value required
OAuth API Script	Script to customize the request and response. Select `OAuthGoogleComputeUtil`
Default Grant type	Grant type used to establish the token. Select **Authorization Code**.
Authorization URL	OAuth authorization code endpoint. Enter `https://accounts.google.com/o/oauth2/v2/auth`.
Token URL	OAuth server token endpoint. Enter `https://oauth2.googleapis.com/token`.
Redirect URL	URL of the ServiceNow instance in this format: `https://<instance>.service-now.com/oauth_redirect.do`.

4. Right-click the form header, and click **Save**.
   The system validates the OAuth credentials.

Create a credential record for the Google Compute Engine spoke

Create a credential record to connect the Google Compute Engine custom OAuth application you created during account configuration. The Google Compute Engine spoke connection and credential aliases use these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Integration Hub** > **Connections & Credentials**.
2. Open the record, **GoogleCloudCompute**.
3. In the **Credentials** tab, click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
4. Select **OAuth 2.0 Credentials**.
5. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to identify the credential record. For example, `Google Cloud Compute Cred`.
OAuth Entity Profile	Select the default OAuth entity profile, **Google Compute default_profile**.
Credential alias	Credential alias associated with this record. The default alias record, **sn_gcompute_spoke.GoogleCloudCompute** is selected.

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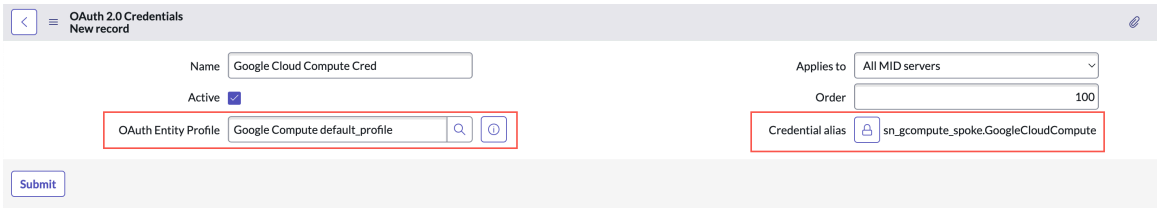

6. Right-click the form header and click **Save**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

Google Directory Spoke

Manage groups, members, and users in Google Directory from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Note:

- In this version, the alias type is changed to the **Connection and Credential**. The alias type supports multiple connections.
- If you're upgrading to Google Directory spoke v1.1.2, you must reconfigure the alias record.

Spoke version

Google Directory spoke v1.6.0 is the latest version. For version history of the spoke, see Google Directory spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

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Google Directory account requirements

The Google Directory spoke requires a custom app that you create in the Google Developers Console.

Supported versions

This spoke was built for API version v1, but may be compatible with later versions.

Spoke subflows

The Google Directory spoke provides sample subflows to demonstrate automating tasks. To customize a sample subflow, copy it to the required application scope. These webhook subflows perform specific tasks when webhooks execute user resource changes in the Google Directory. Available sample subflows include:

Subflow	Description
Create Google Directory User Webhook Subflow	When you update the details of a user in the Google Directory, a webhook notifies your ServiceNow instance. Now, when you execute the `Create Directory User Webhook Subflow`, it creates a subscription and an entry to the `Google Directory Webhook Registries table`. **Note:** To execute the subflow, you must provide the webhook URL that ServiceNow exposes for incoming webhooks in the Test Subflow window. The webhook URL format is `https://<instance-name>.service-now.com/api/sn_googledir_spoke/google_directory_webhook_callbacks/wh_entry`.
Process Google Directory User Webhook Subflow	Processes Google Directory webhooks when user details are updated in the Google directory. The Google Directory provides sample subflows to demonstrate automating Google Directory webhook flows.

Spoke actions

The Google Directory spoke provides actions to automate Google Directory when events occur in ServiceNow. Available actions include:

Category	Action	Description
Group Management	Create Group	Creates a group.
	Delete Group	Deletes a group.
	Look up Group Details by Group Email or ID	Retrieves details of the specified groups based on group email or ID.
	Look up All Groups Stream	Retrieves the details of all groups.

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Category	Action	Description
	Look up Groups Stream by Filtering Criteria	Retrieves details of the specified groups based on the provided filter criteria.
	Update Group Details	Updates details of the specified group.
Member Management	Add Member To A Group	Adds member to the specified group.
	Check Membership of a Group	Checks if the given user is a member of the group email or ID.
	Look up Member Details from a Group	Retrieves the details of the required member in the specified group.
	Look up Members of a Group by Group Email or ID	Retrieves the details of all member in the specified group.
	Remove Member from a Group	Removes the specified member from a group.
	Update Member	Updates details of the specified member in a group.
User Management	Create User	Creates a user.
	Delete User	Deletes the specified user.
	Generate Random Password	Generates a random password with the specified length.
	Grant Admin To User	Grants admin privileges to the specified user.
	Look up All Users Stream by Customer ID	Retrieves a paginated list of all users in a domain, including deleted users if *`showDeleted`* is set to `true`.
	Look up User Details by User Email or ID	Retrieves details of the given user.
	Look up Users Stream by Filtering Criteria	Searches for users matching the filter criteria. This action accepts the query parameter which is a search query combining one or more search clauses.

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Category	Action	Description
	Reactivate User	Reactivates the specified user. **Note:** Exercise caution while using this action, as it may affect the other user's account.
	Reset User Password	Resets the password of the user. **Note:** Exercise caution while using this action, as it may affect the other user's account. By default, the **Force Change Password** option is enabled and the user is forced to change the password on the first login.
	Revoke Admin from User	Revokes the admin privileges of the specified user.
	Suspend User	Suspends the specified user. **Note:** Exercise caution while using this action, as it may affect the other user's account.
	Update User Details	Updates details of the specified user.
Webhook Management	Create Subscription Channel	Creates a subscription channel that watches for changes in the users list.
	Stop Subscription Channel	Stops watching resources through the given channel before the expiry of the subscription.
Schema Management	Look up Schema by ID	Retrieves details of the specified schema.
	Look up schemas	Retrieves details of all schemas for a customer.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Directory spoke.

Set up the Google Directory spoke

Integrate the ServiceNow instance and Google Directory spoke by using G Suite credentials to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Google Directory spoke.
- Role required: admin.

Configure the Google Directory application

Create a custom OAuth application from your Google G Suit account to enable OAuth 2.0 authentication with the Google Directory spoke.

Before you begin

Google Directory integration requirements:

- A domain and an email address associated with the domain. For example, www.mydomain.com and jane-admin@mydomain.com. Note that you can only register one email address per domain in G Suite.
- A Google G Suite or login created with the domain.

Role required: admin.

About this task

Complete these steps from the Google Developers Console. See the G Suite product documentation for instructions on creating and configuring custom applications.

Procedure

1. Register a new custom application and open it.
   a. Navigate to https://console.developers.google.com.
   b. Create a project with your G Suite administrator credentials.
   c. Open the project.
2. Provide the OAuth authorized domain name.
   a. From the APIs & Services menu, select **OAuth consent screen**.
   b. Enter the application name.
   c. Specify the Authorized domain `service-now.com`.
   d. Click **Save**.
3. Create the credentials.
   a. From the APIs & Services menu, select **Credentials**.
   b. Select **Create OAuth client ID** from the **Create credentials** list.
4. Select the application type **Web application**.
5. Enter the following Authorized redirect URI: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
   The OAuth client window shows your client ID and client secret.
6. Copy these two values to a text file so that you can use them when you add the Google Directory connection in ServiceNow instance.

Tip: You can always access the client ID and secret in the Google APIs & Services interface by clicking **Credentials** and selecting the OAuth 2.0 client ID name.

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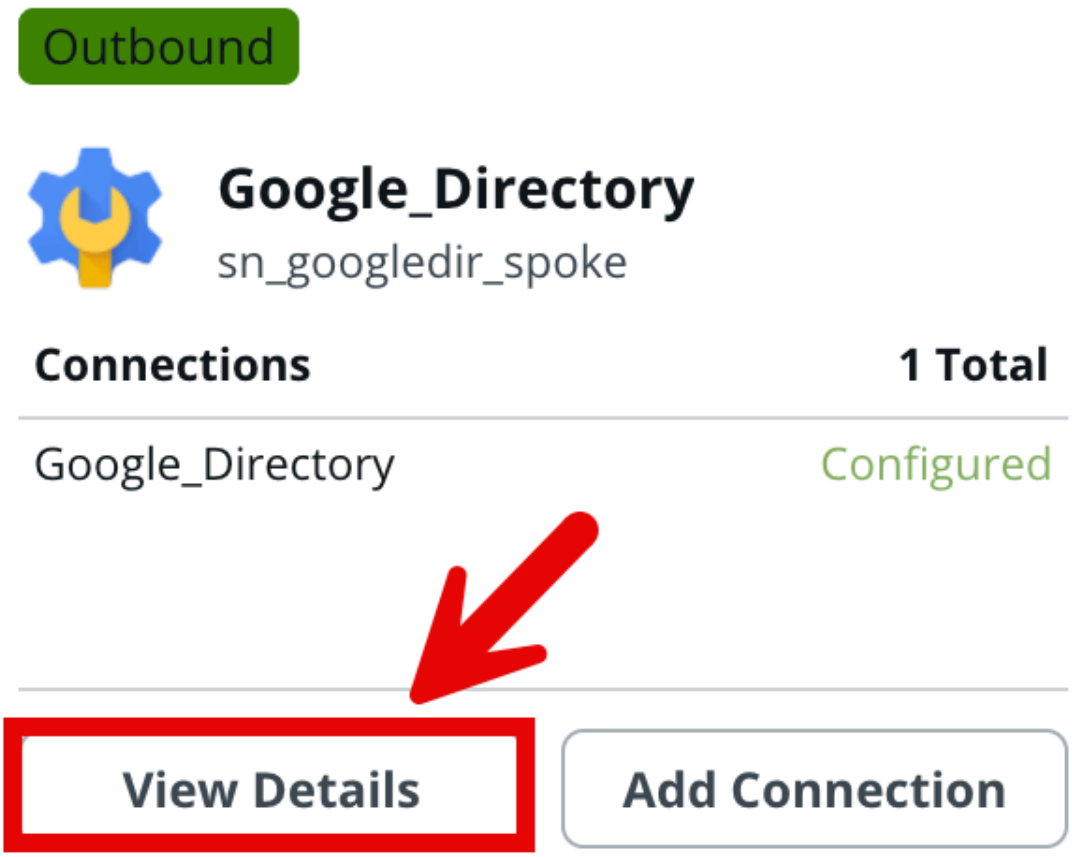
Add Google Directory connection in ServiceNow instance

Add the Google Directory connection in Workflow Studio to configure the Google Directory spoke.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Connections** tab.
3. Toggle and enable the **Outbound** connections.
4. Locate the **Google Directory** connection alias and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Google Directory spoke, click **View Details**.



   - To manage more than one Google Directory spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.

5. On the form, fill these values.

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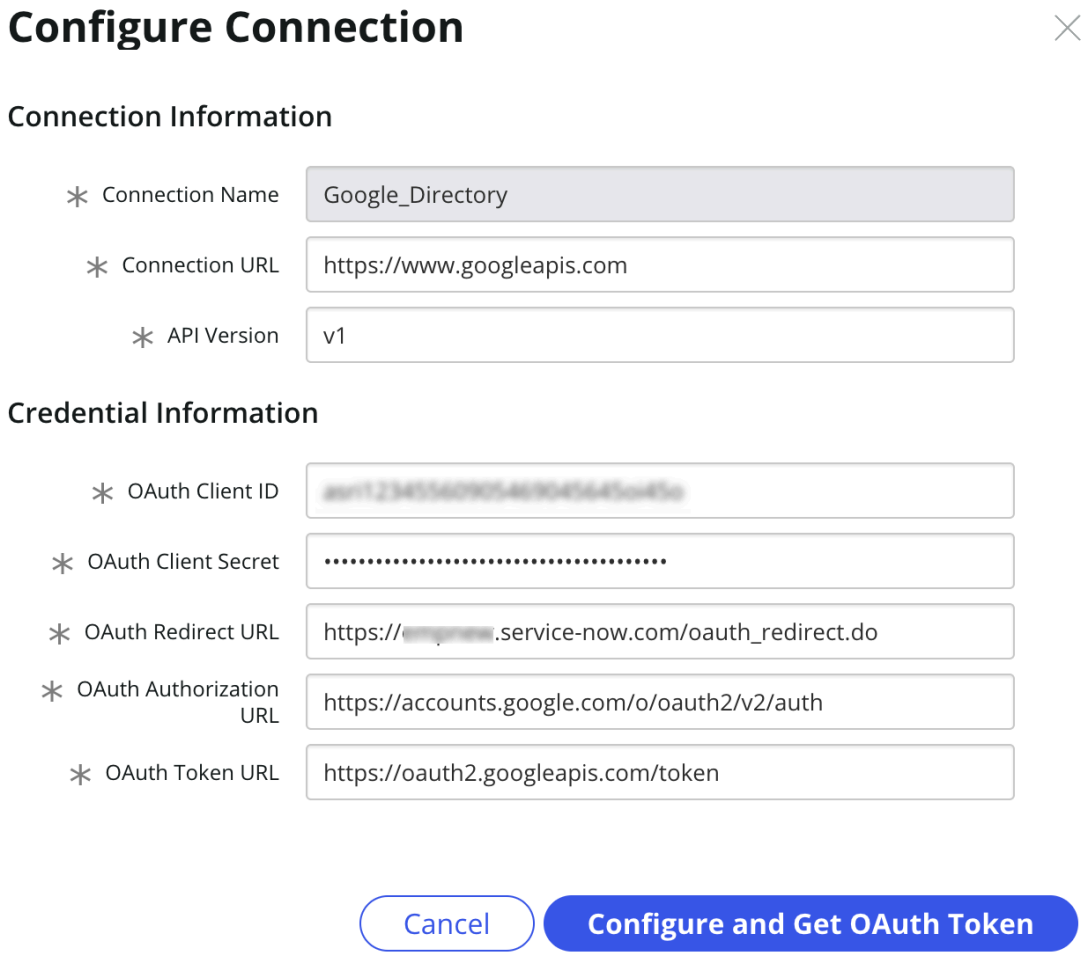
Configure Connection form

Field	Description
Connection URL	URL to connect to Google Directory. Enter `https://googleapis.com`.
Credential Name	Name to identify the credential record. For example, `Google Directory Cred`.
OAuth Name	Name to identify the OAuth record. For example, `Google_Directory OAuth`.
OAuth Client ID	Client ID of your Google app.
OAuth Client Secret	Client Secret of your Google app.
OAuth Redirect URL	Redirect URL provided in your Google app. This value is auto-populated.
OAuth Authorization URL	OAuth authorization code endpoint. Enter `https://accounts.google.com/o/oauth2/v2/auth`.
OAuth Token URL	Token URL. Enter `https://oauth2.googleapis.com/token`.



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6. Click **Configure and Get OAuth Token**.
7. In the pop-up window, click **Allow**.
   The OAuth Access token is generated for the Google Directory spoke.

Set up a bi-directional webhook for the Google Directory spoke

Create a webhook routing policy and subflow according to your requirement.

Before you begin

Role required: admin

About this task

The default routing policy in the Google Directory WebHook Routing Policies module triggers the Process Google Directory User Webhook Subflow and notifies the ServiceNow app when certain events occur in the Google Directory. To use any other fields in your custom subflow and customize conditions in the routing policy, perform these steps.

Procedure

1. Navigate to **All** > **Flow Designer**.
2. Select Subflows.
3. In the name field, enter `Process Google Directory User Webhook Subflow` and press **Enter**.
4. Select the subflow.
5. On the Process Google Directory User Webhook Subflow page, select the More Actions Menu icon ( ).
6. Select **Copy Subflow**.
7. Customize the subflow according to your requirement and publish it.
8. In the filter field, enter `Google Directory Webhook Routing Policies`.
9. Select **New**.
10. Fill the form.

Decision form

Field	Description
Label	A unique label to identify the routing policy.
Application	The application is set to Global.
Order	The order in which the request is processed.
Answer	Subflow that must be triggered when the specified conditions are met.
Default answer	Option to specify if the answer is the default answer.
Condition	Conditions to be met when the required events occur in the Google Directory.

11. Select **Submit**.

Google Docs Spoke

Manage documents in Google Docs from your ServiceNow instance.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Docs spoke v1.3.0 is the latest version. For version history of the spoke, see Google Docs spoke release notes.

Supported versions

This spoke was built for Google Docs v1, but may be compatible with later versions.

Spoke requirements

Google Cloud account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Google Docs spoke provides actions to automate Google Docs tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Document Management	Create Document	Creates a document in Google Docs.
	Create Footer	Creates a footer in the specified document.
	Create Header	Creates a header in the specified document.
	Get Document Details	Retrieves the structure of the specified document as a JSON object.
	Search Text in Document	Searches for the required document based on the search text or content.
	Update Document	Updates the content of a document with the provided HTML content.

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Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Google Docs document management AI agent	Manage documents (that is, create document, create header or footer, get document details, search text in document) in Google Docs.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Docs.

Set up the Google Docs

Integrate the ServiceNow instance and Google Docs by creating a custom OAuth application in G Suite credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Docs spoke.
- Role required: admin.

Configure Google Docs application

Create a custom OAuth application from your G Suite account to enable OAuth 2.0 authentication with the Google Docs spoke.

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Before you begin

- A Google G Suite or login created with the domain
- Role required: admin

About this task

Complete these steps from your Google G Suite account. See the G Suite product documentation for instructions on creating and configuring custom applications.

Procedure

1. Register a new custom application.
   a. Navigate to https://console.developers.google.com.
   b. Create a project with your G Suite administrator credentials.
   c. Open the project.
2. Set the Authorized domain.
   a. From the **APIs & Services** menu, select **OAuth consent screen**.
   b. Enter the application name.
   c. Specify the Authorized domain `service-now.com`.
   d. Click **Save**.
3. Search for the Google Docs API and enable it.
4. Create the OAuyth client ID.
   a. From the APIs & Services menu, select **Credentials**.
   b. Select **Create OAuth client ID** from the **Create credentials** list.
5. Select the application type **Web application**.
6. Enter the following Authorized redirect URI: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
   This redirect URI must match the **Redirect URL** you provide when you configure a connection for the Google Docs spoke.
7. The OAuth client window shows your client ID and client secret.

   Copy these two values to a text file so that you can use them when you configure a connection for the Google Docs spoke.

Tip:

You can always access the client ID and secret in the Google APIs & Services interface by clicking **Credentials** and select the OAuth 2.0 client ID name.

Configure a connection for the Google Docs spoke

Add and configure a Google Docs connection to authenticate ServiceNow requests in Google Docs spoke.

Before you begin

- Configure Google Docs application
- Role required: admin

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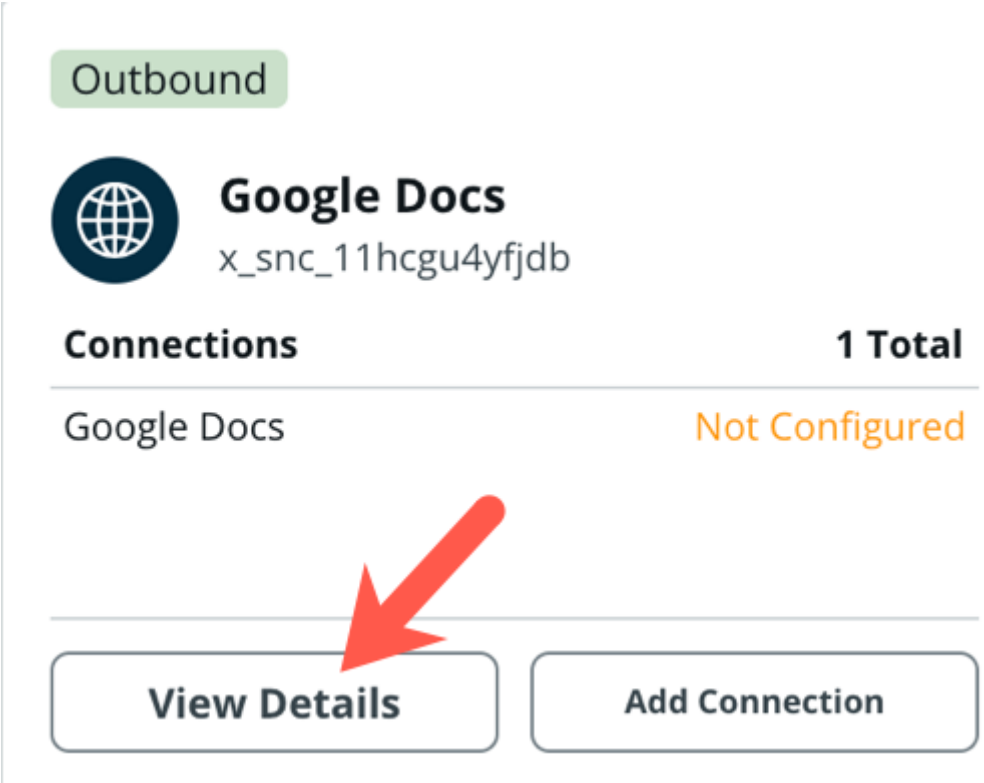
Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. Select the **Connections** tab.
4. In the Search all connections field, enter `Google Docs`.
5. On the Google Docs card, select **View Details**.



6. Select **Configure**.



7. On the **Connection** form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection record. For example, `Google Docs Connection`.
Connection URL	Connection URL for the spoke. Enter `https://www.googleapis.com/`
OAuth Entity Name	Name to identify the OAuth entity record. For example, `Google Docs entity`.
OAuth Client ID	Client ID generated while creating the application in G suite.
OAuth Client Secret	Client secret generated while creating the application in G suite.

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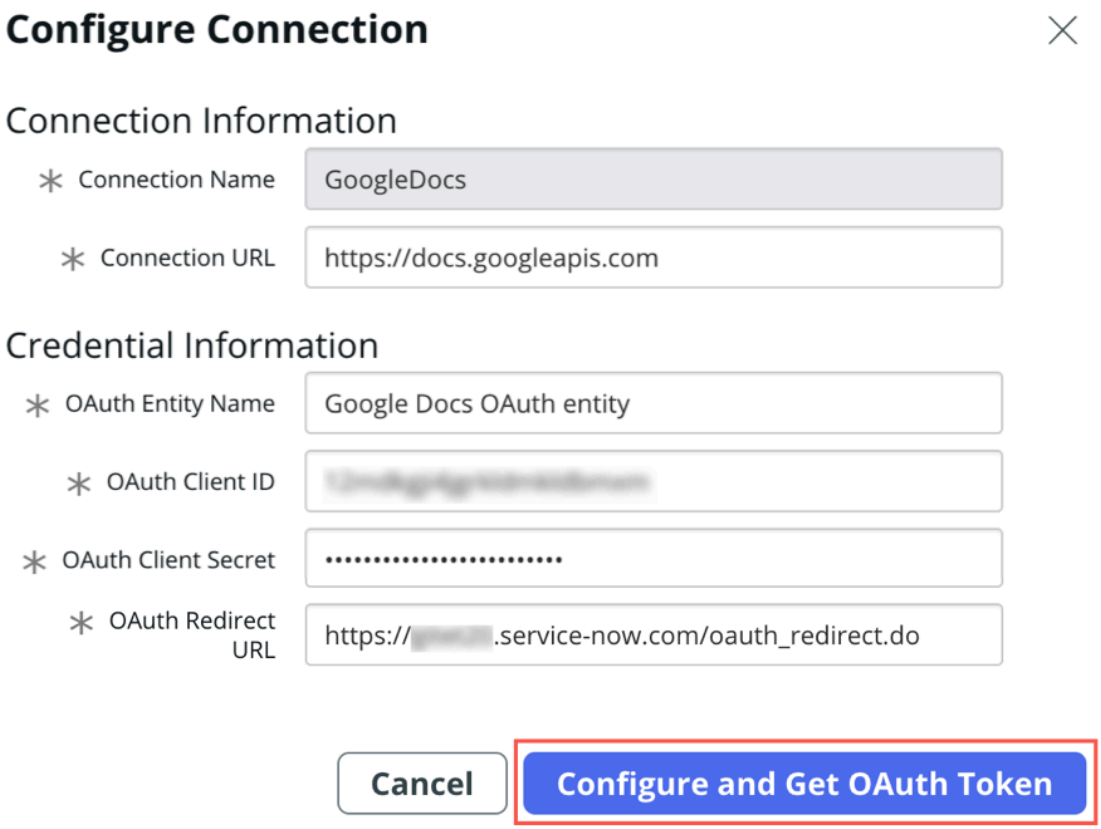
Field	Description
OAuth Redirect URL	Redirect URL of your ServiceNow instance in this format: `https://<instance_name>.service-now.com/oauth_redirect.do`.

8. Click **Configure and Get OAuth Token**.



9. Log in to Google to get the OAuth token.

Result
The spoke connection is configured and ready to be used.

Google Drive Spoke

Use Google Drive as file storage in place of attachments in ServiceNow. Adds Google Drive storage to your ServiceNow instance and enables users to reference Google Drive files in ServiceNow records.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Google Drive spoke v2.3.0 is the latest version. For version history of the spoke, see Google Drive Spoke release notes.

Supported versions

API version v3.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke actions

The Google Drive spoke provides actions to perform Google Drive tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
File and Folder Management	Copy Attachment to Drive	Copies a ServiceNow attachment to a Google Drive folder. It either copies to the root drive of the current account or to the specified folder. To change the file name during the copy, use the optional file name.
	Copy Doc File to Attachment	Copies a file Google Drive and attaches it to a ServiceNow record.
	Copy File	Creates a copy of a Google Drive File and applies any metadata updates like a change in file name, file description, parent folder location, if file is starred, or shared by users with writer permissions.
	Copy Drive File To Attachment	Copies a drive file to a ServiceNow attachment. If a ServiceNow record is supplied as input, the record should be attached to it.
	Copy File Revision as Attachment	Copies the revision ID of a file ID to any record on the ServiceNow instance.
	Create Folder	Creates a Google Drive folder that can be nested within other folders.

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Category	Action	Description
	Delete Drive File Or Folder	Permanently deletes a drive file or folder owned by the Google Drive account user without moving it to the trash. To delete folders the user must be the owner of folder and its contents
	Delete File Revision	Deletes a revision to a file.
	Look up Files and Folders Stream	Retrieves the list of files and folders.
	Look up File Revisions Stream	Retrieves the list of all revisions to a file.
	Look up File	Retrieves the metadata information from a file ID.
	Look up Files Stream	Retrieves a list of Google Drive files based on the given search parameters.
	Look up Folders Stream	Retrieves a list of Google Drive folders based on the given search parameters.
	Update Attachment To Drive	Updates the contents of a file, but maintains the previous versions and metadata. This action only updates the content of the Google Drive file. It does not update metadata.
	Update File Or Folder Metadata	Updates the metadata on a file or folder. This can be a file name change, change to the file description, a move to a new parent folder, a change in starred status, or a change to sharing permissions.
	Look up Files or Folders by Name	Retrieves the details of the files or folders including ID for the specified file name or folder name.
Permission Management	Create File or Folder Permission	Adds a permission to a given user, group, domain, or anyone for a file or folder. If User or Group is selected, the email address is required for those users and groups. If Domain is selected, the domain name is required. If Anyone is selected, then anyone has permissions to the file or folder.
	Delete File Or Folder Permission	Removes a permission to a given user, group, domain, or anyone for a file or folder.
	Look up Permissions Stream	Retrieves the list of files or shared drives permissions.
	Transfer Ownership Of All User Data	Transfers the ownership of data from one user to another within a domain. All previous permissions of old owner are removed and new owner permissions are created for new user.

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Category	Action	Description
	Update File Or Folder Permission	Updates a given permission by updating the role.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agents	Description
Google Drive permission manager AI agent	Manages file or folder permissions(create file or folder permission, transfer ownership of all user data, update file or folder permission, delete file or folder permission) in Google Drive.
Google Drive file and folder manager AI agent	Manages files and folders(copy doc file to attachment, copy file revision as attachment, delete file or folder, update attachment to drive, copy drive file to attachment, copy attachment to drive, copy file, delete file revision, create folder, look up files or folders by name, update file or folder metadata, look up file) in Google Drive.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Google Drive Online account requirements

The Google Drive spoke requires a custom app that you create in Google Drive Enterprise or Google G Suite.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Google Drive spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Google Drive alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up Google Drive spoke

Integrate a ServiceNow instance and Google Drive spoke by using Google Drive credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Drive spoke.
- Role required: admin.

Configure Google Drive application

Create a custom OAuth application from your Google Drive account to enable OAuth 2.0 authentication with the Google Drive spoke.

Before you begin

Google Drive integration requirements:

- A domain and an email address associated with the domain. For example, www.mydomain.com and jane-admin@mydomain.com. Note that you can only register one email address per domain in GSuite or Google Drive.
- A Google G Suite or Google Drive login created with the domain.
- A Google Drive account.

Role required: admin.

About this task

Complete these steps from your Google G Suite or Google Drive account. See the G Suite product documentation for instructions on creating and configuring custom applications.

Procedure

1. Log in to the G Suite portal, https://gsuite.google.com/, with your domain email credentials.
2. Enter your business name, the number of employees, and your country, and click **Next**.
3. Enter the administrator contact name, email address and business phone number, and click **Next**.
4. Enter the domain associated with this spoke.

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5. Provide the user name and password for your domain.
6. Add users to the G Suite account.
7. Verify your domain and email address.
   Users must create their own logins by navigating to the Google documentation.
8. Register a new custom application.
   a. Navigate to https://console.developers.google.com.
   b. Create a project with your G Suite administrator credentials.
9. Search for the Google Drive API and enable it.
10. Create a Credentials application and save the Client ID and Client secret.
    The Client Secret is only displayed in plain text for a short time. Copy the Client ID and the Client Secret to a text file so that you can use them when you Configure the Google Drive connection.

Configure the Google Drive connection

Use the information generated during Google Drive account configuration to register the Google Drive application as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Connections** tab.
3. Toggle and enable the **Outbound** connections.
4. Locate the **Google Drive** connection alias and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Google Drive spoke, click **View Details**.
   - To manage more than one Google Drive spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.
5. On the form, fill in the fields.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Enter the URL `https://www.googleapis.com/`.
Credential Information	
Credential Name	Name to identify the credential record.
OAuth Name	Name to identify the application registry record.

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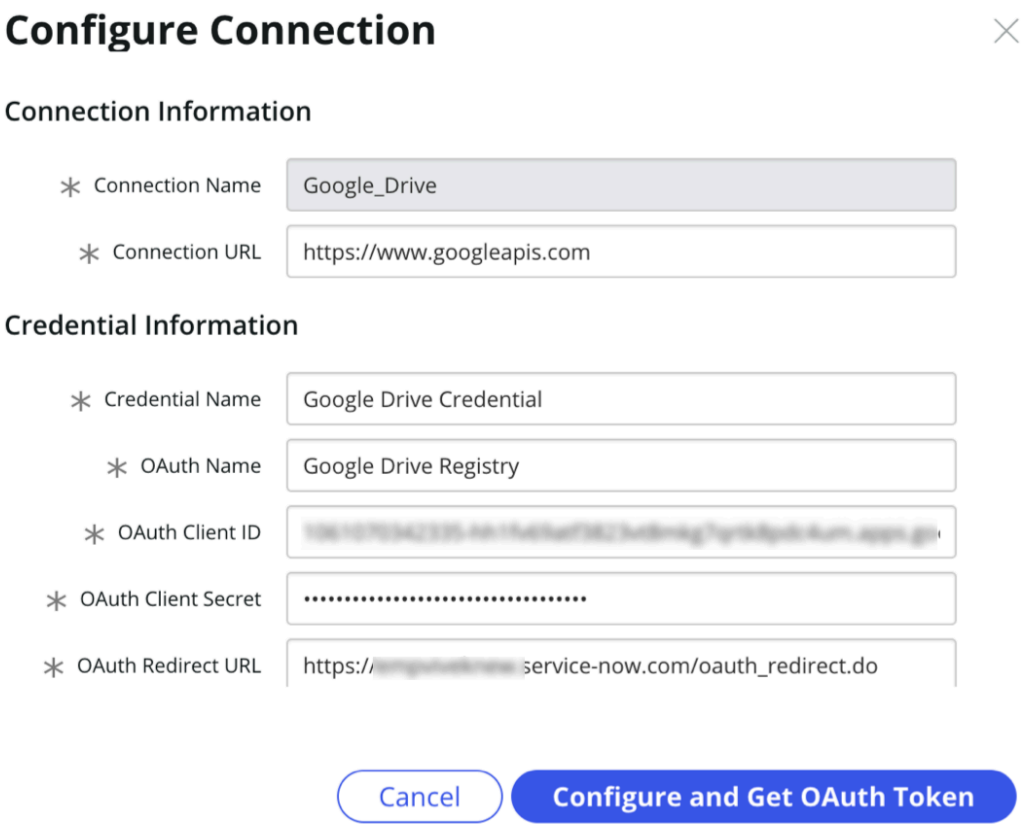
Field	Description
OAuth Client ID	Client ID of the Google Drive application you created in G Suite.
OAuth Client Secret	Client Secret you generated when you created the application in G Suite.
OAuth Redirect URL	ServiceNow instance URL in this format: `https://<Instance-Name>.service-now.com/oauth_redirect.do`



6. Click **Configure and Get OAuth Token**.

Google Identity and Access Spoke

Manage folders, projects, roles, and service accounts in Google Identity and Access Management and Google Resource Manager.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Google Identity and Access spoke v1.1.1 is the latest version. For version history of the spoke, see Google Identity And Access spoke release notes.

Supported Versions

This spoke was built for API version v2 only Folder Management category and v1 for other categories, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke requirements

Google Cloud Platform account.

Spoke flows and subflows

This spoke has no flows and subflows.

Spoke actions

The Google Identity and Access spoke provides actions to automate Google Identity and Access Management and Google Resource Manager tasks when events occur in ServiceNow. For the spoke actions to be performed, you must ensure that your project or organization in Google Cloud Platform has the mentioned permissions. Available actions include:

Spoke actions

Category	Action	Description	Required Permission
Folder Management	Create Folder	Creates a folder.	resourcemanager.folders.create
	Delete Folder	Deletes a folder.	resourcemanager.folders.delete
	Look up Child Folder	Retrieves the information of a child folder.	resourcemanager.folders.get
	Look up Folders	Retrieves the list of folders.	resourcemanager.folders.list
	Rename Folder	Renames the specified folder.	resourcemanager.folders.update

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Spoke actions (continued)

Category	Action	Description	Required Permission
	Restore Folder	Restores the specified folder.	resourcemanager.folders.undelete
Organization Management	Look up Organization by Organization ID	Retrieves details of the specified organization.	resourcemanager.organizations.get
Project Management	Create Project	Creates a project.	resourcemanager.projects.create
	Delete Project	Deletes the specified project.	resourcemanager.projects.delete
	Look up Project by Project ID	Retrieves details of the specified project.	resourcemanager.projects.get
	Look up Projects	Retrieves the list of projects.	resourcemanager.projects.list
	Look up Projects Stream	Retrieves the list of projects as a complex object.	resourcemanager.projects.list
	Rename Project	Renames the specified project.	resourcemanager.projects.update
	Restore Project	Restores the specified project.	resourcemanager.projects.undelete
Role Management	Create Role For Organization	Creates a custom role for an organization.	iam.roles.create
	Create Role For Project	Creates a custom role for the specified project.	iam.roles.create
	Delete Role For Organization	Deletes a custom role for the specified organization.	iam.roles.delete
	Delete Role For Project	Deletes a custom role for the specified project.	iam.roles.delete
	Look up Role for Organization	Retrieves details of the custom role for the specified organization.	iam.roles.get
	Look up Role For Project	Retrieves details of the custom role for the specified project.	iam.roles.get
	Look up Roles in Organization by Organization ID	Retrieves the list of custom roles for the specified organization.	iam.roles.list
	Look up Roles in Organization Stream	Retrieves the list of custom roles for the	iam.roles.list

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Spoke actions (continued)

Category	Action	Description	Required Permission
		specified organization as a complex object.	
	Look up Roles in Project by Project ID	Retrieves the list of custom roles for the specified project.	iam.roles.list
	Look up Roles in Project Stream	Retrieves the list of custom roles in given project ID.	iam.roles.list
	Restore Role For Organization	Restores the specified custom role for an organization.	iam.roles.undelete
	Restore Role For Project	Restores the specified custom role for a project.	iam.roles.undelete
Service Account Management	Look up Service Account	Retrieves the details of the specified service account.	iam.serviceAccounts.get
	Look up Service Accounts by Project ID	Retrieves the list of service accounts in a project.	iam.serviceAccounts.list

For more information about the required permissions, see IAM permissions reference.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Google Identity and Access Spoke.

Set up the Google Identity and Access Spoke

Integrate the ServiceNow instance and Google Identity and Access spoke by using Google Cloud Platform credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Identity and Access spoke.
- Role required: admin.

Configure the Google Identity and Access application

Create a custom OAuth application from your Google Cloud Platform account to enable OAuth 2.0 authentication with the Google Identity and Access spoke.

Before you begin

Google Identity and Access integration requirements:

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- Google Cloud Platform account.
- Role required: admin.

About this task

Complete these steps from the Google Cloud Platform.

Procedure

1. Register a new custom application and open it.
   a. Navigate to https://console.developers.google.com.
   b. Create a project with your Google Cloud Platform administrator credentials.
   c. Open the project.
2. Provide the OAuth authorized domain name.
   a. From the APIs & Services menu, select **OAuth consent screen**.
   b. Enter the application name.
   c. Specify the Authorized domain `service-now.com`.
   d. Click **Save**.
3. Create the credentials.
   a. From the APIs & Services menu, select **Credentials**.
   b. Select **Create OAuth client ID** from the **Create credentials** list.
4. Select the application type **Web application**.
5. Enter the following Authorized redirect URI: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
6. Copy your client ID and client secret to a text file so that you can use them when you Register Google Identity and Access as an OAuth provider.

> **Tip:** You can always access the client ID and secret in the Google APIs & Services interface by clicking **Credentials** and selecting the OAuth 2.0 client ID name.

Register Google Identity and Access as an OAuth provider

Use the information generated during Google Identity and Access account configuration to register the Google Identity and Access application as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. In ServiceNow instance, navigate to **System OAuth** > **Application Registry**.
2. Open the record, **Google cloud platform**.
3. On the form, fill these fields:

Field	Description
Name	Name to uniquely identify the record, for example `Google Identity and Access`.

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Field	Description
Client ID	Client ID of the Google Identity and Access application.
Client Secret	Client Secret you generated when you create the application.
OAuth API Script	Script to customize the request and response. Select `OAuthGoogleIAMUtil`.
Default Grant type	Grant type used to establish the token. Select **Authorization Code**.
Authorization URL	OAuth authorization code endpoint. Enter `https://accounts.google.com/o/oauth2/v2/auth`.
Token URL	OAuth server token endpoint. Enter `https://oauth2.googleapis.com/token`.
Redirect URL	URL of the ServiceNow instance in this format: `https://<instance>.service-now.com/oauth_redirect.do`.

4. Right-click the form header, and click **Save**.
   The system validates the OAuth credentials.

Create Credential record for the Google Identity and Access spoke

Create Credential records to connect the Google Identity and Access custom OAuth application you created during account configuration. The Google Identity and Access spoke connection and credential aliases use these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Credentials** and click **New**.
2. Select OAuth 2.0 Credentials.
3. Enter a unique name for the credential, for example, `GCPIAM Cred`.
4. Click the **OAuth Entity Profile** search icon (🔍) and select the profile with the name of the OAuth application registry you created when you registered the Google Identity and Access service as an OAuth provider.
5. Click **Get Oauth Token**.

Google Meet Spoke

Set up a flow and complete various actions on Google Meet after integrating your ServiceNow instance with the Google Meet account. For example, you can set up a meeting space or end an active conference as part of the flow.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Meet spoke v1.2.1 is the latest spoke version. For version history of the spoke, see Google Meet Spoke release notes.

Supported versions

This spoke was built for Google Meet API v2, but may be compatible with later versions.

Spoke requirements

- Google Meet API access
- Google Meet Cloud console access

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Google Meet provides actions to automate Google Meet tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description	Required Scopes (at least one scope is required)
Conference Management	Look up Conference	Retrieve a details of conference record associated with a specific Google Meet space.	• https://www.googleapis.com/auth/meetings.space.readonly

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Category	Action	Description	Required Scopes (at least one scope is required)
			• https://www.googleapis.com/auth/meetings.space.created
	Look up Conferences Stream	Retrieves a list of conference records, which can be filtered optionally and limited by a specified page size.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
Space Management	Create Meeting Space (Conversational-ready)	Creates a Google Meet space and shares the link for participants to join and collaborate.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	End Active Conference	Ends the active Google Meet session, disconnecting all participants and concluding the meeting.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	Look up Meeting Space	Retrieves conference record details, including the configuration and current conference status for a specific Google Meet space.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	Update Meeting Space (Conversational-ready)	Updates the settings of an existing Google Meet space.	https://www.googleapis.com/auth/meetings.space.created

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Category	Action	Description	Required Scopes (at least one scope is required)
Participant Management	Look up Participant	Retrieves details of a participant in a Google Meet conference.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	Look up Participant Session	Retrieves the details of a specific session, including session start and end times, in a Google Meet conference.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	Look up Participants Stream	Retrieves a paginated list of participants in a specified Google Meet conference, with optional filtering.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	Look up Participant Sessions Stream	Retrieves a paginated stream of sessions for a specific participant in a Google Meet conference.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
Artifacts Management	Look up Recording	Retrieves the details of a Google Meet recording, including its state, timestamps, and Google Drive location.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created

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Category	Action	Description	Required Scopes (at least one scope is required)
	Look up Recordings Stream	Retrieves a paginated list of recordings for a specific Google Meet conference, including recording status, timestamps, and Google Drive location.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	Look up Transcript	Retrieves the details of a Google Meet transcript, including its state, timestamps, and document location in Google Docs.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	Look up Transcript Entry	Retrieves a specific transcript entry from a Google Meet conference, including its content, speaker details, and timestamp.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	Look up Transcripts Stream	Retrieves a paginated list of transcripts for a specific Google Meet conference, including transcript status, timestamps, and the document location in Google Docs.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created
	Look up Transcript Entries Stream	Retrieves a list of transcript entries for a specific Google Meet conference, including details like participant, transcript text, language, and timestamps.	• https://www.googleapis.com/auth/meetings.space.readonly • https://www.googleapis.com/auth/meetings.space.created

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Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Google Meet artifacts management AI agent	Automates tasks such as retrieving recordings, transcripts, and other meeting-related data, making it easier to organize and utilize meeting resources effectively.
Google Meet participant management AI agent	Automates tasks such as looking up participant details, retrieving participant session streams, and accessing session-specific information.
Google Meet conference management AI agent	Automates tasks such as look up conference details, retrieve live conference streams, and manage meeting spaces and participants.
Google Meet space management AI agent	Automates tasks such as creating and updating meeting spaces, ending active conferences, and retrieving information about existing meeting spaces.

Available conversational actions

Install Now Assist for Conversational Spokes and start using the conversational ability of Integration Hub spokes. For more information, see Now Assist in Conversational Spokes.

Supported actions

Action	Usage
Create Meeting Space	In the Ask Now Assist to... field, enter the phrase that asks Now Assist to perform the action and press **Enter**. For example, `Create a meeting space`.

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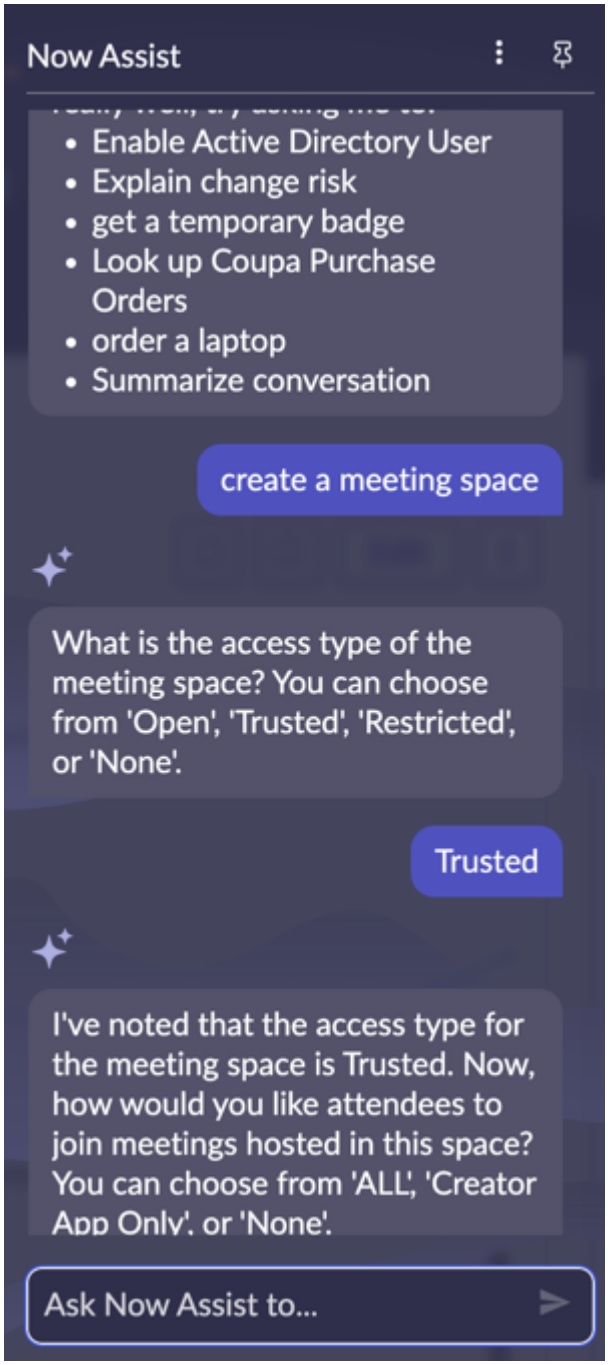
Supported actions (continued)

Action	Usage
Update Meeting Space	In the Ask Now Assist to... field, enter the phrase that asks Now Assist to perform the action and press **Enter**. For example, `Update a meeting space`.



Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't

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need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Google Meet spoke.

Set up the Google Meet spoke

Integrate the ServiceNow instance and Google Meet by creating a custom OAuth application in the Google Cloud console to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Meet spoke.
- Role required: admin.

Create OAuth credentials for Google Meet API

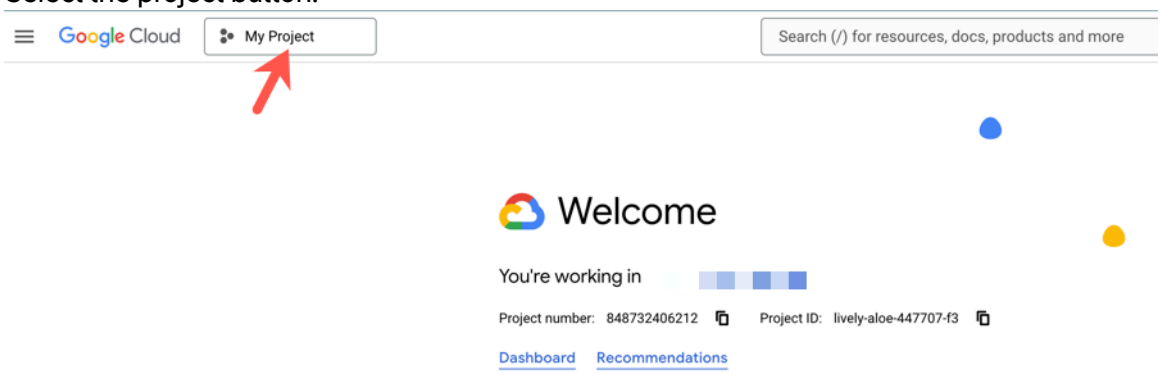
Create OAuth credentials that your ServiceNow instance uses to have its requests for connection authenticated by Google Cloud console.

Before you begin

Role required: admin

Procedure

1. Log in to the Google Cloud console.
2. Select the project button.



3. On the Select a project window, select **NEW PROJECT**.
4. Set up the new project.
   a. In the Project name field, enter the project name.
   b. In the Location field, select **BROWSE** to select an organization.
   c. Select **CREATE**.

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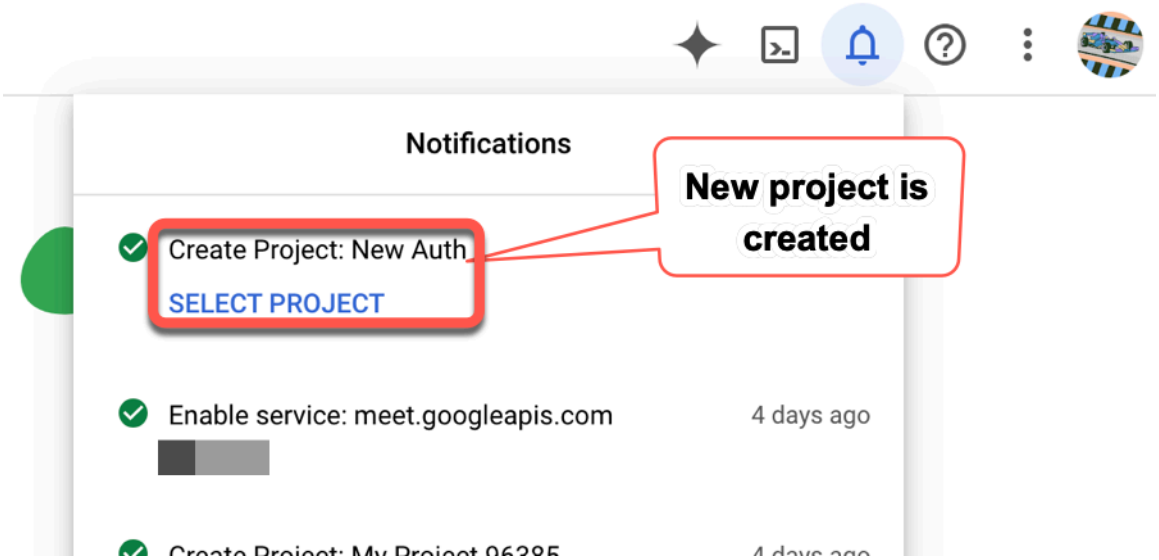
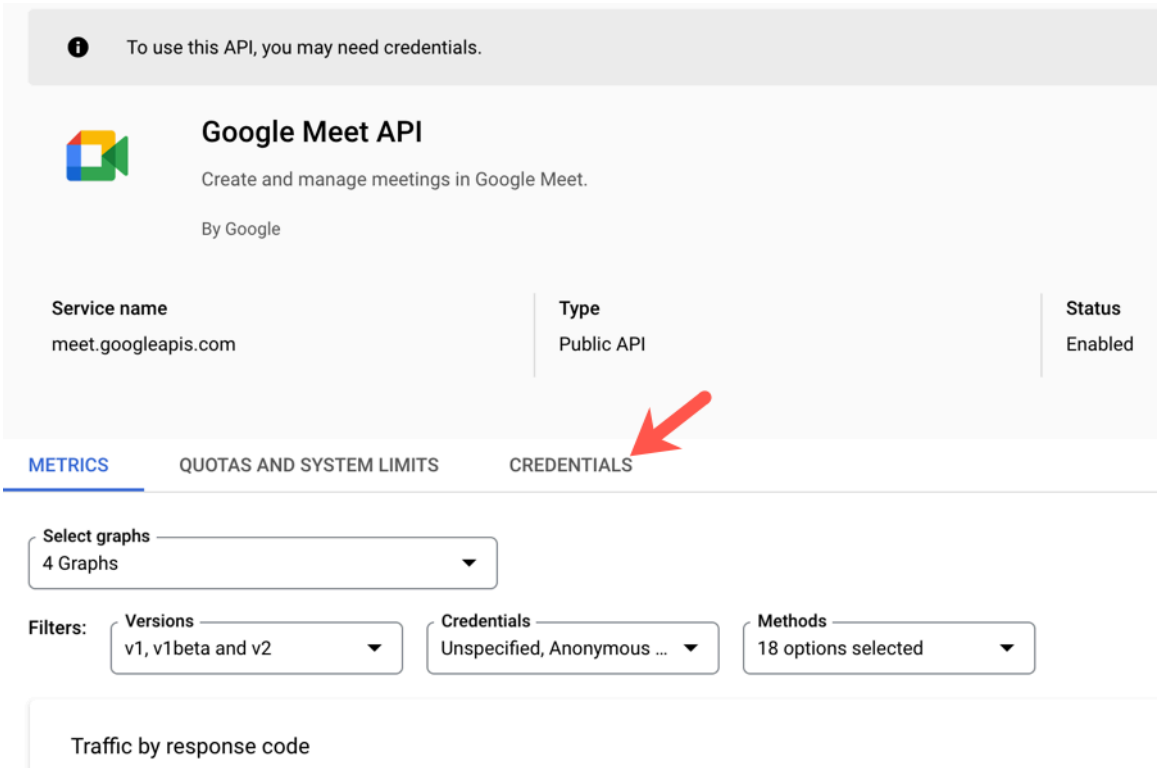
Notifications show that the project is created.



5. Select **SELECT PROJECT**.
6. Navigate to **Navigation Menu** > **APIs & Services** > **Enabled APIs & Services**.
7. Select **+ENABLE APIS AND SERVICES**.
8. In the Search for APIs and services field, enter `Google Meet REST API` and press **Enter**.
9. Select **Google Meet REST API**.
10. Select **ENABLE**.
11. Select the **CREDENTIALS** tab.



12. Select **+ CREATE CREDENTIALS** and then select **OAuth client ID.**

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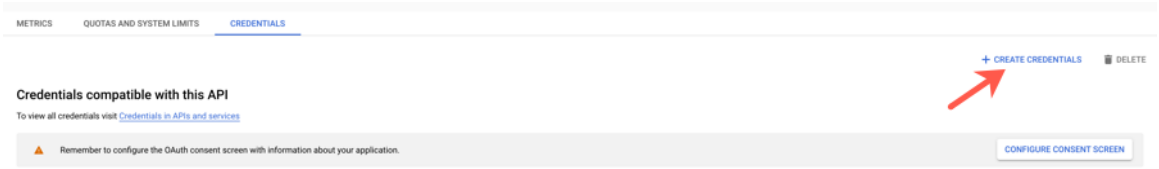

13. Select **CONFIGURE CONSENT SCREEN**.

> **Note:** Refresh token expires in 7 days when a Google Cloud Platform project with an OAuth consent screen is configured for an external user type and its publishing status is **Testing**. To get new OAuth, click **Edit and Get OAuth Token** by navigating to the associated connection.

14. Select **Internal**.
15. Select **CREATE**.
16. Fill the form.

OAuth application details

Field	Description
App name	Option to provide a name of the OAuth application that you're creating.
User support email	Option to provide the email ID that the users of the OAuth application can use to request support.
Developer contact information	Option to provide the email ID of the developer of the OAuth application.

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1 **OAuth consent screen** — 2 Scopes — 3 Test users — 4 Summary

OAuth consent screen management is changing. This page has been replaced with a new, easier-to-use experience. The current pages will only be available for a few more days.

GO TO NEW EXPERIENCE

App information

This shows in the consent screen, and helps end users know who you are and contact you

App name *

The name of the app asking for consent

User support email *

For users to contact you with questions about their consent. Learn more

App logo

This is your logo. It helps people to recognise your app and is displayed on the OAuth consent screen.
After you upload a logo, you will need to submit your app for verification unless the app is configured for internal use only or has a publishing status of 'Testing'. Learn more

Logo file to upload BROWSE

Upload an image, not larger than 1 MB on the consent screen that will help users recognise your app. Allowed image formats are JPG, PNG and BMP. Logos should be square and 120px by 120px for the best results.

App domain

To protect you and your users, Google only allows apps using OAuth to use Authorised Domains. The following information will be shown to your users on the consent screen.

Application home page

Provide users a link to your home page

Application privacy policy link

Provide users a link to your public privacy policy

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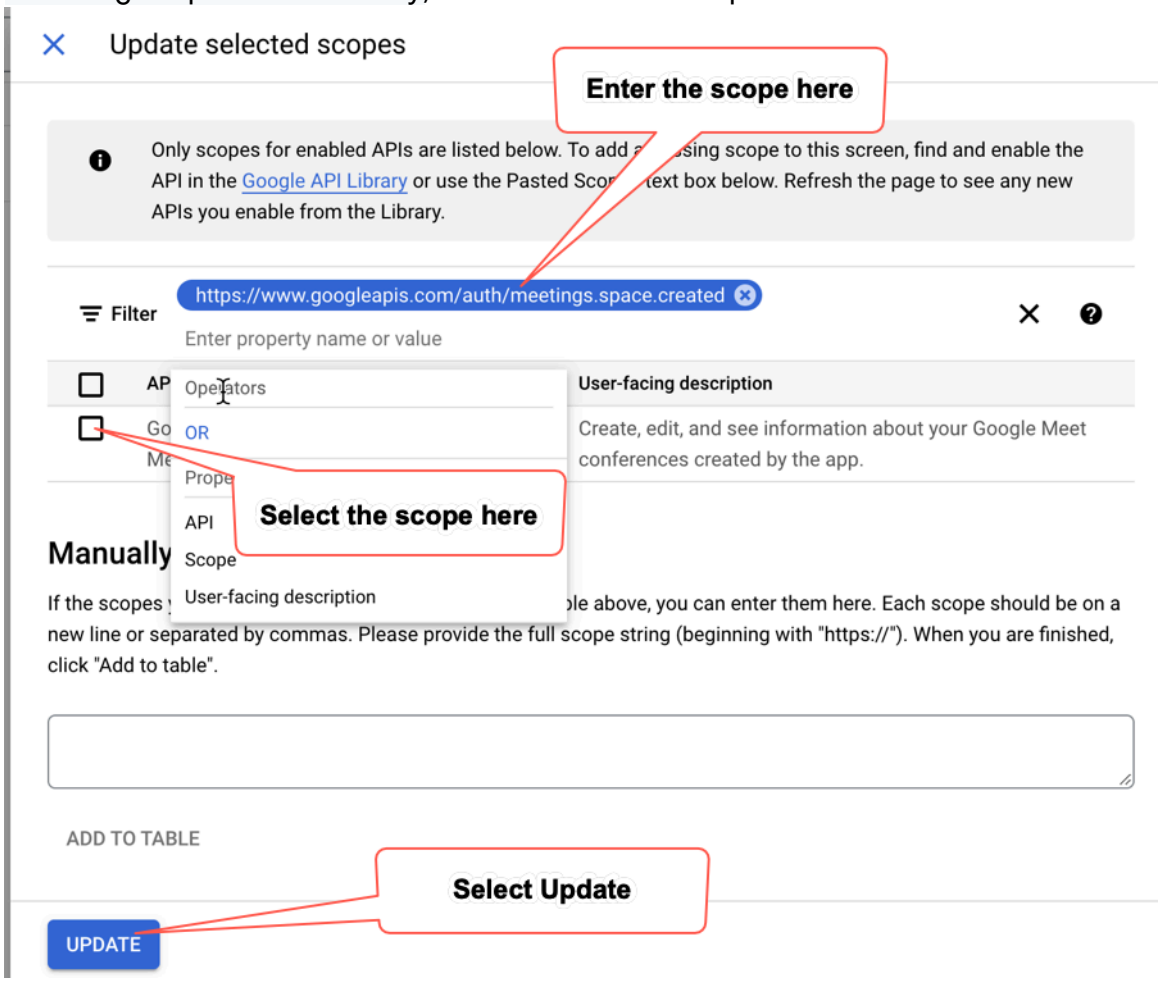
17. Select **SAVE AND CONTINUE**.
18. Select **ADD OR REMOVE SCOPES**.
19. In the Filter field, enter the scope `meetings.space.created`, `openid`, and `meetings.space.readonly`, and then select the scope value.



20. Select **UPDATE**.
    The scopes appear under the Your non-sensitive scopes and Your sensitive scopes sections.

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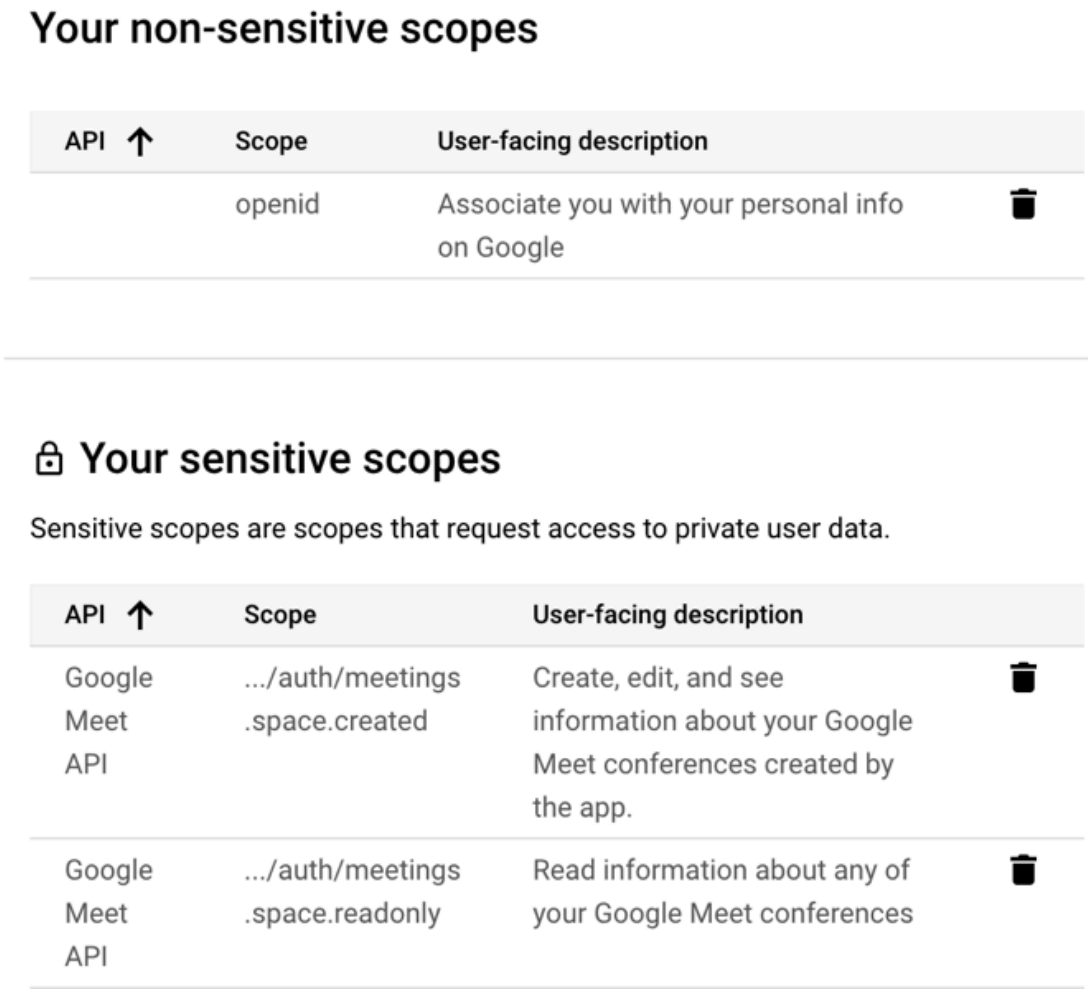

21. Select **SAVE AND CONTINUE**.
22. On the left panel, select **Credentials**.
23. Navigate to **+CREATE CREDENTIALS OAuth client ID**.
24. In the Application type field, select **Web application**.
25. In the Name field, enter a name of the application.
26. Under the Authorized redirect URIs, select **+ADD URI**.
27. In the URI1 field, enter the redirect URL in the format `https://<your-instance-name>.service-now.com/oauth_redirect.do`.
28. Select **CREATE**.
29. Copy the client ID and client secret and store at secure place.

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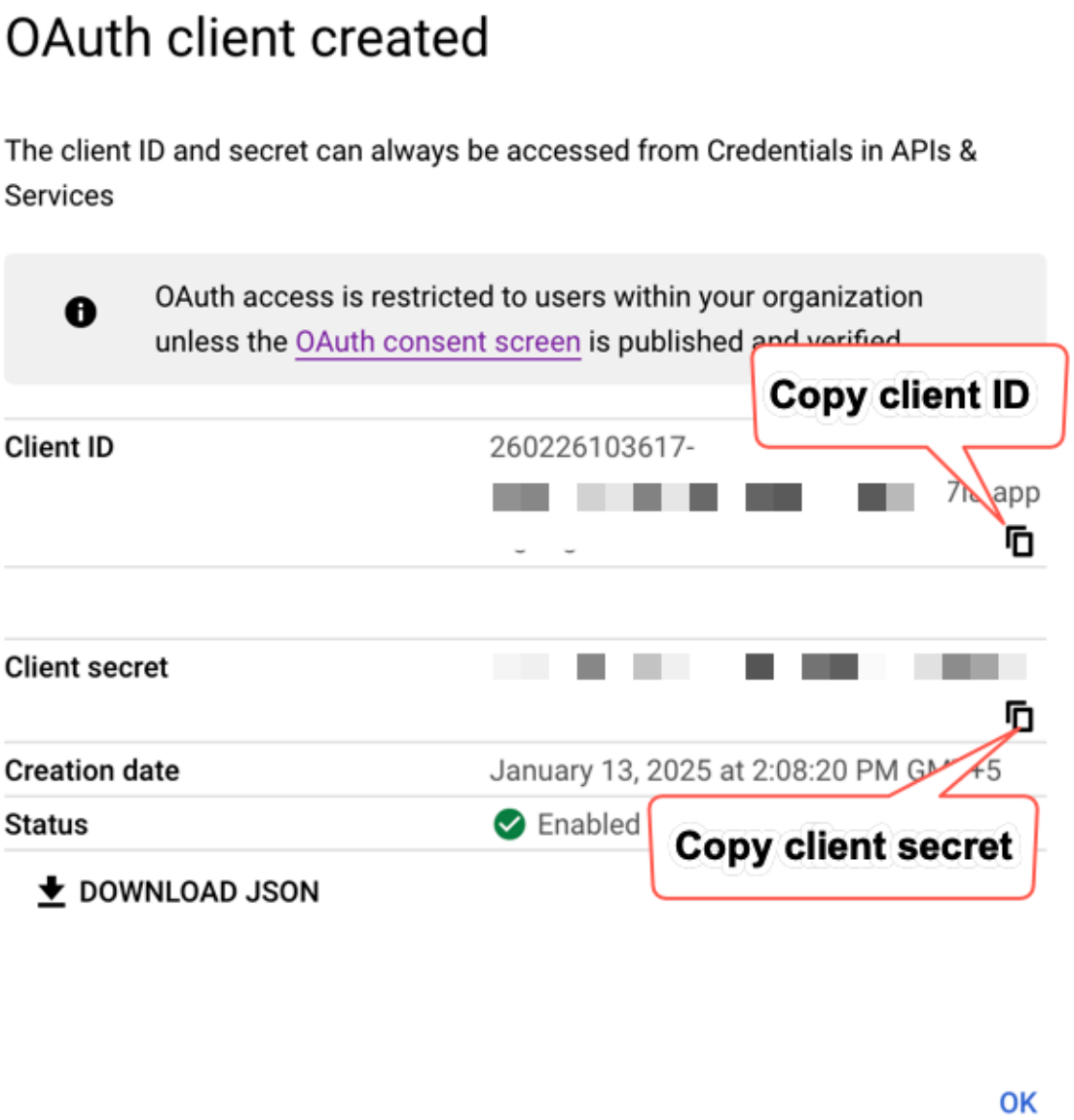

30. Select **OK**.

Configure connection for Google Meet spoke

Set up the connection between your ServiceNow instance and the Google Meet APIs.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. Confirm that the **Outbound** tab is selected.
4. In the Search all connections field, enter `Google Meet`.
5. On the Google Meet tile, select **View Details**.

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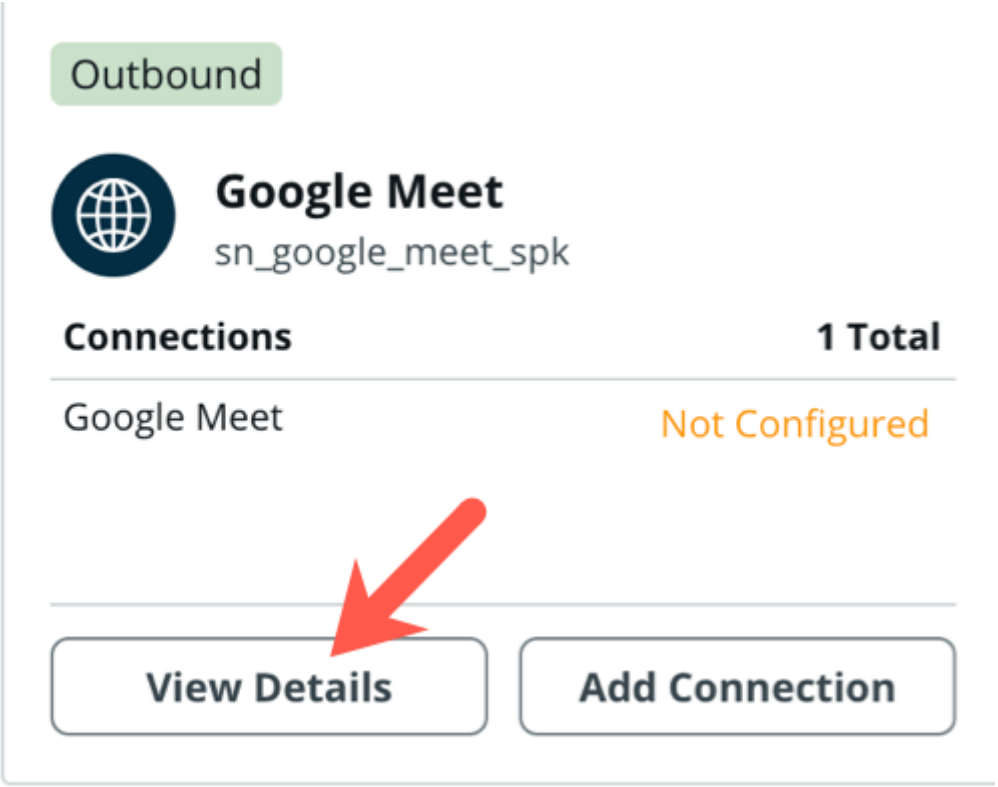

6. Select **Configure**.
7. Fill the form.

Create Connection for Google Meet spoke

Field	Description
Connection name	Name that uniquely identifies the connection record.
Connection URL	URL to Google Meet APIs. Enter `https://meet.googleapis.com`.
Client ID	OAuth client ID of the Google Meet OAuth app that you had created in the Google Cloud console.
Client Secret	OAuth client secret of the Google Meet OAuth app that you had created in the Google Cloud console.
Redirect URL	OAuth redirect URL of your ServiceNow instance. Enter in this format `https://<your-instance-name>.service.now.com/oauth_redirect.do`.

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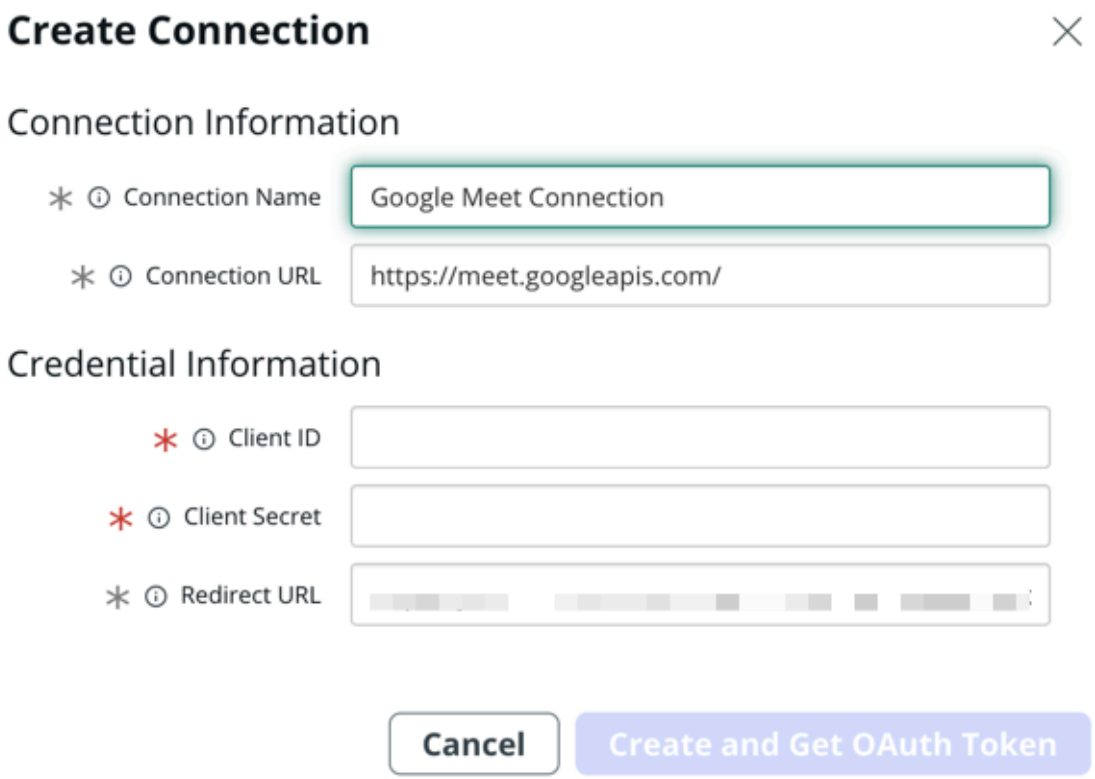

8. Select **Create and Get OAuth Token**.
   You must log in to the Google Cloud console to fetch the OAuth token.

Google Persistent Disk Spoke

Manage disks, snapshots, and images in Google Persistent Disk from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Persistent Disk spoke v1.0.2 is the latest version. For version history of the spoke, see Google Persistent Disk spoke release notes.

Supported versions

This spoke was built for API version v1, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- Google Cloud Virtual Network Spoke (sn_gcp_vpc_spoke)
- Google Compute Engine Spoke (sn_gcompute_spoke)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Google Persistent Disk account requirements

The Google Persistent Disk spoke requires a custom app that you create in the Google Cloud Platform.

Spoke actions

The Google Persistent Disk spoke provides actions to automate Google Persistent Disk when events occur in ServiceNow. For the spoke actions to be performed, you must ensure that your project or organization in Google Cloud Platform has the mentioned permissions. Available spoke actions include:

Category	Action	Description	Permissions Required
Disk Management	Create Disk	Creates a persistent disk in the specified project.	compute.disks.create
	Delete Disk	Deletes the specified persistent disk.	compute.disks.delete
	Get Disk	Retrieves details of the specified persistent disk.	compute.disks.get
	Get Disk Type by Zone	Retrieves the details of the specified disk type by zone.	compute.diskTypes.get
	Resize Disk	Resizes the specified persistent disk.	compute.disks.resize
Image Management	Create Image for Disk	Creates an image in the specified project.	compute.images.create
	Create Image for Image	Creates an image in the specified project.	compute.images.create
	Create Image for Snapshot	Creates an image in the specified project.	compute.images.create

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Category	Action	Description	Permissions Required
	Delete Image	Deletes the specified image.	compute.images.delete
	Get Image	Retrieves details of the specified image.	compute.images.get
Metadata Retrieval Management	List Disk Types by Zone	Retrieves a list of disk types available to the specified project.	compute.diskTypes.list
	List Disks	Retrieves a list of persistent disks contained within the specified zone.	compute.disks.list
	List Images	Retrieves the list of images available to the specified project.	compute.images.list
	List Snapshots	Retrieves the list of snapshot resources contained within the specified project.	compute.snapshots.list
Snapshot Management	Create Snapshot	Creates a snapshot of a specified persistent disk.	compute.snapshots.create
	Delete Snapshot	Deletes the specified snapshot resource.	compute.snapshots.delete
	Get Snapshot	Retrieves details of the specified snapshot.	compute.snapshots.get

For more information about the required permissions, see IAM permissions reference.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Persistent Disk spoke.

Set up the Google Persistent Disk spoke

Integrate the ServiceNow instance and Google Persistent Disk spoke by using G Suite credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Persistent Disk spoke.
- Activate and set up the Google Compute Engine Spoke.
- Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Credentials**.
2. Open record for the Google Compute Engine spoke. For example, `Google Compute Cred`.

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3. For **Credential alias**, select the Connection and Credential alias record of the Google Persistent Disk spoke.
4. Right-click the form header and click **Save**.
5. Click **Get Oauth Token**.

Google Sheets Spoke

Manage spreadsheets in Google Sheets from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Google Sheets spoke v1.0.7 is the latest version. For version history of the spoke, see Google Sheets spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for Google Sheets v4, but may be compatible with later versions.

Spoke requirements

Google Cloud Platform account.

Spoke actions

The Google Sheets spoke provides actions to automate Google Sheets tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Sheet Management	Add Row	Adds a row with the specified values to a sheet.

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Category	Action	Description
	Clear Cells	Clears the values in the sheet for the specified range.
	Copy Sheet	Copies a sheet from a spreadsheet to another spreadsheet.
	Create Sheet	Creates a sheet in the specified spreadsheet.
	Delete Sheet	Deletes a sheet in the spreadsheet.
	Get Cell Values	Retrieves the values in the sheet for the specified range.
	Update Cells	Updates a range of cell values in a sheet.
Spreadsheet Management	Get Spreadsheet Details	Retrieves details about the specified spreadsheet.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Google Sheet spoke.

Set up the Google Sheet spoke

Set up an outbound integration between your ServiceNow instance and the Google Sheets by setting up a connection and credential record.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Sheets spoke plugin.
- Role required: admin.

About this task

The Google Sheets API authenticates the requests from your ServiceNow instance through an OAuth application. You must Set up OAuth app on Google Sheets API by visiting the https://console.developers.google.com/. The connection and credentials record contains the information the Google Sheets API must authenticate the requests from your ServiceNow instance.

Set up OAuth app on Google Sheets API

Set up an OAuth application on the Google Sheets API to enable authentication of requests from your ServiceNow instance.

Before you begin

- Create a business account on https://console.developers.google.com/
- Create a domain and an email address associated with the domain. For example, www.mydomain.com and jane-admin@mydomain.com.

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Note: You can only register one email address per domain in Google Workspace.

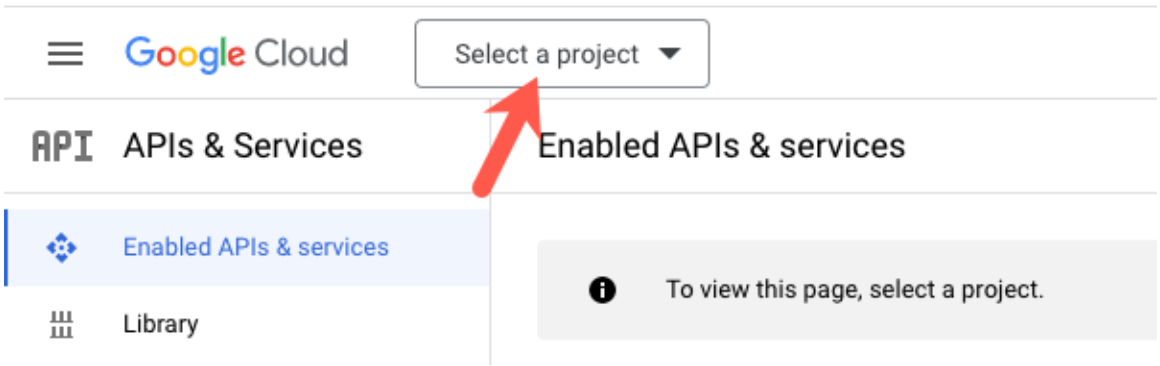
- Role required: admin

Procedure

1. Set up a project on the Google Workspace.
   The project includes the details of the OAuth application and the Application Programming Interface (API) permissions, if applicable.

   a. Log in to https://console.developers.google.com/ with the same domain email ID and password as mentioned in the prerequisites.

   b. Select the button.



   c. Select **NEW PROJECT**.

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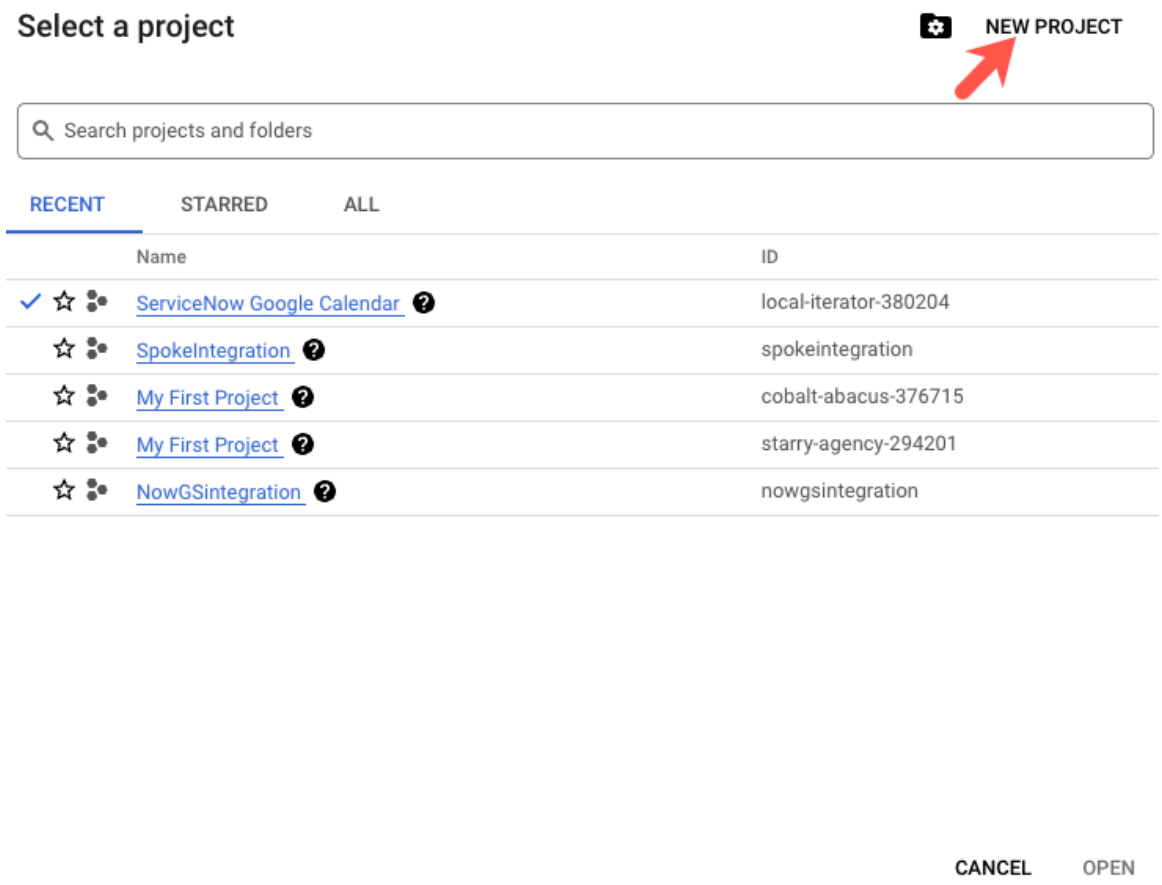
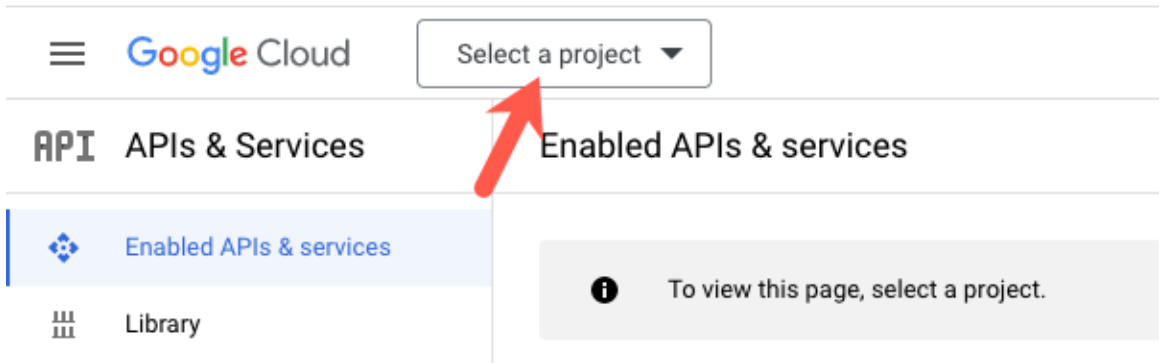


d. In the Project name* field, enter a unique name for the project.

e. In the Location* field, select **BROWSE** to select an organization.

f. Select **CREATE**.
The project is created.

g. Select the button.



2. Select the project that you created.

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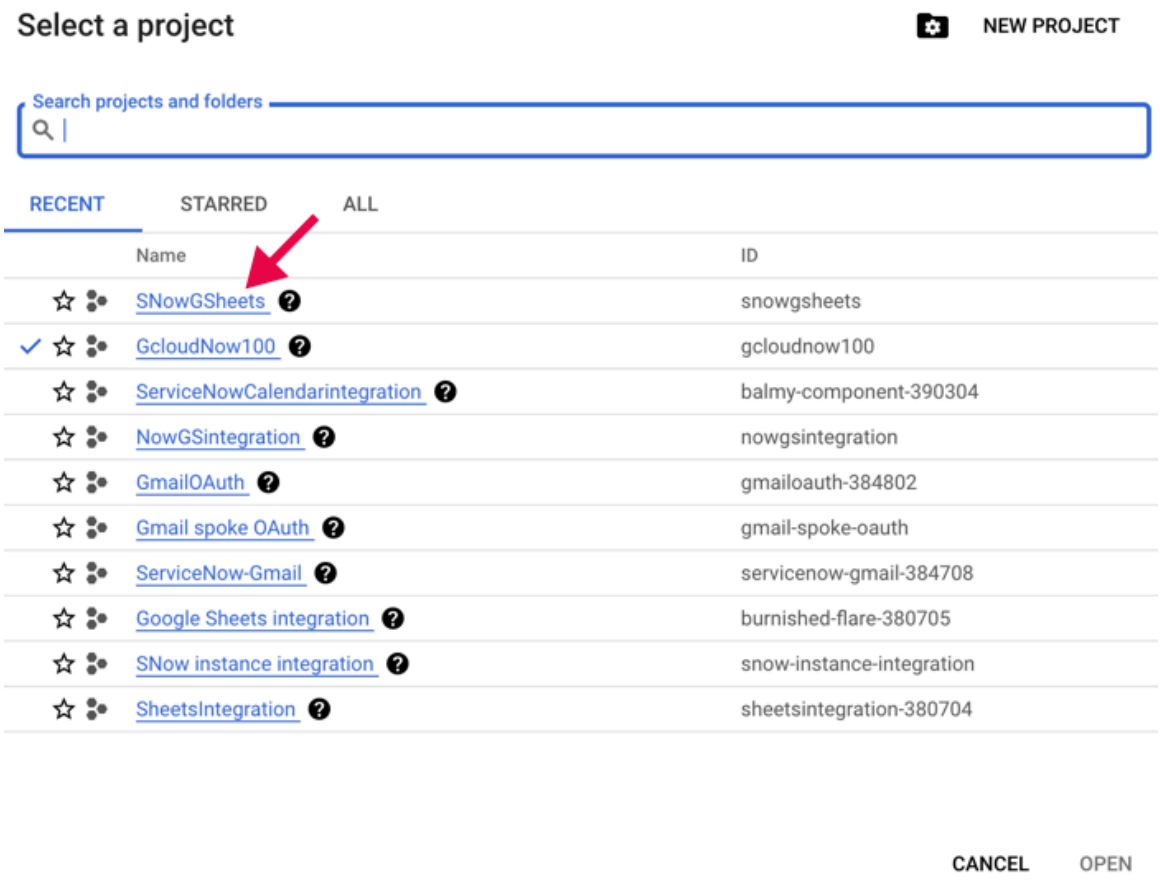
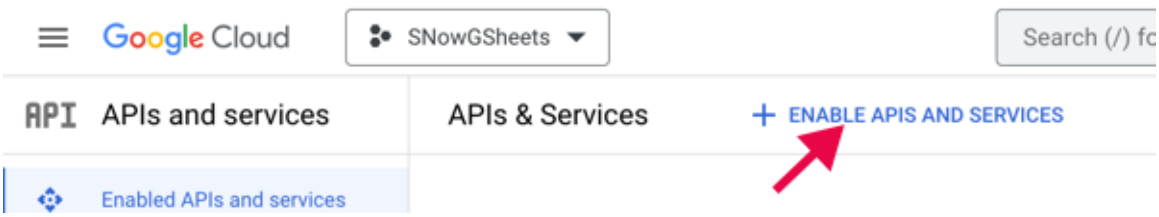


3. Enable the Google Sheets API.

   a. Click **+ENABLE APIS AND SERVICES**.



   b. On the Welcome to the API Library page, enter `Google Sheets` in the search box.

   c. Press **Enter**.

   d. Select the Google Sheets API button.

   e. Select **ENABLE**.
   The Google Sheets APIs are enabled on your project.

4. Create the OAuth app and credentials.

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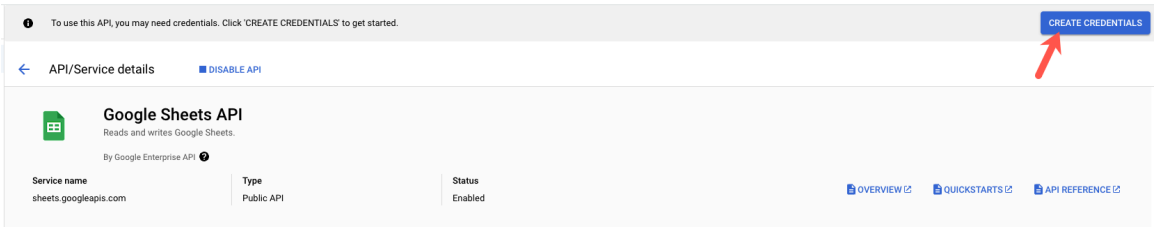
a. Select **CREATE CREDENTIALS**.



b. Fill the form.

Google Sheets API credentials

Field	Description
Select an API*	Name of the API for which you're creating the credentials. **Note:** Ensure that you select Google Sheets API.
What data will you be accessing? *	Type of data your ServiceNow will access through the APIs. **Tip:** Select User data.

c. Click **NEXT**.

d. Fill the form.

Google Sheets API credentials

Field	Description	Mandatory?
App name	Name of the OAuth app.	Yes
User support email	Email at which users can send queries to you about their consent.	Yes
Logo file to upload	Logo representing the OAuth app.	No
Developer contact information	Google will contact the developer of the OAuth app if there are any changes to the project.	Yes

e. Click **SAVE AND CONTINUE**.

5. **Optional:** Define the API scopes.
   API scopes enable you to select specific APIs. For example, /auth/spreadsheets scope enables you to create, edit, or remove spreadsheets.

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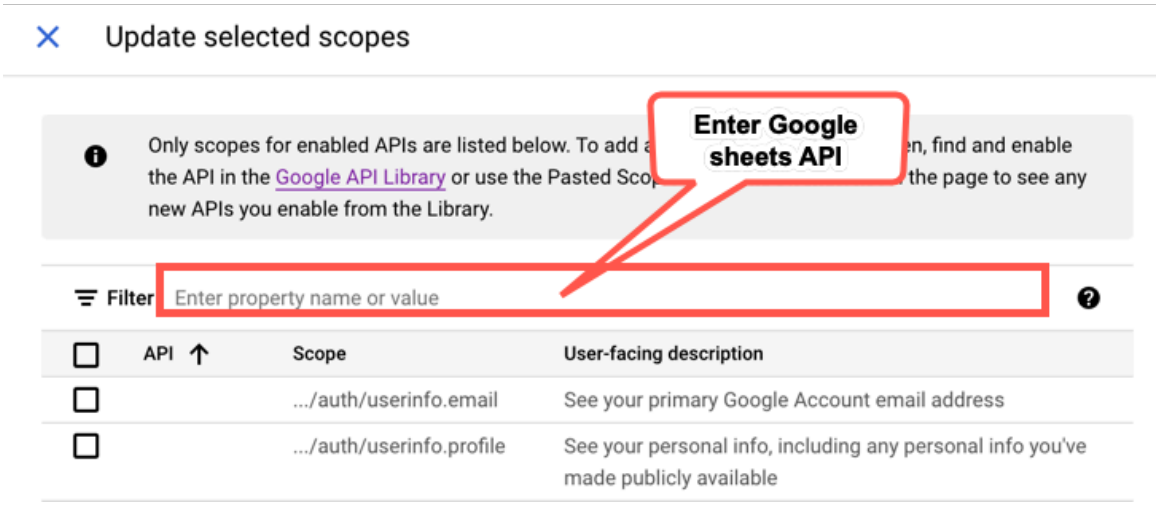
a. Click **ADD OR REMOVE SCOPES**.

b. Enter `Google sheets API`, as shown in the image.



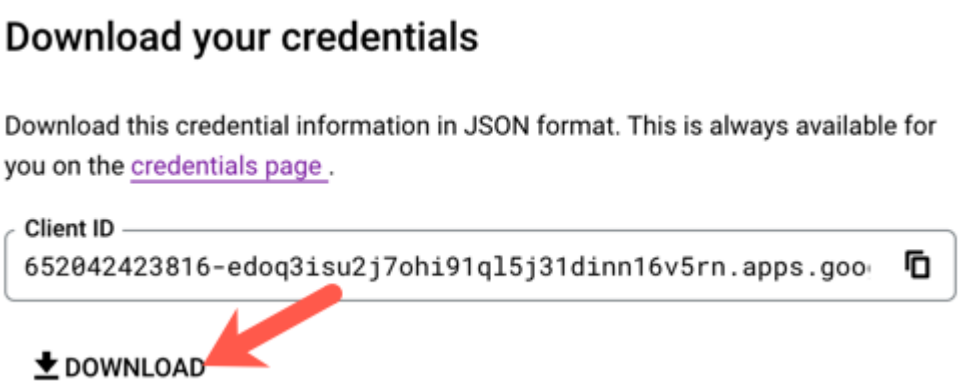
c. Select one or more scopes.

d. Click **UPDATE**.

e. Click **SAVE AND CONTINUE**.

6. Generate OAuth client ID.
   a. From the Application type* list, select `Web application`.
   b. In the Name* field, enter a unique name of the OAuth client.
7. Under the Authorised redirect URIs heading, click **+ ADD URI**.
8. In the URI field, enter the redirect URI in the following format: `https://instance.service-now.com/oauth_redirect.do`.
9. Click **CREATE**.
   The OAuth details are generated in a JSON file.

   Tip: Click DOWNLOAD to download the JSON file for later reference.



10. Click **DONE**.
    You've created the OAuth application on Google Workspace.

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Create Connection and Credential record for Google Sheets spoke

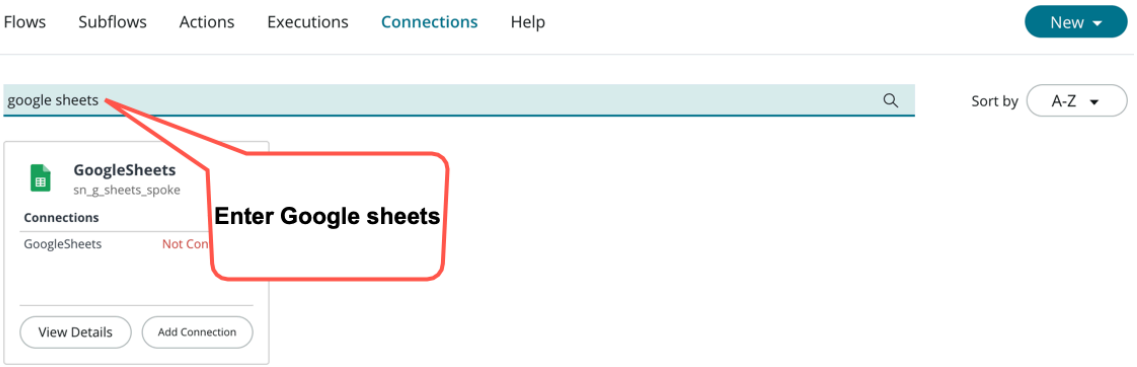
Create a connection and credential record that contains the details required to connect to the Google Sheets Application Programming Interfaces (API) on the Google Workspace.

Before you begin

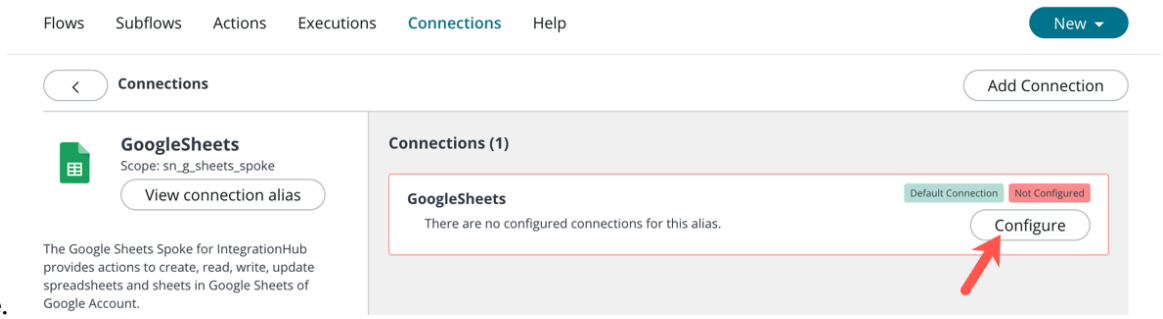
- Create an OAuth application for the Google Sheets APIs in the Google Workspace. To learn how to create an OAuth application, see Set up OAuth app on Google Sheets API.
- Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Click Connections.
3. In the Search all connections field, enter `Google sheets`.



4. On the GoogleSheets card, click **View Details**.
5. Click **Configure**, as shown in the image.



6. Fill the form.

Configure Connection

Field	Description
Connection Name	Name of the connection. **Note:** The field is read-only.
Connection URL	The URL used for connecting to Google Sheets APIs. This field is automatically set to `https://sheets.googleapis.com/v4/spreadsheets`

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Field	Description
Credential Name	Name of the credential. This field is automatically set to `Google Sheets Spoke Credential`.
OAuth Entity Name	Name of the OAuth entity profile. This field is automatically set to `Google Sheets Spoke OAuth`.
OAuth Client ID	Client ID of the Google Sheets application you registered in G Suite.
OAuth Client Secret	Client Secret generated when you registered the application in Google API Console.
OAuth Redirect URL	The redirect URL. The format of the URL is `https://<your-instance>.service-now.com/oauth_redirect.do`

7. Click **Create and Get OAuth Token**.

Google Tasks Spoke

Manage Google tasks and list from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

API version v1.

Spoke version

Google Tasks spoke v1.4.0 is the latest version. For version history of the spoke, see Google Tasks spoke release notes.

Spoke subflows

The Google Tasks spoke provides sample subflows in the draft state to demonstrate automating Google Tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Move a ServiceNow attachment to Google Tasks	Copies an attachment from ServiceNow to Google Tasks.

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Spoke actions

The Google Tasks spoke provides actions to automate Google Tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Task Management	Complete Task	Mark a task complete in a task list.
	Create Task	Create a task in a task list.
	Delete Task	Delete a task from a task list.
	Get Task	Retrieve details of a specified task from a task list.
	Look Up Tasks	Retrieve details of specified tasks from a task list.
	Update Task	Update details of the specified task in a task list.
Task List Management	Create Task List	Create a task list in your Google Tasks account.
	Delete Task List	Delete the specified task list.
	Get All Task Lists	Retrieve the details of all task lists in your Google Tasks account.
	Get Task List	Retrieve details of a specified task list.
	Update Task List	Update details of a specified task list.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Google Tasks Task Management AI Agents	Manages task management tasks (that is, get a tasklist ID from a tasklist name, delete a

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AI agent	Description
	task, get a task, update a task, create a task, complete a task) in Google Tasks.
Google Tasks Tasklist Management AI Agents	Manages tasklist management tasks (that is, update a tasklist, delete a tasklist, get a tasklist, create a tasklist, get all tasklists, get a tasklist ID from a tasklist name) in Google Tasks.
Google Tasks AI Agents	Retrieves tasklist ID from a tasklist name from Google Tasks.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Google Tasks spoke account requirements

The Google Tasks spoke requires a custom app that you create in the Google Developers Console.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Google Tasks spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Google Tasks alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Google Tasks spoke

Integrate the ServiceNow instance and the Google Tasks spoke by using the G Suite credentials to authenticate the ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Google Tasks spoke.
- Role required: admin.

Set up an OAuth 2.0 Client application

Create a custom OAuth application to enable OAuth 2.0 authentication of the ServiceNow by the Google Workspace.

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Before you begin

Google Tasks integration requirements:

- A domain and an email address associated with the domain. For example, www.mydomain.com and jane-admin@mydomain.com. Note that you can only register one email address per domain in G Suite.
- A Google G Suite or Gmail login created with the domain.

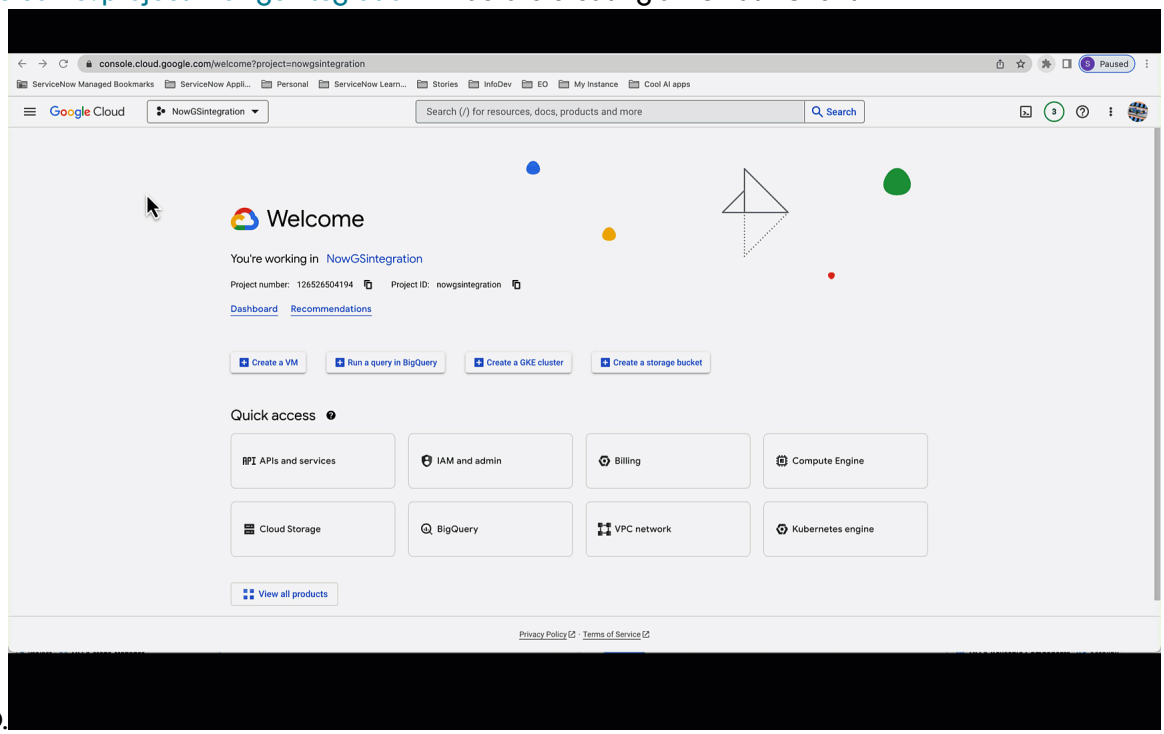
Role required: admin.

About this task

Complete these steps from the Google Developers Console. See the G Suite product documentation for instructions on creating and configuring custom applications.

Procedure

1. Navigate to https://console.developers.google.com, create a project with your G Suite administrator credentials, and open the project.
2. From the APIs & Services menu, select **OAuth consent screen**.
3. Enter the application name, and specify the Authorized domain `service-now.com`.
4. Select **Save**.
5. From the APIs & Services menu, select **Credentials**, and select **Create OAuth client ID** from the **Create credentials** list.
6. Select the application type **Web application**.
7. Enter the following Authorized redirect URI: `https://<instance>.service-now.com/oauth_redirect.do` and select **Create**.
8. Copy the Client ID and the Client Secret to a text file.
   The animation demonstrates the setting up of OAuth Client ID. You must activate the Google Tasks API on https://console.cloud.google.com/welcome?project=nowgsintegration before creating an OAuth Client ID.



Tip: Save the JSON file containing the OAuth client details for later reference.

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Configure a connection for Google Tasks spoke

Create a connection and credential record to establish a connection between the ServiceNow instance and the Google Workspace.

Before you begin

Role required: admin.

About this task

The connection and credentials contain the details such as the client ID, client secret, and the redirect URL that the Google Workspace must authenticate the ServiceNow instance.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select Integrations.
3. In the Search all connections field, enter `Google Tasks`.
4. On the Google Tasks tile, select **View Details**.
5. Select **Configure**.
6. Fill the form with the details given in the table.

Configure connection form

Field	Description
Connection Name	Name of the connection between the Google Workspace and the ServiceNow instance. **Note:** The default name is Google Tasks and it's read-only. However, you can provide custom names when you set up more connection and credential records after this record.
Connection URL	Enter the URL `https://www.googleapis.com` **Note:** Make sure that you don't include spaces before or after this URL. If there are spaces, the connection fails. .
OAuth Client ID	The OAuth client ID generated when you created the OAuth client ID.
OAuth Client Secret	The OAuth client secret generated when you created the OAuth client ID.
OAuth Redirect URL	The OAuth redirect URL. It must be in the format https://<instance-name.service-now.com>/oauth_redirect.do.

7. Select **Configure and Get OAuth Token**.

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GoTo Spoke

The GoTo spoke provides actions to view and analyze meaningful usage data for GoTo software subscriptions. Analyze usage for GoToMeeting, GoToWebinar, and GoToConnect to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

GoTo spoke v2.0.1 is the latest version. For version history of the spoke, see GoTo Spoke release notes.

Supported versions

This spoke was built for LogMeIn Admin Center v5.29.0, but may be compatible with later versions.

Spoke requirements

GoTo admin account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The GoTo spoke provides actions to automate GoTo tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Connect Management	Look up Connect Users Stream	Retrieves a list of all users with a GoToConnect license within a GoTo account.

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Category	Action	Description
	Look Up User Activity Summary Stream	Retrieves a summary of all user activities, including information about the set of users and their associated metrics.
	Look Up User Activity Details Stream	Retrieves the activity records of the specific user.
License Management	Look Up Licenses	Retrieves a list of all product licenses within a GoTo account.
	Remove User License	Removes a user from a specified product license.
Meeting Management	Get Historical Meeting Report	Reports the meeting history of all organizers within a GoTo account during a given date range.
	Get Upcoming Meeting Report	Reports meetings that are scheduled for all organizers within a GoTo account during a given date range.
User Management	Delete User	Deletes a user from a GoTo account.
	Look up Authenticated User	Retrieves details of the authenticated user, including information about the accounts the user holds.
	Look up Users	Retrieves a list of all users within a GoTo account.
Webinar Management	Get Webinars	Retrieves a list of all webinars for a GoTo account.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the GoTo spoke.

Set up the GoTo spoke

Integrate the ServiceNow instance and GoTo by creating a custom OAuth client in GoTo to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the GoTo spoke.
- GoTo role required: User with a LogMeIn developer account and admin account.
- Role required: admin.

Create a GoTo OAuth client

Create an OAuth client for authenticating GoTo API requests.

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Before you begin

Role required: GoTo user with a LogMeIn developer account and admin account.

Procedure

1. From a web browser, open the GoTo Developer Center.
2. Sign in using your LogMeIn developer account.
   If you have not already set up a LogMeIn developer account, see How to login or create a developer account for detailed instructions.
3. From the LogMeIn Developers home page, select the **OAuth Clients** tab.
4. Click **Create a client**.
5. On the Details tab of the form, fill in the client details.

Details tab of Create Client form

Field	Description
Client name	Name of the OAuth client.
Description	Optional description for the OAuth client.
Redirect URLs	Redirect URL of the ServiceNow instance on which you are integrating your GoTo applications. Enter `https://<instance-url>/oauth_redirect.do`, where `<instance-url>` is the URL of your ServiceNow instance.

6. Click **Next**.
7. On the Scopes tab, specify the level of access that the OAuth client has to your GoTo users and applications.

Scopes tab

Field	Description
Profile	OAuth scopes for getting and modifying user information for your authenticated users. The **Get user information** scope is enabled automatically. Select the check box to enable the **Modify user details** scope.
GoToMeeting, GoToWebinar, or GoTo Training	OAuth scope for creating, starting, and modifying sessions for your GoToMeeting, GoToWebinar, and GoTo Training applications. Select the check box to enable this scope. **Note:** The SaaS License Management GoTo integration does not support license management for the GoTo Training application.
GoTo Assist Remote Support or Service Desk	OAuth scope for creating, starting, and modifying sessions for the GoTo Assist Remote Support and Service Desk applications. Leave this check box unselected. **Note:** The SaaS License Management GoTo integration does not support license management for the GoTo Assist applications.

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Field	Description
SCIM	OAuth scope for automating user management using the System for Cross-domain Identity Management (SCIM) protocol. Leave this check box unselected.
Admin Center	OAuth scope for managing LogMeIn users through the GoTo Admin Center. Select the check box to enable this scope.
GoToConnect	OAuth scope for initiating phone calls and other telephone services using GoToConnect. If the GoToConnect license is enabled, select these check boxes: ○ Access call history for phone lines in the PBX [cr.v1.read] ○ Retrieve your phone line information [users.v1.lines.read]

8. Click **Save**.
9. On the Credentials tab, copy the values in the **Client ID** and **Client secret** fields. Save them in a secure location for later use.
10. Select the check box to verify that you have stored the client secret.
11. Click **Done**.

Create a GoTo connection

Create a connection between your GoTo applications and your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. From your ServiceNow instance, navigate to **Process Automation** > **Flow Designer**. The Flow Designer launches in a new tab.
2. Select the **Connections** tab.
3. Click **View Details** for your GoTo connection.
4. From the list of available connections, locate GoTo and then click **Configure**. The Configure Connection dialog box opens.
5. In the dialog box, fill in the fields.

Configure Connection dialog box

Field	Description
Connection Name	Name of the GoTo connection. This field populates automatically.
Name	Name of your GoTo credentials. This field populates automatically.
OAuth Client ID	Client ID that is assigned to your GoTo OAuth client.
OAuth Client Secret	Client secret that is assigned to your GoTo OAuth client.

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Field	Description
OAuth Redirect URL	Redirect URL of the ServiceNow instance on which you are integrating your GoTo applications. This field populates automatically.

6. Click **Configure and Get OAuth Token**.
   The Authorize App dialog box opens.
7. On the dialog box, click **Allow**.
   The OAuth access token becomes available for authorizing your GoTo connection.
8. If the GoToConnect license is enabled, navigate to the **Connections** tab.
9. Find the connection for GoToConnect and click **View Details**.
10. Click **Get OAuth Token** to generate a token for GoToConnect.

GovNotify Spoke

Use the GovNotify spoke to send emails, texts, and letters based on automation in your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

GovNotify spoke v1.3.0 is the latest version. For version history of the spoke, see GovNotify spoke release notes.

Supported versions

This spoke was built for GovNotify API version v2, but may be compatible with later versions.

Spoke flows

The GovNotify spoke provides the sample flow, Send a Text Message to User to demonstrate sending a text message to the specified user. To customize the sample flow, copy it to the required application scope.

Spoke subflows

The GovNotify spoke provides the sample subflow, GovNotify Webhook Callback to demonstrate automating tasks. To customize a sample subflow, copy it to the required application scope.

Spoke actions

The GovNotify spoke provides actions to automate tasks when events occur in your ServiceNow instance. Available actions include:

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Action	Description
Look up Notification Status by ID	Retrieves the latest notification by the notification ID.
Look up Notifications	Retrieves up to 250 messages and statuses that is one page.
Send a Letter	Sends a physical notification letter to a recipient.
Send a Text Message	Sends a text message to a recipient.
Send an Email	Sends an email notification to the recipient.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
GovNotify message manager	Manages notifications and messages (that is, send a text message, email, or letter, look up notifications, look up notification status by ID) in GovNotify.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke module

The GovNotify spoke adds the GovNotify Spoke application to your instance and includes these modules:

Module	Description
Client Details	Stores the client record that authenticates the requests.

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Module	Description
Credentials	Contains the default credential record of the GovNotify spoke.
Templates	Displays the details of the templates in your GovNotify account.
Text Notifications	Displays the details of sent text messages.
Transactions	Displays the details of all sent messages. The records include transactions for emails, text messages, and letters.
Webhook Decision Answers	Stores the webhook answer record that triggers the required subflow.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the GovNotify spoke.

Set up the GovNotify spoke

Integrate ServiceNow instance and GovNotify account using JWT authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the GovNotify spoke.
- Role required: admin.

Procedure

1. In the GovNotify account, create an API key.
   a. Log in to your GovNotify account as admin.
   b. Navigate to **API integration** and click **API Keys**.
   c. Click **Create an API key**.
   d. On the form, provide a name for the API key and select the required key type.

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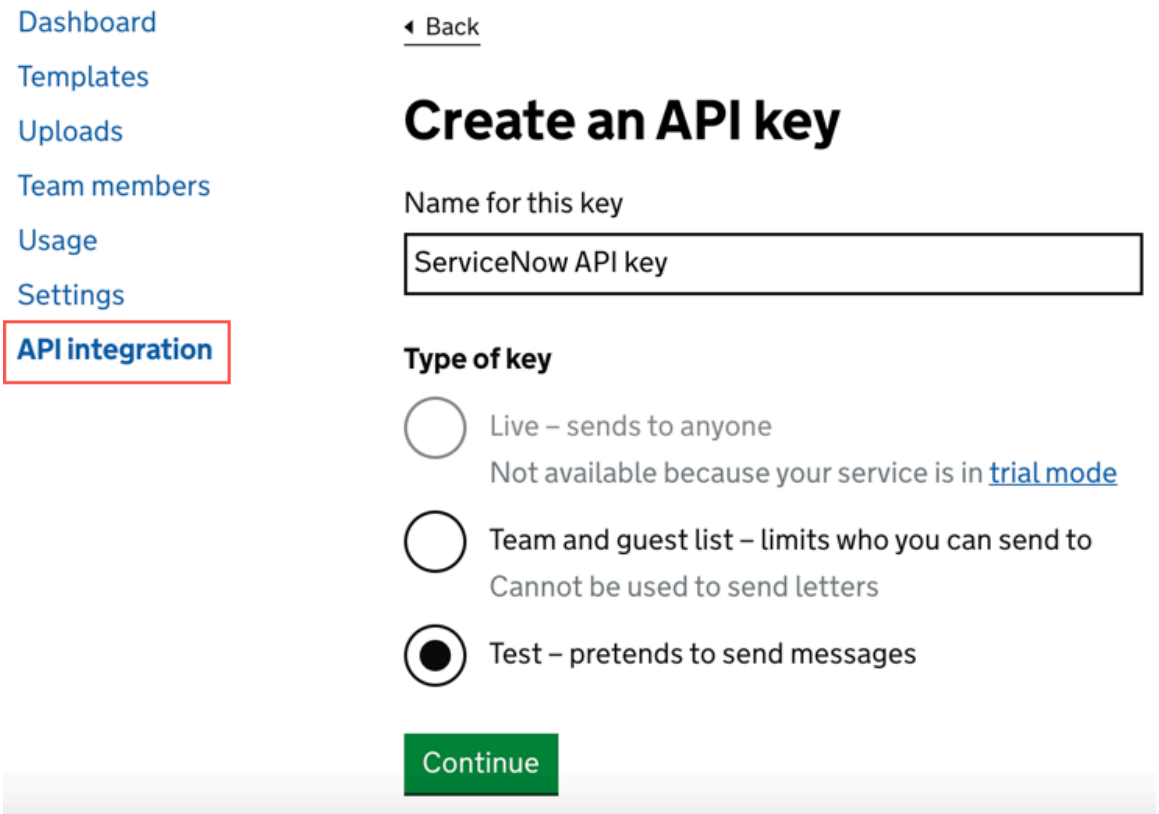
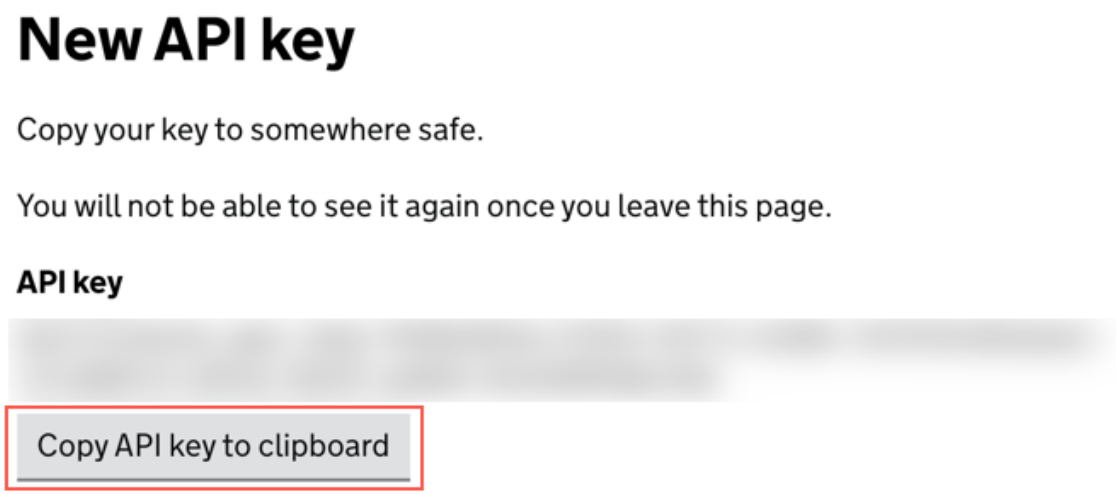


e. Click **Continue**.
The API key is displayed in this format: `{key_name}-{iss-uuid}-{secret-key-uuid}`. For example, if the API key is `my_test_key-26785a09-ab16-4eb0-8407-a37497a57506-3d844edf-8d35-48ac-975b-e847b4f122b0`:

- API key name is: `my_test_key`
- iss (service id) is: `26785a09-ab16-4eb0-8407-a37497a57506`
- secret key or signing key is: `3d844edf-8d35-48ac-975b-e847b4f122b0`

For more information, see Headers in GovNotify REST API documentation.

f. Click **Copy API key to clipboard** and record the value for later use.



2. Configure the default JWT key record in your ServiceNow instance.

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a. Navigate to **System OAuth** > **JWT Keys**.

b. Open the record, **GovNotify Key**.

c. Enter the signing key you had copied from the API key in **Signing key**.

d. Click **Update**.

3. Configure the default JWT provider record in your ServiceNow instance.

a. Navigate to **System OAuth** > **JWT Providers**.

b. Open the record, **GovNotify JWT Provider**.

c. In the **Standard claims** tab, click the **iss** record.

d. Enter the iss (service id) value you had copied from the API key in **Claim value**.

e. Click **Update**.

4. Configure the default credential record in your ServiceNow instance.

a. Navigate to **GovNotify Spoke** > **Credentials**.

b. Open the record, **GovNotify Cred**.

c. For **JWT Provider**, select the JWT provider you had configured.

d. Click **Update**.

5. Configure the default connection and credential alias record in your ServiceNow instance.

a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

b. Open the record, **GovNotify**.

c. In the **Connections** tab, click **New**.

d. On the form, fill these values.

HTTP(s) Connection form

Field	Description
Credential	Credential record you had configured. For example, `GovNotify Cred`.
Connection URL	URL to connect to GovNotify account. Enter `https://api.notifications.service.gov.uk`.

e. Click **Submit**.

Set up the webhook for the GovNotify spoke

Configure a webhook to subscribe to GovNotify with a ServiceNow callback URL.

Before you begin

- Set up the GovNotify spoke
- Role required: admin

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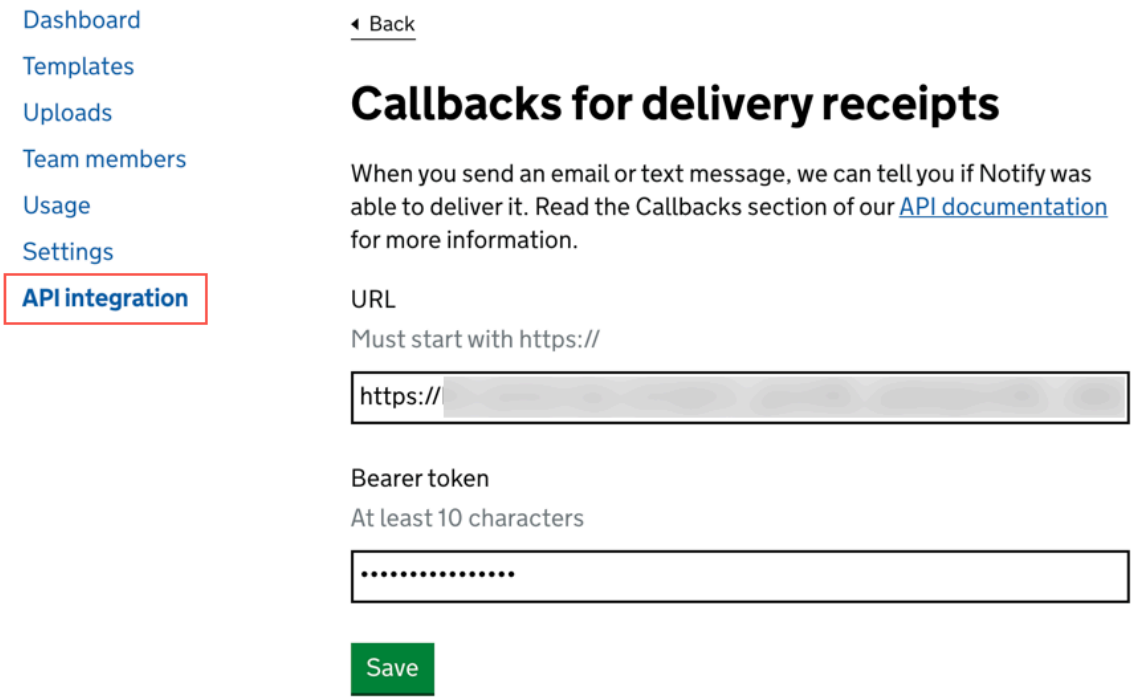
Procedure

1. Copy the scripted REST API URL for the GovNotify spoke from your ServiceNow instance.
   a. Navigate to **System Web Services** > **Scripted REST APIs**.
   b. Open the record, **GovNotify Callback**.
   c. Copy and record the value of **Base API path** for later use.
2. Add the callback URL in GovNotify account.
   a. Log in to your GovNotify account as admin.
   b. Navigate to **API integration** and click **Callbacks**.



   c. On the form, enter these values.

Field	Description
URL	Callback URL in this format: `https://<ServiceNow-instance>.com/<base-api-path>`.
Bearer token	Token to authenticate the request. Enter a token as per your requirement.

   d. Click **Save**.
3. Create client record in your ServiceNow instance.
   a. Navigate to **GovNotify Spoke** > **Client Details**.
   b. Click **New**.

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c. On the form, fill these values.

Field	Description
Name	Name to identify the client record.
Authorization Key	Bearer token you had provided in the GovNotify account.

d. Click **Submit**.

4. Create webhook answer record in your ServiceNow instance.

a. Navigate to **GovNotify Spoke** > **Webhook Decision Answers**.

b. Click **New**.

c. On the form, fill these values.

Field	Description
Subflow	Subflow that needs to be triggered. Select the default subflow or the subflow you had configured as per your requirement.
Description	Description of the webhook decision answer.

d. Click **Submit**.

5. Configure the webhook decision policy in your ServiceNow instance.

a. Navigate to **System Definition** > **Decision Tables**.

b. Open the record, **GovNotify Webhook Decision Policy**.

c. In the **Decisions** tab, open the **Default decision** record.

d. For **Answer**, select the sys_ID of the webhook answer record you had created.

e. Click **Update**.
The subflow that is configured in the webhook answer record is triggered when conditions in the webhook decision policy are met.

Gremlin Spoke

Simulate outages and manage attacks using Gremlin instance from your ServiceNow instance.

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Important:

Starting with the Yokohama release, Gremlin Spoke is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported. Spoke Generator provides the latest experience for this functionality.

For details, see the Deprecation Process [KB0867184] article in the Now Support knowledge base.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Gremlin spoke v1.0.3 is the latest version. For version history of the spoke, see Gremlin spoke release notes.

Supported versions

This spoke was built for Gremlin version v1, but may be compatible with later versions.

Spoke requirements

- Set up clients as per your requirement.
- Admin access to the Gremlin dashboard.
- Team in your Gremlin account for integration with ServiceNow instance. For more information about creating teams, see Teams.
- Team ID and API Key of the team. Copy and record these value for later use. For more information about accessing these values, see the Signature-based Authentication section.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Gremlin spoke provides actions to automate Gremlin tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
Attack Management	Create Attack	Creates an attack on the Gremlin platform.
	Get Attack Details	Retrieves details about an attack.
	Get Attack Executions	Retrieves a list of executions associated with an attack.
	Halt All Attacks	Idempotently halts all active attacks across the Gremlin platform.
	Look up Attacks	Lists all attacks on the Gremlin platform. **Note:** • By default, this action can retrieve data up to 5 MB. You can configure the *glide.pf.rest.response_payload_max_size* property to retrieve data up to 10 MB. If the data in the response is more 10 MB, an error is displayed. • As data up to 10 MB only can be retrieved, you can also specify number of records that should be retrieved in the input field, **Number of records to return**.
Attack Schedule Management	Create Attack Schedule	Creates an attack schedule on the Gremlin platform.
	Delete Attack Schedule	Deletes the specified attach schedule.
	Get Attack Schedule Details	Retrieves details about the specified attack schedule.
	Look up Active Attack Schedules	Lists all the attack schedules on the Gremlin platform.

Note:

- Time zone that is considered in the spoke actions, is same as the time zone of your ServiceNow instance.
- Based on your Gremlin license, if you don't have access to certain Gremlin functionality, you can't use the associated spoke actions in your ServiceNow instance as well.
- For some arguments that take `True` or `False` as input, the actual value that the Gremlin platform considers, might be different from the value you have provided.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Create Connection and Credential record for the Gremlin spoke.

Create Connection and Credential record for the Gremlin spoke

Authorize the Gremlin spoke actions by creating connection and credential record for the application registered in Gremlin. The Gremlin spoke connection and credential alias uses these connections and credentials to authorize actions.

Before you begin

- Request an Integration Hub subscription.
- Activate the Gremlin spoke.
- Role required: admin.

Procedure

1. Navigate to **All** > **Connection & Credentials** > **Connection & Credential Alias**.
2. Open the record, **Gremlin**.
3. Click the **Create New Connection & Credential** related link.
4. On the form, fill these values.

Field	Description
Connection Name	Name to identify the connection record. By default, this is `Gremlin Connection`. You may change it as per your requirement.
Connection URL	URL to connect to Gremlin. By default, this is `https://api.gremlin.com`.
API Version	API version of the Gremlin platform. By default, this is `v1`.
Team ID	Team ID of your team.
API Key	API Key of your team.
Credential Name	Name to identify the credential record. By default, this is `Gremlin Credentials`. You may change it as per your requirement.

5. Click **Create**.

Guidewire Spoke

Integrate a ServiceNow instance with your Guidewire account to look up insurance customer and policy information, and manage claims.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Guidewire Spoke v1.3.0 is the latest version. For version history of the spoke, see Guidewire Spoke release notes.

Supported versions

This spoke was built for Guidewire application programming interface (API) version Elysian (2022.05) , but may be compatible with later versions. This spoke also supports APIs on Guidewire Cloud InsuranceSuite.

Key features

Guidewire spoke application enables a flow designer to build workflows from actions which call the Guidewire InsuranceSuite cloud APIs. These actions can be called from any subflows within the insurance applications which provide real-time integration with Guidewire. Manage ClaimCenter, PolicyCenter, and ContactManager actions that:

- Create, cancel, submit, validate, update, and close claims.
- Manage customer contact details.
- Retrieve policies associated with the customer.
- Delete or change claim details.
- Add notes to claims.

Spoke requirements

Guidewire account

Spoke dependencies

Ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: If used outside the spoke implementation, some of these plugins are licensable features and need appropriate licenses.

Spoke actions

The Guidewire spoke provides actions to trigger Guidewire's cloud InsuranceSuite processes when events happen in your ServiceNow instance. This spoke integrates with most APIs from Guidewire's ContactManager, PolicyCenter, and ClaimCenter relevant to auto and property insurance claims. You can extend and customize the available actions for your business needs.

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Note:

- Across all Guidewire actions included in this spoke, only a subset of the fields from Guidewire responses are parsed into the action outputs. This spoke returns the entire Guidewire JSON response.
- Streaming actions retrieve records individually instead of the entire list simultaneously.

Available actions include the following.

Category	Action	Description
Contact Management	Look up Companies in Contacts Stream	Retrieves a stream of company contact records from Guidewire's ContactManager based on search parameters.
	Look up Company Contact from Contact Manager by Contact ID	Retrieves the details of a company contact record using its Contact ID from Guidewire's ContactManager.
	Look up Contact Manager Typelist	Enumerates the available values for a specific Typelist in ContactManager. The Typelist name is provided in the description of each field that uses a Typelist enumeration.
	Look up Person Contact from Contact Manager by Contact ID	Retrieves the details of a person contact record using its Contact ID from Guidewire's ContactManager.
	Look up Persons in Contacts Stream	Retrieves a list of person contact records from Guidewire's ContactManager based on search parameters.

Category	Action	Description
Policy Management	Bind and Issue Policy Transaction	Initiates validation of data to make coverage become effective, and triggers the creation of a binding document.
	Initiate Policy Cancellation	Begins the cancellation process by selecting the specified policy and providing the necessary information and reason for cancellation.
	Look up Company Account by Account ID	Retrieves information about a company's account, including all of its policies, and other interactions, based on its account ID.
	Look up Company Accounts Stream	Retrieves a stream of all company account records from the Guidewire system that match the input criteria. Information retrieved may include details such as the company's name, contact information, and other relevant information.
	Look up Insurance Policies Stream	Retrieves a list of insurance policies from the Guidewire PolicyCenter application. Retrieved information can include policy numbers, effective dates, expiration dates, coverages, endorsements, and other relevant information.

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Category	Action	Description
	Look up Insurance Policy by Policy ID	Retrieves information about an insurance policy based on its policy ID. Information retrieved may include a policy's effective date, expiration date, policy limits, deductibles, endorsements, and other relevant information about provided coverage.
	Look up Person Account by Account ID	Retrieves information about a person's account, including the IDs of all their policies and account details such as First Name, Last Name, and Preferred Currency, based on their account ID.
	Look up Person Accounts Stream	Retrieves a stream of all person account records from the Guidewire system. Retrieved information may include details such as the person's name, contact information, policy details, and other relevant information.
	Look up Policy Center Typelist	Enumerates the available values for a specific Typelist in PolicyCenter. The Typelist name is provided in the description of each field that uses a Typelist enumeration.
	Look up Policy Contact by Contact ID	Retrieves the details of a policy contact record using its Contact ID from Guidewire's PolicyManager.
	Look up Policy Document Content by Document ID	Retrieves the content of a specific policy document using its unique document ID.
	Look up Policy Document Content by Policy ID Stream	Retrieves the policy content of all documents associated with the specified policy using the policy ID stream.
	Look up Policy Locations by Policy ID	Retrieves a list of physical locations associated with a specified insurance policy, based on the policy ID, returning information such as the mailing address, billing address, and property address.
	Look up Product by Product ID	retrieve information about the specific insurance product, based on the product ID.
	Look up Product Coverables by Line ID Stream	Retrieves information about the coverages and options associated with a specific insurance product line, based on the line ID.
	Look up Product Coverable Coverages on Line by Coverable ID Stream	Retrieves information about the various types of insurance coverage offered by an insurance product, by the ID assigned to each type of coverage within the product.
	Look up Product Coverages by Line ID Stream	Retrieves information about product coverages associated with a specific line ID stream.
	Look up Product Lines by Product ID Stream	Retrieves information about the product lines associated with the specific product, based on the product ID.

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Category	Action	Description
	Quote Policy Transaction	Generates a quote for a policy transaction.
	Withdraw Policy Transaction	Cancels or revoke a policy transaction that has been initiated or in progress.

Category	Action	Description
Claim Management	Cancel Draft Claim	Discards the draft claim and removes all information about the draft claim from the ClaimCenter database.
	Close Claim	Updates the status of the claim to "closed" or "settled", and updates any associated financial transactions to reflect the final settlement of the claim. **Note:** In addition to updating the claim status, the "Close claim" action may also involve other related tasks. Tasks could include closing any associated activities or tasks, and generating final reports or documentation related to the claim. The details of this action can vary depending on the Guidewire application being used, as well as the particular business processes and workflows being followed by the insurance company.
	Close Exposure on Claim	Closes the specified exposure, based on the exposure ID.
	Create Check-Sets on Claim	Creates a set of checks and payment transactions for a claim.
	Create Claim Contact	Creates a ClaimContact on the claim.
	Create Document on Claim	Creates a document on the claim.
	Create Draft Auto Claim with additional objects (composite requests)	
	Create Draft Claim	Creates a non-open draft claim with claim ID and claim number in the ClaimCenter database.
	Create Exposure on Claim	Creates an exposure object for tracking potential payments on the given claim.
	Create Fixed	Creates an incident object that captures loss information about a fixed property.

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Category	Action	Description
	Property Incident on Claim	
	Create Injury Incident on Claim	Creates an incident object for capturing single-injury loss information on the specified claim.
	Create Minimal Draft Claim	Creates an insurance claim with minimal initial data required for the claim.
	Create Note on Claim	Creates a note on an existing claim or activity.
	Create Reserves on Claim	Creates financial reserves for a claim in the Guidewire ClaimCenter application based on the specified parameters. Parameters could include the type of loss, the severity of the claim, the estimated costs of repair or replacement, and other relevant factors.
	Create Vehicle Incident on Claim	Creates an incident object that captures loss information about a vehicle.
	Delete Check on Claim	Deletes an individual check, subject to business constraints, from the claim.
	Delete Claim Contact	Deletes a Claim Contact from the specified claim.
	Delete Document on Claim	Deletes a document from the claim.
	Delete Exposure on Claim	Deletes an exposure object from the specified claim.
	Delete Fixed Property Incident on Claim	Deletes a fixed property incident object from the specified claim.
	Delete Injury Incident on Claim	Deletes an injury incident object from the specified claim.
	Delete Vehicle Incident on Claim	Deletes a vehicle incident object from the specified claim.

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Category	Action	Description
	Look up Claim by Claim ID	Retrieves detailed information about a claim from the ClaimCenter database, based on the claim ID.
	Look up Claim Center Typelist	Enumerates the available values for a specific Typelist in ClaimCenter. The Typelist name is provided in the description of each field that uses a Typelist enumeration.
	Look up Claims Stream	Retrieves claim records based on criteria entered.
	Look up Contacts on Claim by Claim ID Stream	Retrieves contact information associated with the claim from the ClaimCenter database, based on the claim ID.
	Look up Persons in Contacts Stream	Retrieves a stream of records of information about individuals associated with a specified policy or claim. This action searches the Guidewire system when one or more search criteria, such as an individual's name, email address, phone number, or policy number is specified. This action enables more efficient processing by the requesting system.
	Look up Policy Coverages on Claim by Claim ID Stream	Retrieves the coverage details associated with the insurance policy.
	Look up Policy Locations on Claim by ID Stream	Retrieves the physical locations associated with the insurance policy.
	Look up Policy on Claim by Claim ID	Retrieves the policy information associated with the claim from the ClaimCenter database, based on the claim ID.
	Look up Policy Vehicles on Claim by Claim ID Stream	Retrieves the vehicle risk units associated with an insurance policy.
	Submit Claim	Submits the draft claim as an open claim with an open claim number assigned, and executes automated claim setup, including business rules.
	Update Check on Claim	Updates the status of a check on a claim.

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Category	Action	Description
	Update Claim	Updates the details of the claim, which may include the claimant's information, policy details, loss details, and claim status.
	Update Claim Contact	Updates a claim contact for the specified claim.
	Update Claim Using Composite Request	Updates a claim by combining multiple updates into a single composite request.
	Update Document on Claim	Enables changing the content of a document associated with a claim, and updates the specified document.
	Update Exposure on Claim	Updates an exposure object, the estimated loss amount/potential payments, on the specified claim.
	Update Fixed Property Incident on Claim	Updates an existing incident associated with a fixed property on the specified insurance claim in Guidewire.
	Update Injury Incident on Claim	Updates an incident injury object for capturing single-injury loss information on the specified claim.
	Update Vehicle Incident on Claim	Updates an existing incident associated with an injury on the specified insurance claim.
	Validate Claim	Checks if the specified claim meets certain criteria or requirements set by the insurer before it can be processed further in Guidewire.
	Validate Exposure	Validates the exposure, based on the exposure ID, and return a response indicating whether the exposure is valid or not.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Guidewire spoke.

Set up the Guidewire spoke

Integrate the ServiceNow instance and Guidewire using basic Auth or OAuth 2.0 authentication to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Guidewire spoke.
- Choose and implement the Guidewire authentication approach appropriate for your application. See the Guidewire documentation for Choosing an authentication flow for details.
- Ensure that the dependent plugins are activated.
- Role required: admin.

Register Guidewire as an OAuth provider

Use the information generated during the Guidewire application configuration to register Guidewire as an OAuth provider. OAuth provider registration enables the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

- Role required: admin
- Client ID and client secret generated from configuration of the third-party Guidewire application

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Select **New**.
   The system displays this message: `What kind of OAuth application?`.
3. Select **Connect to a third party OAuth Provider**.
4. On the form, fill these values.

Application Registries form

Field	Description
Name	Name to uniquely identify the record. For example, enter: `Guidewire OAuth`
Client ID	<Client ID> created during the Guidewire account configuration.
Client Secret	<Client Secret> created during the Guidewire account configuration.
Authorization URL	OAuth authorization code endpoint.
Token URL	OAuth server token endpoint.
Token Revocation URL	OAuth server token revocation endpoint.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`
OAuth API Script	Script to customize the request and response.
Logo URL	URL that contains an image to use as the application logo.

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Field	Description
Default Grant Type	Grant type used to establish the token..
Refresh Token Lifespan	Time, in seconds, that the refresh token is valid. The default time is 8,640,0000 seconds.
PKCE required	Option to enable public clients to require PKCE for an authorization. **Note:** You can use only **Authorization Code** as the **Default Grant type** when **PKCE** is enabled.
Application	Application scope that contains this record.
Accessible from	Application scope that this registry is accessible from.
Active	Option to actively use the application registry.
Use mutual authentication	Option to use mutual authentication for token request and revocation. This option requires a mutual authentication profile to be specified.
Send credentials	Option for whether or how to send authentication information identifying the application and its authorized users to the OAuth server.

5. On the form header, select **Submit**.

Create OAuth 2.0 credential record for the Guidewire spoke

Create credential records to the Guidewire custom OAuth application you created during Guidewire account configuration. The Guidewire spoke connection and credential aliases use these credentials to authorize actions in Guidewire application. The Guidewire connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

The following example shows the steps for creating a credential record for Guidewire PolicyCenter, Guidewire ContactManager, or Guidewire ClaimCenter.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **OAuth 2.0 Credentials**.
   The pop-up window displays a blank OAuth 2.0 Credentials form.
4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `Guidewire OAuth2.0 API Credentials`.
Active	Enable

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Field	Value required
OAuth Entity Profile	Select the OAuth profile you created when you registered the custom Equifax application as an OAuth provider. For example, select **Equifax OAuth default profile**.
Applies to	Select the MID Servers that can use this credential. For example, select **All MID Servers**.
Order	Select the order to apply this credential. For example, enter `100`.

5. Select **Submit**.
6. To generate the OAuth token, select the **Get OAuth Token** related link.

Create Basic Auth credential record for the Guidewire spoke

Create a Basic Auth credential record for the Guidewire application. The Guidewire connection and credential alias uses these credentials to authorize actions in Guidewire PolicyCenter, Guidewire ContactManager, and Guidewire ClaimCenter.

Before you begin

Role required: admin

The following example shows the steps for creating a basic Auth credential record for Guidewire PolicyCenter, Guidewire ContactManager, and Guidewire ClaimCenter.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select Basic Auth Credentials.
4. On the form, fill in the fields.

Field	Description
Name	Name to uniquely identify the record. For example, Guidewire.
User name	User name to be entered as credential.
Password	Password to be entered as credential.
Active	Option to actively use the credential record. Select the option.
Order	Order that the credentials are used. For example, enter `100`.

5. Right-click the form header and select **Submit**.

Switch between basic Auth and OAuth 2.0 credential

You can choose to switch between implemented basic Auth and OAuth 2.0 authentication based on your event or security needs.

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Before you begin

- Role required: admin
- Create Basic Auth credential record for the Guidewire spoke
- Register Guidewire as an OAuth provider

The following example shows the steps for switching from basic auth to OAuth 2.0 for the Guidewire ClaimCenter application.

Procedure

1. Navigate to **AllConnections & CredentialsConnection & Credential Aliases**.
2. Select the Guidewire ClaimCenter record you want to re-configure.
3. From the **Connections** tab, open the existing target connection record.
4. In the **Credential** field, select the reference lookup icon.
5. Select the credential record.

   - If switching the authentication method from basic auth to OAuth 2.0, select the credential record created during OAuth setup.
   - If switching the authentication method from OAuth 2.0 to basic auth, select the credential record created during basic Auth setup.

6. Save the record.

What to do next

Get Guidewire OAuth token

Create connection record for the Guidewire spoke

Create a connection record for your Guidewire application. The Guidewire connection and credential aliases use these connections to perform actions in Guidewire PolicyCenter, Guidewire ContactManager, and Guidewire ClaimCenter.

Before you begin

Role required: admin

The following example shows the steps for creating a connection record for Guidewire PolicyCenter, Guidewire ContactManager, or Guidewire ClaimCenter.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record, for example, **Guidewire ClaimCenter**.
3. From the **Connections** tab, select **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Guidewire Connection`.

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Field	Description
Credential	Basic Auth or OAuth 2.0 credential record created for Guidewire. For example, `Guidewire OAuth2.0 API Credentials`.
Connection alias	Alias record associated with this connection.
Connection URL	Base URL to connect to **Guidewire**.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

5. Select **Submit**.

Get Guidewire OAuth token

Generate the Guidewire access token.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select the Guidewire spoke OAuth Credential record.

   Example
   For example, select **Guidewire OAuth2.0 Credentials**.
3. From Related Links, select **Get OAuth Token**.

Result

The Guidewire spoke receives a new OAuth access token.

HL7 FHIR Spoke

Integrate ServiceNow with any HL7 FHIR R4-conformant server. The HL7 FHIR Spoke gives Workflow Studio authors a typed, paginated, error-handled way to read FHIR R4 provider-directory resources — Organization, Location, Practitioner, and PractitionerRole — from your ServiceNow instance.

The HL7 FHIR Spoke is an Integration Hub action pack that exposes eight read-only Workflow Studio actions — a look-up-by-ID action and a search-and-stream action for each of the four FHIR R4 provider-directory resources. Health systems expose practitioner, organizational, and location data through HL7 FHIR R4 APIs, but Workflow Studio has no native way to query those endpoints. Without this spoke, workflow builders write custom REST messages, script includes, and JSON parsers. The HL7 FHIR Spoke closes that gap.

The spoke is FHIR-agnostic: it returns raw FHIR field values as Workflow Studio data pills and does not map them to any ServiceNow data model. Downstream applications, such as the Healthcare Operations HL7 FHIR Integration, compose these actions inside their own flows to persist FHIR data into ServiceNow tables.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

HL7 FHIR Spoke v2.0.0 is the latest version. For version history of the spoke, see HL7 FHIR Spoke release notes.

Supported versions

This spoke was built for HL7 FHIR R4 and connects to any FHIR R4-conformant server. A connection attribute named `api_version` selects the FHIR R4 URL fragment (default `baseR4`), so you can re-point all actions to a different API path without re-authoring any flow.

Spoke requirements

- Access to an HL7 FHIR R4-conformant server and its base URL.
- OAuth 2.0 client credentials registered for your instance: the authorization, token, and revoke-token endpoint URLs and the client ID and client secret. The provider uses the authorization code grant with PKCE (`S256`).

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are active:

- Workflow Studio (com.glide.hub)
- Flow Designer Action Step — CORE (com.glide.hub.action_step.core)
- REST step type (com.glide.hub.action_step.rest)
- Integration Hub Action Template — Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The HL7 FHIR Spoke provides actions to read FHIR R4 provider-directory resources from your ServiceNow instance. For each resource, a look-up-by-ID action retrieves a single resource by its FHIR logical ID, and a stream action searches the resource with optional FHIR R4 search parameters and streams one resource per item, following each FHIR Bundle `next` link automatically until the server stops paging. Available actions include:

Category	Action	Description
Organization Management	Look up Organization by ID	Retrieves a single FHIR Organization resource by its logical ID.

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Category	Action	Description
	Look up Organizations Stream	Searches and streams Organization resources with automatic pagination.
Location Management	Look up Location by ID	Retrieves a single FHIR Location resource by its logical ID.
	Look up Locations Stream	Searches and streams Location resources with automatic pagination.
Practitioner Management	Look up Practitioner by ID	Retrieves a single FHIR Practitioner resource by its logical ID.
	Look up Practitioners Stream	Searches and streams Practitioner resources with automatic pagination.
PractitionerRole Management	Look up PractitionerRole by ID	Retrieves a single FHIR PractitionerRole resource by its logical ID.
	Look up PractitionerRoles Stream	Searches and streams PractitionerRole resources with automatic pagination.

All actions are read-only (HTTP GET). Write operations, real-time event triggers such as CDS Hooks or FHIR subscriptions, and FHIR resources beyond the four provider-directory resources are out of scope. For the inputs and outputs of each action, see HL7 FHIR Spoke actions reference.

Note: Spoke actions return raw FHIR field values; the consuming flow owns all persistence and field mapping.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

All eight actions route through a single Connection & Credential Alias named `HL7 FHIR`, so the FHIR server URL and OAuth credentials are bound once at install time and reused by every action.

For information about setting up the spoke, see Activate the HL7 FHIR Spoke.

Activate the HL7 FHIR Spoke

Install the HL7 FHIR Spoke from the ServiceNow Store and verify that the required platform plugins are active so that the eight FHIR actions are available in Workflow Studio.

Before you begin
Role required: admin

The following platform plugins must be active before the spoke's stream actions can be added to a flow:

- Workflow Studio (`com.glide.hub`)
- Flow Designer Action Step — CORE (`com.glide.hub.action_step.core`)

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- REST step type (`com.glide.hub.action_step.rest`)
- Integration Hub Action Template — Data Stream (`com.glide.hub.action_type.datastream`)

About this task

HL7 FHIR Spoke is distributed as a scoped application in the ServiceNow Store. After you install it, the eight FHIR actions appear in the Workflow Studio action picker under the four FHIR Integration Hub categories.

Procedure

1. Request the HL7 FHIR Spoke application from the ServiceNow Store and install it on your instance.

   Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

2. Navigate to **All** > **System Definition** > **Plugins** and confirm that the four required plugins listed in the prerequisites are active.
3. In Workflow Studio, create or open a flow, add an action step, and confirm that the FHIR actions appear under the Organization Management, Location Management, Practitioner Management, and PractitionerRole Management categories.

Result

The HL7 FHIR Spoke is installed and its actions are available to flow authors. Before the actions can read from a FHIR server, configure the connection and credentials. See Configure the HL7 FHIR connection and credentials.

Configure the HL7 FHIR connection and credentials

Bind the FHIR server URL and OAuth credentials to the shared `HL7 FHIR` Connection & Credential Alias so that all eight spoke actions can authenticate to and read from your FHIR R4 server.

Before you begin

Role required: admin

You need the following from your FHIR server administrator: the FHIR R4 server base URL, the OAuth authorization, token, and revoke-token endpoint URLs, and the OAuth client ID and client secret registered for your instance.

About this task

The spoke ships a Connection & Credential Alias named `HL7 FHIR` with an attached configuration template named `FHIR Connection Configuration`. The template adds a guided **Add Connection** action to the alias that creates the HTTP connection and an OAuth 2.0 credential in one step. The OAuth client credentials and the FHIR server URL ship empty — you supply them through the guided setup. All eight actions share this single alias.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases** and open the **HL7 FHIR** alias.
2. On the alias record, click **Add Connection** to open the guided `FHIR Connection Configuration` setup form.

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3. Enter the connection details: a **Connection Name**, the **Connection URL** (your FHIR R4 server base URL — host and protocol only, over HTTPS), and the **API version**.

   Leave **API version** at the default `baseR4` unless your FHIR server uses a different R4 URL fragment. This value populates the `api_version` connection attribute that every action appends to the base URL.

4. Enter the OAuth credential details supplied by your FHIR server administrator: **OAuth Name**, **OAuth Client ID**, **OAuth Client Secret**, and **OAuth Token URL**.

   The guided setup creates an OAuth 2.0 credential (`FHIR Spoke Credential`) and application registry (`FHIR Spoke OAuth`) that use the authorization code grant with PKCE (`S256`).

5. Save the connection, then complete the OAuth authorization to obtain an access token.
6. Use the alias **Test Connection** action to verify that the instance can authenticate to and reach the FHIR server.

Result

All eight HL7 FHIR Spoke actions can now authenticate to your FHIR server through the shared alias. To add a stream action to a flow, see Add a FHIR stream action to a flow.

Add a FHIR stream action to a flow

Add an HL7 FHIR Spoke stream action to a flow to search a FHIR resource and process each matching record as it streams in, with pagination handled automatically by the spoke.

Before you begin

Role required: a Workflow Studio authoring role, such as `flow_designer`.

The `HL7 FHIR` connection and credentials must be configured. See Configure the HL7 FHIR connection and credentials.

About this task

Stream actions use the data stream action template, which retrieves results page by page. You process the streamed items inside a "For Each" flow logic block so that the flow handles each resource without buffering the entire result set.

Procedure

1. In Workflow Studio, open your flow or subflow and add an action step.
2. Search for the stream action for the resource you want — for example, **Look up Organizations Stream** — and add it to the flow.
3. Set the required **Page size** input.

   Page size controls how many resources the spoke requests per FHIR page. The spoke continues to request pages until the FHIR server returns no `next` link.

4. Set any optional FHIR R4 search parameters to filter the results — for example, **name** or **active**.

   For the full set of search parameters per resource, see HL7 FHIR Spoke actions reference.

5. Add a **For Each** flow logic block that iterates over the action's stream output.
6. Inside the loop, map the resource data pills into your downstream steps — for example, to create or update records in your application.
7. After the loop, check the action's **status code**, **error code**, and **error message** outputs to detect transport failures.

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Components installed with the HL7 FHIR Spoke

Several types of components are installed with the HL7 FHIR Spoke, including Workflow Studio actions, a Connection & Credential Alias and configuration template, script includes, and application menu modules. The spoke installs no custom tables or roles.

Flow Designer actions installed

The spoke installs eight read-only actions, grouped into four Integration Hub categories. For each action's inputs and outputs, see HL7 FHIR Spoke actions reference.

Category	Actions
Organization Management	Look up Organization by ID; Look up Organizations Stream
Location Management	Look up Location by ID; Look up Locations Stream
Practitioner Management	Look up Practitioner by ID; Look up Practitioners Stream
PractitionerRole Management	Look up PractitionerRole by ID; Look up PractitionerRoles Stream

Connection and credential records installed

Record	Type	Description
HL7 FHIR	Connection & Credential Alias	Shared connectivity point for all eight actions. Stores the FHIR server base URL. Includes an `api_version` connection attribute (default `baseR4`) that selects the FHIR R4 URL fragment.
FHIR Connection Configuration	Configuration template	Attached to the `HL7 FHIR` alias to provide the guided **Add Connection** setup. Creates the HTTP connection and an OAuth 2.0 credential (`FHIR Spoke Credential`, with application registry `FHIR Spoke OAuth`) that use the authorization code grant with PKCE (`S256`). The client ID, client secret, and endpoint URL are supplied by the customer during guided setup.

Script includes installed

The spoke installs four script includes that perform input validation, FHIR R4 response parsing, and stream query-string assembly for the actions. These classes support the actions internally and are not intended for direct use by other applications; their method signatures may change between releases.

Script include	Description
`OrganizationLookUpUtil`	Pre- and post-processing for the Organization actions.
`LocationLookUpUtil`	Pre- and post-processing for the Location actions.
`PractitionerLookUpUtil`	Pre- and post-processing for the Practitioner actions.
`PractitionerRoleLookUpUtil`	Pre- and post-processing for the PractitionerRole actions.

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Application menu and modules installed

The spoke adds a **FHIR App** application menu, visible to users with the `snc_internal` role, with two modules: **FHIR App Registry** (a list of FHIR-related OAuth providers) and **Connection Alias** (a list of FHIR-related Connection & Credential Aliases). These modules are for administrative inspection during installation and troubleshooting.

HL7 FHIR Spoke actions reference

The HL7 FHIR Spoke provides eight read-only Workflow Studio actions — a look-up-by-ID action and a stream action for each of the four FHIR R4 provider-directory resources. This reference lists the key inputs and outputs of each action.

Outputs common to all actions

Every action returns an action status (a code and a message). Look-up-by-ID actions also expose a **Don't treat as error** option that lets a flow continue when a resource is not found. Stream actions additionally return page and item counts and transport **status code**, **error code**, and **error message** outputs.

Stream-action search inputs map directly to FHIR R4 search parameters. For the complete parameter set and prefix syntax, see the HL7 FHIR R4 search specification.

Organization actions

Action	Key inputs	Key outputs
Look up Organization by ID	Organization ID (required)	id, active, name, alias, type code and display, telecom, address, part of, contact
Look up Organizations Stream	Page size (required); optional: name, active, type, identifier, part of, address fields, last updated, and other FHIR R4 search parameters	Per-item Organization fields (as above); page count, item count, count

Location actions

Action	Key inputs	Key outputs
Look up Location by ID	Location ID (required)	id, name, description, status, operational status, mode, physical type, type, telecom, address, latitude, longitude, managing organization, part of
Look up Locations Stream	Page size (required); optional: name, status, operational status, location type, identifier, managing organization, part of, near, address fields, and other FHIR R4 search parameters	Per-item Location fields (as above); page count, item count, count

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Practitioner actions

Action	Key inputs	Key outputs
Look up Practitioner by ID	Practitioner ID (required)	id, name text, family, given, prefix, suffix, gender, birth date, active, telecom, address, communication language, qualification code and display and issuer
Look up Practitioners Stream	Page size (required); optional: name, given name, family name, identifier, active, gender, communication language, email, phone, address fields, and other FHIR R4 search parameters	Per-item Practitioner fields (as above); page count, item count, count

PractitionerRole actions

Action	Key inputs	Key outputs
Look up PractitionerRole by ID	PractitionerRole ID (required)	id, role code and display, specialty code and display, active, practitioner reference, organization reference, location reference, period start and end, telecom, availability exception
Look up PractitionerRoles Stream	Page size (required); optional: practitioner, organization, location, role, specialty, identifier, active, date, phone, email, and other FHIR R4 search parameters	Per-item PractitionerRole fields (as above); page count, item count, count

iManage Spoke

Automate document, folder, workspace, and user management while enabling seamless collaboration within iManage. This automation solution facilitates tasks such as creating, downloading, uploading, updating, and removing files on iManage directly from the ServiceNow AI Platform.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

iManage spoke v1.1.0 is the latest version. For version history of the spoke, see iManage Spoke release notes.

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Roles

All iManage users are assigned to the predefined Default role. Because the default role is automatically assigned to all users, for security reasons it has limited privileges. The iManage administrator can modify this role's privileges but cannot delete it. Other roles can be created, deleted, or modified as required.

The iManage spoke user [sn_imanage_spk.user] is available when the iManage spoke is installed. The role is required for users accessing iManage external storage.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow® IntegrationHub Action Step — REST (com.glide.hub.action_step.rest)
- ServiceNow® IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow® IntegrationHub Action Template — Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

iManage Work API (REST API v2).

Spoke actions

iManage provides actions to automate the tasks in the following table when events occur in ServiceNow.

Note: To prevent unauthorised access, make sure that the required users has the least privileges for the spoke actions.

Category	Action	Description
Authentication	Look up Discovery	Retrieves the Customer ID and other details.
User Management	Look up Library Users Stream	Retrieves a list of users from the specific library.
Workspace Management	Look up Workspace Security	Retrieves the default security of the workspace and a list of users and groups who have access to the workspace.
	Look up User Access Permission for Workspace	Retrieves a list of users in the specified library optionally filtered by search criteria.
	Create Workspace	Creates a workspace.
	Delete Workspace	Deletes a specified workspace.
	Look up Library Workspaces Stream	Retrieves a list of the workspaces in the specific library.

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Category	Action	Description
	Look up Workspace	Retrieves the workspace profile, and when the list of allowed operations for the Workspace ID is fetched, depending on the request.
	Look up Workspaces	Retrieves a list of all workspaces.
	Create Root Level Workspace Folder	Creates a folder at the root level of the specified workspace.
	Look up User Workspace Operations	Retrieves the operations that the current user is able to perform on the specific workspace.
	Update Workspace	Updates the information of a specified workspace.
	Update Workspace Users and Groups Security	Updates the default security of the specified workspace and the access to the workspace by users and groups.
	Look up Workspace Container Stream	Retrieves the folder structure from a specified template.
Folder Management	Delete Folder	Deletes a specified folder.
	Look up Folder Content Stream	Retrieves the content of the specified folder.
	Look up Library Folders Stream	Retrieves a list of folders from the specified library.
	Look up Folder Profile	Retrieves the folder profile of the specified folder ID.
	Look up Folder Security	Retrieves details of the access permission and default security of the specified folder.
	Update Folder Properties	Updates the folder properties with the specified properties.
	Create Subfolders	Creates a folder within the specified folder.
	Look up Folder Path	Retrieves the path of the specified folder.
	Look up Folder Operations	Retrieves the operations that the current user has permission to execute on the specified folder.
	Update Folder Security	Updates the access permissions and default security of a folder.
	Remove Document from Folder	Deletes the specified document from the folder.
Document Management	Delete Document	Deletes the document associated with a document ID.
	Look up Document Operations	Retrieves the set of operations that the current user is able to perform on a document.
	Upload Document To Folder	Uploads a document to a specific folder.
	Look up Document Profile	Retrieves the profile of a specified document.
	Look up Documents	Retrieves documents that match the specified document profile fields.

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Category	Action	Description
	Look up Document Versions Stream	Retrieves the profiles of all versions of a document.
	Upload New Document Version	Creates and uploads a new version of the specified document.
	Look up Library Documents Stream	Retrieves all documents that match specified search criteria.
	Download Document with Filename	Downloads and saves a document to a local machine.
	Download Document	Downloads the specific document to the local machine.
	Look up Parent Folders of Specified Documents Stream	Retrieves a list of the direct parent folders of a specified document.
	Promote Document Version	Creates a version of the document from a saved document state.
	Look up Latest Document Version Number	Retrieves the latest version of a specified document.
	Look up User Access on Document	Retrieves the access permission of a user for the specified document.
	Look up Document Security	Retrieves the access permission and default security for the document associated with the specified document ID.
	Update Document Security	Updates the access permission or default security or both of the document associated with the specified document ID.

iManage online account requirements

The iManage spoke requires an iManage work account and access to the iManage Control Center to generate OAuth 2.0 tokens.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up iManage spoke.

Set up iManage spoke

Integrate a ServiceNow instance and the iManage spoke by using#iManage credentials to authenticate#ServiceNow#equests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the iManage spoke.
- Role required: admin.

Request an application with iManage

Request an application with iManage and register it in the iManage Control Center.

Before you begin

You must have an iManage account and tenant administrator credentials.

Role required: admin

Procedure

1. As an iManage Cloud (cloudimanage.com) customer, send an email to appregistration@imanage.com with the following details.
   - Application Name: ServiceNow - External Storage
   - Redirect_Url: `<your-instance>/oauth_redirect.do`
   - Customers name: Give your Customer name
   - Tenant/Customers ID: Give your tenant or customer ID

   iManage will review and respond with the Client ID and Secret
2. Once you have the Client ID/ Secret, register your application in iManage Control Center by following the document Adding an application.

Note:

- This integration capability has been validated for iManage cloud. If you want to use it for iManage on-premises, validate that it meets your requirements before using it.
- If you are a iManage on-premises user, follow the document Adding an application package to register your application.

What to do next

Register iManage as OAuth provider.

Register iManage as OAuth provider

Register iManage as an OAuth provider to allow the instance to request OAuth 2.0 tokens.

Before you begin

Note the following requirements:

- Integration Hub subscription.
- iManage access credentials
- The iManage spoke must be activated

Role required: admin

Procedure

1. On your ServiceNow® instance, navigate to **System OAuth** > **Application Registry**.
2. Select **New**.

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3. On the page titled **What kind of OAuth application**, select **Connect to a third-party OAuth Provider**.
4. On the form, fill in the fields.

Application Registries form

Field	Description
Name	Unique name to identify the record, for example, `iManage OAuth profile`.
Client ID	Application ID of the iManage application.
Client Secret	The Client Secret you generated when you created the application.
Default Grant type	The value in this field should be **Password**.
Token URL	The value in this field should be `https://cloudimanage.com/auth/oauth2/token`. You might have to unlock the field to enter the value.
Redirect URL	The value in this field should be `https://<your-instance>.service-now.com/oauth_redirect.do`. You might have to unlock the field to enter the value.

5. Right-click the form header, and select **Save**.
   The system validates the OAuth credentials.

Result
iManage is registered as an OAuth provider, which enables the instance to request OAuth 2.0 tokens.

What to do next
Integrate the iManage spoke with ServiceNow instance.

Integrate the iManage spoke with ServiceNow instance

Integrate the connection to your iManage account. The iManage spoke connection & credential aliases use these connections to perform actions in iManage.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > *iManage*.
2. Select the **Create New Connection & Credential** related link.
3. On the form, fill in the fields.

Field	Value required
Connection Name	Name to identify the connection. This field is automatically set to iManage spoke connection.

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Field	Value required
Connection URL	The URL to establish connection with the spoke. This field is automatically set to `https://cloudimanage.com`. Update the default URL to your specific URL required to establish the connection.
OAuth Entity Name	Name of the OAuth entity profile. This field is automatically set to iManage spoke Auth.
OAuth Client ID	Client ID of the iManage application you registered in the registration portal.
OAuth Client Secret	Client Secret generated when you registered the application in the iManage portal.
OAuth Redirect URL	The redirect URL. The format of the URL is https://<your-instance>.service-now.com/oauth_redirect.do.

4. Select **Create and Get OAuth Token**.

Result

The iManage spoke is set up and integrated with your ServiceNow instance.

Infoblox Spoke

Automate network management tasks in Infoblox from your ServiceNow instance. For example, register or delete IP addresses on an Infoblox server.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Infoblox spoke v2.1.0 is the latest version. For version history of the spoke, see Infoblox spoke release notes.

Supported version

Infoblox versions 2.7, 2.11 and may be compatible with other future API versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)

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- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- Remote Tables plugin (com.glide.script.vtable)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Infoblox spoke provides sample flows in the draft state to automate allocating IP addresses in the Infoblox grid server. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Infoblox Register or Reserve IP in IPAM	Registers or reserves an IP address in Infoblox based on a Service Catalog item request.

Spoke subflows

The Infoblox spoke provides sample subflows to register and reserve IP addresses.

Flow	Description
Register AName Record and Get Network Details	Registers an AName record type in the DNS server and retrieves network details such as network options and ID.
Process Inbound Notifications from Infoblox	Receives the inbound notifications from Infoblox and logs the details.

Spoke module

The Infoblox spoke adds the Infoblox application to your instance and includes these modules:

Module	Description
CName Records	Lists all the CName records.
Webhook Registry	Lists all the webhook registries for the spoke.

Spoke actions

The Infoblox spoke provides actions to manage IP addresses and networks in Infoblox from your ServiceNow instance. Available actions include:

Category	Action	Description
DHCP Management	Delete IP Reservation	Deletes IP address range from an Infoblox server.

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Category	Action	Description
	Look up IP Address Reservation	Lists IP address reservation in the DHCP server for a given Infoblox network view.
	Reserve IP Address Range	Reserves an IP address range in the Infoblox server.
DNS Management	Add IPs to Host Record	Adds the specified list of IPs to the existing IP addresses in the specified host record.
	Change IPs of Host Record	Replaces the IP addresses of the specified host record with the new list of IPs.
	Create Host Record	Creates a host record in Infoblox.
	Delete DNS Record	Deletes a DNS record in the Grid Server.
	Look up CName Records	Lists CName records present in the Infoblox server.
	Look up DNS Records	Lists DNS records present in the Infoblox server.
	Look up Host Record by Reference	Retrieves the details of the specified host record.
	Look up Host Records Stream	Retrieves the details of all host records.
	Register AName Record	Registers an AName record type in DNS server. An AName record stores mapping between the fully qualified domain name and the IP address.
	Register CName Record	Registers a CName record in the Infoblox DNS Server. A CName record is an alias to the fully qualified domain name.
	Update AName Record	Updates the properties of the specified AName record.
	Update CName Record	Updates the properties of the specified CName record.
	Update Host Record	Updates the properties of specified host record.
Generic	Create Record	Creates a record in Infoblox for the specified object.
	Delete Record	Deletes the specified record.
	Look up Record by Reference	Retrieves the details of the specified record.

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Category	Action	Description
	Look up Records by Criteria Stream	Retrieves the details of all records for the specified schema object.
	Look up Records Stream	Retrieves the details of all records of the specified object type.
	Update Record	Updates a record in Infoblox for the specified object.
IPAM Management	Delete IPAM IP Address Reservation	Deletes an IPAM IP address Reservation in Infoblox.
	Look up IPAM Reservations	Lists the IP addresses within a given Infoblox Server.
	Register IPAM IP Address	Registers the IP addresses within a given Infoblox Server.
	Reserve IPAM IP Addresses	Reserves the IP addresses within a given Infoblox Server.
Metadata Retrieval	Look up Definition of Extensible Attributes	Retrieves the definitions of the extensible attributes.
	Look up Object Metadata	Retrieves the list of all supported fields for a given operation for the specified schema object.
	Look up Overall WAPI Metadata	Retrieves the list of all supported objects in the configured API version.
Network Management	Create Network	Creates a network within a given Infoblox Server.
	Delete Network	Deletes a network within a given Infoblox Server.
	Look up Network Details	Retrieves the network details within a given InfoBlox Server.
	Update Network	Updates the network within a given Infoblox Server.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the Infoblox alias record to authorize actions.

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Connection & Credential alias	Description	Connection alias requirements
Infoblox	Connection to Infoblox server	• Connection type: HTTP • Connection URL: URL of the host machine where the Infoblox server is installed.

To use the spoke connection alias, create an associated Connection record and an associated Credential record. For information about setting up the spoke, see Set up the Infoblox spoke.

MID Server requirements

These actions use REST calls, which must run on a MID Server. Use the connection record associated with the Infoblox alias to configure where actions run as well as set MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Infoblox spoke

Integrate the ServiceNow instance and Infoblox using basic authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Infoblox spoke.
- Role required: admin.

Create a Connection and Credential Alias for Infoblox spoke

Create Connection records to your Infoblox account. The Infoblox spoke connection and credential aliases use these connections to perform actions in Infoblox.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the Infoblox record.
3. From the **Related Links** section, click **Create New Connection & Credential**.
4. On the form, fill in these fields:

Field	Description
Connection Name	Unique name to identify the connection. For example, Infoblox Spoke Connection.
Connection URL	Host URL to connect to your Infoblox account.
API Version	API version of Inblox. This field is auto-populated to `v2.11`

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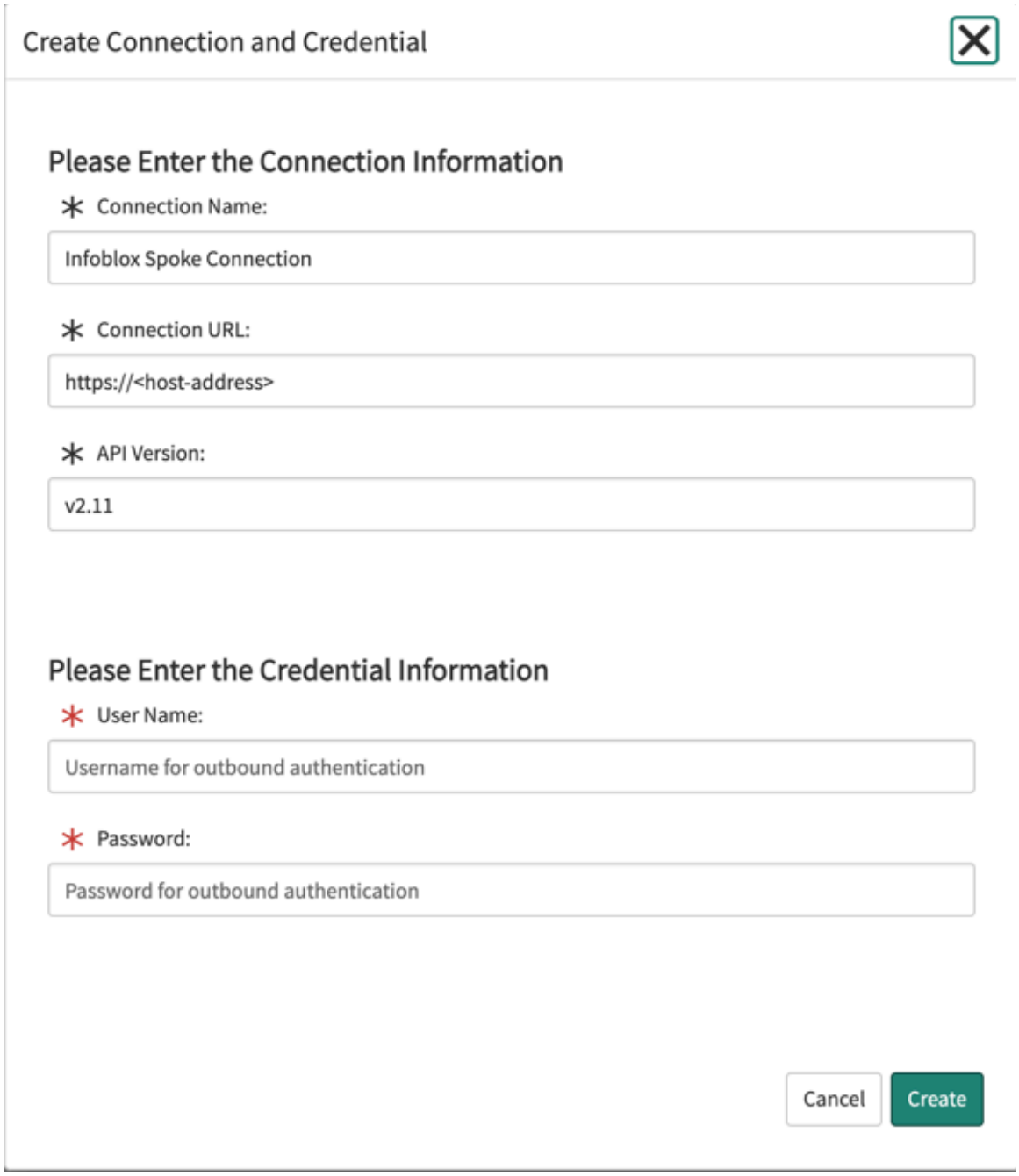
Field	Description
User Name	User name of your Infoblox account.
Password	Password of your Infoblox account.



5. Click **Create**.

Set up a bi-directional webhook for the Infoblox spoke

Configure a webhook to subscribe to Infoblox with a ServiceNow callback URL.

Before you begin

- Request an Integration Hub subscription.
- Activate the Infloblox spoke.
- Role required: admin.

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Register a Infoblox webhook

Register a Infoblox webhook in a ServiceNow instance to notify the ServiceNow application when certain events occur in Infoblox.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Infoblox spoke** > **Webhook Registry**.
2. Click **New**.
3. On the form, fill in these fields.

Infoblox Webhook Registry

Field	Description
Name	Name to identify the webhook registry. **Note:** The name must be only `Infoblox Webhook Authentication`.
Username	Username specified in the Infoblox outbound endpoint configuration.
Password	Password specified in the Infoblox outbound endpoint configuration.
Description	Description of the webhook registry.
Path	Infoblox webhook path. This is field is auto-populated with `api/sn_infoblox_spoke/infoblox_webhook`.

4. Right-click the form header and click **Save**.
5. Click **Callback URL**.
   The system displays the webhook callback URL.
6. Copy and record the webhook callback URL.

Add callback URL in Infoblox

Specify a webhook callback URL in Infoblox account to create a webhook.

Before you begin

- Register a Infoblox webhook
- Download Infoblox outbound templates from the KB0966373
- Role required: admin

Procedure

1. Log in to your Infoblox account.
2. Create a webhook in your Infoblox account.

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For more information, see KB0966373.

3. Configure a outbound endpoint for your ServiceNow instance.
   For more information about configuring Infoblox outbound endpoints, see About Outbound Templates.
4. Configure templates by uploading the templates from the KB0966373 article.

Templates

Template name	Description
Host_Address_IPv4_Insert.txt	Template to configure notifications when a new IPv4 address is added to a host.
Range_IPv4_Insert.txt	Template to configure notifications when a new IPv4 range is added.
Network_Insert.txt	Template to configure notifications when a new IPv4 network is added.
Host_Address_IPv6_Insert.txt	Template to configure notifications when a new IPv6 address is added to a host.

5. Configure notifications rules using the Notification Wizard.

Jack Henry jXchange Spoke

Integrate ServiceNow instance with your Jack Henry jXchange account to access customer and account information.

Important: Starting with the Utah release, the Financial Services Operations Integration with Jack Henry Associates (JHA) jXchange application has been renamed to Financial Services Operations Integration with Jack Henry jXchange.

Request apps on Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

The current version of the Jack Henry Associates jXchange spoke is v 3.0.2. For version history of the spoke, see Jack Henry jXchange Spoke release notes.

Spoke requirements

Ensure that you contact Jack Henry jXchange admin and have these details ready:

- Username of your Jack Henry jXchange account.
- Password of your Jack Henry jXchange account.
- Valid Consumer Name.
- Valid Consumer Product.

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- Institute Routing ID.
- Institute Environment.
- SOAP Connection URL.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow Integration Hub Action Step - SOAP (com.glide.hub.action_step.soap)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Jack Henry jXchange spoke provides sample flows to demonstrate automating tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Look up Transactions Updates	Triggers the Look up Transactions Updates subflow and retrieves the latest transactions updates.
Sample Get Customers Information flow	Retrieves the customer information and logs it.

Spoke subflows

The Jack Henry jXchange spoke provides a sample subflow, Look up Transactions Updates subflow to demonstrate retrieving the latest transactions updates. To customize the sample subflow, copy it to a new application scope.

Spoke actions

The Jack Henry jXchange spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Customer Information Management	Look up Customer Information by ID	Retrieves customer information based on customer identifier.
	Look up Customers Information Stream	Retrieves customer information existing on a service provider.
Financial Account Information Management	Look up Financial Account by Account Details	Retrieve financial account information of a customer by account details existing on a service provider.

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Category	Action	Description
	Look up Financial Accounts Stream	Retrieves financial account information of customers existing on a service provider.
	Look up Financial Transactions Stream	Retrieves financial account transactions of an account existing on a service provider.
	Update Financial Account Deposit Balance	Updates deposit balance of a financial account existing on a service provider.

Spoke module

The Jack Henry jXchange spoke adds the Financial Services Operations application to your instance and includes these modules:

Module	Description
Customers	Retrieves and displays the customer data from your Jack Henry jXchange account. When a user navigates to, **JHA** > **Remote Tables** > **Customers**, the Look up Customers Information Stream action is triggered and data is retrieved.
Accounts	Retrieves and displays the account data from your Jack Henry jXchange account. When a user navigates to, **JHA** > **Remote Tables** > **Accounts**, the Look up Financial Accounts Stream action is triggered and data is retrieved.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Jack Henry jXchange spoke.

Set up the Jack Henry jXchange spoke

Integrate ServiceNow and Jack Henry jXchange account by using the Jack Henry jXchange connection and credential record to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Jack Henry jXchange spoke.
- Role required: admin.

Procedure

1. Log in to your ServiceNow instance as an admin.
2. Navigate to **Integration Hub** > **Connections & Credentials** > **Credentials**.
3. Open the record, **JHA**.
4. Click the **Create New Connection & Credential** related link.
5. On the form, fill these values.

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Field	Description
Connection Name	Name to identify the connection record.
SOAP Connection URL	SOAP endpoint to connect to the Jack Henry jXchange account. Enter `https://jxdmz.jackhenry.com/jxchange/2008/ServiceGateway/ServiceGateway.svc`.
Valid Consumer Name	Valid consumer name for provider.
Valid Consumer Product	Valid consumer product for provider.
Institute Routing ID	Institute Routing ID for provider.
Institute Environment	Institute Environment for provider.
User Name	User name to authenticate the outbound requests.
Password	Password to authenticate the outbound requests.

6. Click **Create**.
7. Navigate to **Integration Hub** > **SOAP Security Policies**.
8. Open the record, **JHA Security Policy**.
9. For **WS-Security Username Profile**, select the credential record that is created for the Jack Henry jXchange spoke.
10. Click **Update**.

Jamf Spoke

Manage users, mobile devices, groups, and computers in the Jamf account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Jamf spoke v2.0.0 is the latest version. For version history of the spoke, see Jamf spoke release notes.

Supported versions

This spoke was built for Jamf Classic and Pro APIs, but may be compatible with later versions.

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST(com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and need appropriate licenses, if used outside the spoke implementation. For information on the licenses, contact your account manager.

Spoke subflows

The Jamf spoke provides sample subflows to demonstrate automating tasks. To customize a sample subflow, copy it to the required application scope. Available sample subflows include:

Subflow	Description
Configure Group	Enables a CSD agent to create and configure the target group in Jamf portal.
Create Software Configuration	Enables a CSD Agent to create the software configuration record of the specified Jamf application.
Discover and Store Data	Discovers the data from the Jamf server and updates the records in Application, Group, and Policy tables.
Look up Application Details	Retrieves the additional details for applications and updates the respective records in the application table.
Deploy Application	Adds the provided user or device to the given group in the Jamf Server.
Revoke Application	Removes the provided user or device from the given group in the Jamf Server.
Look up Configuration Data	Retrieves configuration data for the specified requested item or software configuration record.

Note: These subflows are available only when the Client Software Distribution 2.0 application is installed.

Spoke actions

The Jamf spoke provides actions to automate tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Computer Management	Look up Application by ID	Retrieves details of an application by ID in Jamf.

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Category	Action	Description
	Look up Applications Stream	Retrieves all the applications.
	Look up Computer by Serial Number	Retrieves details of computer by serial number in Jamf.
	Look up Computers Stream	Retrieves general and hardware details of all the computers.
	Look up Package by ID	Retrieves details of package by ID in Jamf.
	Look up Packages Stream	Retrieves all the packages.
	Look up Policies Stream	Retrieves all the policies.
	Look up Policy by ID	Retrieves details of policy by ID in Jamf.
	Add Computer Group to Mac Application	Adds a target computer group to a Mac application given the current scope of the application.
	Add User Group to Mac Application	Adds a target user group to a Mac application given the current scope of the application.
	Remove Computer Group from Mac Application	Removes a target computer group from a Mac application given the current scope of the application.
Data Management **Note:** These actions are available only when the Client Software Distribution 2.0 application is installed.	Look up Configuration Data	Retrieves the configuration data for the specified requested item or software configuration record.
	Prepare Software Data	Prepares the software data for the specified requested item that can be used for deployment or revocation.
Group Management	Add Computer to Static Group	Adds an existing computer to a static group in Jamf.

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Category	Action	Description
	Add Mobile Device to Static Group	Adds an existing mobile device to a static group in Jamf.
	Add User to Static Group	Adds an existing user to a static group in Jamf.
	Create Static Computer Group	Creates a static computer group with the given name on the server.
	Create Static Mobile Device Group	Creates a static mobile device group with the given name on the server.
	Create Static User Group	Creates a static user group with the given name on the server.
	Delete Computer Group	Deletes the given computer group from the server.
	Delete Mobile Device Group	Deletes the given mobile device group from the server.
	Delete User Group	Deletes the given user group from the server.
	Is Computer in Group	Checks if an existing computer is a member of the specified group in Jamf.
	Is Mobile Device in Group	Checks if an existing mobile device is a member of the specified group in Jamf.
	Is User in Group	Checks if an existing user is a member of the specified group in Jamf.
	Look up Computer Group by ID	Retrieves details of computer group by ID in Jamf.
	Look up Computer Groups Stream	Retrieves all the computer groups.
	Look up Target Groups	Retrieves the target group details associated with given application.
	Look up Mobile Device Group by ID	Retrieves details of mobile device group by ID in Jamf.
	Look up Mobile	Retrieves all the mobile device groups.

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Category	Action	Description
	Device Groups Stream	
	Look up User Group by ID	Retrieves details of user group by ID in Jamf.
	Look up User Groups Stream	Retrieves all the user groups.
	Remove Computer from Static Group	Remove an existing computer from a static group in Jamf.
	Remove Mobile Device from Static Group	Remove an existing mobile device from a static group in Jamf.
	Remove User from Static Group	Remove an existing user from a static group in Jamf.
Mobile Device Management	Look up Mobile Device Application by ID	Retrieves details of mobile device application by ID from Jamf. **Note:** Configure the system property *com.glide.attachment.max_get_size* to customize the size of attachment that can be retrieved. The default value is 5 MB.
	Look up Mobile Device Applications Stream	Retrieves all the mobile device applications.
	Look up Mobile Device by Serial Number	Retrieves details of mobile device by serial number in Jamf.
	Look up Mobile Devices Stream	Retrieves details of all the mobile devices.
User Management	Look up User by ID	Retrieves details of user by ID in Jamf.
	Look up User by Name	Retrieves details of user by user name in Jamf.
	Look up Users Stream	Retrieves all the users.

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Category	Action	Description
Software Management	Look up Computer Application Scope	Retrieves scope of a given computer application from the server.
	Look up Mobile Device Application Scope	Retrieves scope of a given mobile device application from the server.
Mobile Device Management	Remove Mobile Device Group from Mobile Device Application	Removes a target mobile device group from a mobile device application given the current scope of the application.
	Add Mobile Device Group to Mobile Device Application	Adds a target mobile device group to a mobile device application given the current scope of the application.
	Add User Group to Mobile Device Application	Adds a target user group to a mobile device application given the current scope of the application.
	Remove Mobile Device Group from Mobile Device Application	Removes a target mobile device group from a mobile device application given the current scope of the application.
	Remove User Group from Mobile Device Application	Removes a target user group from a mobile device application given the current scope of the application.

Spoke module

The Jamf spoke adds the Jamf application to your instance. The application includes these modules and data accessed through the spoke modules is stored in the respective tables:

Module	Description	Table
Applications	Displays the list of applications from the Jamf server.	Application [sn_jamf_spoke_application]

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Module	Description	Table
Groups	Displays the list of groups from the Jamf server.	Group [sn_jamf_spoke_group]
Configurations	Stores software configuration details for the applications.	Configuration [sn_jamf_spoke_sf_config]
Policies	Displays the list of policies from the Jamf server.	Policy [sn_jamf_spoke_policy]
Server Instances	Stores details of the provider servers.	Server Instance [sn_jamf_spoke_server]

Note: These modules and tables are available only when the Client Software Distribution 2.0 application is installed.

Another table is Jamf Credential [sn_jamf_spoke_jamf_credential] is available that stores details of the credential records. This table is available along with the Jamf spoke and doesn't require installation of the Client Software Distribution 2.0 application.

Spoke triggers

Use triggers in the Jamf spoke to subscribe to the required events. The endpoint enables webhooks to connect with your ServiceNow instance. You can configure the flows to execute only when the specified trigger conditions are met. The supported events are:

Category	Trigger	Description
Computer Management	Computer Inventory Completed	Trigger initiates when a managed computer submits inventory.
Group Management	Smart Group Computer Membership Change	Trigger initiates when a managed computer joins or leaves the membership of a smart computer group.
Mobile Device Management	Mobile Device Inventory Completed	Trigger initiates when a device completes the Update Inventory MDM command.

For information about setting up the triggers for the Jamf spoke, see Set up triggers for the Jamf spoke. For more information about inbound integration, see Conditional and event-driven inbound integration.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Jamf spoke.

Set up the Jamf spoke

Integrate the ServiceNow instance and Jamf instance using the Jamf credential to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Jamf spoke.
- Role required: admin.

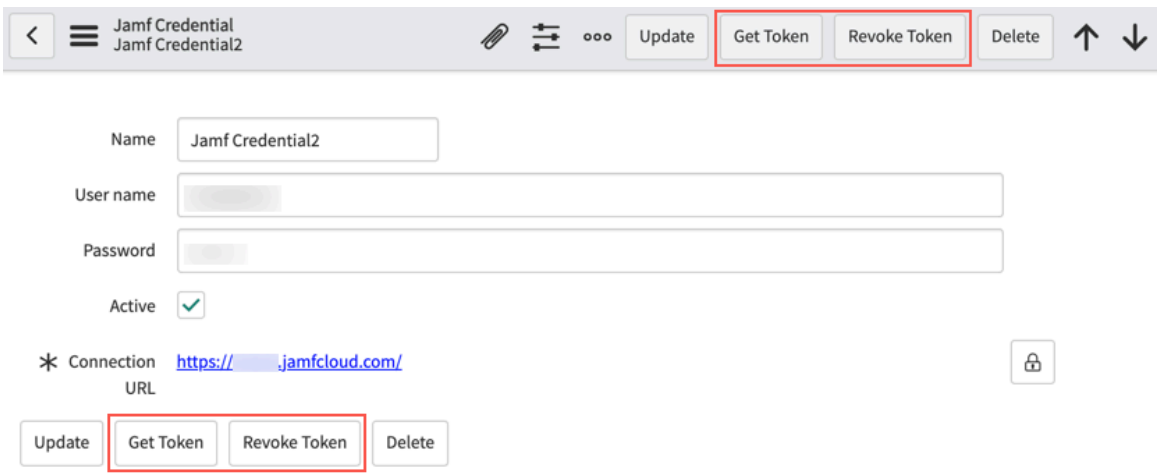
Procedure

1. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the record, **Jamf**.
3. Click the **Create New Connection & Credential** related link.
4. On the form, fill these values.

Field	Description
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to your Jamf instance in this format: `https://<Instance-name>.jamfcloud.com/`.
Credential Name	Name to identify the credential record.
User Name	User name of the Jamf account.
Password	Password of the Jamf account.
Connection URL	Base URL to connect to your Jamf instance in this format: `https://<Instance-name>.jamfcloud.com/`.

5. Click **Create**.

Note: If required, you can get token and revoke token by creating a new credential record for the default connection ad credential alias record.



Set up triggers for the Jamf spoke

Set up triggers for the Jamf spoke for the required events. The endpoint enables webhooks to connect with your ServiceNow instance.

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Before you begin
Role required: admin

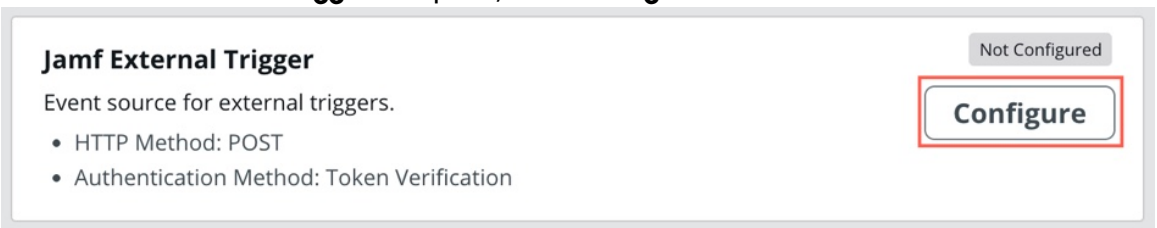
Configure triggers in ServiceNow instance

Configure endpoint for webhooks in the Jamf that support the token authentication.

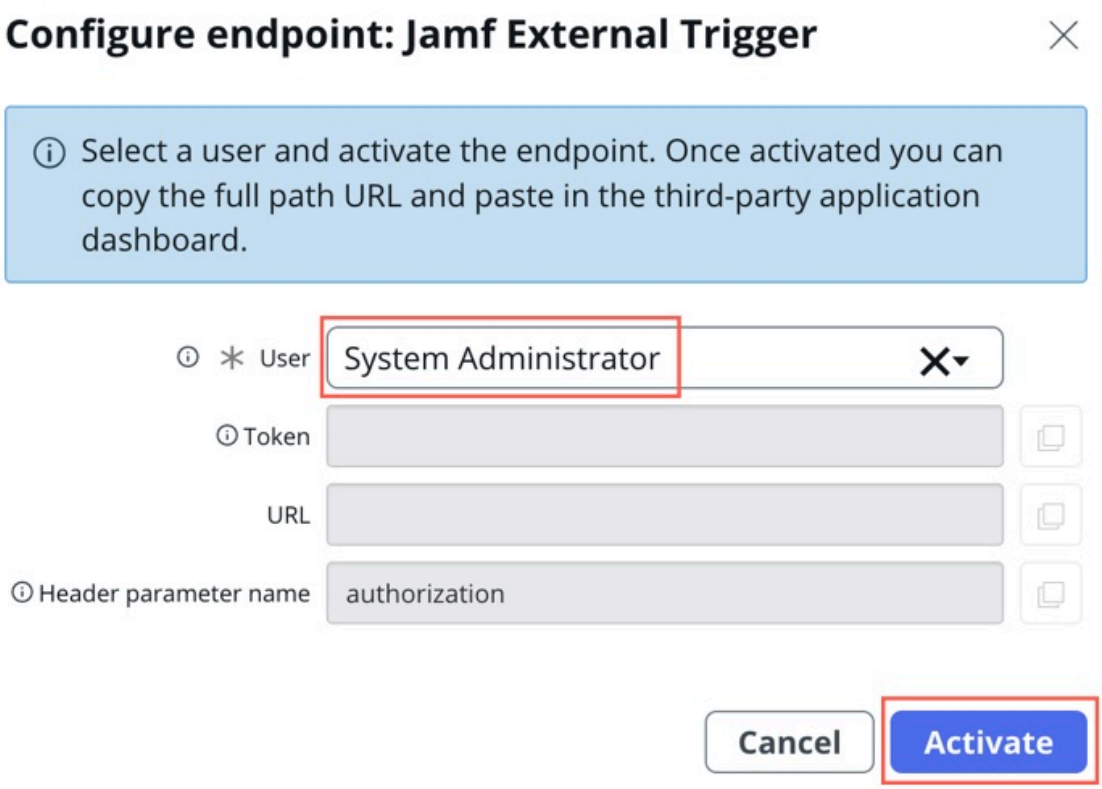
Before you begin
Role required: flow_designer and connection_admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Toggle and enable the **Inbound** connections.
4. Locate the **Jamf Spoke** endpoint and click **View Details**.
5. For the **Jamf External Trigger** end point, click **Configure**.



6. Select the user who can trigger the endpoint and click **Activate**.



The values **Token** and **URL** are generated.

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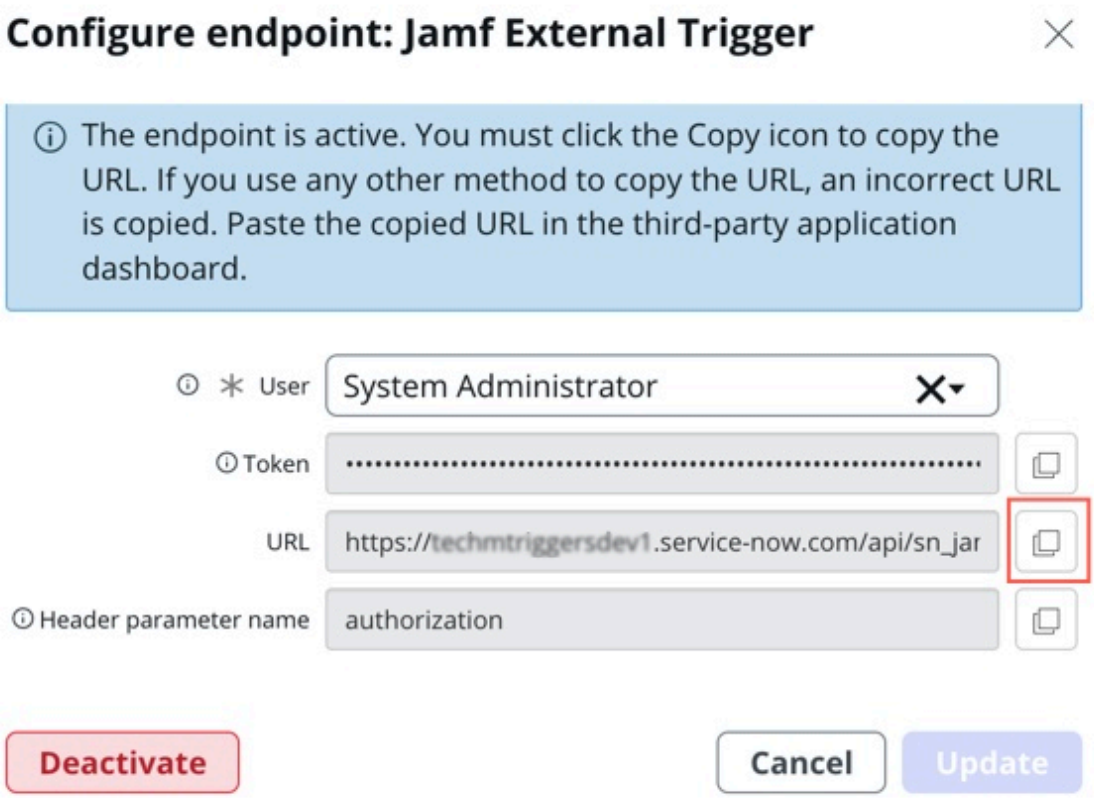
7. Copy the generated endpoint URL for later use.



Create an outbound webhook

Create an outbound webhook in your Jamf Pro cloud instance.

Before you begin
Role required: admin

Procedure

1. Log in to the Jamf cloud account as an admin.
2. Click **Settings**.
3. Click the **Global** tab and click the **Webhooks** tile.
4. Click **+ New**.
5. On the form, fill these values.

Field	Description
Display Name	A display name to identify the webhook.
Webhook URL	URL the webhook should post to. Paste the URL that was generated when you configured triggers in ServiceNow instance. For more information, see Configure triggers in ServiceNow instance.

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Field	Description
Authentication Type	Type of authentication required to connect to the webhook. Choose the **Header Authentication** option. When you select **Header Authentication**, another **Header Authentication** field is displayed. Provide the header metadata in JSON format that is used for authentication. For example, enter `{"Authorization":"Bearer eyJhbGciOiJIUzI1NiJ9.eyJhdX", "Date":"Fri, 22 Nov 2024 16:56:32 GMT"}`.
Connection timeout	Connection timeout for the webhook.
Read Timeout	Read timeout for the webhook.
Content Type	Format for sending the webhook information. Select **JSON**.
Webhook Event	Event that will trigger the webhook. Select one of the supported events. For the list of supported events, see the Spoke triggers section.

For more information about configuring the webhook, see Configuring a Webhook in Jamf Learning Hub.

6. Click **Save**.

Jenkins Spoke

Manage builds, users, settings, and jobs on the Jenkins server. Retrieve Jenkins data to use in a flow.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

All versions between 1.651.1 and 2.150.3.

Spoke version

Jenkins spoke v2.3.1 is the latest version. For version history of the spoke, see Jenkins spoke release notes.

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Spoke actions

The Jenkins spoke provides actions to automate the Jenkins tasks when events occur in the ServiceNow instance. Available actions include:

Category	Action	Description
Build Management	Delete Build	Deletes a build from a Jenkins server job.
	Get All Builds	Retrieves all the builds for a given Jenkins server job. Returns the URL, build number, and class of each build.
	Get Build History	Retrieves a range of build history for a given job from the Jenkins server.
	Get Build Information	Retrieves the build timestamp, build status, and complete build information of a given job from the Jenkins server.
	Get Build Number	Retrieves the build number for a Jenkins server job based on a pre-defined build filter, such as the last successful build.
	Perform a Build	Executes a job on the Jenkins server.
Configuration Management	Create Jenkins Credentials	Creates the Jenkins server credentials.
	Create Node	Creates a node that you can launch with the Java Web Start software. A node is a machine that is part of the Jenkins environment and capable of executing jobs.
	Delete Node	Deletes a node from the Jenkins server.
	Get CSRF Token	Retrieves a CSRF token if your Jenkins server has the "Prevent Cross Site Request Forgery exploits" option enabled. **Note:** If your Jenkins server has CSRF protection enabled, use this action to retrieve a token for use by the rest of the flow. The action outputs the token as a data pill for use in other actions in the flow.
	Get Version	Retrieves the Jenkins server version.
	Restart Jenkins	Restarts the Jenkins server.
	Test Connection	Tests the connection to the Jenkins server.
Job Management	Copy Job	Creates a job by copying an existing Jenkins server job.
	Create Folder	Creates a Jenkins server folder to organize the jobs.
	Create Job	Creates a Jenkins server job from an XML file.
	Delete Folder	Deletes an existing Jenkins server folder.

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Category	Action	Description
	Delete Job	Deletes a Jenkins server job.
	Get All Jobs From Folder	Retrieves all the jobs from a given Jenkins server folder. Returns the class and name of each job up to the specified number of levels.
	Get Build timestamp	Retrieves the build timestamp of a specified Jenkins server job.
	Get Console Output	Retrieves the build console output of a Jenkins server job.
	Get Job Configuration	Retrieves the XML configuration for a Jenkins server job.
	Reload Job	Reloads a Jenkins server job.
	Rename Job	Renames a Jenkins server job.
User Management	Create User	Creates a Jenkins server user.
	Delete User	Deletes an existing Jenkins server user.
View Management	Add Job To View	Adds a job to the Jenkins server view. Views are containers to organize jobs. As a Jenkins instance grows, you can create views for appropriate groups and categories. For example, you may want to create a Build view, which only displays the build-specific jobs.
	Create View	Creates a Jenkins server view.
	Delete View	Deletes a Jenkins server view.
	Get All Jobs From View	Retrieves all jobs from a Jenkins server view. Returns the class and the name of the top-level jobs.
	Remove Job From View	Removes a job from a Jenkins server view.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

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AI Agent	Description
Jenkins View Management AI Agents	Manages job records and retrieves details of all jobs from a Jenkins server view.
Jenkins Job Management AI Agents	Manages jobs and retrieves details of all the jobs from a given Jenkins server folder.
Jenkins Configuration Management AI Agents	Manages a node from the Jenkins server. Retrieves a CSRF token if your Jenkins server has the "Prevent Cross Site Request Forgery exploits" option enabled.
Jenkins User Management AI Agents	Manages the Jenkins server user recor.ds
Jenkins Build Management AI Agents	Manages a build from a Jenkins server job and retrieves the required build details.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Support for CRSF tokens

If your Jenkins server has the "Prevent Cross Site Request Forgery exploits" option enabled, certain actions require a unique token. Use the Get CSRF Token action to retrieve a token for use by the rest of the flow. The action outputs the token as a data pill for use in other actions in the flow.

Connection and credential requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the Jenkins Connection & Credential Alias record to authorize actions. To use the spoke connection alias, create an associated Connection record and an associated Credential record.

For information about setting up the spoke, see Set up Jenkins spoke.

MID Server requirements

These actions use the REST calls, which must run on a MID Server. Use the connection record associated with the Jenkins alias to configure where actions run as well as set MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up Jenkins spoke

Integrate the ServiceNow instance and Jenkins using basic authentication to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Jenkins spoke.
- Role required: admin.

Create Credential records for the Jenkins spoke

Create Credential records to the Jenkins server. The Jenkins spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **Basic Auth Credentials**.
   A blank Basic Auth Credentials form displays.
4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `Jenkins Credentials`.
User name	Your Jenkins user name.
Password	Your Jenkins password.
Active	Enable
Order	Select the order to apply this credential. For example, enter `100`.

5. Click **Submit**.

Create Connection records for the Jenkins spoke

Create Connection records to your Jenkins account. The Jenkins spoke connection and credential alias uses these connections to perform actions on Jenkins.

Before you begin

Role required: admin.

Procedure

1. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Jenkins**.
3. From the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.
4. Enter these values.

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Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `Jenkins Connection`.
Credential	Select the Credential record you created for Jenkins. For example, select **Jenkins Credentials**.
Connection URL	The URL of the host machine where Jenkins is installed.

5. Click **Submit**.

Jenkins v2 Spoke

Manage builds, users, settings, and jobs on the Jenkins server. Retrieve Jenkins data to use in a flow.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Jenkins v2 spoke v1.4.1 is the latest version. For version history of the spoke, see Jenkins v2 spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke requirements

The Jenkins v2 spoke v2 requires generating an API token. See Security Hardening: New API token system in Jenkins 2.129+ for more information about the API tokens.

Supported versions

All versions between 2.176.2 to 2.222.1.

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Spoke modules

You can configure the Jenkins v2 spoke v2 to receive updates from Jenkins at your ServiceNow instance. In the routing policies, conditions that must be met to receive updates at your ServiceNow instance are defined. When the conditions are met, routing policy triggers the associated subflow, which in turn automates the Jenkins tasks. This requires separate setup and can be used independently without using the spoke actions. See Set up a webhook for the Jenkins spoke for information regarding setting up and configuring the webhooks. To use other conditions in the routing policy or customize the default subflows, see Customize a webhook.

Routing policies and subflows support these fields:

- Keywords
- Build Number
- Job Name
- Job Path
- Show Related Fields

By default, the Jenkins v2 application is available in the Jenkins v2 spoke and has these modules:

Module	Description
Webhook Answer Subflows	Details of the webhook authorization key to authorise requests from Jenkins.
Webhook Client Detail	Details about the subflows in Jenkins v2 spoke.

The Jenkins v2 spoke v2 includes these tables:

- Jenkins v2 Webhook Answer Subflow [sn_jenkinsv2_spoke_webhook_answer_subflow]
- Jenkins Webhook Client Details [sn_jenkinsv2_spoke_webhook_client_details]

Spoke subflows

The Jenkins v2 spoke provides sample subflows to demonstrate automating Jenkins tasks. Available sample subflows include:

Subflow	Description
Build Jenkins Job	Receives updates from Jenkins at the ServiceNow instance.
Jenkins Webhook Answer Subflow: Process build information	Builds Jenkins job and retrieves the information. To customize this subflow, create a copy of the subflow and change it as per your requirement.
Build Jenkins Job with Parameters	Builds Jenkins job with the specified parameters and retrieves the information.

Spoke actions

The Jenkins v2 spoke provides actions to automate Jenkins tasks when events occur in ServiceNow. Available actions include:

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Category	Action	Description
Build Management	Delete Build	Deletes a build from a Jenkins server job.
	Get Build ID	Retrieves the Build ID of an executed job from the Jenkins server.
	Get Build Timestamp	Retrieves build timestamp of a given job from the Jenkins server.
	Get Console Output	Retrieves build console output for a given job from Jenkins Server.
	List Builds	Retrieves all the builds for a given job from the Jenkins server.
	Perform Build with Parameters	Executes a job with parameters on the Jenkins server.
	Get Build History	Retrieves a range of build history for a given job from Jenkins Server.
	Get Build Information	Retrieves the build timestamp, build status, and complete build information of a given job from the Jenkins server.
	Get Build Number	Retrieves the build number for a Jenkins server job based on a pre-defined build filter, such as last successful build.
	Perform Build	Executes a job on the Jenkins server.
	Look up Builds by Date Range	Retrieves all the builds between date range for a given job from the Jenkins server.
	Look up Commits by Build	Retrieves the commits of a particular build for a given job from the Jenkins server.
	Look up Stage Nodes by Build	Retrieves information about the Sonar actions, restartable stages, and nodes of all stages of a particular build for a given pipeline job from the Jenkins server.
	Look up Stages by Build	Retrieves the build status, start time, end time, duration, and stages of a particular build for a given pipeline job from the Jenkins server.
	Look up Test Report by Build	Retrieves information about the test summaries, total number of executed tests, passed tests, failed tests, skipped tests, and time taken to execute JUnit tests in a particular build for a given job from the Jenkins server.
Configuration Management	Create Node	Creates a node that you can launch with Java Web Start software. A node is a machine that is part of the Jenkins environment and capable of executing jobs.
	Delete Node	Deletes a node from the Jenkins server.
	Get Version	Retrieves the Jenkins server version.
	Restart Jenkins	Restarts the Jenkins server.

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Category	Action	Description
	Test Connection	Tests the connection to the Jenkins server.
Job Management	Copy Job	Creates a job by copying an existing Jenkins server job.
	Create Folder	Creates a Jenkins server folder to organize jobs.
	Create Job	Creates a Jenkins server job from an XML file.
	Delete Folder	Deletes an existing Jenkins server folder.
	Delete Job	Deletes a Jenkins server job.
	List Jobs By Folder	Retrieves all the jobs for a given folder from the Jenkins server.
	Get Job Configuration	Retrieves the XML configuration for a Jenkins server job.
	Reload Job	Reloads a Jenkins server job.
	Rename Job	Renames a Jenkins server job.
User Management	Create User	Creates a Jenkins server user.
	Delete User	Deletes an existing Jenkins server user.
View Management	Add Job To View	Adds a job to the Jenkins server view. Views are containers to organize jobs. As a Jenkins instance grows, you can create views for appropriate groups and categories. For example, you may want to create a Build view, which only displays build-specific jobs.
	Create View	Creates a Jenkins server view.
	Delete View	Deletes a Jenkins server view.
	List Jobs By View	Retrieves all jobs from a view on the Jenkins server.
	Remove Job From View	Removes a job from a Jenkins server view.

Spoke triggers

Use triggers in the Jenkins spoke to subscribe to the required events. The endpoint enables webhooks to connect with your ServiceNow instance. You can configure the flows to execute only when the specified trigger conditions are met. The supported events are:

Category	Trigger	Description
Build Management	Build Aborted	Trigger initiates when a Jenkins build is aborted.
	Build Failed	Trigger initiates when a Jenkins build fails.
	Build Success	Trigger initiates when a Jenkins build is successful.

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Category	Trigger	Description
	Build Unstable	Trigger initiates when a Jenkins build is unstable.
Job Management	Pipeline Failed	Trigger initiates when a Jenkins pipeline fails.

Connection and credential requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the Jenkins v2 Connection & Credential Alias record to authorize actions. To use the spoke connection alias, create an associated Connection record and an associated Credential record. For information about setting up the spoke, see Set up the Jenkins spoke.

MID Server requirements

These actions use REST calls, which must run on a MID Server. Use the connection record associated with the Jenkins alias to configure where actions run as well as set MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Jenkins spoke

Integrate the ServiceNow instance and Jenkins using basic authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Jenkins spoke.
- Role required: admin.

Configure a connection for Jenkins v2 spoke

Add and configure a Jenkins v2 connection to authenticate ServiceNow requests in Jenkins v2 spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Jenkins_v2** and click **View Details**.

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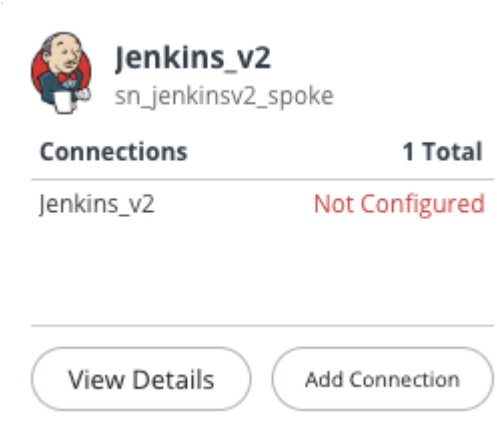
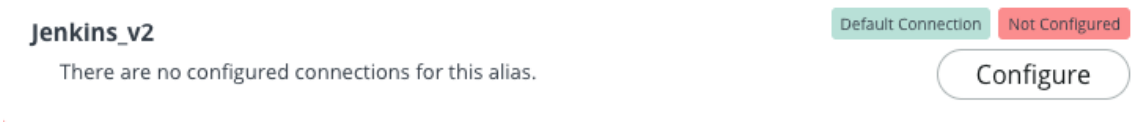
- To configure the default connection and credential alias record that is shipped along with the Jenkins v2 spoke, click **View Details**.



- To manage more than oneJenkins v2 spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the Connection form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection. For example, `Jenkins v2 connection`.
Connection URL	Base URL to connect to Jenkins. The format of URL should be: http://<host_ip_address>:<port>. For example, `http://198.51.100.24:8080`.
User name	User name of your Jenkins account.
Password	API token of your Jenkins account.

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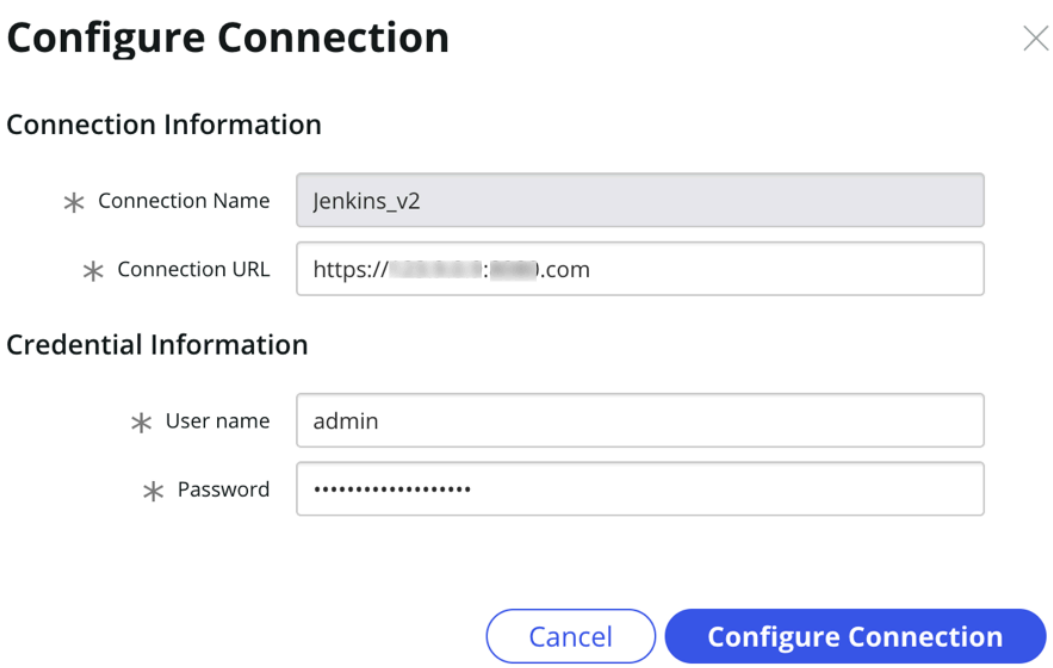

6. Click **Create Connection**.
7. Navigate to **All** > **Connections & Credentials** > **Connections**.
8. Open the newly created connection record for Jenkins v2 spoke.
9. From the **Advanced MID Server Configuration** tab, specify the MID Server settings.

Result
The spoke connection is configured and ready to be used.

Set up a webhook for the Jenkins spoke

Set up a webhook application to receive the required updates from Jenkins at your ServiceNow instance.

Before you begin
Role required: admin

Create authorization key for the Jenkins v2 spoke

Create a authorization key to authorise requests from Jenkins.

Before you begin
Role required: admin.

Procedure
1. Navigate to **All** > **System Definition** > **Scripts - Background**.
2. Enter this command in the **Run script (JavaScript executed on server)** text field:
   ```
   gs.info(GlideSecureRandomUtil.getSecureRandomString(32));
   ```
3. Click **Run Script**.

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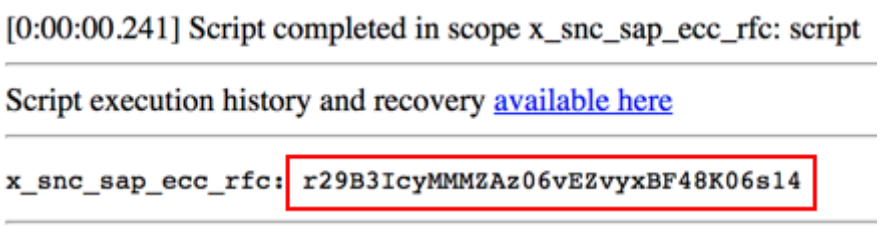
4. Copy and record the generated value for later use.



Provide authorization key for webhook

Authorise requests from Jenkins by providing authorization key for webhook in your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Jenkins v2** > **Webhook Client Details**.
2. Click **New**.
3. On the form, fill these values:

Jenkins Webhook Client Details form

Field	Description
Authorization Key	Authorization key you had generated. See Create authorization key for the Jenkins v2 spoke for more information.
Name	Name to identify the webhook client record.

4. Click **Submit**.

Provide authorization key in Jenkins

Receive updates from Jenkins by providing the authorization key in Jenkins.

Before you begin

Role required: admin.

Procedure

1. Log in to your Jenkins account.
2. Click and open the job for which you want to configure your webhook.
3. Click **Configure**.
4. In the **Bindings** tab, click **Add** and select **Jenkins**.

   For more information about the using the plugin, see Credentials Binding.

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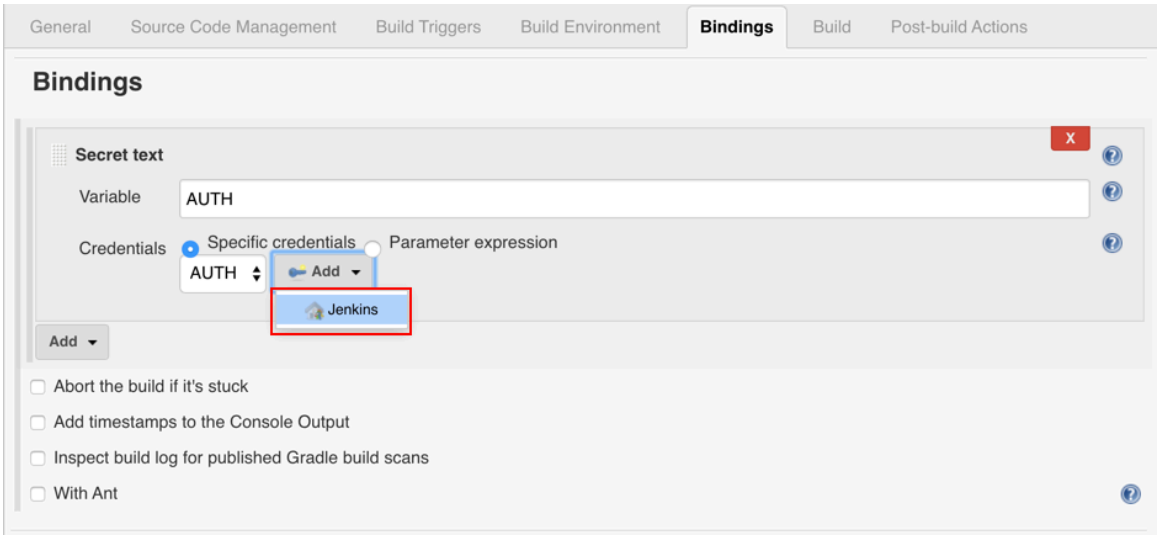

5. On the form, fill in the fields.

Jenkins Credential Provider form

Field	Description
Kind	Select **Secret text**.
Secret	Enter authorization key. See Create authorization key for the Jenkins v2 spoke for more information.
ID	Provide unique identifier to identify the record.

6. Click **Add**.
7. In the **Post-build Actions** tab, configure task and specify script to receive updates at your ServiceNow instance.
   - Sample Windows **Script**: `curl "https://<instance-name>.service-now.com/api/sn_jenkinsv2_spoke/jenkins_v2_webhook/build_status" -X POST -H "content-type:application/json" -H "jenkinsKey: %<ID>%" -d "{\"Job_Name\":\"%JOB_NAME%\",\"Job_Path\": \"%JOB_URL%\",\"Build_Number\":\"%BUILD_NUMBER%\"}"`
   - Sample Shell **Script**: `curl "https://<instance-name>.service-now.com/api/sn_jenkinsv2_spoke/jenkins_v2_webhook/build_status" -X POST -H "content-type:application/json" -H "jenkinsKey: ${<ID>}" -d "{\"Job_Name\":\"${JOB_NAME}\",\"Job_Path\":\"${JOB_URL}\", \"Build_Number\":\"${BUILD_NUMBER}\"}"`

   Note: ID in the script is the ID you had provided in the Jenkins Credential Provider form.

   For more information about the using the plugin, see Post build task.
8. Click **Apply**.

Provide description to subflow

Provide user friendly descriptions to the subflows in the Jenkins v2 spoke.

Before you begin
Role required: admin.

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Procedure

1. Navigate to **All** > **Jenkins v2** > **Webhook Answer Subflows**.
2. Click **New**.
3. On the form, fill these values:

Field	Description
Description	Description about the subflow.
Subflow	Required subflow in the Jenkins v2 spoke.

4. Click **Submit**.

Provide answers to the decision table

Provide subflows as answers to the conditions mentioned in the decision table. When the specified conditions are met, the associated subflow is triggered.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Decision Tables**.
2. Open the record for the **Jenkins v2 spoke**.
3. In the **Decisions** tab, click **New**.
4. On the form, fill these values:

Decision form

Field	Description
Label	Unique label to identify the routing policy.
Default answer	Option to specify if this is the default answer. The default answer is applicable when the conditions are not met.
Condition	Conditions to be met when the required events occur in Jenkins. See Jenkins v2 Spoke for information about the supported fields.
Answer	Subflow that must be triggered when the specified conditions are met. **a.** Click the Lookup icon ( ). **b.** Select the required subflow from the Document list. **Note:** Ensure that the **Table name** is `Jenkins v2 Webhook Answer Subflow [sn_jenkinsv2_spoke_webhook_answer_subflow]`.

5. Click **Submit**.

Customize a webhook

Create a webhook routing policy and customize subflow as per your requirement.

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Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Flow Designer** > **Designer**.
2. Click **Subflows**.
3. Create a copy of the required default subflow.
4. Customize the Jenkins Webhook Answer Subflow: Process build information subflow as per your requirement and publish it.
   See Building subflows for more information about creating and using subflows and Jenkins v2 Spoke for information about the fields that the routing policies and subflows support.
5. Navigate to **Jenkins v2** > **WebHook Answer Subflows**.
6. Click **New**.
7. On the form, fill in the fields.

Field	Description
Description	Description about the subflow.
Subflow	Required subflow in the Jenkins v2 spoke.

8. Click **Submit**.

> **Note:** These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

9. Navigate to **System Definition** > **Decision Tables**.
10. Open the record for the **Jenkins v2** spoke.
11. In the **Decisions** tab, click **New**.
12. On the form, fill these fields:

Decision form

Field	Description
Label	Unique label to identify the routing policy.
Default answer	Option to specify if this is the default answer. The default answer is applicable when the conditions are not met.
Condition	Conditions to be met when the required events occur in Jenkins. See Jenkins v2 Spoke for information about the supported fields.
Answer	Subflow that must be triggered when the specified conditions are met.

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Field	Description
	a. Click the Lookup icon ( ). **b.** Select the required subflow from the Document list. **Note:** Ensure that the **Table name** is `Jenkins v2 Webhook Answer Subflow [sn_jenkinsv2_spoke_webhook_answer_subflow]`.

13. Click **Submit**.

Set up triggers for the Jenkins spoke

Set up triggers for the Jenkins spoke for the required events. The endpoint enables webhooks to connect with your ServiceNow instance.

Before you begin
Role required: admin

Configure triggers in ServiceNow instance

Configure endpoint for webhooks in the Jenkins that support the token authentication.

Before you begin
Role required: flow_designer and connection_admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Toggle and enable the **Inbound** connections.
4. Locate the **JenkinsV2 Spoke** endpoint and click **View Details**.

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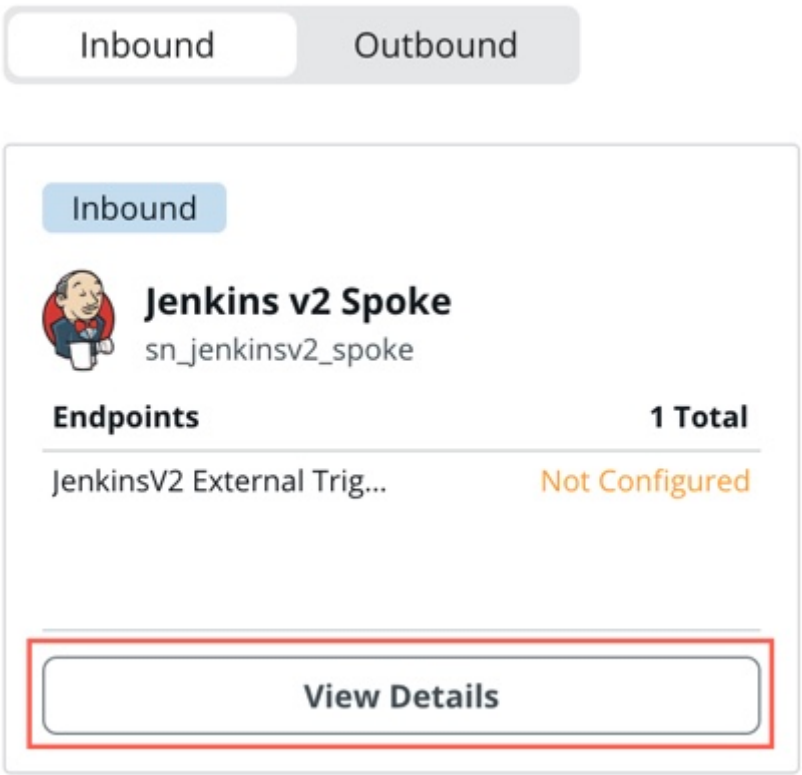
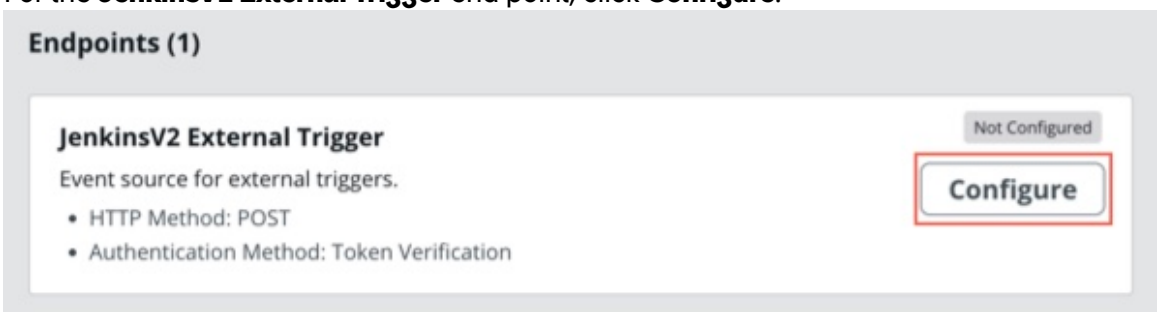


5. For the **JenkinsV2 External Trigger** end point, click **Configure**.



6. Select the user who can trigger the endpoint and click **Activate**.

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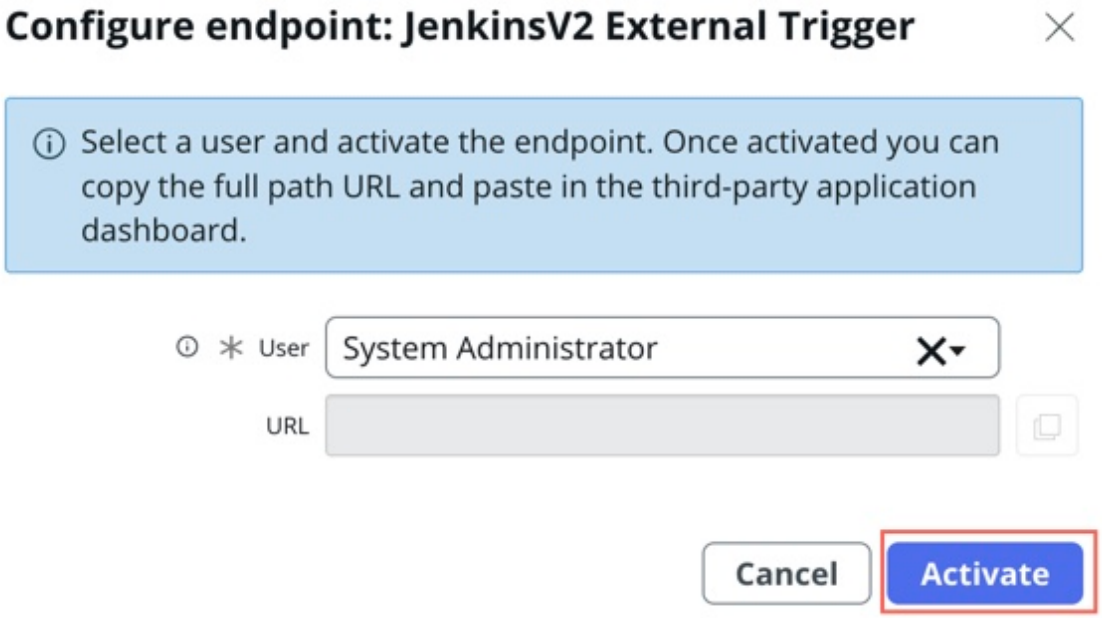
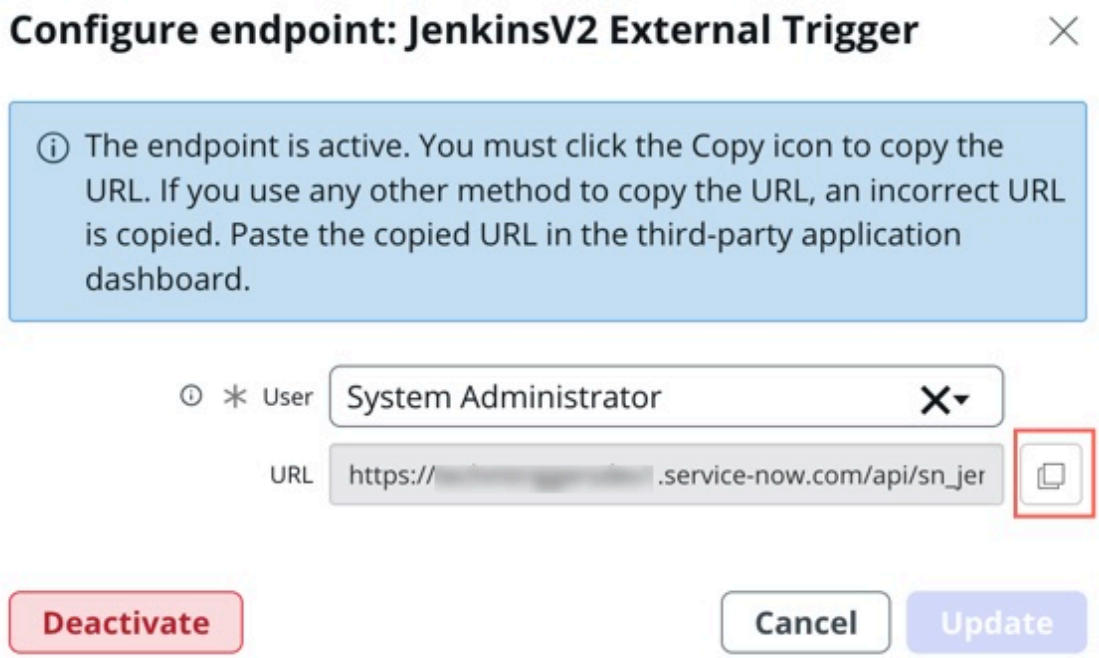


7. Copy the generated endpoint URL.



Create a pipeline project in Jenkins

Create a pipeline projects in Jenkins to add the endpoint URL in `Jenkinsfile` that is generated in your ServiceNow instance and enable webhooks to connect with your ServiceNow instance.

Before you begin

- Ensure that you install Jenkin in the local environment.
- Ensure that Maven and GitHub are installed in the Jenkins account.
- Ensure that these plugins are installed in the Jenkins account.

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- Pipeline
- Git plugin
- Git client
- Http request
- Credentials
- Warnings
- Coverage

- In GitHub, generate a classic personal access token and copy the value.

  Ensure that you select the scopes for the personal access token.

  - repo
    - repo:status
    - repo_deployment
    - public_repo
    - repo:invite
    - security_events
  - write:packages
    - read:packages

  For more information about creating a classic personal access token, see Creating a personal access token (classic) in GitHub Docs.

  For the list of supported events, see the Spoke triggers section.

- Role required: admin

Procedure

1. From the Jenkins Dashboard, select **+ New Item**.
2. On the form, enter a name to identify the pipeline and select **Pipeline**.
3. Click **OK**.
   The pipeline is created and its configuration options are displayed.
4. Under **Configure**, click **Pipeline**.
5. On the form, fill these values.

Field	Description
Definition	Select **Pipeline script from SCM**.
SCM	Select **Git**.
Repository URL	Provide GitHub repository URL.
Credentials	Create the GitHub credential record and select it. **a.** Click **+Add**. **b.** Select **Username with password** and click **Next**.

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Field	Description
	c. For **Username**, enter the GitHub username. **d.** For **Password**, paste the personal access token that is generated in GitHub. **e.** For **ID**, provide a unique ID to identify the credentials. **f.** For **Description**, enter a description for the credentials. **g.** Click **Create**. **h.** Select this record for **Credentials**.
Branch Specifier (blank for 'any')	Specify the required branch.
Script path	Relative location within the checkout of your Pipeline script. **Important:** In `Jenkinsfile`, paste the endpoint URL that was generated after you configured triggers in your ServiceNow instance. For more information, see Configure triggers in ServiceNow instance. 

6. Click **Save**.

Jira Service Management Spoke

Automate service management tasks in Jira Service Management from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Jira Service Management spoke v2.0.1 is the latest version. For version history of the spoke, see Jira Service Management spoke release notes.

Spoke requirements

JIRA Service Management account.

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Integrations - External Authentication Framework (com.glide.external.app)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Jira Service Management spoke provides actions to automate tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Metadata	Look up Service Desk IDs (Metadata)	Retrieves the list of all service desk IDs from the specified JIRA instance.
User Management	Report Personal Data	Reports the user's personal data for your apps.
Organization Management	Add Organization to Service Desk	Adds the specified organization ID to the specified service desk instance.
	Add Users to Organization	Adds users to the specified organization.
	Create Organization	Creates an organization account for the specified service management instance.
	Delete Organization	Deletes an organization account from the specified service management instance.
	Look up Organizations	Retrieves the list of organizations in service management instance.
	Look up Users in Organization	Retrieves the list of users in an organization.
	Remove Organization from Service Desk	Removes the specified organization from the specified service desk instance.
	Remove Users from Organization	Removes users from the specified organization.
Request Management	Add Customer Request Participants	Adds customers to request for the specified service desk instance.
	Create Customer Request	Creates customer request for the specified service desk instance.
	Create Customer Request Comment	Creates a customer request comment for the specified service desk instance.

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Category	Action	Description
	Create Temporary Attachment	Creates a temporary attachment for the specified request. **Note:** This action works only for Jira Service Management Cloud.
	Create Temporary File	Creates a temporary file for the specified request.
	Look up Comment Attachment	Retrieves comment attachment for the specified issue ID or issue key. **Note:** This action works only for Jira Service Management Cloud.
	Look up Customer Request Comments	Retrieves the list of customer request comments for the service desk.
	Look up Customer Request Participants	Retrieves the list of request participants related to customer request for the specified service desk instance.
	Look up Customer Request Status History	Retrieves the customer request status history for the specified service desk instance.
	Look up Customer Request Transitions	Retrieves a list of customer request transitions for the specified service desk instance.
	Look up Customer Requests	Retrieves a list of customer request for the specified service desk instance.
	Look up SLA Information	Retrieves the SLA information for the specified service desk instance.
	Look up Subscription Status	Retrieves subscription status for the specified service desk instance. **Note:** This action works only for Jira Service Management Cloud.
	Perform Customer Request Transition	Changes the state of a customer request for the specified service desk instance. **Note:** This action works only for Jira Service Management Cloud.
	Remove Customer Request Participants	Removes a customer request from the specified service desk instance.
	Subscribe Customer Request	Subscribes to a customer request for the specified service desk instance.
ServiceDesk Management	Add Customers	Adds the specified users to the service desk.
	Look up Issues in Queue	Retrieves the list of issues in a queue for the specified service desk instance.

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Category	Action	Description
	Look up Queue	Retrieves the list of queues specified in service desk instance.
	Look up Request Type Fields	Retrieves the list of request type fields for the specified service desk instance.
	Look up Request Types	Retrieves the list of request types for the specified service desk instance.
	Look up Service Desks	Retrieves the list of all service desk for the specified service management instance from JIRA instance.
	Look up User Account ID	Retrieves the user account ID of user. **Note:** This action works only for Jira Service Management Cloud.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Jira Service Management request management AI agent	Automates and manages workflows in Jira Service Management. Retrieves customer request details, manages participants, handles SLA information, and automates transitions.
Jira Service Management organization management AI agent	Manages organizations, service desk associations, and user lookups.
Jira Service Management service desk management AI agent	Automates and manages tasks within Jira Service Management. Retrieves service desks, request type fields, queues, request types, and issues in queues.

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There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Jira Service Management spoke.

Set up the Jira Service Management spoke

Integrate the ServiceNow instance and Jira Service Management by using OAuth 2.0 to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Jira Service Management spoke.
- Role required: admin.

About this task

Important:

Starting with the Australia release, instructions for generating and using API tokens have been removed from our documentation to align with Atlassian's Acceptable Use Policy. See the Atlassian blog, Building Secure and Scalable Integrations: Our Guidance for Third-Party Apps for more information.

Obtain the value of Cloud ID

Obtain the value of Cloud ID of the cloud instance. This value is required during the configuration of the connection record in your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Log in to Atlassian Administration as an admin.
2. Click **Select** against the required organization.
3. From the **Jira Software** product, click **Manage product access**.
   A new window is opened and the URL is in this format: `https://admin.atlassian.com/s/<Cloud-ID>/apps`.
4. Copy the value of the Cloud ID for later use.

Configure a connection for the Jira Service Management spoke

Add and configure a Jira Service Management connection to authenticate ServiceNow requests in a Jira Service Management spoke.

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Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, the **Outbound** connections are displayed by default.
4. Locate the **Jira_SM** connection alias and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Jira Service Management spoke, click **View Details**.
   - To manage more than one Jira Service Management spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.
5. On the **Connection** form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection. For example, `Jira Spoke OAuth basic conn`.
Connection URL	URL of your Jira instance in this format: `https://api.atlassian.com/ex/jira/{cloud-id}/`. Replace `{cloud-id}` with value of the Cloud ID you had obtained previously.
Scopes	By default, these scopes are provided `read:jira-user`, `read:servicedesk-request`, `write:servicedesk-request`, `manage:servicedesk-customer`, `read:jira-work`, `read:me`, `read:account`, `offline_access`. You can modify the scopes as per your requirement. **Note:** After the scopes are modified and saved, whenever you edit the connection record, the scopes are reset to the default scopes.

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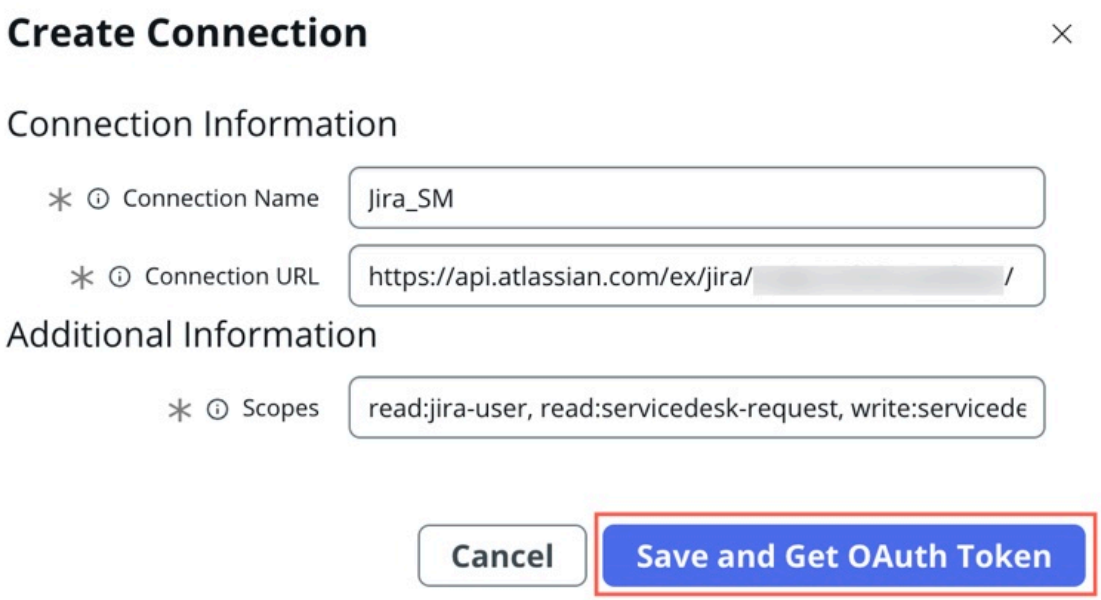

6. Click **Save and Get OAuth Token**.

Jira Spoke

Manage issues, users, stories, and groups in Jira. Retrieve Jira data to use in a flow. Use bi-directional webhooks and subscribe to Jira with a ServiceNow callback URL.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Jira spoke v6.1.3 is the latest version. For version history of the spoke, see Jira spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Step - Get Connection Info (com.glide.hub.action_step.get_connection_info)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

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- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Integrations - External Authentication Framework (com.glide.external.app)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for API version v2, but may be compatible with later versions.

Note:

- If your Jira instance supports another API version, specify the API version in **API Version** in the respective connection record under the Attributes related list. By default, the **API Version** is 2.
- Jira Service Desk isn't supported by the Jira spoke. ServiceNow offers Jira Service Management Spoke to integrate with Jira Service Management that is the new version of Jira Service Desk.

Jira Webhooks module

Bi-directional webhooks can be set up to be notified about the required events. Routing policy defines conditions that must be met to notify the ServiceNow instance. These conditions are based on the events in Jira that you want to be notified about. When the conditions are met, the routing policy triggers the associated subflow, which in turn automates the Jira tasks.

The bi-directional webhooks require separate setup and can be used independently without using the spoke actions. By default, the Jira Webhooks application is available in the Jira and has the following modules:

- Jira Webhook Registries
- Jira WebHook Routing Policies

Use the Jira Webhook Registries module to assign a token and provide the API path. You must generate a Callback URL here and provide the URL in Jira. A default routing policy is provided in the Jira WebHook Routing Policies module. The default routing policy supports these fields:

Category	Field
Issue	• Jira instance URL • Webhook Event • Issue Description • Created • Updated • Issue Resolution • Previous Issue Resolution • Issue Summary • Issue Type • Previous Issue Type

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Category	Field
	• Issue Priority • Previous Issue Priority • Issue Status • Previous Issue Status • Issue Status Category • Previous Issue Status Category • Project
Comment	• Jira Instance URL • Webhook Event • Comment • Created • Updated • Issue Summary • Issue Type • Issue Priority • Issue Status • Issue Status Category • Project
Worklog	• Jira Instance URL • Webhook Event • Worklog Time Spent • Created • Updated
Attachment	• Jira Instance URL • Webhook Event • Created • Attachment File Name • Attachment Size • Attachment Mime Type
Project	• Jira Instance URL • Webhook Event • Project

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Category	Field
Version	• Jira Instance URL • Webhook Event • Version • Version Description • Merged To Version • Merged To Version Description

To use other conditions in the routing policy, create a routing policy in the Jira WebHook Routing Policies module and specify conditions as per your requirement. See Set up a bi-directional webhook for the Jira spoke for information regarding setting up and configuring the webhooks.

Tip: To set up and use webhooks, you should configure webhook registries, decision tables, and create subflows. For a low-code alternative with less configurations, you can use Spoke triggers.

Spoke subflow

The Jira spoke provides a sample subflow to handle various Jira webhook events. The available sample subflow is Process Jira Webhooks. The Process Jira Webhooks subflow supports these fields:

Category	Field
Issue	• User • Issue • Attachments • Issue Change Log • Project
Comment	• Issue • Project • Comment
Worklog	Worklog
Attachments	Attachment
Project	Project
Version	Version
Webhook Event	
Timestamp	
Payload	

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Category	Field
Note: This is the entire Jira payload.	

To customize the default subflow, you must a create a copy of the sample subflow, parse the payload, and customize the subflow as per your requirement. Payload is one of the inputs to the subflow.

While customizing subflows, you must ensure that the subflows are configured to avoid infinite loops.

Note:

- You must configure webhooks to use the spoke subflow. See Set up a bi-directional webhook for the Jira spoke for information regarding setting up and configuring the webhook.
- The sample subflow runs as a user by default. The subflow can be configured to run as system.

Spoke triggers

Use triggers in the Jira spoke to subscribe to the required events. The endpoint enables webhooks to connect with your ServiceNow instance. You can configure the flows to execute only when the specified trigger conditions are met. The supported events are:

Category	Trigger	Description
Board Management	Board Deleted	Trigger is initiated when a board is deleted.
	Board Updated	Trigger is initiated when a board is updated.
	Board Created	Trigger is initiated when a board is created.
Comment Management	Comment Deleted	Trigger is initiated when a comment is deleted.
	Comment Updated	Trigger is initiated when a comment is updated.
	Comment Created	Trigger is initiated when a comment is created.
Issue Managament	Issue Updated	Trigger is initiated when an issue is updated. The events like issue assigned, issue resolved, issue closed, issue reopened, issue moved, and other events that are related to updating an issue come under this webhook event.
	Issue Assigned	Trigger is initiated when an issue gets assigned.

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Category	Trigger	Description
	Issue Deleted	Trigger is initiated when a issue is deleted.
	Issue Created	Trigger is initiated when a issue is created.
Sprint Management	Sprint Updated	Trigger is initiated when a sprint is updated.
	Sprint Deleted	Trigger is initiated when a sprint is deleted.
	Sprint Created	Trigger is initiated when a sprint is created.
	Sprint Closed	Trigger is initiated when a sprint is closed.
	Sprint Started	Trigger is initiated when a sprint is started.

For information about setting up the triggers for the Jira spoke, see Set up triggers for the Jira spoke. For more information about inbound integration, see Conditional and event-driven inbound integration.

Spoke actions

Use actions in the Jira spoke in Workflow Studio to automate Jira tasks when an event occurs in the ServiceNow AI Platform. Available actions include:

Note:

- Some of the spoke actions from this release onwards don't have the **Connection Alias** input.

  The existing flows in your instance that use actions of the previous versions, continue to work. However, those earlier actions are renamed by adding the `deprecated` suffix and you can't use them from this version onwards.

- Error evaluation capabilities are provided in some of the spoke actions.

Category	Action	Description
Audit Management	Look up Audit Logs Stream	Retrieves login activity for the Jira user subscriptions. **Note:** This action is supported on Jira Server 9 and earlier versions, and Jira Cloud.
	Look up Audit Logs Stream (Server 10+)	Retrieves audit log records from the Jira instance within a specified date range.

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Category	Action	Description
		Note: This action is supported on Jira Server 10 and later versions.
Group Management	Add User to Group	Adds given user to a group in Jira.
	Create Group	Creates a group in Jira.
	Look up Groups Stream	Retrieves all groups in the Jira account, including the default groups. **Note:** This action can be used with Jira Cloud subscription only.
	Look up Users by Group Name Stream	Retrieves details of all members in a Jira group.
	Remove Group	Removes the given group from Jira.
	Remove User from Group	Removes the given user from a group in Jira.
Issue Management	Add Comment	Adds a comment to the specified issue in Jira.
	Add Watcher	Adds the specified user as a watcher for the specified issue.
	Assign Issue	Assigns the issue in Jira to the user.
	Copy Attachment	Copies the required attachment associated with the ServiceNow record to the required issue in Jira.
	Create Issue	Creates an issue in Jira. Depending on how your organization is using Jira, an issue could represent a software bug, a project task, a help desk ticket, or more. An issue in Jira represents a task in the ServiceNow AI Platform.
	Delete Attachment	Deletes the required attachment in Jira.
	Delete Issue	Deletes an issue in Jira.
	Delete Watcher	Deletes the user as a watcher for the specified issue.
	Do Transition	Transitions an issue in Jira from one state to another.

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Category	Action	Description
	Look up Issue Type Statuses by Project	Retrieves details of the statuses in a project.
	Look up Issue	Retrieves the details for an issue.
	Look up Issue Priorities	Retrieves the list of issue priorities and details for individual issue priorities.
	Look up Issues Stream	Retrieves a list of issues matching a JQL query string.
	Look up Sprint Issues Stream	Retrieves the details of all issues for the given sprint.
	Look up Transitions	Retrieves information about all Transitions for a given Issue ID.
	Look up Watchers	Retrieves the list of watchers for the specified issue.
	Update Issue	Updates a set number of fields of an issue in Jira with values passed as input.
Metadata Retrieval	Get Creatable Fields (Metadata)	Retrieves the list of all fields in a required Jira project.
	Get Editable Fields (Metadata)	Retrieves the list of all editable fields in a required Jira issue.
	Get Issue Types (Metadata)	Retrieves the list of all issue types in a required Jira project.
Project Management	Create Project	Creates a project in Jira.
	Look up Project	Retrieves details of the specified project by its ID or key.
	Look up Projects	Retrieves details of all projects. **Note:** This action only works for the Jira server.
	Look up Projects Stream	Retrieves details of all projects. **Note:** This action only works for the Jira Cloud.
	Look up Users Assignable to Projects	Retrieves a list of users that can be assigned to issues in one or more projects.
Sprint Management	Create Sprint	Creates a sprint in Jira.

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Category	Action	Description
	Delete Sprint	Deletes a sprint in Jira.
	Look up Sprint	Retrieves the details of the required sprint as a complex object.
	Look up Sprints by Board	Retrieves the details of all sprints in the required board.
	Update Sprint	Updates the details of a sprint in Jira.
Story Management	Create Story	Creates a story in the Jira Cloud instance. This is comparable to story in the ServiceNow Agile Development plugin.
	Look up Stories Stream	Retrieves details of all stories.
	Update Story	Updates a set number of fields of a story in Jira Cloud with the provided input values.
User Management	Create User	Creates a user in Jira.
	Look up Authenticated User	Retrieves details of the authenticated user account.
	Look up Group Memberships for User	Retrieves details of all groups of a Jira user.
	Look up Users Stream	Retrieves details of all Jira user subscriptions. **Note:** This action can be used with a Jira Cloud subscription only.
	Look up Users Stream by Name	Retrieves a list of users that match the search string. **Note:** This action can be used with a Jira server subscription only.
	Remove User	Removes a user from Jira.
	Report Personal Data	Reports personal data for given accounts to the Jira app.
Utility Actions	Copy Issue Attachment to Record	Copies Attachment from Jira to any record in ServiceNow instance. When you use this action in a subflow, make sure that the Content URL data pill is specified in the Attachment URL field.

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Category	Action	Description
	Look up Fields	Retrieves the internal name and other details of the required field label in Jira.
	Look up Issue from Comment	Retrieves the details of the issue by parsing the payload for the specified comment. You can use this action in the Process Jira Webhook subflow for Jira on-prem server when only comment related information is specified without any details about the Jira issue. For example, when only comment information is specified, this action parses the payload and extracts the issue details.
	Look up Latest Attachment on Issue	Retrieves the latest attachment for the specified issue from Jira. You can use this action in a flow or subflow for validation. For example, a subflow adds an additional attachment only when the latest attachment of an issue in Jira isn't as the same specified attachment.
	Look up Latest Comment on Issue	Retrieves the latest comment for the specified issue from Jira. You can use this action in a flow or subflow for validation. For example, a subflow adds an additional comment only when the latest comment of an issue in Jira isn't as the same specified comment.
	Look up Server	Retrieves general information about the current Jira instance.
Webhook Management	Look up Webhooks	Retrieves details of all registered webhooks from the Jira instance.
	Subscribe Webhook	Registers a webhook in the Jira instance.
	Unsubscribe Webhook	Deletes the registered webhook in Jira instance.
	Update Webhook	Updates webhook with the given ID in Jira.

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Category	Action	Description
		Note: This action isn't supported when OAuth 2.0 authentication is used.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Jira story management AI agent	Retrieves information about stories in a stream, creates new stories, and updates existing stories.
Jira utility management AI agent	Provides utility actions that can copy issue attachment to record, retrieve the latest attachment and comments on a Jira issue, and retrieve field details using labels. Ensures accurate data retrieval.
Jira user management AI agent	Creates and removes the required user. Retrieves information about users, group memberships, and authenticated user accounts.
Jira audit management AI agent	Manages audit logs and provides actionable insights by automating repetitive tasks.
Jira sprint management AI agent	Deletes sprints, updates sprint details, and retrieves specific sprint information.
Jira project management AI agent	Retrieves project details, creates new projects, retrieves project streams, and identifies users assignable to projects.
Jira group management AI agent	Manages groups by performing actions such as, creating and deleting groups, adding

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AI agent	Description
	and removing users, retrieving details about groups, retrieving data and updates, and retrieving group members.
Jira issue management AI agent	Manages issues by performing actions such as, deleting issues, managing transitions, handling watchers, and working with attachments. Also, manages transitions, comments, attachments, and watchers.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Jira account requirements

The Jira requires generating an API token for Jira using your Jira account.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the Jira alias record. To use these actions, you must create a connection record and a credential record and associate them with the Jira alias record.

These actions use REST calls, which can run on an instance. Use the connection record associated with the Jira alias to configure the endpoint against which the actions run.

Set up the Jira spoke for Jira Cloud

Integrate your ServiceNow instance with the Jira Cloud instance to authenticate the requests from ServiceNow.

Before you begin

- Request an Integration Hub subscription.
- Activate the Jira spoke.
- Role required: admin.

About this task

Important:

Starting with the Australia release, instructions for generating and using API tokens have been removed from our documentation to align with Atlassian's Acceptable Use Policy. See the Atlassian blog, Building Secure and Scalable Integrations: Our Guidance for Third-Party Apps for more information.

Option 1: Using OAuth authentication (Authorization Code grant type)

Integrate the ServiceNow instance with your Jira account using OAuth to authenticate ServiceNow requests.

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Before you begin
Role required: admin.

Obtain the value of Cloud ID

Obtain the value of Cloud ID of the cloud instance. This value is required during the configuration of the connection record in your ServiceNow instance.

Before you begin
Role required: admin

Procedure

1. Log in to Atlassian Administration as an admin.
2. Click **Select** against the required organization.
3. From the **Jira Software** product, click **Manage product access**.
   A new window is opened and the URL is in this format: `https://admin.atlassian.com/s/<Cloud-ID>/apps`.
4. Copy the value of the Cloud ID for later use.

Configure a connection for Jira spoke

Add and configure a Jira connection to authenticate ServiceNow requests in Jira spoke.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, the **Outbound** connections are displayed by default.
4. Locate the **Jira** connection alias and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Jira spoke, click **View Details**.
   - To manage more than one Jira spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.
5. On the **Connection** form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection. For example, `Jira Spoke OAuth basic conn`.
Connection URL	URL of your Jira instance in this format: `https://api.atlassian.com/ex/jira/{cloud-id}/`. Replace `{cloud-id}` with value of the Cloud ID you had obtained previously.
Scopes	By default, these scopes are provided `read:jira-work, read:jira-`

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Field	Description
	`user, write:jira-work, manage:jira-project, manage:jira-configuration, manage:jira-webhook, manage:jira-data-provider, delete:sprint:jira-software, read:sprint:jira-software, write:sprint:jira-software, read:board-scope:jira-software, read:project:jira, read:jql:jira, read:issue-details:jira, read:me, read:account, offline_access`. You can modify the scopes as per your requirement.



6. Click **Save and Get OAuth Token**.

Option 2: Using OAuth authentication (Client Credentials grant type)

Integrate the ServiceNow instance with your Jira account using OAuth to authenticate ServiceNow requests.

Before you begin

- In your Jira cloud instance, Create OAuth 2.0 credential for service accounts.

  Save the values of **Client ID**, **Client Secret**, and **Cloud ID**. You will need these for configurations in ServiceNow instance.

- Role required: admin.

Create an application registry record

Create an application registry record to provide client ID and client secret for authenticating the requests.

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Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Click **New**.
   The system displays the message `What kind of OAuth application?`.
3. Select **Connect to a third party OAuth Provider**.
4. On the form, fill these values.

Field	Description
Name	Name to identify the application registry record. For example, `Jira Client Credentials OAuth`.
Client ID	Client ID generated when the OAuth 2.0 integration was created in Atlassian Developer console.
Client Secret	Client secret generated when the OAuth 2.0 integration was created in Atlassian Developer console.
Default Grant type	Grant type used to establish the token. Select **Client Credentials**.
Token URL	OAuth server token endpoint. Enter: `https://auth.atlassian.com/oauth/token`.
Token Revocation URL	OAuth server token revocation endpoint. Enter: `https://auth.atlassian.com/oauth/token`.
Active	Select the check box.

5. In the **OAuth Entity Scopes** tab, create these entity scope records.

Name	OAuth scope
Classic scopes	`manage:jira-configuration manage:jira-project manage:jira-webhook read:jira-work read:jira-user write:jira-work`
Granular Scopes	`delete:sprint:jira-software read:issue-details:jira read:jql:jira read:sprint:jira-software write:sprint:jira-software read:board-scope:jira-software read:project:jira`

6. Right-click the form header and click **Save**.

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The record is saved and a OAuth Entity Profile record under the **OAuth Entity Profiles** tab.

7. Click the **OAuth Entity Profiles** tab and open the default profile record.
8. Verify these values.
   - **Grant type** is set to **Client Credentials**.
   - Scope records previously created are listed under the **OAuth Entity Profile Scopes** related list.
9. Click **Update**.

Create credential record for the Jira spoke

Create a credential record for the Jira account. The Jira spoke connection and credential alias uses this credential to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message `What type of Credentials would you like to create?`
3. Select **OAuth 2.0 Credentials**.
4. On the form, fill these values.

Field	Description
Name	Name to identify the credential record for the Jira spoke. For example, `Jira client credential cred`.
OAuth Entity Profile	Select the OAuth entity profile record that was created when the application registry record is configured. For more information, see Create an application registry record.

5. Right-click the form header and click **Save**.
6. Click the **Get OAuth Token** related link.

Create a connection record for the Jira spoke

Create a connection record for the Jira account. The connection and credential alias uses this connection to perform actions in Jira.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the alias record for **Jira** that shipped with the spoke.
3. On the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.

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4. Enter these values and click **Submit**.

Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `Jira cloud OAuth Connection`.
Credential	Select the Credential record created for Jira. For example, select **Jira cloud OAuth credential**.
Connection URL	Enter the URL of your Jira instance in this format: `https://api.atlassian.com/ex/jira/<Cloud-ID>`.

5. Click **Submit**.
   The Jira spoke is configured to use OAuth 2.0 Client Credentials via the service account.

Set up the Jira spoke for Jira Server

Integrate the ServiceNow instance and Jira Server using user name and password to authenticate ServiceNow requests.

Before you begin

Important:

- Starting with the Australia release, instructions for generating and using API tokens have been removed from our documentation to align with Atlassian's Acceptable Use Policy.
- As of February 15, 2024 PT, your Jira Server products reached the end of support. Starting from Jira Software 9.13 and Jira Service Management 5.13, new Jira releases support only Data Center licenses.
- End of life for impacted Data Center products will take place on March 28, 2029 at 23:59 PST. Data Center subscriptions and any associated Marketplace apps will expire on this date, making Data Center products and apps read-only. For more information, see Data Center EOL General Questions.
- Apps that collect API tokens to create individual 3LO apps don't comply with Atlassian security requirements for cloud apps and Atlassian acceptable use policy.

- Request an Integration Hub subscription.
- Activate the Jira spoke.
- Role required: admin.

Option 1: Using user name and password

Integrate the ServiceNow instance and Jira Server using user name and password to authenticate ServiceNow requests.

Before you begin

Role required: admin

Create credential record for the Jira spoke

Create a credential record for the Jira account. The Jira spoke connection and credential alias uses this credential to authorize actions.

Before you begin

Role required: admin

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Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message `What type of Credentials would you like to create?`
3. Select **Basic Auth Credentials**.
4. On the form, fill these values.

Field	Description
Name	Name to identify the credential record for the Jira spoke. For example, `Jira Data Center Basic Cred`.
Username	Username to log in to the Jira Data Center or Jira Server.
Password	Password to log in to the Jira Data Center or Jira Server.

5. Right-click the form header and click **Save**.

Create a connection record for the Jira spoke

Create a connection record for the Jira account. The connection and credential alias uses this connection to perform actions in Jira.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the alias record for **Jira** that shipped with the spoke.
3. On the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.
4. Enter these values and click **Submit**.

Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `Jira cloud OAuth Connection`.
Credential	Select the Credential record created for Jira. For example, select **Jira Data Center Basic Cred**.
Connection URL	Base URL of the Jira server.

5. In the Attributes related list, provide these values.
   a. Enter the value `2` for **api_version**.
   b. Enter the value `server` for **server_type**.

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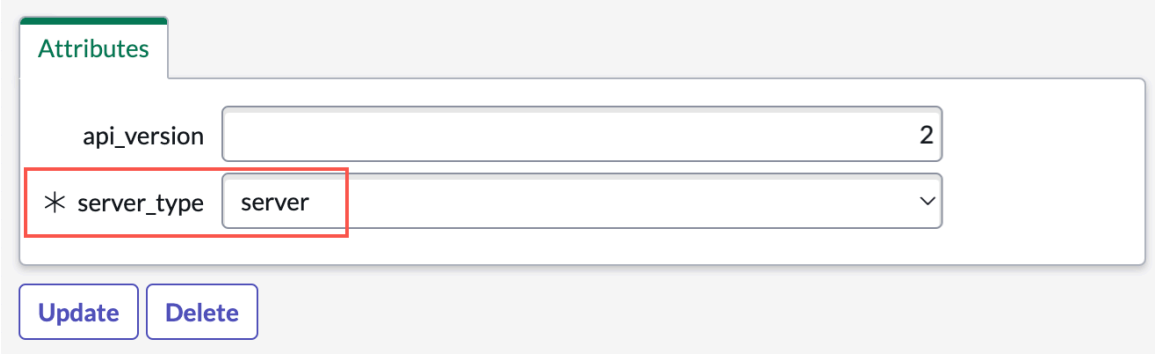

6. Click **Submit**.
   The Jira spoke is configured to use Basic Auth credentials.

Set up a bi-directional webhook for the Jira spoke

Configure a webhook to subscribe to Jira with a ServiceNow callback URL.

Before you begin

- Request an Integration Hub subscription
- Activate the Jira spoke
- Role required: admin

Create a token

Create a token to embed in the Jira webhook URL.

Before you begin

Role required: admin

Procedure

1. In the navigation filter, enter `token_verification.list`.
   The system displays records in the Token Verifications table.
2. Click **New**.
3. On the form, fill the fields.

Token Verification form

Field	Description
Name	Unique name to identify the token. For example, `Jira token`.
Description	Description of the token.
Token	Authentication token. This token is used to authenticate incoming webhook requests.

Result

The token created is used to authenticate incoming webhook requests.

Register a Jira webhook in ServiceNow

Register a Jira webhook in ServiceNow to notify the ServiceNow app when certain events occur in Jira.

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Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Jira Webhooks** > **Jira Webhook Registries**.
2. Click **New**.
3. On the form, fill in the fields.

Jira Webhook Registry form

Field	Description
Name	Unique name to identify the record. For example, `Jira webhook`.
Description	Description of the record.
Token	Authentication token. This token is used to authenticate incoming webhook requests.
Path	Jira webhook path. By default, this path is set to `api/sn_jira_spoke/jira_webhook_callbacks/wh_entry`.

4. Right-click the form header and click **Save**.
5. Choose how you want to authenticate callback requests and select one of the either options.

Callback URL Type	Description
Token-based Callback URL	Uses a static token in the URL for simple authentication.
HMAC-based Callback URL	Uses Hash-based Message Authentication Code (HMAC) for enhanced security and tamper-proof authentication.

   The system displays either the token#based callback URL or the HMAC#based callback URL based on your selection.
6. Copy and record the webhook callback URL.

Result
The Jira webhook is registered in your ServiceNow instance.

Add a callback URL in Jira

Provide a webhook callback URL in yourJira Atlassian account to create a webhook.

Before you begin
Role required: admin

Procedure

1. Log in to your Jira Atlassian account.
2. Create a webhook in your Atlassian account.
3. Enter the webhook callback URL in the **URL** field.
   See the Atlassian Developer portal documentation for instructions on creating a webhook.

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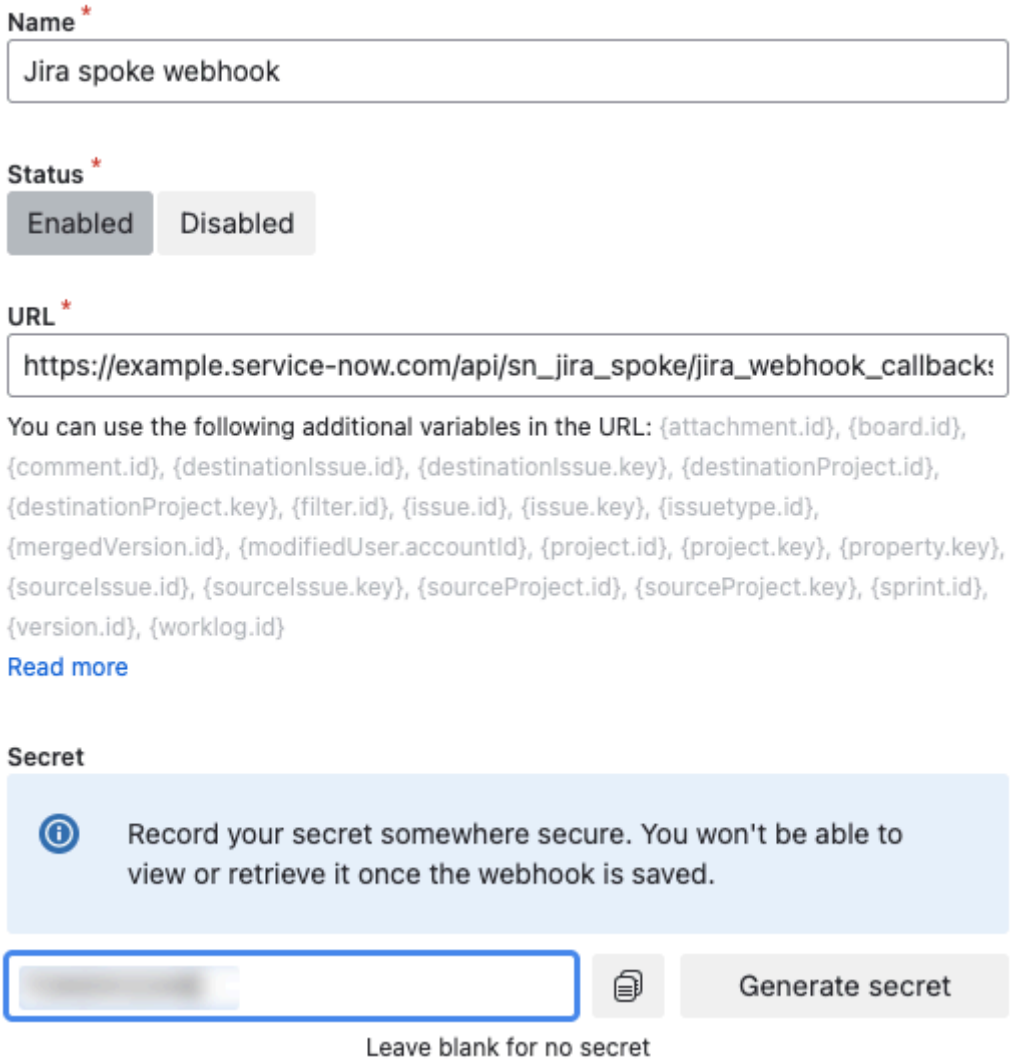
Note: If you select an HMAC-based callback URL while registering a webhook, enter the secret token created from your ServiceNow instance in the webhook's **Secret** field.



4. Select the related events that should trigger the webhook.

Result

The callback URL is added in your Jira Atlassian account. You can create routing policies and subflows as per your requirement. See Customize a bi-directional webhook for information regarding the creation of new routing policies and subflows.

Customize a bi-directional webhook

Create a webhook routing policy and subflow as per your requirement.

Before you begin

Role required: admin

About this task

The default routing policy in the Jira WebHook Routing Policies module triggers the Process Jira Webhooks subflow and notifies the ServiceNow app when certain events occur in Jira. See Jira Spoke for information about the fields that the default routing policy and subflows support. To use any other fields in your custom subflow and customize conditions in the routing policy, perform these steps.

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Procedure

1. Navigate to **All** > **Flow Designer** > **Designer**.
2. Click **Subflows**.
3. Create a copy of the default subflow, Process Jira Webhooks.
4. Customize the subflow as per your requirement and publish it. See Building subflows for more information about creating and using subflows and Jira Spoke for information about the fields that the default routing policy and subflows support.
5. Navigate to **Jira Webhooks** > **Jira WebHook Routing Policies**.
6. Click **New**.
7. On the form, fill in the fields.

Decision form

Field	Description
Label	Unique label to identify the routing policy.
Default answer	Option to specify if this is the default answer. The default answer is applicable when the conditions are not met. **a.** Click the lookup icon ( ). **b.** Select the required subflow from the Document list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow]`.
Condition	Conditions to be met when the required events occur in Jira. See Jira webhooks for information about the supported fields.
Answer	Subflow that must be triggered when the specified conditions are met.

8. Click **Submit**.

Note: These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

Result
The routing policy and subflow are created.

Set up triggers for the Jira spoke

Set up triggers for the Jira spoke for the required events. The endpoint enables webhooks to connect with your ServiceNow instance.

https://player.vimeo.com/video/1109174361?h=eeb0b782e1&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin
Role required: admin

Configure triggers in ServiceNow instance

Configure endpoint for webhooks in the Jira that support the token authentication.

Before you begin
Role required: flow_designer and connection_admin

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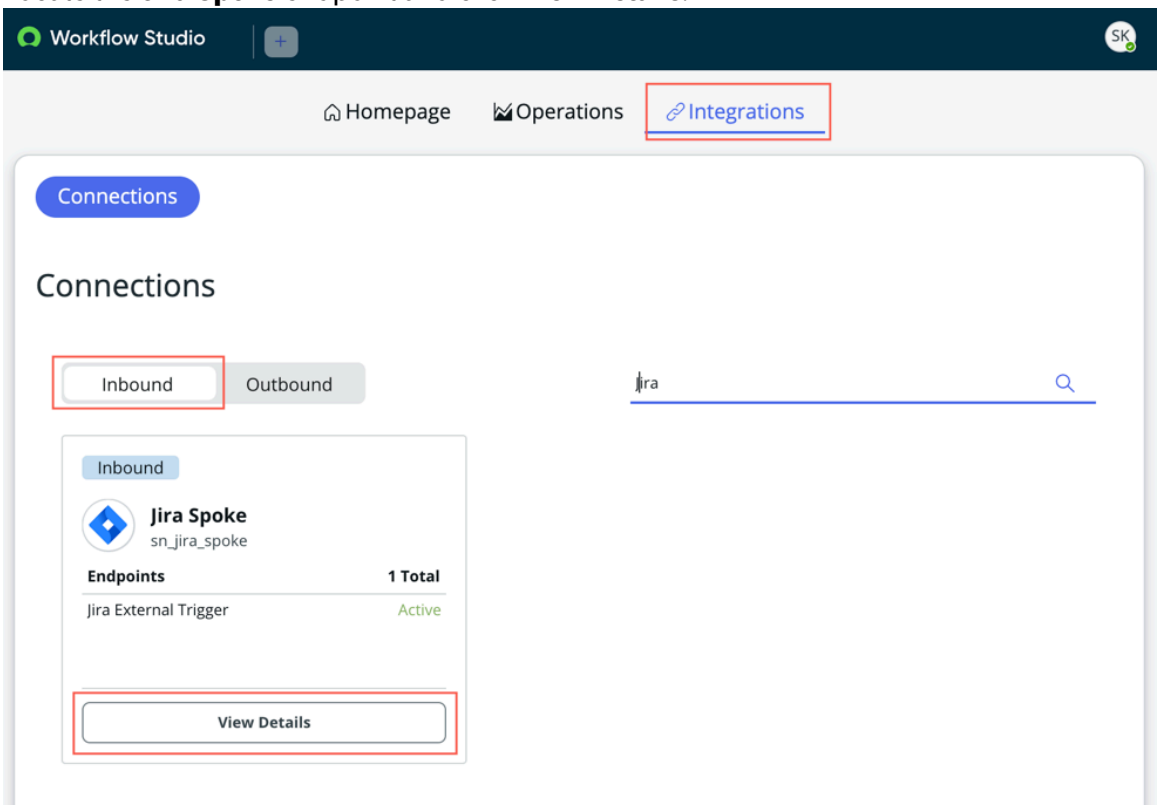
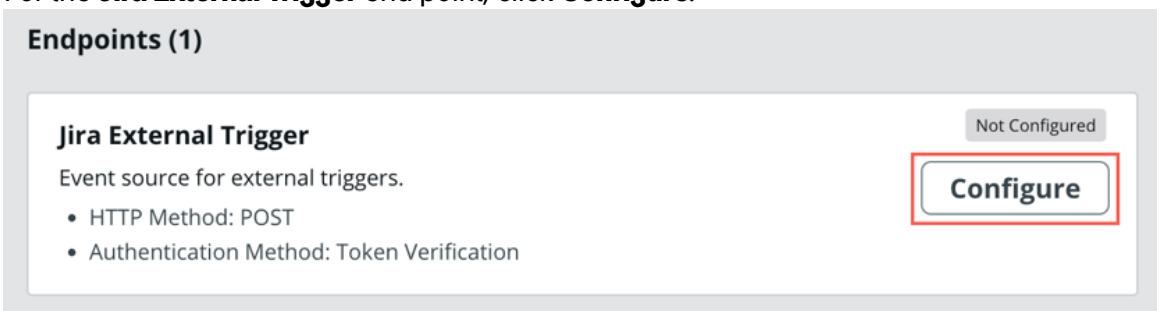
Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Toggle and enable the **Inbound** connections.
4. Locate the **Jira Spoke** endpoint and click **View Details**.



5. For the **Jira External Trigger** end point, click **Configure**.



6. Select the user who can trigger the endpoint and click **Activate**.

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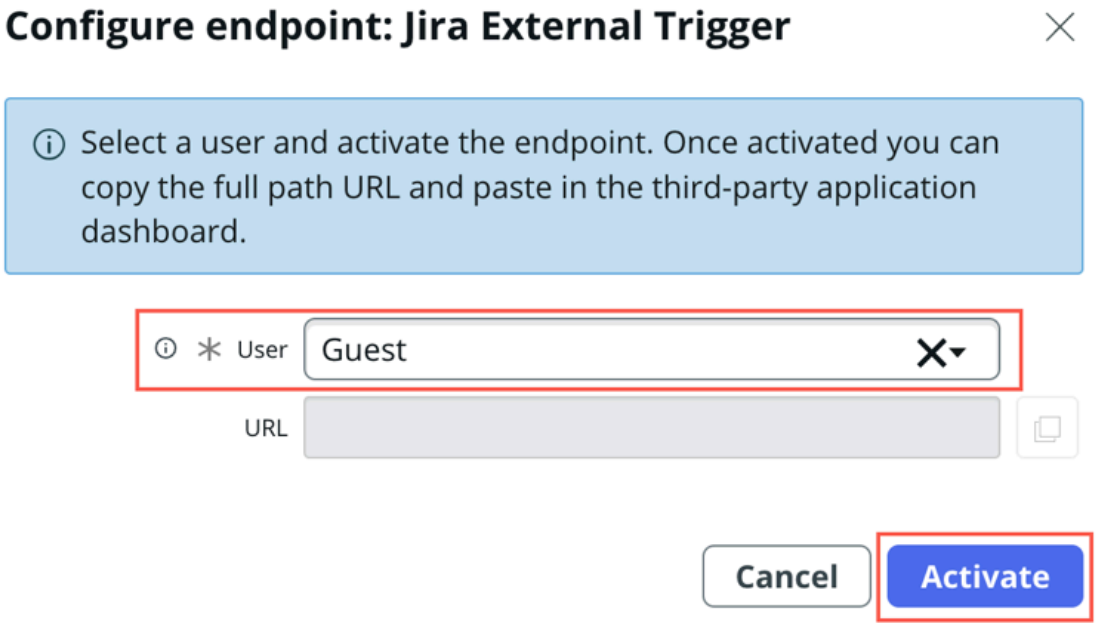
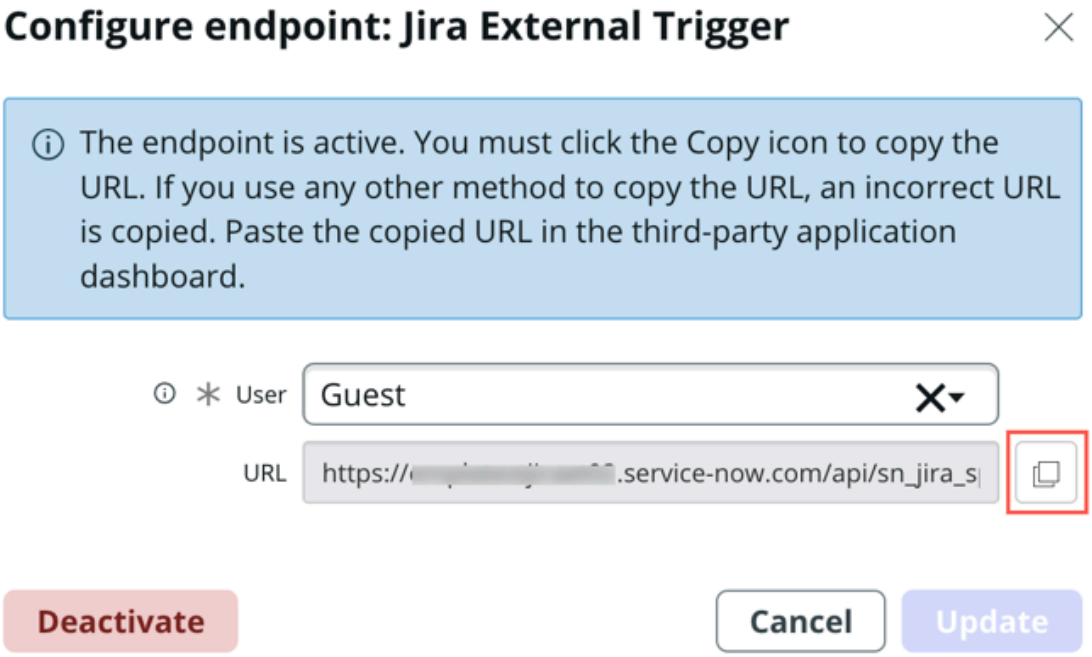


7. Copy the generated endpoint URL.



Add the endpoint URL in Jira

Add the endpoint URL that is generated in your ServiceNow instance in the Jira Atlassian account to enable webhooks to connect with your ServiceNow instance.

Before you begin
Role required: admin

Procedure

1. Log in to your Jira Atlassian account.

2. Navigate to **JIRA SETTINGS** > **System**.

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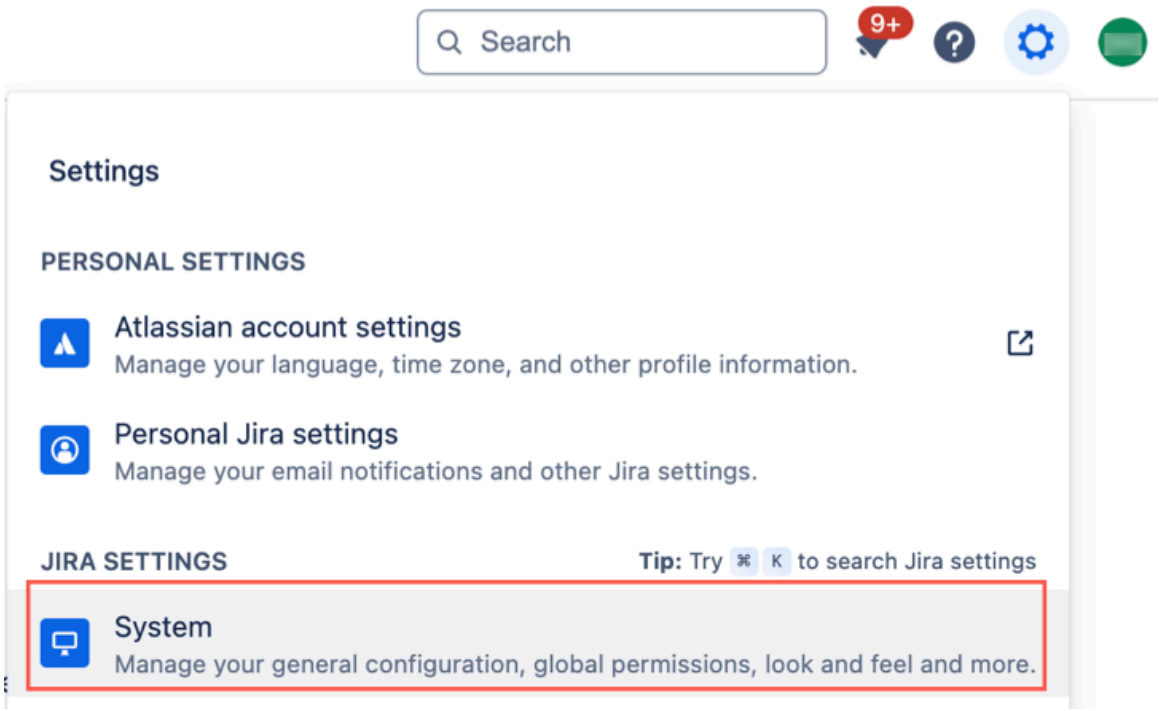

3. Under **Advanced**, click **WebHooks**.
4. Click **+Create a WebHook**.
5. On the form, fill in the values.

Field	Description
Name	Name to identify the webhook.
URL	Paste the generated endpoint URL that was generated after you configured triggers in the ServiceNow instance.



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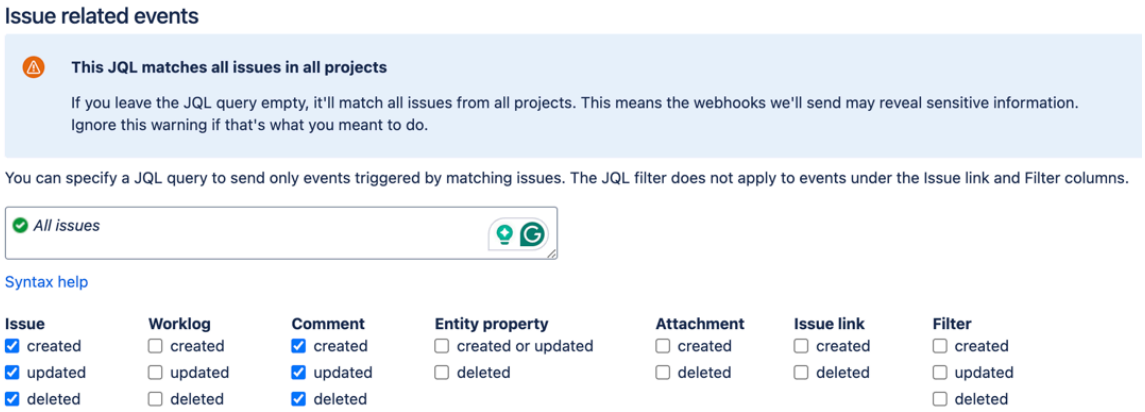
6. Select the supported events as per your requirement.

   For the list of the supported events, see the Spoke triggers section.



7. Click **Create**.

Kubernetes Spoke

Automate changes in Kubernetes when an event occurs in ServiceNow.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Kubernetes spoke v1.4.0 is the latest version. For version history of the spoke, see Kubernetes spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

API version v1.

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Spoke actions

The Kubernetes spoke provides actions to automate Kubernetes tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Endpoint Management	Create Endpoints	Creates an endpoint in the Kubernetes instance.
	Delete Endpoints	Deletes an endpoint from the Kubernetes instance.
Namespace Management	Create Namespace	Creates a namespace in the Kubernetes instance.
	Delete Namespace	Deletes a namespace from the Kubernetes instance.
Node Management	Create Node	Creates a node in the Kubernetes instance.
	Delete Node	Deletes a node in the Kubernetes instance.
	Inspect Node	Inspects a specified node in the Kubernetes instance and returns node information and status.
Pod Management	Create Pod	Creates a Pod in the Kubernetes instance.
	Delete Pod	Deletes a pod from the Kubernetes instance.
	Inspect Pod	Inspects the specified pod in the Kubernetes instance and returns pod information and status.
Secret Management	Create Docker Hub Secret	Creates a secret in the Kubernetes instance.
	Delete Docker Hub Secret	Deletes a Secret from the Kubernetes instance.
Service Management	Create Service	Creates a service on a Kubernetes server.
	Delete Service	Deletes a service from the Kubernetes server.
Volume Management	Create Persistent Volume	Creates a persistent volume in the Kubernetes instance.
	Create Persistent Volume Claim	Creates a Persistent Volume Claim in a Kubernetes instance.
	Delete Persistent Volume	Deletes a persistent volume from the Kubernetes instance.
	Delete Persistent Volume Claim	Deletes a persistent volume claim from the Kubernetes instance.
	Inspect Persistent Volume Claim	Inspects a persistent volume claim in a Kubernetes instance and returns claim information and status.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

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- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Kubernetes endpoint management AI agent	Manages (that is, creates or deletes) an endpoint in the Kubernetes instance.
Kubernetes namespace management AI agent	Manages (that is, creates or deletes) a namespace in the Kubernetes instance.
Kubernetes node management AI agent	Manages (that is, creates or deletes) and inspects the specified node in the Kubernetes instance.
Kubernetes pod management AI agent	Manages (that is, creates or deletes) and inspects the specified pod in the Kubernetes instance.
Kubernetes secret management AI agent	Manages (that is, creates or deletes) a secret in the Kubernetes instance.
Kubernetes service management AI agent	Manages (that is, creates or deletes) a service in the Kubernetes instance.
Kubernetes volume management AI agent	• Manages (that is, creates or deletes) a persistent volume. • Manages (that is, creates or deletes) and inspects the specified persistent volume claim.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Kubernetes account requirements

The Kubernetes spoke requires generating and configuring your Kubernetes account to use a web API key.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the Kubernetes alias record to authorize actions. To use the spoke connection alias, create an associated Connection record and an associated Credential record. For information about setting up the spoke, see Set up the Kubernetes spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Kubernetes alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Kubernetes spoke

Integrate the ServiceNow instance and Kubernetes using an API key and certificate to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Kubernetes spoke.
- Role required: admin.

Generate Kubernetes API token and certificate

Generate an access token and a certificate from your Kubernetes account for API key authentication.

Before you begin

Kubernetes requirements:

- Kubernetes account.
- Role required: administrator with credentials on the host machine where Kubernetes is installed.

About this task

Complete these steps from your Kubernetes host machine. See Kubernetes documentation for instructions on generating your API token and client certificate.

Procedure

1. From your Kubernetes host machine, generate an access token to interact with Kubernetes APIs.
   This token does not expire.
2. Copy and record the access token to create Credential records on your ServiceNow instance.
3. Generate a client certificate to upload to your ServiceNow instance.

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Upload Kubernetes client certificate

Upload the Kubernetes client certificate to your ServiceNow instance to authenticate API requests to the Kubernetes host machine.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System LDAP** > **Certificates**.
2. Click **New**.
3. Complete the form and enter the certificate in the **PEM Certificate** field.
   For more information about uploading certificates, see Upload a certificate to an instance.
4. Click **Submit**.

Configure a connection for the Kubernetes spoke

Add and configure the Kubernetes connection to authenticate ServiceNow requests in Kubernetes spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Kubernetes** and click **View Details**.

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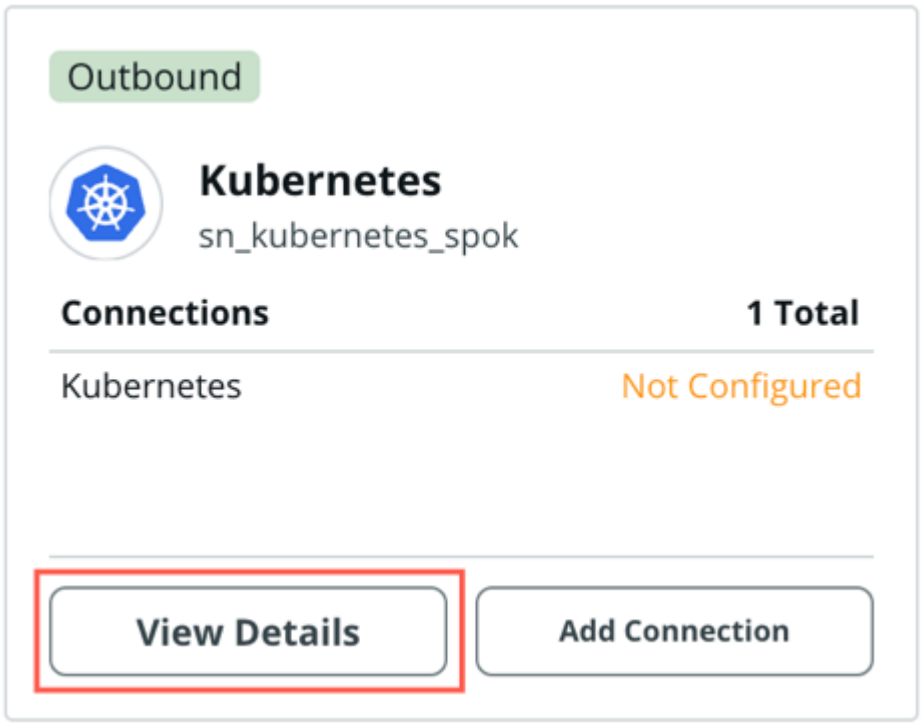
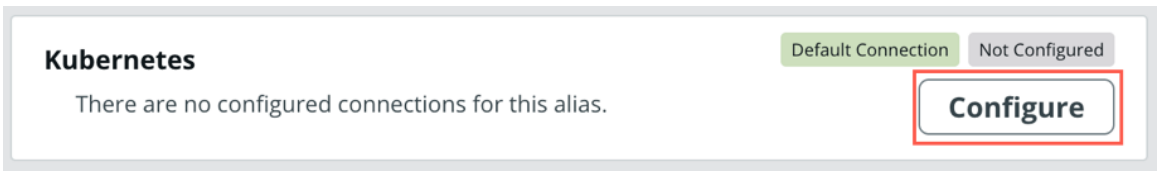
- To configure the default connection and credential alias record that is shipped along with the Kubernetes spoke, click **View Details**.



- To manage more than one Kubernetes spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the **Connection** form, fill in the fields.

Field	Description
Connection Name	Name to identify the Kubernetes connection alias record.
Connection URL	IP address and port of the host machine where Kubernetes is installed.
API Key	Token you obtained from Kubernetes in this format: `Bearer {access token}`.

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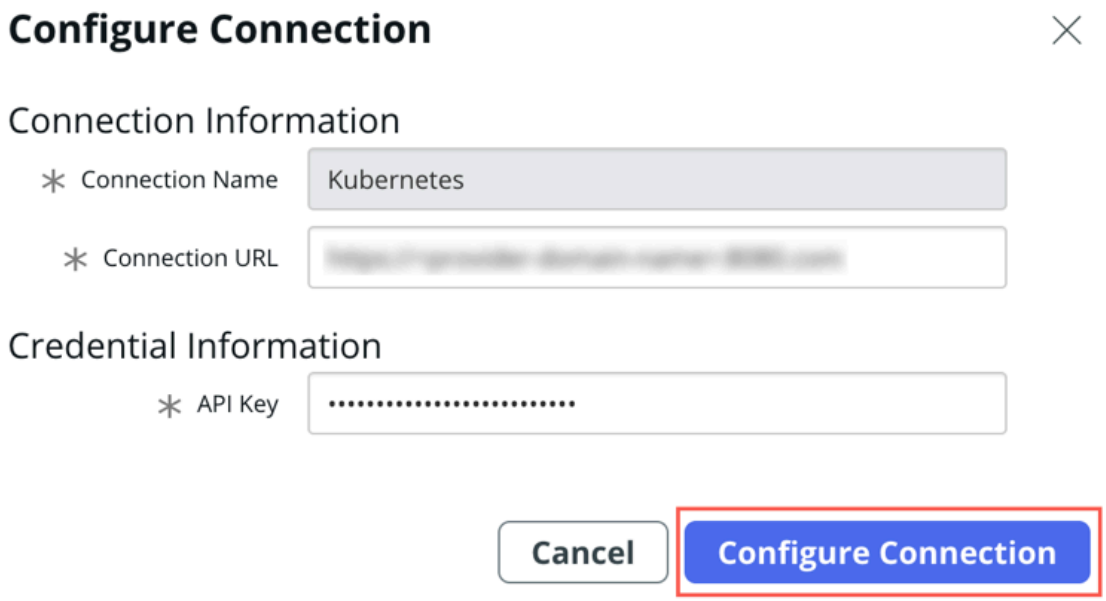

6. Click **Configure Connection**.

Result
The spoke connection is configured and ready to be used.

Turn off remote SSL host verification

A system property prevents the Kubernetes spoke from processing Kubernetes responses. Set the *com.glide.communications.httpclient.verify_hostname* system property to false to enable the integration.

Before you begin
Role required: admin.

Procedure

1. Enter `sys_properties.list` in the application navigator.
   The System Properties [sys_properties] table opens.
2. Search for the *com.glide.communications.httpclient.verify_hostname* system property.
3. Set the value to false.

Legal Tracker Spoke

Legal Tracker spoke enables a seamless integration of the Thomson Reuters Legal Tracker application with a ServiceNow® instance to enable legal departments to create matters for Outside Firm and Outside Counsel Engagements and to track spends.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Legal Tracker spoke v1.0.2 is the latest version. For version history of the spoke, see Legal Tracker Spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow® IntegrationHub Action Step — REST (com.glide.hub.action_step.rest)
- ServiceNow® IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow® IntegrationHub Action Template — Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

Legal Tracker API (REST API v1)

Spoke actions

Legal Tracker provides actions to automate the tasks in the following table when events occur in your ServiceNow instance.

Note: To avoid unauthorized access, make sure that the required users have the least privileges for the spoke actions.

Category	Action	Description
User Management	Look up Users Stream	Retrieves all users in the current company.
Company List	Look up Companies Stream	Retrieves a list of companies accessible to current user.
Location Management	Look up Countries Stream	Queries for countries based on an OData filter query.
Data Warehouse Access Management	Look up Organizational units Stream	Retrieves all Organizational units.
	Look up Practice groups Stream	Retrieves all Practice Groups.
	Look up Substantive law Stream	Retrieves all Substantive Laws.

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Category	Action	Description
Accounts Payable Data Exchange Management	Look up AP Routes Stream	Retrieves all AP Routes available for user.
Matter Management	Create Matter	Creates a matter record on the Legal Tracker application.
	Look up Matter status	Retrieves the existing status for a matter by the matter ID.
	Look up Matter Budgets	Retrieves information about a matter budget identified by the matter ID, source, firmID, and firmType.
	Look up Matters Stream	Retrieves a list of matters.
	Look up Matter by ID	Retrieves information about a matter by Matter ID.
	Look up Templates	Retrieves a list of matter templates.
	Look up Template Types	Retrieves a list of types for matter template.
	Look up Matter Fields by ID	Retrieves a Matter Field by Field ID.
	Look up Matter Financials	Retrieves the total spending and budget information for a matter in the matter's configured currency.

Spoke user roles

The Legal Tracker Spoke user [sn_legal_trckr_spk.user] is available when the Legal Tracker spoke is installed. The role is required for users accessing Legal Tracker.

Legal Tracker online account requirements

The Legal Tracker spoke requires a Legal Tracker account to generate OAuth 2.0 tokens.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Legal Tracker spoke.

Set up the Legal Tracker spoke

Integrate a ServiceNow instance and the Legal Tracker spoke by using#Legal Tracker credentials to authenticate#ServiceNow#egal requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Legal Tracker spoke.
- Role required: admin.

Register Legal Tracker as an OAuth provider

Register Legal Tracker as an OAuth provider to enable the instance to request OAuth 2.0 tokens.

Before you begin

You must have the following setup to register Legal Tracker OAuth provider:

- Integration Hub subscription
- Legal Tracker access credentials
- The Legal Tracker spoke must be activated

Role required: admin

Procedure

1. On your ServiceNow® instance, navigate to **All** > **System OAuth** > **Application Registry**.
2. Select **New**.
3. On the **What kind of OAuth application** page, select **Connect to a third-party OAuth Provider**.
4. On the form, fill in the fields.

Application Registries form

Field	Description
Name	Unique name to identify the record, for example, Legal Tracker OAuth profile.
Client ID	Application ID of the Legal Tracker application.
Client Secret	The Client Secret that you generated when you created the application.
Default Grant type	The value in this field should be **Password**.
Token URL	The value in this field should be **https://api.thomsonreuters.com/auth/oauth2/token**. You might have to unlock the field to enter the value.
Redirect URL	The value in this field should be **https://<your-instance>.service-now.com/oauth_redirect.do**. You might have to unlock the field to enter the value.

5. Right-click in the form header and select **Save**.
   The system validates the OAuth credentials.

Result

Legal Tracker is registered as an OAuth provider, which enables the instance to request OAuth 2.0 tokens.

What to do next

Integrate the Legal Tracker spoke with your ServiceNow instance.

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Integrate the Legal Tracker spoke with your ServiceNow instance

Create and integrate the connection to your Legal Tracker account. The Legal Tracker spoke Connection & Credential Aliases use these connections to perform actions in Legal Tracker.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Select **Legal Tracker**.
3. Select the **Create New Connection & Credential** related link.
4. On the form, fill in the fields.

Create Connection and Credential form

Field	Value required
Connection Name	Name to identify the connection. This field is automatically set to the Legal Tracker spoke connection.
Connection URL	The URL to make the connection to the spoke. This field is automatically set to **https://api.thomsonreuters.com**.
Credential Name	Name to identify the credential record. By default, this value is **Legal Tracker Spoke Credential** but you may change it.
OAuth Name	Name of the OAuth entity profile. This field is automatically set to Legal Tracker spoke Auth.
OAuth Client ID	Client ID of the Legal Tracker application you registered in the registration portal.
OAuth Client Secret	Client Secret generated when you registered the application in the Legal Tracker portal.
OAuth Redirect URL	The redirect URL. The format of the URL is https://<your-instance>.service-now.com/oauth_redirect.do.

5. Select **Create and Get OAuth Token**.

Result

The Legal Tracker spoke is set up and integrated with your ServiceNow instance.

Lenovo Spoke

Get the warranty details of your hardware assets from Lenovo.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Lenovo Spoke v1.0.0 is the latest version. For version history of the spoke, see Lenovo spoke release notes.

Supported versions

This spoke was built for Lenovo Warranty API v2.5, but may be compatible with later versions.

Spoke requirements

You should have the Client ID provided by Lenovo. If you don’t have one, contact your organization's Lenovo sales or service representative.

Spoke dependencies

The Lenovo spoke doesn't have a dependency on any other plugin.

Spoke actions

The Lenovo spoke provides action to automate downloading asset warranty information when events occur in your ServiceNow instance. Available action is as follows:

Action	Description
Download Asset Warranty	Connect to the Lenovo Warranty API to download asset warranty information.

Note: For more information on getting asset warranty details from Lenovo, see Integration with Lenovo for asset warranty details.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

To use the actions in the Lenovo spoke, you must create a connection and credential record to authenticate and connect to Lenovo. For more information, see Create a connection and credential for Lenovo spoke

Create a connection and credential for Lenovo spoke

Create a connection and credential for Lenovo to authenticate ServiceNow requests in Lenovo spoke.

Before you begin

- Request an Integration Hub subscription.
- Activate the Lenovo spoke.
- Role required: admin.

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Procedure

1. Navigate to **All** > **Connection and Credentials** > **Connection and Credential Aliases**.
2. Select **Lenovo**.
3. From the **Related Links**, select **Create New Connection and Credential**.
4. **Optional:** Change the default connection name for the connection to Lenovo Warranty API in the **Connection name** field.
   By default, this field is set to **Lenovo Connection**.

   Important: Don't change the default URL specified in the Connection URL field.

5. In the **Client ID** field, enter the Client ID provided by Lenovo.
6. Select **Create**.

Result

The Lenovo connection is successfully created and listed in the Connections tab.

Looker Spoke

Manage subscriptions for Looker by analyzing usage based on last login time and activity sessions to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Looker spoke v1.0.0 is the latest version. For version history of the spoke, see Looker spoke release notes.

Spoke requirements

Looker account with an admin role.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream Inputs (com.glide.hub.action_type.datastream)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)

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Note: Some of these plugins are licensable features and require appropriate licenses if used outside the spoke implementation.

Spoke actions

The Looker spoke provides actions to automate Looker tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Role Management	Look up Roles	Retrieves all roles in an account.
User Management	Look up Users Stream	Retrieves all users in an account.
	Update User	Modifies the specified user's details.
	Delete User	Deletes the specified user and associated records from the account.
	User Inputs - Dynamic	Retrieves the list of fields to be used as dynamic input.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Setting up the Looker spoke.

Setting up the Looker spoke

Integrate the ServiceNow instance and Looker by using Looker credentials to authenticate ServiceNow requests.

Configure Looker API key settings

Configure API key settings to manage and retrieve Looker API keys.

Before you begin

- Request an Integration Hub subscription.
- Activate the Looker spoke.
- Role required: Looker admin.

Procedure

1. Navigate to your Looker (https://<instancename>.looker.com/) instance.
2. Select the gear icon to open Admin settings.
3. Select **Users** > **Open the admin user account**.
4. Select **Edit API3 Keys** under the Profile tab.

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5. Select **New API3 Key**.
6. Copy the Client ID and Client secret for later use.

Lucidchart Diagramming Spoke

Use Lucidchart to create architectural diagrams. Integrate your Application Portfolio Management instance with your Lucidchart account to directly access your Lucid diagrams from APM.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Lucidchart Diagramming Spoke version 1.1.1. For version history of the spoke, see Lucidchart Diagramming Spoke release notes.

Supported versions

Lucidchart API version 1.0.

Spoke requirements

The Lucidchart Diagramming Spoke requires creating a workspace and custom app on your Lucid account to generate OAuth 2.0 tokens for the Lucidchart Diagramming spoke. See Create OAuth 2.0 Client in Lucidchart and Create a connection and credential alias for the Lucidchart Diagramming spoke.

Spoke actions

The Lucidchart Diagramming Spoke provides **Create Diagram** action to access your Lucid account directly from the ServiceNow® instance and create an architectural diagram.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Create a connection and credential alias for the Lucidchart Diagramming spoke.

Create OAuth 2.0 Client in Lucidchart

Integrate your ServiceNow instance with your Lucidchart account. Create a custom OAuth application in Lucidchart to authenticate ServiceNow requests.

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Before you begin

- Lucidchart account.
- Role required: Lucidchart admin.

About this task

Create a custom OAuth application in your Lucid account to enable the OAuth 2.0 authentication with the Lucidchart Diagramming spoke.

Procedure

1. Log in to your Lucid account (www.lucid.app) using the admin credentials.
2. In the left navigation, click **Admin**.
3. Select **App Integration** > **General**.
4. In the Custom OAuth card, click **Settings**.
   The OAuth 2.0 Clients page is displayed.
5. Enter a name for the client and click **Create OAuth 2.0 Client**.
6. Click **Details** and view the Client ID and Client Secret details.
   The Client ID and Client Secret details are required to register the application as a third-party OAuth provider on your ServiceNow instance.

Result

The custom OAuth application in your Lucid account is created and can be integrated with your ServiceNow instance.

Create a connection and credential alias for the Lucidchart Diagramming spoke

Create a connection and credential record for the Lucidchart application. The Lucidchart connection and credential alias uses these credentials to authorize actions.

Before you begin

- Request an Integration Hub subscription.
- Activate the Lucidchart spoke.
- Register your application using Lucid API console and record the client ID and client secret. For more information, see Create OAuth 2.0 Client in Lucidchart.
- Role required: ServiceNow admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the Lucidchart record.
3. Under Related Links section, click **Create New Connection & Credential**.
4. On the pop-up window, fill in the fields.

Create Connection and Credential pop-up window

Field	Description
Connection Name	Name of the connection. This field is automatically set to **Lucid Spoke Connection**.

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Field	Description
Connection URL	The URL used for connecting to Lucid APIs. This field is automatically set to `https://api.lucid.co`.
OAuth Entity Name	Name of the OAuth entity profile. This field is automatically set to **Lucid Credentials**.
OAuth Client ID	Client ID generated when you created the OAuth client application in the Lucid API Console.
OAuth Client Secret	Client Secret generated when you created the OAuth client application in the Lucid API Console.
OAuth Authorization URL	Lucid authorization URL. This field is automatically set to https://lucid.app/oauth2/authorizeUser.
OAuth Token URL	Lucid token URL. This field is automatically set to https://api.lucid.co/oauth2/token.
OAuth Redirect URL	The redirect URL. This field is an auto-generated value. You must copy this URL and paste in the Lucid OAuth Client for the integration. The format of the URL is `https://<your-instance>.service-now.com/oauth_redirect.do`.

5. Click **Create and Get OAuth Token**.

Result
An Application Registry, Connection Record, and Credential record is created in the ServiceNow instance.

Metrikus spoke

Metrikus spoke provides actions to retrieve data from various sensors (such as occupancy sensor, air quality sensor, temperature sensor etc.) that are found at a workplace.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Metrikus spoke - IntegrationHub overview.

Supported versions

This spoke was built for Metrikus Beta v1.0.

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Key features

Metrikus Spoke integrates with Flow Designer Integration Hub. It fetches the occupancy sensor data from Metrikus and provides the following:

- Get event data. For example, when an employee enters a meeting room,when an employee occupies a desk).Get occupancy data for Workplace Connectors space records from Metrikus.
- Get occupancy data.
- The occupancy data is used for configuring automatic reservation check in.
- Workplace Service Delivery Location Directory shows Occupancy state for a selected location or space.

Spoke requirements

- Ensure that you have Metrikus login credentials.
- Metrikus provided Client ID and Client Secret key.

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime [com.glide.hub.integration.runtime]
- ServiceNow IntegrationHub Action Step - OpenAPI [com.glide.hub.action_step.openapi]
- Metrikus Spoke [com.sn.wsd.metrikus.spoke]

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Metrikus Spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Actions

Actions	Description
Look up Space Tree	Get all the spaces along with the location hierarchy from Metrikus.
Look up Space Occupancy Batches	Gets batches of spaces (for example, 2000) and get occupancy data from Metrikus for all batches to combine and map it.
Look up Latest Desk Occupancy	Gets occupancy data for desks in a batch (for example, 2000.)
Look up Latest Space Occupancy	Gets occupancy data for spaces in a batch (for example, 2000)
Look up Desks Occupancy Batches	Gets batches of desks (for example, 2000) and get occupancy data to combine and map it with Metrikus Spoke.

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Spoke subflows

The Metrikus Spoke provides sample subflows to demonstrate automating Workplace Connectors tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Get All occupancy by Ids	Retrieves occupancy data of both Workplace Connectors spaces and desks.
Get Occupancy by desks by Ids	Retrieves occupancy data of all desks. Invoked by **Get All Occupancy by Ids**sub flow.
Get Occupancy by spaces	Retrieves occupancy of all spaces. Invoked by the **Get All Occupancy by Ids** sub flow.

Spoke user roles

The Metrikus spoke provides the System Administrator user role to control access to data:

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up Metrikus spoke

Integrate the ServiceNow instance and Metrikus Spoke. Create a connection and credential alias in the Metrikus spoke to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Ensure that you have activated the Metrikus Spoke plugin dependencies.
- Activate the Metrikus Spoke plugin (sn_wsd_metrikus_spoke).
- Metrikus Client ID and Client secret key.
- Role required: admin.

Integrate Metrikus with your ServiceNow instance

Create the connection records to your Metrikus account. The Metrikus Spoke connection and credential aliases use these connections to perform actions in Metrikus.

Procedure

1. Navigate to **All** > *Integration Hub* > **Connections & Credentials** > *Metrikus*.
2. Select the **Create New Connections & Credential** related link.
3. On the form, fill in the fields:

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Enter the Connection Information

Field	Description and value required
Connection Name	Name to identify the connection. This field is automatically set to Metrikus Spoke connection.
Connection URL	The URL to make connection to the spoke. This field is automatically set to https://nextgen-api.metrikus.io.

Enter the Credential Information

Field	Description and value required
Credential Name	Name of the Metrikus Spokec credential. For example, **Metrikus Credential**
Token URL	Token URL address https://nextgen-api.metrikus.io/oauth/token.
OAuth Client ID	Client ID of the Metrikus application to register in the registration portal.
OAuth Client Secret	Client Secret key that is generated while registering the Metrikus application in the Metrikus portal.

4. Select **Create and Get OAuth Token**.

   The Metrikus Spoke is set up and integrated with your ServiceNow® Store instance.

What to do next

Navigate to **All** > *Workplace Connectors* > **Provider Connector Configuration** table. The Workplace Core locations provided in this table are mapped with the external Ids provided by Metrikus. The external IDs provided by Metrikus are transformed to retrieve workplace occupancy data in Workplace Connectors Space Occupancy Data table.

Magnit Spoke

The ServiceNow® Magnit spoke pulls contingent workers from the Magnit application into a ServiceNow instance and creates onboarding tasks for those contingent workers from a ServiceNow instance.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Magnit spoke v1.1.0 is the latest version. For version history of the spoke, see Magnit spoke release notes.

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Magnit spoke actions are used to pull data from a Magnit application into a ServiceNow instance. Available actions include:

Action	Description
Look Up Correlation ID for Delta Pull	Fetches the correlation ID for a delta pull. This action is handled from the Magnit application end.
Look Up Correlation ID for Full Pull	Fetches the correlation ID for a full pull. This action is handled from the Magnit application end.
Look up Contingent Workers Stream	**Look Up Correlation ID for Delta Pull** or **Look Up Correlation ID for Full Pull** is passed through the **Look up Contingent Workers Stream** action to pull full data or partial data.

Script includes installed

These script includes are installed with the Magnit application.

Script includes for Magnit

Script include	Description
MagnitErrorHandler	Error handler script for the Magnit spoke actions. For example, contains an error message that must be displayed when an action fails.
MagnitUtil	Utility functions for the Magnit spoke actions. For example, validating the mandatory inputs.

Edit Magnit OAuth

Automatically create application registry, credentials, and connections by editing the Magnit OAuth form.

Before you begin

- Request an Integration Hub subscription.
- Activate the Magnit spoke.
- Role required: admin.

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Note: A default record of Connection & Credential aliases is available on activating the Magnit spoke.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the record for the Magnit spoke.
3. Click the **Create New Connection & Credential** related link.
4. In the Create Connection and Credential record window, fill in the fields:

Field	Description
Connection Name	Name to uniquely identify the connection record.
Connection URL	URL of the Magnit instance.
Credential Name	Name to uniquely identify the credential record.
OAuth Name	Name to identify the application registry record.
OAuth Client ID	Client ID that is received from Magnit.
OAuth Client Secret	Client secret that is received from Magnit.
OAuth Token URL	Token Generation URL

5. Click **Create and Get OAuth Token**.
6. Enter **Username** and **Password**.
7. Click **Get OAuth Token**.

Mastercard Spoke

Integrate your ServiceNow instance with Mastercard's Mastercom API Suite (MCOM) and Mastercom Extended APIs (MCOM Extended) to manage the full card dispute lifecycle. Handle tasks such as searching transactions, creating claims, and processing chargebacks, pre-arbitration, and arbitration case filings efficiently.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Mastercard Spoke v3.0.1 is the latest version. For version history of the spoke, see Mastercard Spoke release notes.

Supported version

This spoke was built for Mastercom v6.

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Key features

Mastercard Spoke enables a flow designer to build workflows using actions that invoke Mastercom and Mastercom Extended. This includes the ability to:

- Search transactions
- Create claims and initiate chargebacks
- Manage seamless filing of pre-arbitration and arbitration cases
- Collaborate with merchants to prevent chargebacks
- Monitor disputes throughout the dispute lifecycle
- Expedite the end-to-end dispute management process
- Manage disputes for cleared Single Message System original transactions with Mastercom Extended

Note: The Mastercom API (MCOM) handles disputes for Dual Message System transactions, while the Mastercom Extended API (MCOM Extended) handles disputes for Single Message System transactions, which are primarily PIN debit and ATM transactions (such as Cirrus and Maestro). For more information, see the Mastercard developer documentation.

Spoke requirements

- Integration Hub subscription
- Mastercard configuration details such as, certificate, key alias, consumer key, and keystore password

Spoke dependencies

Ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Mastercard Spoke provides actions to simplify card dispute resolution. Available actions include:

- **Actions with sensitive information** - These actions contain sensitive information in the request and response body. When using Mastercom/Mastercom Extended APIs, it is recommended to use a Tokenization solution. This involves using a request builder to securely create requests and a response parser to handle encrypted API responses.

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Actions with sensitive information

Category	Action	Description
Mastercom Chargeback Management	Look up Chargeback Documents Request Builder	Retrieves and parses chargeback-related documents in the required format.
	Look up Chargeback Documents Response Parser	
Mastercom Case Filing Management	Create Case Request Builder	Allows issuers or acquirers to file a pre-arbitration, arbitration, pre-compliance, or compliance case and optionally upload documents. They can also use the endpoint to create an Expedited Billing Dispute Form (EBDF) and attach it to the claim.
	Create Case Response Parser	
	Look up Case Documents Request Builder	Retrieves and parses documents associated with a case in the preferred format.
	Look up Case Documents Response Parser	
Transactions	Look up Authorization Details of Transaction Request Builder	Retrieves and parses authorization details for the original transaction involved in the claim.
	Look up Authorization Details of Transaction Response Parser	
	Look up clearing Details of Transaction Request Builder	Retrieves and parses clearing details for the original transaction involved in the claim.
	Look up Clearing Details of Transaction	

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Category	Action	Description
	Response Parser	
	Look up Transactions Request Builder	Searches for and parses information about an original transaction to support claim-related actions.
	Look up Transactions Response Parser	
Claims	Look up Claims in a Queue Request Builder	Retrieves and parses a list of claims in the queue within the specified date range.
	Look up Claims in a Queue Response Parser	
	Look up Claim Details by Claim ID Request Builder	Retrieves and parses detailed information about a specific claim and its associated cases.
	Look up Claim Details by Claim ID Response Parser	

Mastercom Extended actions with sensitive information

Category	Action	Description
Mastercom Extended - Claim Management	Look up Claim Details by ID Request Builder - Extended	Request Builder produces the request payload for this action. Use this endpoint to retrieve details for an existing claim.
	Look up Claim Details by ID Response Parser - Extended	Parses the response from the search. Use this endpoint to retrieve details for an existing claim.
	Look up Claim Details Request Builder - Extended	Request Builder produces the request payload for this action. Use this endpoint to retrieve a list of claims.
	Look up Claim Details Response Parser - Extended	Parses the response of the searchClaim. Use this

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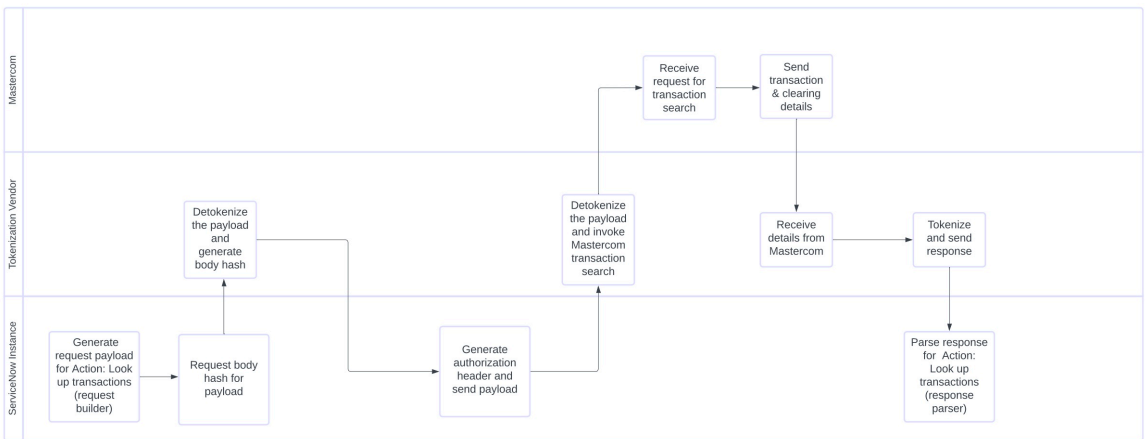
Category	Action	Description
		endpoint to retrieve a list of claims.
Mastercom Extended - Transaction Management	Look up Transactions Request Builder - Extended	Request Builder produces the request payload for this action. Use this endpoint to search for transactions.
	Look up Transactions Response Parser - Extended	Parses the response from the search. Use this endpoint to search for transactions.
Mastercom Extended - Case Filing Document Management	Look up Processed Documents by Case ID Request Builder - Extended	Request Builder for Retrieve processed documents associated with cases API. Use this endpoint to retrieve all documents from a case. The documents include any documents attached by any party.
	Look up Processed Documents by Case ID Response Parser - Extended	Parses response of the Retrieve processed documents associated with cases. Use this endpoint to retrieve all documents from a case. The documents include any documents attached by the sender, receiver, or both.
Mastercom Extended - Document Management	Look up Processed Documents by Document Completed ID Request Builder - Extended	Request Builder for Retrieve processed documents API. Use this endpoint to retrieve processed documents.
	Look up Processed Documents by Document Completed ID Response Parser - Extended	Response Parser for Retrieve processed documents API endpoint. Use this endpoint to retrieve processed documents.

The following example illustrates the solution overview when it integrates with a Tokenization solution:



• The sensitive infromation like PAN number from the Card Managment System will be tokenized by the tokenization vendor and stored in ServiceNow

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- **Actions with non-sensitive information** - You can directly invoke these Mastercom/Mastercom Extended APIs from your ServiceNow instance.

Actions with non-sensitive information

Category	Action	Description
Mastercom Case Filing Management	Look up Cases Status	Allows issuers and acquirers search for the status of documents for a specific list of cases.
	Take Action on Case	Allows issuers or acquirers take action on a case filing, such as accept, reject, rebut, escalate, or withdraw, with or without attaching documents.
	Look up List of Claims	Allows issuers or acquirers retrieve a list of claims associated with the existing cases.
Mastercom Chargeback Management	Acknowledge Chargebacks	Moves a chargeback or second representment from the Unworked queue to the Worked queue.
	Create Chargeback	Creates chargebacks and second presentments with the option to upload supporting documents.
	Load Data for Chargebacks	Obtains information about a potential first chargeback or second presentment before creating the chargeback.
	Look up Chargeback Documents	Retrieves documents in the required format associated with the chargeback type.
	Look up Chargeback Image Status	Retrieves documents with a status (completed, pending, failed, unavailable, or document not applicable) for chargebacks.
	Look up Status of Chargebacks	Retrieves the status of documents for a specific list of claim IDs and chargeback IDs. **Note:** Issuers and acquirers can send a maximum of 2,000 chargeback IDs in a single request.
	Reverse Chargeback	Reverses an existing chargeback when the issuer or acquirer creates a chargeback in error.
	Update Chargeback	Updates existing chargebacks with memos or documents.
Mastercom Claim Management	Create Claim	Issuers use this endpoint to create a claim, which is required before creating a retrieval request or a first chargeback.
	Take Action on Existing Claim	Issuers use this endpoint to perform operations (reopen or close) on an existing claim.
Mastercom Fraud Management	Create Fraud	Creates a fraud item when the issuer determines that a transaction was fraudulent. **Note:** Mastercom enables issuers to create fraud items in the Fraud and Loss database. However, issuers must use the Fraud and Loss application to make further updates to fraud items.

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Category	Action	Description
	Look up Fraud Related Information	Issuers use this endpoint to obtain fraud-related information associated with a claim before creating a fraud item for the claim.
Mastercom Queues Management	Look up Queue Names	Retrieves a list of queue names.
Health Check	Look up API Suite Health	Retrieves the status of the Mastercom API suite.

Mastercom Extended actions with non-sensitive information

Category	Action	Description
Mastercom Extended - Case Filing Document Management	Attach Document by Case ID - Extended	Use this endpoint to attach a new document to an existing case when the previous document failed to process. Document processing status can be retrieved from the GET /cases/documents/ attributes endpoint.
	Look up Statuses for Documents Associated with Cases - Extended	Use this endpoint to retrieve the processing status of documents associated with cases.
Mastercom Extended - Case Filing Management	Create Pre-Arbitration/ Arbitration Case - Extended	Use this endpoint to create a pre-arbitration or arbitration case.
	Look up Case Details by ID - Extended	Use this endpoint to retrieve details for an existing case, providing comprehensive information about the case.
	Update Pre-Arbitration/ Arbitration Case - Extended	Use this endpoint to update or respond to a pre-arbitration or arbitration case.
	Update Pre-Compliance/ Compliance Case - Extended	Use this endpoint to update or respond to a pre-compliance or compliance case.
Mastercom Extended - Chargeback Management	Create Chargeback Reversal - Extended	Use this endpoint to reverse existing chargebacks.
Mastercom Extended - Claim Management	Create Claim - Extended	Use this endpoint to create a new claim.
	Create Pre-Compliance/ Compliance Case - Extended	Use this endpoint to create a pre-compliance or compliance case.
Mastercom Extended - Dispute Management	Initiate a Dispute by Claim ID - Extended	Use this endpoint to initiate a dispute. At this time, only

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Category	Action	Description
		creating a chargeback is supported.
Mastercom Extended - Document Management	Attach Documents by Claim ID and Event ID - Extended	Use this endpoint to attach previously uploaded documents to existing dispute events.
	Check Document Details - Extended	Use this endpoint to get the details of documentation attached to their events, including status.
	Upload Documents - Extended	Use this endpoint to upload documents. To see details about file restrictions, refer to the Tutorials and Guides section of the Mastercom Extended API Specifications.
Mastercom Extended - Queue Management	Look up Claims in a Queue by ID Stream - Extended	Use this endpoint to retrieve a list of claims in a queue within a specified date range.
	Look up Queue by ID - Extended	Use this endpoint to retrieve fields within a specific queue.
	Look up Queues Stream - Extended	Use this endpoint to retrieve a list of queues and their fields.
Mastercom Extended - Report Definition Management	Look up Report Fields - Extended	Use this endpoint to retrieve fields within a specific report.
	Look up Report Fields Stream - Extended	Use this endpoint to retrieve a list of reports and their fields.
Mastercom Extended - Report Management	Create a Report - Extended	Use this endpoint to request the creation of report. NOTE: The system requires at least 120 seconds to generate a report.
	Look up Completed Report - Extended	Use this endpoint to retrieve a completed report.
	Look up Report Status - Extended	Use this endpoint to retrieve the status of a specific report.
	Look up Reports Stream - Extended	Use this endpoint to obtain a report status and reportCompletedId.
Mastercom Extended - Representment Management	Update Representment by Claim ID and Event ID - Extended	Use this endpoint to acknowledge a representment, which moves the claim to the

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Category	Action	Description
		Worked queue. Issuers may take further actions on acknowledged claims.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Mastercard spoke

Set up Mastercard spoke

Integrate the ServiceNow instance with the Mastercard account using the OAuth protocol (version 1.0a) for secure authorization to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Mastercard spoke.
- Role required: admin.

Attach a Mastercard certificate

Use the certificate generated during the Mastercard account configuration to sign the request and payloads.

Before you begin

- Valid Mastercard certificate
- Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Certificates**.
2. Select **New**.
3. On the form, fill in the fields:

X.509 Certificate form fields

Field	Description
Name	Enter a name to identify the certificate.
Type	Type of the certificate. Select `PKCS12 Key Store`.
Notify on expiration	Select the list of users to be notified when the certificate expires.
Warn in days to expire	Enter the number of days when a notification is sent to users before a certificate expires.
Key store password	Password to access the certificate. Use the destination keystore password specified when creating the certificate.
Active	Option to make the client certificate active.

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Field	Description
Short description	Short description of the user client certificate.

4. Select the manage attachments icon ( ) and attach a Mastercard certificate.
5. Select **Validate Stores/Certificates** to validate the certificate.
6. Select **Submit**.

Create a credential record for Mastercard spoke

Create a credential record for your Mastercard account configuration. The Mastercard spoke connection and the credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **Mastercard Credential**.
   A Mastercard Credential form displays.
4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, `Mastercard Credentials`.
Active	Enable
Key alias	Key alias associated with the Mastercard account.
Keystore password	The password associated with the certificate.
Consumer key	Consumer key that you generated during the Mastercard configuration.
Certificate	Select the newly created Mastercard certificate.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select **Mastercard algorithm**. **Note:** You are cautioned against directly modifying the default authentication algorithm.

5. Select **Submit**.

Create a connection record for Mastercard spoke

Create a connection record for your Mastercard account configuration. The Mastercard spoke connection and credential aliases use these connections to perform actions in Mastercard.

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Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the record for **Mastercard Connection**.
3. On the **Connections** tab, select **New**.
4. On the form, fill these values.

Field	Value required
Connection URL	Base URL to connect to your Mastercard instance. For example, `https://sandbox.api.mastercard.com`.
Credential	Credential record you that created for Mastercard.

5. Right-click the form header and select **Save**.
6. Ensure that **api_version** is set `V6` in the Attributes related list.

Microsoft 365 Excel Spoke

Manage Microsoft Office 365 Excel workbooks stored in Microsoft OneDrive from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft 365 Excel spoke v1.0.4 is the latest version. For version history of the spoke, see Microsoft 365 Excel spoke release notes.

Supported versions

This spoke was built for Microsoft Office 365 Excel v1.0, but may be compatible with later versions.

Spoke requirements

- Microsoft Azure Portal account
- Client ID and Client Secret of the application registered in Azure Portal

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Microsoft 365 Excel Spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Cell and Range Management	Get Cell Details	Retrieves the properties of the specified cell.
	Get Cells	Retrieves the properties of the selected range of cells.
	Update Cells	Updates the properties of the selected range of cells.
Table Management	Add Rows	Adds one or more rows to the given table.
	Create Table	Adds a table to the worksheet.
	Get Table Cells	Retrieves the properties of the selected range of table cells.
	Get Table Details	Retrieves the properties of the specified table.
	Look up Table Columns	Lists the details of the specified range columns from the selected table.
	Look up Table Rows	Lists the details of the specified range of rows from the selected table.
Workbook Management	Look up Workbooks	Lists all the workbooks in the specified folder.
Worksheet Management	Add Worksheet	Adds a worksheet to a workbook.
	Get Used Cells	Retrieves the properties of the specified range of cells in the worksheet.
	Get Worksheet Details	Retrieves the properties of the worksheet.
	Look up Worksheets	Lists all the worksheets in the workbook.
	Update Worksheet	Updates a worksheet of a workbook.

Note: You must specify the input values for **Update Cells** and **Add Row** actions as shown in the following examples.

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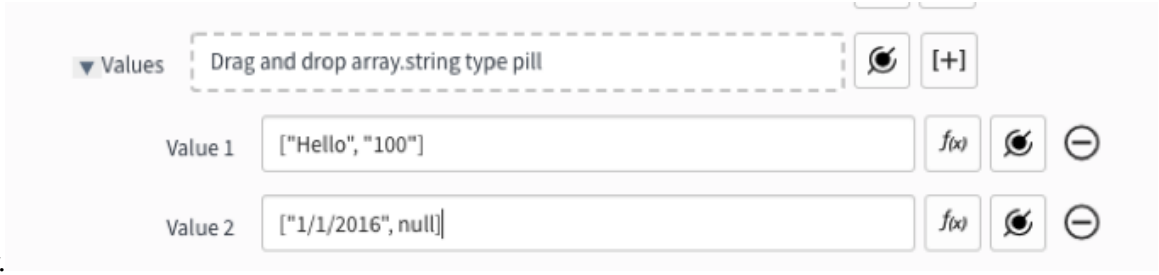
Add Row action: The action input, Value 1 corresponds to the first row in your table. The values Hello and 100 correspond to the values of the first and second column

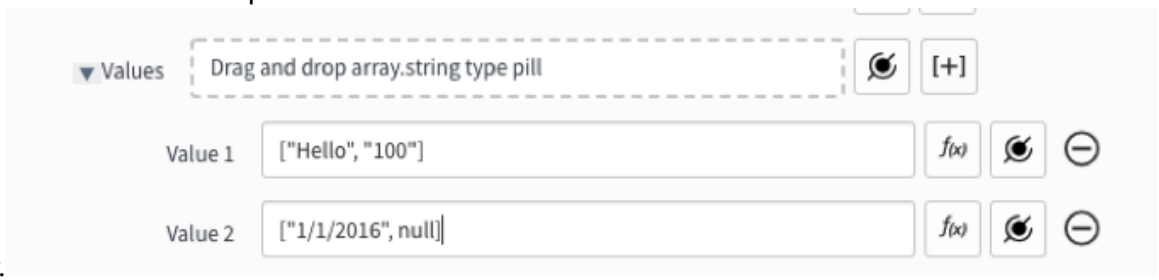


respectively.

```
{
"values" : [["Hello", "100"],["1/1/2016", null]],
"formulas" : [[null, null], [null, "=B1*2"]],
"numberFormat" : [[null,null], ["m-ddd", null]]
}
```

You must provide values in the same format for the action inputs: Formulas, Formulas R1C1, Formulas Local, and Number Format. For more information, see Add Row.

Update Cells action: The action input, Value 1 corresponds to the first row in your range. The values Hello and 100 correspond to the values of the first and second column



respectively.

```
{
"values" : [["Hello", "100"],["1/1/2016", null]],
"formulas" : [[null, null], [null, "=B1*2"]],
"numberFormat" : [[null,null], ["m-ddd", null]]
}
```

You must provide values in the same format for the action inputs: Formulas, Formulas R1C1, Formulas Local, and Number Format. For more information, see Update Rage.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Microsoft 365 Excel spoke.

Set up the Microsoft 365 Excel spoke

Integrate the ServiceNow instance and Microsoft 365 Excel by using the OAuth credentials to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft 365 Excel spoke.
- Role required: admin.

Create a credential record for the Microsoft 365 Excel spoke

Create a credential record for the Microsoft Azure Portal account. The Microsoft 365 Excel Spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

- Register your ServiceNow instance in Microsoft Azure Portal and record the client ID and client secret. Also, add the offline_access, Files.ReadWrite.All, and Files.ReadWrite scopes in the API permissions for the application. For more information, see Quickstart: Register an application with the Microsoft identity platform.

  Note: Ensure that the Redirect URI of the instance is in the `https://<instance>.service-now.com/oauth_redirect.do` format.

- Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Connection and Credential Aliases**.
2. Open the **Microsoft_365_Excel** record.
3. Click the **Create New Connection & Credential** related link.
4. On the form, fill these values.

Connection and Credentials form

Field	Description
Connection Name	Name of the connection. This field is automatically set to `Microsoft 365 Excel Spoke Connection` Cred.
Connection URL	The URL used for connecting to Microsoft Office 365 Excel. This field is automatically set to `https://graph.microsoft.com/v1.0`
Credential Name	Name of the credential. This field is automatically set to `Microsoft 365 Excel Spoke Credential`
OAuth Entity Name	Name of the OAuth entity profile. This field is automatically set to `Microsoft 365 Excel Spoke OAuth`
OAuth Client ID	Client ID of the Microsoft Office 365 Excel application you registered in Azure Portal.
OAuth Client Secret	Client Secret that you request for the registered application in Azure Portal.

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Field	Description
OAuth Redirect URL	The redirect URL. The format of the URL is `https://<instance>.service-now.com/oauth_redirect.do`

5. Click **Create and Get OAuth Token**.

Microsoft Dynamics 365 Spoke

Use Microsoft Dynamics 365 spoke to manage users and activities in Dynamics 365.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for Microsoft Graph: v1.0 and Microsoft Dynamics 365: v9.0, but may be compatible with later versions.

Spoke version

Microsoft Dynamics 365 v1.0.8 is the latest version. For version history of the spoke, see Microsoft 365 spoke release notes.

Spoke requirements

- Ensure that you have Global Administrator and Microsoft Dynamics 365 Administrator role in Microsoft Admin Centre.
- You must create an OAuth 2.0 app in Azure AD and generate the OAuth 2.0 token.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Microsoft Dynamics 365 spoke provides actions to automate Microsoft Dynamics 365 tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
User Management	Look up Users Stream	Retrieves all users in an organisation.
	Look up Dynamics CRM Users Stream	Retrieves details of all users with access to Microsoft Dynamics CRM system.
	Look up Dynamics Object Schema (Dynamic)	Retrieves the list of fields for the specified entity name to be used as dynamic input.
SKU Management	Look up Subscribed SKUs	Retrieves all subscriptions that an organization has acquired.
Audit Management	Look up Audit Log Stream	Retrieves all audit logs in the system.
Activity Pointer Management	Look up Activity Pointers Stream	Retrieves all the calendar activities performed.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Microsoft Dynamics 365 and Set up Microsoft Azure Active Directory.

This spoke requires the Integration Hub subscription. For details, see Request Integration Hub

Supported versions

This spoke was built for Microsoft Graph: v1.0 and Microsoft 365 Dynamics: v9.0, but may be compatible with later versions.

Spoke requirements

- Ensure that you have Global Administrator and Microsoft Dynamics 365 Administrator role in Microsoft Admin Centre.
- You must create an OAuth 2.0 app in Azure AD and generate the OAuth 2.0 token.

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke actions

The Microsoft Dynamics 365 spoke provides actions to automate Microsoft 365 tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
User Management	Look up Users Stream	Retrieves all users in an organisation.
SKU Management	Look up Subscribed SKUs	Retrieves all subscriptions that an organization has acquired.
Audit Management	Look up Audit Log Stream	Retrieves all audit logs in the system.
Activity Pointer Management	Look up Activity Pointers Stream	Retrieves all the calendar activities performed.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Microsoft Dynamics 365.

Set up Microsoft Dynamics 365

Set the system-level settings for Microsoft Dynamics 365.

Before you begin

Role required: admin

Procedure

1. Go to https://admin.powerplatform.microsoft.com/.
2. Under Environments, select the environment for which you want to pull the dynamics activities. The details of the environment that you selected appears.
3. From the top ribbon, click **Settings**. The Settings page appears.
4. Click **Audit and logs**. Audit settings section appears.
5. Select all of the following check boxes.
   - Start Auditing
   - Log access
   - Read logs
6. Click **Additional Audit Settings**.
7. From the **Settings** list, select Auditing and click **Global Audit Settings**.
8. Select the following check boxes.
   - Start Auditing
   - Audit user access

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- Start Read Audit
- Common Entities
- Sales Entities
- Customer Service Entities

9. Click **Ok**.

Set up Microsoft Azure Active Directory

Set up Microsoft Azure Active Directory (AD).

Before you begin

Role required: Global administrator and Dynamics 365 administrator in Microsoft admin center.

Procedure

1. Open Microsoft Azure App registration page and log in using an admin account.
2. Select **+ New registration**.
   Register an application page appears.
3. In the **Name** field, enter the name of the application that you want to register.
4. Under Supported account types, select an account with the required organizational directory.
5. Select **Register**.
6. Open the application that you registered and navigate to the **Overview** section.
7. Collect the Application (client) ID and Application (tenant) ID.
8. Navigate to the Certificates and Secrets section.
9. Create a client secret and collect the client secret key.
   You need the client secret key while configuring your ServiceNow instance.
10. Under API Permission, select **+ Add a permission** and then select **APIs my organization uses**.
11. Select Microsoft Graph and add the necessary permissions for both Delegated and Application types as required.
    - `Organization.Read.All`
    - `User.Read.All`
    - `Offline_access`
12. Select Dynamics CRM and add the following permission.
    `user_impersonation`

    Note: These steps aren't applicable for user_impersonation or Microsoft Dynamics CRM connection because the user_impersonation scope is offered as a Delegated permission in Microsoft Dynamics CRM.

13. Under Grant consent, select **Grant admin consent**.
14. In the Authentication section, under the Redirect URI, enter the redirect URI of the ServiceNow instance.

Create a connection record for Microsoft Dynamics 365

Create a connection for your Microsoft Dynamics 365 application. The Microsoft Dynamics 365 spoke connection and credential aliases use these connections to perform actions in Microsoft Dynamics 365.

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Before you begin

Role required: Global administrator and Dynamics 365 administrator in Microsoft admin center

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Select the alias record for **Microsoft 365 Dynamics**.
3. On the Connection & Credential Aliases page, select **Create New connection and credential**.
4. In the Create Connection and Credential window, perform the following:
   a. In the **Connection URL** field, enter the connection URL.
   To fetch the connection URL, log in to the Microsoft Admin portal and navigate to **Admin Centers** > **All admin centers** > **Select Dynamics 365 apps** > **Environments**. Select the environment that you want to integrate with. The environment URL is the connection URL.
   b. Under the **Please Enter the Credential Information** section, select the permission type to ensure your application accesses data correctly and securely.
   The permission type can be **Application Permissions** or **Delegated Permissions** depending on the application's data access requirements.
   c. In the **OAuth Client ID** field, enter the OAuth Client ID that you received from Set up Microsoft Azure Active Directory.
   d. In the **OAuth Client Secret** field, enter the OAuth Client Secret key that you received from Set up Microsoft Azure Active Directory.
5. Select **Create and Get OAuth Token**.

Microsoft Active Directory Spoke

Create, delete, and manage objects in Microsoft Active Directory, such as users, groups, and computers.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Important:

- Starting with the Vancouver release, Microsoft Active Directory Spoke is being prepared for future deprecation. It is hidden and no longer activated on new instances but will continue to be supported. Microsoft Active Directory v2 Spoke provides the latest experience for this functionality. For details, see the Deprecation Process [KB0867184] article in the Now Support Knowledge Base.
- This spoke is available as part of the family release. This spoke can be used to handle the computer objects.

Spoke requirements

Confirm that the Active Directory web services (ADWS) is deployed on the server that has Microsoft AD installed. For information on deploying ADWS, see https://learn.microsoft.com/en-us/services-hub/unified/health/remediation-steps-ad/configure-the-active-directory-web-services-adws-to-start-automatically-on-all-servers for information about deploying ADWS.

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Since your instance must have a MID Server set up and configured to use the PowerShell, the MID Server must be able to access the ADWS at port 9389.

In the MID Server and Microsoft AD server, run these PowerShell commands to install the Active Directory module:

```
PS> Import-Module ServerManager
PS> Install-WindowsFeature -Name RSAT-AD-PowerShell
```

Spoke flows

The Microsoft Active Directory spoke provides sample flows in the draft state to demonstrate automating Active Directory tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
User Offboarding	Disables an AD user account and removes the user from any AD groups when a ServiceNow user record is deactivated.
User Onboarding	Creates and enables an AD user account when a ServiceNow user record is activated.

Spoke subflows

This spoke has no sample subflows.

Spoke actions

The Microsoft AD spoke provides actions to automate Microsoft Active Directory tasks when events occur in the ServiceNow AI Platform. Available actions include:

Category	Action	Description
Computer Management	Create Computer	Creates a Computer Account in Active Directory.
	Delete Computer	Deletes a computer from Active Directory.
	Disable Computer	Disables a computer account in Active Directory.
	Enable Computer	Enables a computer account in Active Directory.
	Get Computer OU	Gets the Organizational Unit (OU) of a Computer Account.
	Is Computer Enabled	Checks the status of the specified computer account in Active Directory.
	Move Computer to OU	Changes the Organizational Unit (OU) of a Computer Account in Active Directory.

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Category	Action	Description
Group Management	Add User To Group	Adds an existing Active Directory user to an Active Directory group.
	Create Group	Creates a group in Active Directory.
	Delete Group	Deletes a group from Active Directory.
	Lookup Group	Gets the details of a given group in Active Directory, including the group category, scope, and distinguished name.
	Remove User From Group	Removes an existing user from a group in Active Directory.
Password Management	Change User Password	Changes the user password in AD. The password input must comply with Active Directory password requirements.
	Is User Account Locked	Checks the locked status of the specified user account in Active Directory.
	Reset AD User Password	Resets a user's password in Active Directory.
User Management	Create User	Creates a user with no password in Active Directory. To enable a user to set a password, log in to AD, create a default password for the user, and enable password reset.
	Delete User	Deletes a user from Active Directory.
	Disable User	Disables a user account in Active Directory.
	Enable User	Enables a user account in Active Directory.
	Is User Enabled	Checks the status of a user account in Active Directory.
	Is User In Group	Checks if an existing Active Directory user is a member of an Active Directory group.
	Lookup User	Gets the details of a given user in Active Directory.
	Unlock AD Account	Unlocks a user account in Active Directory.
	Update User	Updates user attributes in Active Directory.
	Update User Home Location	Updates the Home Directory for a User in Active Directory.

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Category	Action	Description
Object Management	Create AD Object	Creates an object of any type supported in Active Directory.
	Delete AD Object	Deletes an object of any type from Active Directory.
	Query AD	Queries AD for objects specified by a search filter.
	Update AD Object OU	Changes the Organizational Unit (OU) of an object in Active Directory.
	Update AD Object Expiration	Update the account expiration date of an object in Active Directory.

MID Server requirements

To use these actions, your instance must have a MID Server set up and configured to use the PowerShell. For more information about running actions on the MID Server, see Integration steps. For information, see MID Server.

Note: MID and Microsoft Active Directory must be installed on different servers.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the AD alias record to authorize actions in Microsoft Active Directory.

Connection alias	Description	Connection URL
AD	Connection to Microsoft Active Directory.	The URL of the host machine where Microsoft Active Directory is installed.

For information about setting up the spoke, see Set up Microsoft Active Directory spoke.

Set up Microsoft Active Directory spoke

Integrate the ServiceNow instance and your Microsoft AD account using Windows credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Active Directory spoke.
- Role required: admin.

Create Credential record for the Microsoft AD spoke

Create a Credential record for the Microsoft Active Directory host. The Microsoft AD spoke connection and credential alias uses this credential to authorize actions.

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Before you begin

- Request Integration Hub subscription
- Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **Windows Credentials**.
   A blank Windows Credentials form displays.
4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `AD Credential`.
Active	Enable
User name	Enter a user name with access to the target Windows host. For more information about Windows permissions, see Windows credentials.
Password	Enter the password for the account.
Applies to	Select the MID Servers that can use this credential. For example, select **All MID servers**.
Order	Select the order to apply this credential. For example, enter `100`.

5. Click **Submit**.

Create Connection record for the Microsoft AD spoke

Create a Connection record to your Microsoft Active Directory host machine. The Microsoft AD spoke connection and credential alias uses this connection to perform actions in Microsoft Active Directory.

Before you begin

- Request Integration Hub subscription
- Create Credential record for the Microsoft AD spoke
- Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Click **Connections**.

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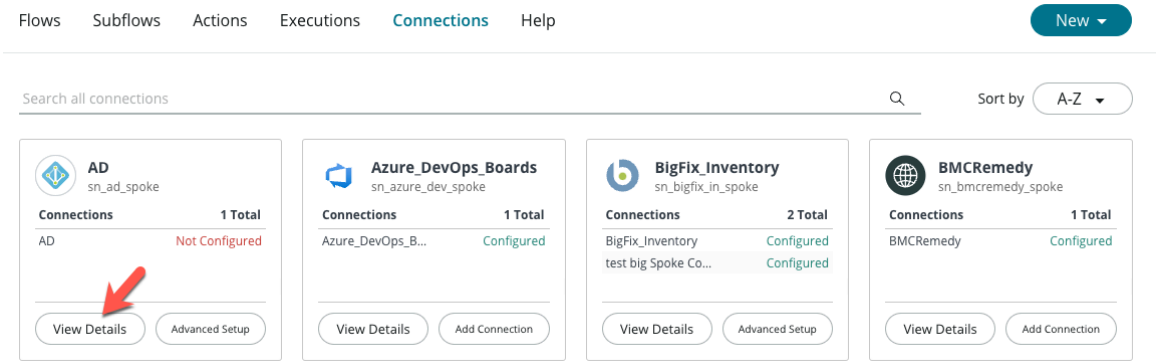
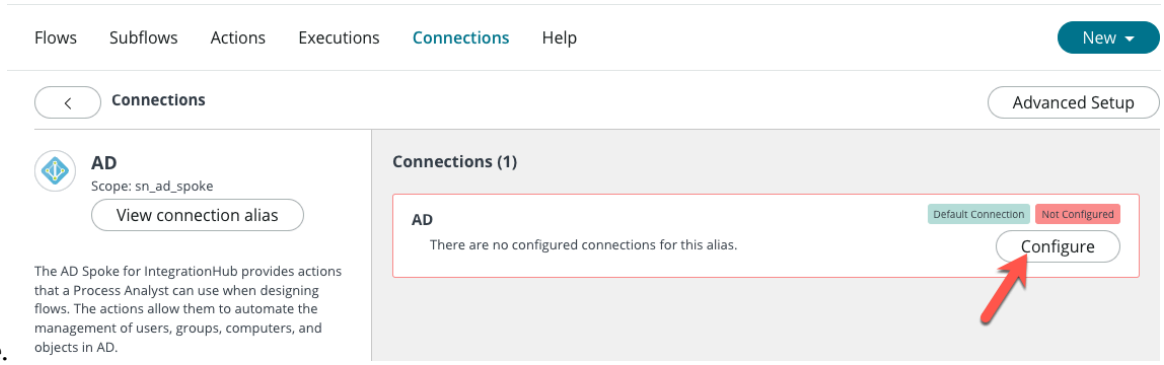
3. On the **AD** card, click **View Details**.



4. Click **Configure**.



5. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `AD Connection`.
Credential	Select the Credential record you created for Windows Active Directory. For example, select **AD Credential**.
Host	Enter the fully qualified domain name of the target host where Microsoft Active Directory is installed. For example, `<host>.<domain>.com`.
Use MID server	Enable
Override default port	Enter the target port used by the connection. If blank, the system uses the default port.

6. Click **Submit**.

Microsoft Active Directory v2 Spoke

Create, delete, and manage objects in Microsoft Active Directory, such as users, groups, and computers.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Active Directory v2 spoke v2.5.3 is the latest version. For version history of the spoke, see Microsoft AD v2 spoke release notes.

Supported versions

This spoke was built for Microsoft Active Directory.

Spoke requirements

Ensure that Active Directory Web Services (ADWS) is deployed in the same server where Microsoft Active Directory is installed. The MID server can access the Active Directory Web Services (ADWS) at port 9389. For more information about ADWS deployment, see Microsoft documentation.

In the MID Server and Microsoft Active Directory v2 server, run the following PowerShell commands to install the Active Directory module:

```
PS> Import-Module ServerManager
PS> Install-WindowsFeature -Name RSAT-AD-PowerShell
```

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)
- ServiceNow IntegrationHub Action Step - PowerShell (com.glide.hub.action_step.powershell)

Note: If used outside the spoke implementation, some of these plugins are licensable features and require licenses.

Spoke actions

The Microsoft Active Directory v2 spoke provides actions to automate the tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Group Management	Add Computer to Groups	Adds the computer account to one or more groups in the Active Directory (AD).
	Add Computers to Group	Adds one or more computer accounts to the group in the Active Directory (AD).
	Add User to Groups	Adds a user to one or more groups in the Active Directory (AD).
	Add Users to Group	Adds one or more user accounts to the group in the Active Directory (AD).

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Category	Action	Description
	Create Group	Creates the group in the Active Directory (AD).
	Delete Group	Deletes the group from the Active Directory (AD).
	Does Group Exists	Checks whether the group exists in the Active Directory (AD).
	Is User in Group	Checks if an existing user is already a member of a group in the Active Directory (AD).
	Look up Group	Retrieves the group from the Active Directory (AD).
	Remove Computer from Groups	Removes the computer account from one or more groups in the Active Directory (AD).
	Remove Computers from Group	Removes one or more computers from the group in the Active Directory (AD).
	Remove User from Groups	Removes a user from one or more groups in the Active Directory (AD).
	Remove Users from Group	Removes one or more users from the group in the Active Directory (AD).
User Authentication	Change User Password	Changes the user's password in the Active Directory (AD). The password has to match the AD password requirements.
	Look up User Password Expiration Details	Retrieves the password expiration details for the user from the Active Directory (AD).
	Generate Random Password	Generates the random password according to the Active Directory (AD) password policy.
	Is User Locked	Checks the locked status of the user account in the Active Directory (AD).
	Reset User Password	Resets the password of the user in the Active Directory (AD).
	Unlock User	Unlocks the user account in the Active Directory (AD).
Computer Management	Create Computer	Creates a computer account in the Active Directory (AD).
	Disable Computer	Disables the computer account in the Active Directory (AD).
	Does Computer Exists	Checks the status of the computer account in the Active Directory.
	Is Computer Disabled	Checks the status of the computer account in the Active Directory (AD).
	Enable Computer	Enables the computer account in the Active Directory (AD).
	Look up Computer	Retrieves a computer account from the Active Directory (AD).
	Update Computer	Updates a computer account in the Active Directory (AD).

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Category	Action	Description
	Delete Computer	Deletes a computer account from the Active Directory (AD).
Object Management	Create Object	Creates an object account in the Active Directory (AD).
	Update Object OU	Updates the Organizational Unit (OU) of an object account in the Active Directory (AD).
	Update Object Expiration	Updates the account expiration date of the object account in the Active Directory (AD).
	Look up Object by Filter	Retrieves object accounts based on a search filter in the Active Directory (AD).
	Delete Object	Deletes an object account from the Active Directory (AD).
User Management	Delete User	Deletes the user from Active Directory (AD).
	Create User	Creates a user account in the Active Directory (AD) and sets a password. **Note:** From Microsoft Active Directory v2 spoke v2.1.1 onwards, these changes are applicable: • **Sam Account Name** is available in the **Additional Fields** drop-down. • When a user is created, the User Principal Name (UPN) is generated in this format: `<username>@<DNS-domain-name>`.
	Disable User (Conversational -ready)	Disables a user account in Active Directory (AD).
	Does User Exists	Checks whether the user account exists in Active Directory (AD).
	Update User	Updates a user account in the Active Directory (AD).
	Enable User (Conversational -ready)	Enables a user account in Active Directory (AD).
	Look up User (Conversational -ready)	Retrieves a user account from the Active Directory (AD). **Note:** Now Assist for Conversational Spokes plugin is required to use the conversational ability of the action.
	Is User Disabled	Checks if the user account is inactive in Active Directory (AD).
	Get User Additional Fields (Metadata)	Retrieves information from the additional fields in a user account from the Active Directory (AD).

Note: This spoke isn't tested with a load balancer.

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Available conversational actions

Install Now Assist for Conversational Spokes and start using the conversational ability of Integration Hub spokes. For more information, see Now Assist in Conversational Spokes.

Supported actions

Action	Usage
Disable User	In the Ask Now Assist to... field, enter the phrase that asks Now Assist to perform the action and press **Enter**. `Disable user "Jack" in Active Directory.`
Enable User	In the Ask Now Assist to... field, enter the phrase that asks Now Assist to perform the action and press **Enter**. For example, `Enable user "Jack" in Active Directory.`
Look up User	In the Ask Now Assist to... field, enter the phrase that asks Now Assist to perform the action and press **Enter**. For example, `Look up user "Jack" in Active Directory.`

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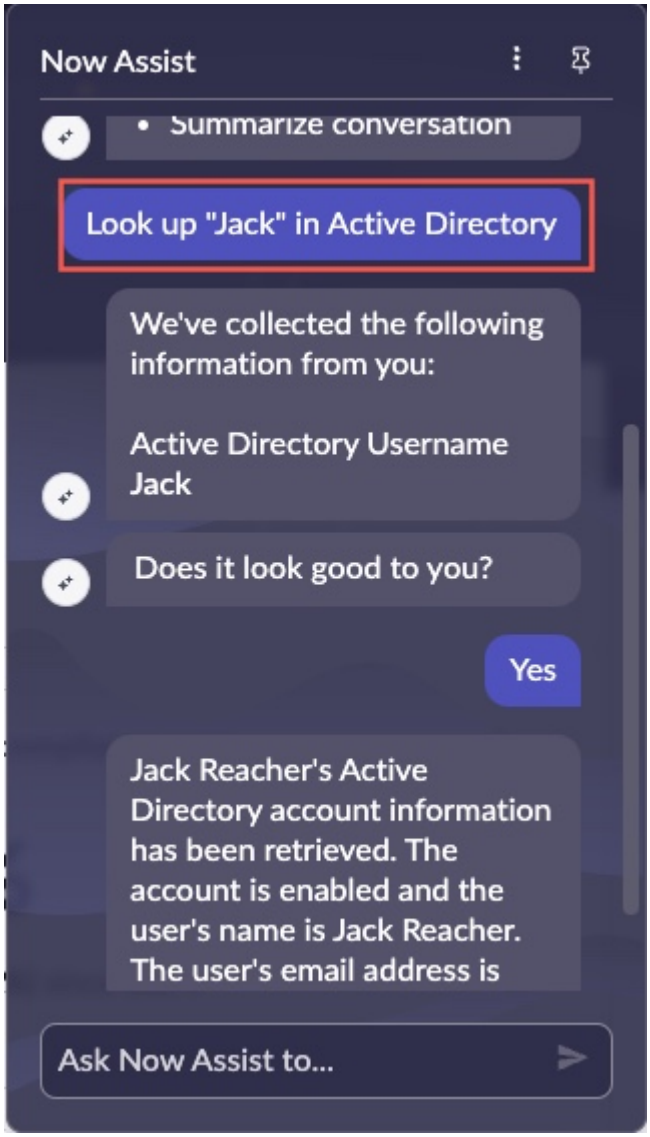

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

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AI agent	Description
Microsoft Active Directory object manager	Manages object accounts in the Active Directory (AD) and retrieves their details.
Microsoft Active Directory user authenticator	Manages user accounts and passwords in the Active Directory (AD) and retrieves their details.
Microsoft Active Directory group manager	Manages groups in the Active Directory (AD) and retrieves their details.
Microsoft Active Directory computer manager	Manages computers in the Active Directory (AD) and retrieves their details.
Microsoft Active Directory user manager	Manages users in the Active Directory (AD) and retrieves their details.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Microsoft Active Directory v2 spoke.

MID Server requirements

To use these actions, your instance must have a MID Server set up and configured to use PowerShell. For more information about running actions on the MID Server, see Integration steps. For more information about the MID Server, see MID Server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Note: You must install the MID Server and Microsoft Active Directory on different servers.

Set up the Microsoft Active Directory v2 spoke

Integrate the ServiceNow instance and the Microsoft Active Directory v2 spoke by using the Windows credentials to authenticate ServiceNow requests.

https://player.vimeo.com/video/1125628248?h=32aa153007&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Active Directory v2 spoke.
- Role required: admin

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Configure a connection record for the Microsoft Active Directory v2 spoke

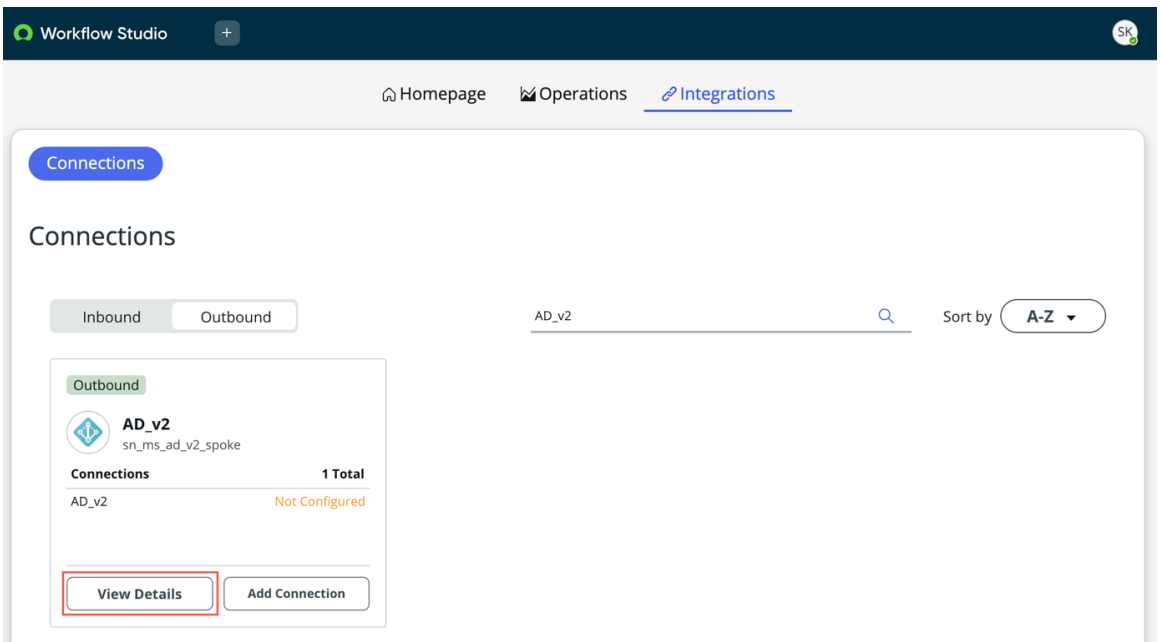
Configure a connection record to connect to the Microsoft Active Directory v2 spoke host and enable the Microsoft Active Directory v2 spoke connections and credentials alias to authorize actions.

Before you begin

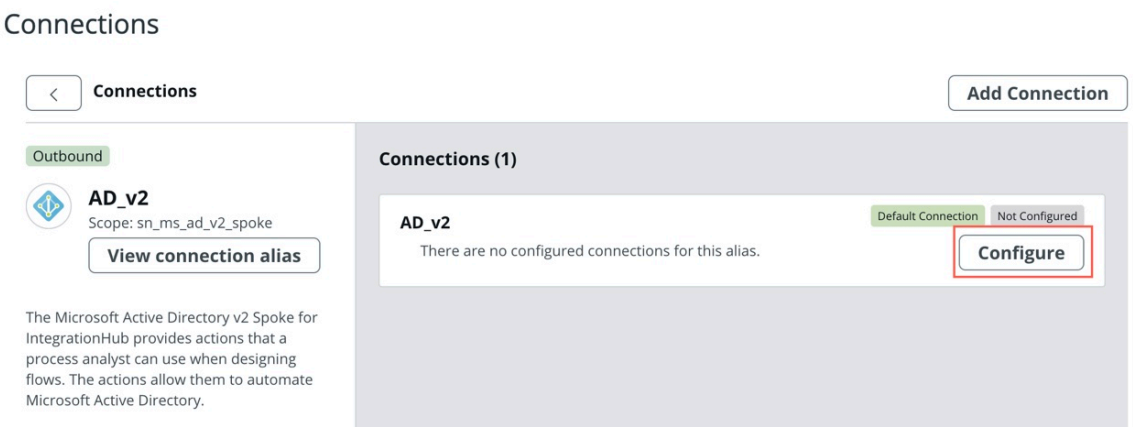
Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Click **Connections**.
4. Toggle and enable the **Outbound** connections.
5. Locate the **AD_v2** connection alias and click **View Details**.



If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**



6. Enter the following details in the form.

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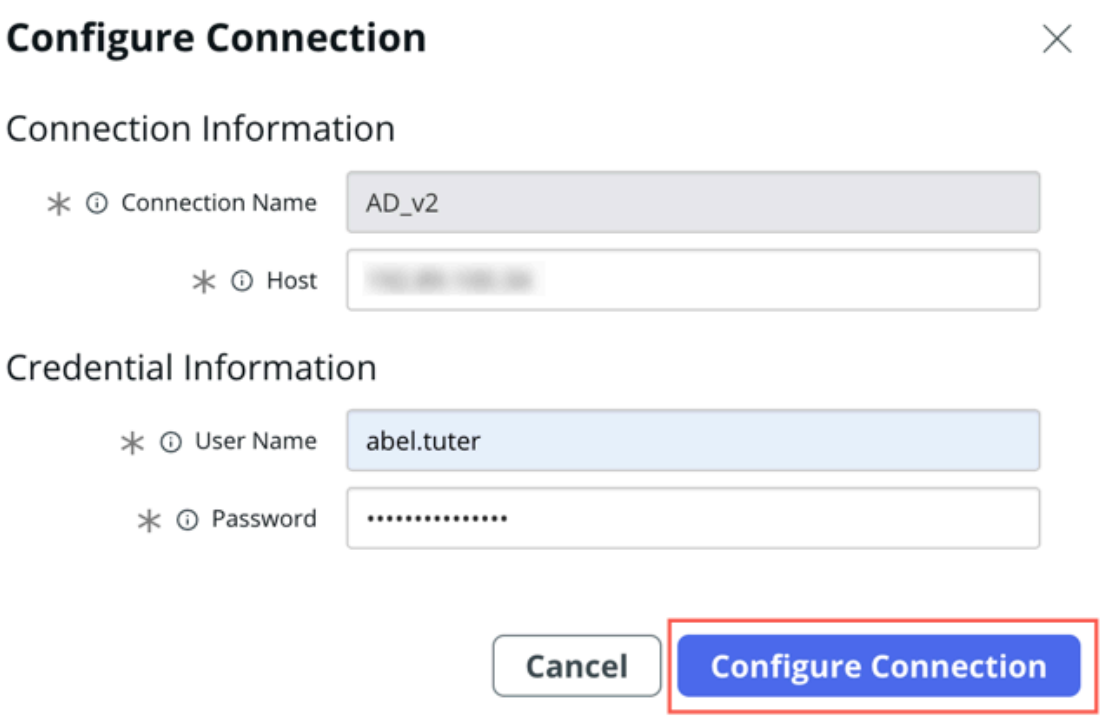
Create connection form

Field	Information
Connection name	Name to uniquely identify the record.
Host	Fully qualified domain name or IP address of the target host where the Microsoft AD is installed. For example, `<host>.<domain>.com`.
User name	User name with access to the target Windows host.
Password	Password for the account.

Create connection form



7. Click **Configure Connection**.

What to do next

To use the spoke actions, your instance must have a MID Server set up and configured to use PowerShell. For more information about running actions on the MID Server, see Integration steps. For more information about the MID Server, see MID Server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Note: You must install the MID Server and Microsoft Active Directory on different servers.

Microsoft Azure Application Insights Spoke

Manage queries, events, and metrics in Microsoft Azure Application Insights account from your ServiceNow instance.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Azure Application Insights spoke v2.0.0 is the latest version. For version history of the spoke, see Microsoft Azure Application Insights spoke release notes.

Supported versions

This spoke was built for Microsoft Azure Application Insights API version v1, but may be compatible with later versions.

Spoke requirements

- Register the application in the Microsoft Azure portal and record the access keys and directory IDs. For more information, see Azure Application Insights Search API in Azure Application Insights REST API documentation.
- Add your the redirect URL of your ServiceNow instance in your registered application. The redirect URL must be in this format: `https://<instance>.service-now.com/oauth_redirect.do`. For more information, see Authentication and authorization for Azure Time Series Insights API in Microsoft Docs.
- Create an API key and record the values of API Key and App ID. These values are needed as inputs to the spoke actions. For more information, see Getting your API key and Application ID in Azure Application Insights REST API documentation.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- Flow Designer Action Step - Payload Builder (com.glide.hub.action_step.payload)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Microsoft Azure Application Insights spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
Event Management	Look up Event	Gets the data for a single event.
	Look up Events by Type	Executes an OData query for events.
	Look up OData Metadata	Gets the OData EDMX metadata that describes the event data model.
Metric Management	Look up Metric Metadata	Gets that metadata that describes the available metrics.
	Look up Metric	Gets the metric values for a single metric.
	Look up Metrics	Gets the metric values for multiple metrics.
Query Management	Execute Query	Executes an analytics query for data.
	Look up Query	Executes an analytics query for data.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Azure Application Insights spoke.

Set up the Azure Application Insights spoke

Create a connection alias on your ServiceNow instance. The alias enables your ServiceNow instance to request OAuth tokens from the Microsoft Azure Application Insights and enables the authenticate its requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Azure Application Insights spoke.
- Role required: admin

Register Microsoft Azure Application Insights as an OAuth provider

Create an OAuth application on Microsoft Azure that authenticates requests for OAuth tokens from your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Log in to https://portal.azure.com/.
2. Select **App registrations**.
3. Select **New registration**.
4. Fill the form.

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OAuth application details

Field	Description
Name	Name of the OAuth application.
Supported account types	Option to specify who can use the OAuth application that you're creating to access Microsoft Azure Blob Storage.
Redirect URI (optional)	Option to provide the redirect URI. The redirect URI format is https://<instance-name>.service-now.com/oauth_redirect.do. From the Select a platform list, select **Web**.

5. Select **Register**.
   The OAuth application is registered.
6. Copy the values from the following fields under the Essentials heading:
   - Application (client) ID
   - Directory (tenant) ID
7. In the Client credentials field, select **Add a certificate or secret**.
8. Under the Client secrets heading, select **New client secret**.
9. In the Add a client secret window, do the following actions.
   a. In the Description field, enter a description of the client secret.
   b. In the Expires field, enter the expiry period of the client secret.
   c. Select **Add**.
      The client secret is generated.
10. Under the Value heading, copy and store the client secret at a secure place.
    Microsoft Azure Application Insights is registered as an OAuth provider and the information required to set up the connection record is available.

Create a connection alias record

Provide the details in the connection alias form. Your ServiceNow instance uses these details to request OAuth tokens from Microsoft Azure Application Insights.

Before you begin

Role required: admin.

Procedure

1. Log in to your ServiceNow instance.
2. Navigate to **All** > **Process Automation** > **Workflow Studio**.
3. Select **Integrations**.
4. Select **Connections**.
5. In the Search all connections field, search the Microsoft Azure Application Insights connection alias record.

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Note: The **Outbound** tab is enabled by default. Or else, toggle to enable it.

6. On the Microsoft Azure Application Insights connection alias tile, select **View Details**.
7. Select **Configure**.
8. Fill the form.

Microsoft Azure Application Insights connection alias

Field	Description
Connection Name	Name of the connection alias record.
Authorization URL	URL that your ServiceNow instance uses to request OAuth tokens from the Microsoft Azure Application Insights. The URL must in the following format: `https://login.microsoftonline.com/{tenant ID}/oauth2/v2.0/authorize`.
Token URL	URL that your ServiceNow instance uses to get the OAuth token. The URL must in the following format: `https://login.microsoftonline.com/{tenant ID}/oauth2/v2.0/token`.
Token Revocation URL	URL that your ServiceNow instance uses to cancel the OAuth token. The URL must in the following format: `https://login.microsoftonline.com/{tenant ID}/oauth2/v2.0/revoke`. **Note:** This field isn't mandatory.
Client ID	Unique ID of the OAuth application that you created on Microsoft Azure Application Insights. The Microsoft Azure Application Insights uses this ID to authenticate your ServiceNow instance requests.
Client Secret	The secret that Microsoft Azure Application Insights uses to authenticate your ServiceNow instance requests. You generate the client secret when you create the OAuth application on Microsoft Azure Application Insights.
Redirect URL	Specific address where the third-party application sends your ServiceNow instance back after the request is authenticated. You must set the redirect URL when you create the OAuth application on Microsoft Azure Application Insights.

9. Select **Configure and Get OAuth Token**.

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You're required to log in to https://portal.azure.com/ before the OAuth token is provided.

On successful authentication, the request is authenticated and the OAuth token is available.

Microsoft Azure Artifacts Spoke

Manage Microsoft Azure Artifacts from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Azure Artifacts spoke v1.0.3 is the latest version. For version history of the spoke, see Microsoft Azure Artifacts spoke release notes.

Supported versions

This spoke was built for Microsoft Azure Artifacts 6.0-preview.1, but may be compatible with later versions.

Spoke requirements

Azure Devops Account.

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Microsoft Azure Artifacts spoke provides actions to automate Microsoft Azure Artifacts tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Artifact Management	Get Package Details	Retrieves details of the specified package.

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Category	Action	Description
	Get Package Version Details	Retrieves version details of the specified package.
	Look up Package Versions	Retrieves a list of package versions.
	Look up Packages	Retrieves a list of packages.
Change Tracking Management	Get Feed Change	Retrieves details of the current state of a feed.
	Look up Feed Changes	Retrieves a list of changes of a feed.
	Look up Package Changes	Retrieves a list of packages that changed in a feed.
Feed Management	Create Feed	Creates a feed to handle various package types.
	Delete Feed	Removes the feed and all the related packages.
	Get Feed Details	Retrieves the details of the feed.
	Look up Feeds	Retrieves a list of feeds.
	Update Feed	Updates the specified feed.
Metadata Retrieval	Look up Package IDs	Retrieves the metadata of a list of package IDs.
	Look up Package Version IDs	Retrieves the metadata of a list of package version IDs.
	Look up Projects	Retrieves a list of all project within an organization.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Microsoft Azure Artifacts spoke.

Set up the Microsoft Azure Artifacts spoke

Integrate the ServiceNow instance and Microsoft Azure Artifacts using Basic Authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Azure Artifacts spoke.
- Create a Personal Access Token in your Azure Devops account and record it for later use.
- Role required: admin.

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Obtain the personal access token

Create and record the personal access tokens in your Microsoft Azure portal. The personal access tokens are required to authenticate ServiceNow requests.

Before you begin
Role required: admin

Procedure

1. Log in to your Azure Artifacts portal as an admin.
2. Navigate to **User Settings** > **Personal access tokens**.
3. Click **New Token**.
4. On the form, fill the required fields.
5. Click **Create**.
   The token is displayed.
6. Copy and record the value of token for later use.

Configure a connection for Microsoft Azure Artifacts spoke

Add and configure a Microsoft Azure Artifacts connection to authenticate ServiceNow requests.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **sn_ms_artfcts_spke** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Microsoft Azure Artifacts spoke, click **View Details**.
   - To manage more than one Microsoft Azure Artifacts spoke connection records, you should create a new child alias record by clicking Add Connection. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.
5. On the **Configure Connection** form, fill in the fields:

Field	Description
Connection Name	Name to uniquely identify the connection record. For example, enter `Microsoft Azure Artifacts Connection`.
Connection URL	URL of the Microsoft Azure Artifacts instance. For example, enter the URL in this format: `https://feeds.dev.azure.com/`
Credential Name	Name to uniquely identify the credential record. For example, enter `Microsoft Azure Artifacts Credential`.

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Field	Description
User Name	User name to log in to your Azure Artifacts instance.
Password	Personal access token to authenticate Azure Artifacts.

6. Click **Configure Connection**.
   The connection for the Microsoft Azure Artifacts spoke is created.
7. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
8. Open the `Microsoft Azure Artifacts` Connection and Credential type.
9. From the `Connections` tab, open the Credential record which is created from the connection template.
10. Click the lock icon beside the **Credential alias** field.
11. Search for `sn_ms_artfcts_spke.Microsoft_Azure_Project` and select it from the list.
12. Save the record.

Result

The Microsoft Azure Artifacts spoke connection is configured and ready to be used.

Microsoft Azure Automation Spoke

Integrate the ServiceNow instance with the Microsoft Azure Automation. Manage the cloud-based automation and configuration services from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

The Microsoft Azure Automation spoke v2.0.2 is the latest version. For version history of the spoke, see Microsoft Azure Automation spoke release notes.

Supported versions

This spoke was built for the Microsoft Azure Automation 2023-11-01 version, but may be compatible with the later versions.

Spoke requirements

Microsoft Azure account.

Spoke dependencies

If you're having trouble installing the app, confirm that these dependent plugins are installed:

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- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Azure Resource Management spoke (sn_azure_rm_spoke) v2.0.0 is installed and a connection alias is created on your instance.

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation. For more information on the licenses, contact your account manager.

Spoke actions

The Microsoft Azure Automation spoke provides actions to automate the Microsoft Azure tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Account Management	Create Account	Creates an automation account.
	Delete Account	Deletes an account.
	Look up Account	Retrieves the details of an automation account using the resource group.
	Look up Accounts Stream by Resource Group	Retrieves the list of accounts present under the specified resource group. Page size is fixed to 100 according to Microsoft.
	Look up Accounts Stream by Subscription ID	Retrieves the list of accounts present under the specified subscription ID. Page size is fixed to 100 according to Microsoft.
	Update Account	Updates the details of an automation account.
Job Management	Create Job	Creates a job of the runbook.
	Look up Job	Retrieves the details of a runbook job.
	Look up Job Output	Retrieves the details of an executed job output identified by the job ID.
	Look up Job Schedule	Retrieves the details of a scheduled job.
	Look up Job Schedules Stream	Retrieves the list of scheduled jobs present in an automation account. The page size is fixed to 100 according to Microsoft.
	Look up Jobs Stream	Retrieves the list of runbook jobs present in an automation account. Page size is fixed to 100 according to Microsoft.
	Resume Job	Resumes the job identified by job name.
	Stop Job	Stops the job execution identified by job name.
	Suspend Job	Suspends the job identified by job name.

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Category	Action	Description
Job Schedule Management	Create Job Schedule	Creates a schedule for a job execution.
	Delete Job Schedule	Deletes a job schedule.
Runbook Management	Create Runbook	Creates a runbook.
	Delete Runbook	Deletes a runbook.
	Look up Runbook	Retrieves the details of a runbook.
	Look up Runbook Content	Retrieves the content of the a runbook.
	Look up Runbooks Stream	Retrieves the list of runbooks present in an automation account. Page size is fixed to 100 according to Microsoft.
	Update Runbook	Updates the details of a runbook.
Schedule Management	Create Schedule	Creates a schedule.
	Delete Schedule	Deletes a schedule.
	Look up Schedule	Retrieves the details of a schedule.
	Look up Schedules Stream	Retrieves the list of schedules present in an automation account. Page size is fixed to 100 according to Microsoft.
	Update Schedule	Updates the details of a schedule.
Software Update Configuration Management	Look up Software Update Configuration Machine Runs Stream	Retrieves the list of software update configuration machine runs present in an automation account. Page size is fixed to 100 according to Microsoft.
	Look up Software Update Configuration Run	Retrieves the details of a software update configuration run.
	Look up Software Update Configuration Runs Stream	Retrieves the list of software update configuration runs present in an automation account. Page size is fixed to 100 according to Microsoft.
State Configuration Management	Compile DSC Configuration	Creates the desired State Configuration compilation job.
	Create DSC Configuration	Creates the desired State Configuration.
	Look up DSC Configuration	Retrieves the details of the Desired State Configuration.
	Look up DSC Configuration Content	Retrieves the content of the Desired State Configuration.
	Look up DSC Configurations Stream	Retrieves the list of DSC Configurations present in an automation account. Page size is fixed to 100 according to Microsoft.
	Look up Nodes Stream	Retrieves the list of Nodes present in an automation account. Page size is fixed to 100 according to Microsoft.

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Category	Action	Description
	Update DSC Configuration	Updates the Desired State Configuration.
	Update Node DSC Configuration	Updates the details of desired State Configuration for the specified node(VM).
Watcher Management	Delete Watcher	Deletes the watcher.
	Look up Watchers Stream	Retrieves the list of watchers present in an automation account. Page size is fixed to 100 according to Microsoft.
	Start Watcher	Starts the watcher.
	Stop Watcher	Stops the watcher.

Set up the Microsoft Azure Automation Spoke

To execute the actions of the Microsoft Azure Automation Spoke, you must first install and configure the Microsoft Azure Resource Management Spoke. No separate configuration of the Microsoft Azure Automation Spoke is necessary. To view the procedure to set up the Microsoft Azure Resource Management Spoke, see Set up the Microsoft Azure Resource Management spoke.

Microsoft Azure Blob Storage Spoke

Manage Azure blobs and containers from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Azure Blob Storage spoke v2.0.0 is the latest version. For version history of the spoke, see Microsoft Azure Blob Storage spoke release notes.

Spoke dependencies

If you're having trouble installing the app, confirm that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Step - JSON Parser (com.glide.hub.action_step.jsonparser)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Supported versions

This spoke was built for API version 2023-11-03, but may be compatible with later versions.

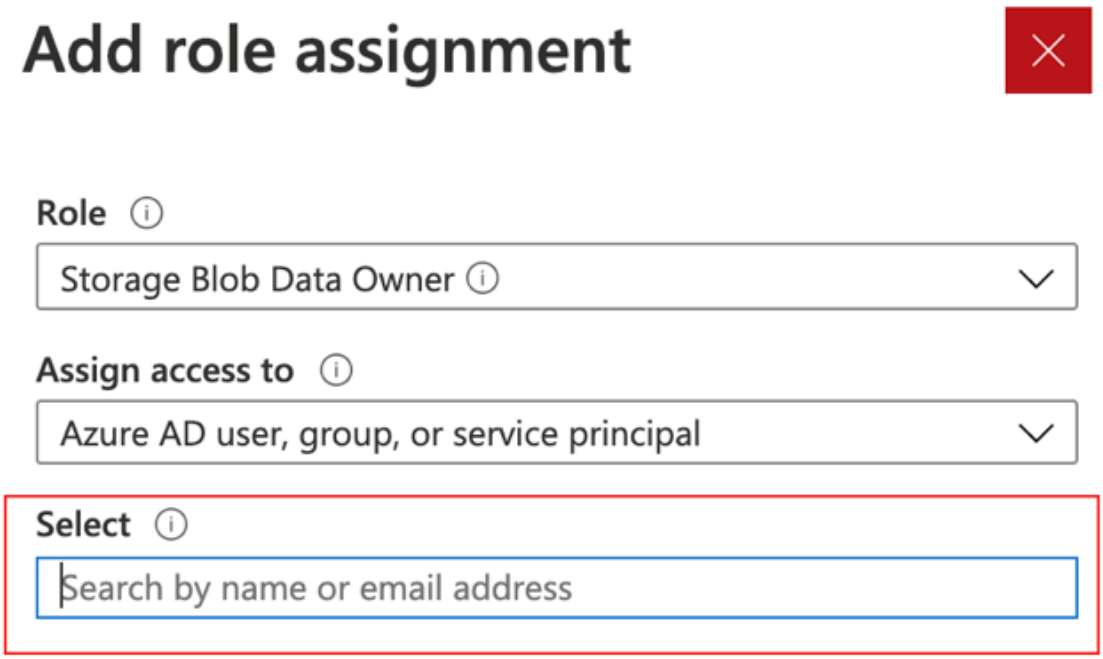
Spoke requirements

- Storage account in your Microsoft Azure portal for integration with your ServiceNow instance.

  Note: Verify that you have the Storage Blob Data Owner role.

  To assign the role:

  1. Log in to your storage account and navigate to Access Control(IAM).
  2. Select the Add a role assignment and select the Storage Blob Data Owner role.
  3. Assign access to the required Azure AD user, group, or service principle option. Select the email address of the Azure account and save the changes.



  For more information, see Use the Azure portal to assign an Azure role for access to blob and queue data.

- Record and save the access keys and Directory ID for later use.

Spoke subflows

The Azure Blob Storage spoke provides sample subflows to demonstrate automating the Azure Blob Storage tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Subflow	Description
Move Blob	Moves a blob from source container to destination container.
Rename Blob	Renames the specified blob.
Look up Blobs Stream	Retrieves the details of all blobs in a container.

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Subflow	Description
Look up Containers Stream	Retrieves a list of containers under the specified storage account.

Spoke actions

The Azure Blob Storage spoke provides actions to automate Azure Blob Storage tasks when events occur in the ServiceNow AI Platform. Available actions include:

Category	Action	Description
Blob Management	Attach Blob to ServiceNow Record	Attaches a blob to the ServiceNow record.
	Copy Blob	Copies a blob from one container to another container.
	Delete Blob	Deletes the specified blob.
	Lease Blob	Creates a lock on a blob for write and delete operations.
	Look up Blob	Retrieves details of the specified blob.
	Look up Blobs	Retrieves details of all blobs in a container.
	Release Lease on Blob	Releases a lock on a blob.
	Snapshot Blob	Creates a snapshot for the specified blob.
	Upload Attachment to Container	Uploads a blob in specified container.
Container Management	Create Container	Creates a container under the specified account.
	Delete Container	Deletes a container.
	Lease Container	Creates a lock on the container for delete operations.
	Look up Container	Retrieves details of the specified container.
	Look up Containers	Retrieves list of the containers under the specified storage account.
	Release Lease on Container	Releases a lock on a container.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Microsoft Azure Blob Storage Spoke.

Set up the Microsoft Azure Blob Storage Spoke

Configure the Microsoft Azure Blob Storage connection alias record on your ServiceNow instance. This enables the authentication of connection requests from the ServiceNow instance by the Microsoft Azure portal.

Before you begin

- Request an Integration Hub subscription.
- Activate the Azure Blob Storage spoke.
- Role required: admin.

Register Microsoft Azure Blob Storage as an OAuth provider

Create an OAuth application on Microsoft Azure that authenticates requests for OAuth tokens from your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Log in to https://portal.azure.com/.
2. Select **App registrations**.
3. Select **New registration**.
4. Fill the form.

OAuth application details

Field	Description
Name	Name of the OAuth application.
Supported account types	Option to specify who can use the OAuth application that you're creating to access Microsoft Azure Blob Storage.
Redirect URI (optional)	Option to provide the redirect URI. The redirect URI format is https://<instance-name>.service-now.com/oauth_redirect.do. From the Select a platform list, select **Web**.

5. Select **Register**.
   The OAuth application is registered.
6. Copy the values from the following fields under the Essentials heading:
   - Application (client) ID
   - Directory (tenant) ID
7. In the Client credentials field, select **Add a certificate or secret**.
8. Under the Client secrets heading, select **New client secret**.
9. In the Add a client secret window, do the following actions.

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a. In the Description field, enter a description of the client secret.

b. In the Expires field, enter the expiry period of the client secret.

c. Select **Add**.
The client secret is generated.

10. Under the Value heading, copy and store the client secret at a secure place.
11. Add the API permission.

a. On the left panel, select **API permissions**.

b. Select **Add a permission**.

c. On the Request API permissions window, select **Azure Storage**.

d. Select **Delegated permissions**.

e. Under Permissions, select **Access Azure Storage**.

f. Select **Add permissions**.
The permission is added and visible under the API / Permissions name heading.

g. Select **Grant admin consent for ServiceNow**.

h. Select **Yes**.

Microsoft Azure Blob Storage is registered as an OAuth service provider.

Configure a connection to Microsoft Azure

Configure the connection and credential alias record of the Microsoft Azure Blob Storage to send a request for an OAuth token from your ServiceNow instance and have it authenticated by the Microsoft Azure portal. After authentication, an OAuth token is available to your instance to access the Microsoft Azure Blob Storage.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. In the Search all connections field, enter Microsoft Azure Blob Storage.
The **Outbound** tab is enabled by default. If the tab isn't enabled, toggle-select to enable.
4. On the Microsoft Azure Blob Storage tile, select **View Details**.
5. Select **Configure**.
6. Fill the form.

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Microsoft Azure Blob Storage connection alias

Field	Description
Connection Name	Name of the connection alias record. The default name of the first connection record is the same as the alias. You can't update the name.
Authorization URL	URL that your ServiceNow instance uses to request OAuth tokens from the Microsoft Azure portal. The URL must in the following format: `https://login.microsoftonline.com/{tenant ID}/oauth2/v2.0/authorize`. Use the tenant ID that you generated when you registered the OAuth application.
Token URL	URL that your ServiceNow instance uses to get the OAuth token. The URL must in the following format: `https://login.microsoftonline.com/{tenant ID}/oauth2/v2.0/token`. Use the tenant ID that you generated when you registered the OAuth application.
Token Revocation URL	URL that your ServiceNow instance uses to cancel the OAuth token. The URL must in the following format: `https://login.microsoftonline.com/{tenant ID}/oauth2/v2.0/revoke`. Use the tenant ID that you generated when you registered the OAuth application. **Note:** This field isn't required.
Client ID	Unique ID of the OAuth application that you created on the Microsoft Azure portal. The Microsoft Azure portal uses this ID to authenticate your ServiceNow instance requests.
Client Secret	The secret that Microsoft Azure portal uses to authenticate your ServiceNow instance requests. You generate the client secret when you create the OAuth application on Microsoft Azure portal.
Redirect URL	Specific address where the third-party application sends your ServiceNow instance back after the request is authenticated. The format of the redirect URL is `https://<instance-name>.service-now.com/oauth_redirect.do`.

7. Select **Configure and Get OAuth Token**.

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You're required to log in to https://portal.azure.com/ before the OAuth token is provided.

On successful authentication, the request is authenticated and the OAuth token is available.

Microsoft Azure Cosmos DB Spoke

Manage Microsoft Azure Cosmos DB from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Azure Cosmos DB spoke v2.0.0 is the latest version. For version history of the spoke, see Microsoft Azure Cosmos DB Spoke release notes.

Supported versions

This spoke was built for Microsoft Azure Cosmos DB v2, but may be compatible with later versions.

Spoke requirements

Microsoft Azure Portal account.

Spoke dependencies

If you’re having trouble installing the app, confirm that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- Microsoft Azure Resource Management spoke (com.sn.ms.azure.resource.mgmt.spoke) v 2.0.0 is installed and a connection alias is created on your instance.
- The connection alias of Microsoft Azure Cosmos DB SAS is configured on your instance.

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Microsoft Azure Cosmos DB Spoke provides actions to automate Microsoft Azure Cosmos DB tasks when events occur in your ServiceNow instance. Available actions include:

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Category	Action	Description
Cassandra Database Management	Create Cassandra Keyspace	Creates a Cassandra keyspace within the specified Subscription ID and Resource Group.
	Delete Cassandra Keyspace	Deletes the specified Cassandra keyspace within the specified Subscription ID and Resource Group.
	Look up Cassandra Keyspace	Get the details of the specified Cassandra keyspace within the specified Subscription ID and Resource Group.
	Look up Cassandra Keyspace Throughput	Gets the details of the throughput of the specified Cassandra keyspace within the specified Subscription ID and Resource Group.
	Look up Cassandra Keyspaces	Lists all the Cassandra keyspaces in the specified Subscription ID and Resource Group.
	Update Cassandra Keyspace Throughput	Update the throughput of the specified Cassandra keyspace within the specified Subscription ID and Resource Group.
Core SQL Database Management	Create Database	Creates a database under a specified database account.
	Create Permission	Creates a permission in the specified database.
	Create User	Creates the user in a specified database.
	Delete Database	Deletes the specified database information in a specified database account.
	Delete Permission	Deletes the specified permission information of a user.
	Delete User	Deletes the user of the specified database.
	Look up Database	Retrieves the specified database information in a specified database account.
	Look up Databases	Lists all the databases in the specified database account.
	Look up Permission	Retrieves the specified permission information of a user.
	Look up Permissions	Lists all the permissions of the specified database.
	Look up User	Retrieves the specified user information in a specified database.
	Look up Users	Lists all the users of the specified database.
	Replace Permission	Replaces the specified permission.
	Replace User	Replaces the specified user in a specified database by another user.

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Category	Action	Description
Database Account Management	Create DB Account	Creates an account in Azure Cosmos DB.
	Delete DB Account	Deletes the specified Cosmos DB account.
	Enable or Disable Options on DB Account	Updates the details of a specified database account.
	Look up Access Keys	Lists all access keys in the specified Azure Cosmos DB database account.
	Look up Connection Strings	Lists all the connection strings in the specified Azure Cosmos DB account.
	Look up DB Account	Retrieves the DB account for the provided Subscription ID and Resource Group.
	Look up DB Accounts by Resource Group	Retrieves the list of DB accounts for the provided Subscription ID and Resource Group.
	Look up DB Accounts by Subscription ID	Retrieves the list of DB accounts for the provided Subscription ID.
	Look up Usages	Retrieves the most recent data in the specified database account.
	Regenerate Access Key	Regenerates an access key for the specified Azure Cosmos DB account.
	Update Failover Priority	Updates the details of a specified database account.
Mongo Database Management	Create MongoDB Database	Creates the specified MongoDB database within the specified Subscription ID and Resource Group.
	Delete MongoDB Database	Deletes the specified MongoDB database within the specified Subscription ID and Resource Group.
	Look up MongoDB Database	Get the details of the provided MongoDB database within the specified Subscription ID and Resource Group.
	Look up MongoDB Database Throughput	Get the details of the throughput of the provided MongoDB database within the specified Subscription ID and Resource Group.
	Look up MongoDB Databases	Lists all the MongoDB databases within the specified Subscription ID and Resource Group.
	Update MongoDB Database Throughput	Creates a Cassandra keyspace within the specified Subscription ID and Resource Group.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Microsoft Azure Cosmos DB spoke.

Set up the Microsoft Azure Cosmos DB spoke by fulfilling the following dependencies:

- Install and configure a connection alias of the Microsoft Azure Resource Management Spoke. To view the procedure, see Set up the Microsoft Azure Resource Management spoke.
- Configure a connection alias of the Microsoft Azure Cosmos DB SAS. To view the procedure, see Create a connection alias record for Microsoft Azure Cosmos DB SAS.

Set up the Microsoft Azure Cosmos DB spoke

Integrate the ServiceNow instance and the Microsoft Azure Cosmos DB by installing and configuring the Microsoft Azure Resource Management Spoke connection alias and configuring the Microsoft Azure Cosmos DB SAS connection alias.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Azure Cosmos DB spoke.
- Role required: admin

Create a connection alias record for Microsoft Azure Cosmos DB SAS

Create a connection alias record for the Microsoft Azure Cosmos DB SAS to execute the actions under the Core SQL Database Management category of the Microsoft Azure Cosmos DB spoke.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select **Connections**.
3. In the Search all connections field, enter `Microsoft Azure Cosmos DB SAS`.
   The **Outbound** tab is active by default. If the tab isn't active, toggle it to activate.
4. On the Microsoft Azure Cosmos DB SAS tile, select **View Details**.
5. Select **Configure**.
6. Fill the form.

Cosmos DB SAS connection alias setup information

Field	Description
Connection name	Name of the connection record.
Credential name	Name of the credential that is used to access the Cosmos DB SAS.

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Field	Description
Shared Access Key Name	Name of the shared access key to the Cosmos DB SAS.
Shared Access Key	Shared access key to the Cosmos DB SAS. Generate the key from the Microsoft Azure portal.

7. Select **Create Connection**.

Microsoft Azure DevOps Boards Spoke

Automate the process of managing work items in Azure DevOps Boards from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes .

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview .

Spoke version

Azure DevOps Boards spoke v3.1.3 is the latest version. For version history of the spoke, see Microsoft Azure DevOps Boards spoke release notes .

Supported versions

This spoke was built for Azure DevOps Boards REST API version 4.1 and TFS 2018 Update 3, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- iHub Spoke Util Pack (com.snc.ihub_spoke_util_pack)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke requirements

- Azure DevOps instance
- Personal access tokens (PATs) to authenticate Azure DevOps

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See Azure DevOps documentation for information about creating personal access token.

Spoke actions

The Azure DevOps Boards spoke provides actions manage work items when events occur in ServiceNow. Available actions include:

Category	Action	Description
Core Process Management	Create Iteration	Creates an Azure DevOps iteration.
	Delete Iteration	Deletes an Azure DevOps iteration by path.
	Delete Team Iteration	Delinks or deletes the iterations from a team.
	Look up Creatable Fields	Get the list of all fields in a required Azure DevOps project.
	Look up Area Paths	Gets all the area paths in a Project.
	Look up Editable Fields	Gets the list of all fields in a required Work Item for editing.
	Look up Area Path of a Team	Get all the area paths of a Team.
	Look up Iteration by Path	Get Iteration by Path.
	Look up Iteration Paths	Get all Iteration Paths in a Project.
	Look up Iteration Paths of a Team	Gets all the iteration paths of a Team.
	Look up Processes	Gets the list of all Azure DevOps Processes.
	Look up Projects Stream	Retrieves the details of all Azure DevOps projects.
	Look up Work Item Revisions Stream	Retrieves the Reporting Work Item Revisions for batch processing.
	Look up Work Item	Retrieve Reporting Work Item Links for batch processing.

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Category	Action	Description
	Links Stream	
	Look up Queries by Wiql	Gets the results of the query given its Wiql.
	Look up Team Settings	Get Backlog and Default Iterations setting of a team.
	Look up Teams	Get all Teams in a Project.
	Look up Work Item Data by ID	Gets all the data of a Work Item.
	Look up Work Item Relations by ID	Gets all relations of a Work Item.
	Look up Work Item Types	Gets the list of all work item types in a required Azure DevOps project.
	Look up Work Item Type Fields by Process	Gets the list of all fields of a Work Item Type by a process from Azure DevOps.
	Post Iteration to Team	Adds an Azure DevOps iteration to an Azure DevOps team.
	Reporting Work Items Revisions	Adds reporting work-item revisions for batch processing.
	Update Iteration	Updates an Azure DevOps iteration.
	Look up Projects Stream	Retrieves the list of all Azure DevOps projects.
	Get Work Item Types By Process	Retrieves the list of all Work Item types in a required Azure DevOps process.
	Get Work Item Types	Retrieves the list of all Work Item types in a required Azure DevOps project.
	Look up Area by Path	Retrieves the area of a project by its path.
	Look up Area Path of a Team	Gets all the area paths of a Team.

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Category	Action	Description
	Look up Area Paths	Get all the area paths in a Project.
	Look up Creatable Fields	Gets the list of all the fields in a required Azure DevOps project.
	Look up Editable Fields	Gets the list of all fields in a required Work Item for editing.
	Look up Iteration by Path	Gets Iteration by Path.
	Look up Iteration Paths	Gets all the Iteration Paths in a Project.
	Look up Iteration Paths of a Team	Gets all Iteration Paths of a Team.
	Look up Processes	Gets the list of all Azure DevOps Processes.
	Look up Work Items	Retrieves the list of work items.
	Look up Team Settings	Gets the Backlog and Default Iteration settings of a team.
	Look up Teams	Gets all Teams in a Project.
	Look up Work Item Data by ID	Gets all Data of a Work Item.
	Look up Work Item Relations by ID	Gets all relations of a Work Item.
	Look up Work Item Type Fields by Process	Gets the list of all Fields of a Work Item Type by a Process from Azure DevOps.
	Look up Work Item Types	Gets the list of all Work Item types in a required Azure DevOps project.
	Look up Work Item Types by Process	Get the list of all Work Item Types by a Process from Azure DevOps.

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Category	Action	Description
	Look up Queries by Wiql	Gets the results of the query given its Wiql.
Work Item Management	Create Link between Work Items	Creates parent-child relationships between the Work Items.
	Create Work Item	Creates a new Work Item on your instance of the Azure DevOps cloud. The Work Item can be of a specific Work Item type or custom Work Item type, depending on how your organization has customized Azure DevOps.
	Create Service Hook	Creates a new subscription to an Azure DevOps Service Hook.
	Delete Work Item	Deletes the required Work Item in your Azure DevOps instance.
	Delete Link between Work Items	Deletes the link between Work Items.
	Update Work Item	Updates a Work Item in your instance of the Azure DevOps cloud.
	Update Work Item Project Details	Moves between projects in the same organization.
	Add Attachment	Adds an attachment associated with a ServiceNow record to the required work item on the Azure DevOps instance.

Spoke triggers

ServiceNow supports specific events on the Azure DevOps instance that create triggers. You must first configure a flow with a supported trigger definition. When an event, for example, a work item is commented on, occurs in Azure DevOps, it sends the payload via a webhook to the ServiceNow instance. After that, the flow that you configured is triggered at the ServiceNow instance to automate a workflow. The supported events are:

Category	Trigger	Definition
Work Item Management	Work item commented on	Trigger initiates when a work item is commented on.
	Work item created	Trigger initiates when a new work item is created.
	Work item deleted	Trigger initiates when a work item is deleted.
	Work item restored	Trigger initiates when a work item is newly restored.
	Work item updated	Trigger initiates when a work item is changed.

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Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Microsoft Azure DevOps Boards core process management AI agent	Manages core process management tasks (that is, look up a projects stream, look up area paths, look up an area path of a team, look up work item types by process, look up team settings, look up an iteration by path, look up work item data by ID, look up creatable fields, look up work item types, look up iteration paths of a team, look up processes, look up editable fields, look up an area by path, delete a team iteration, look up work item relations by ID, look up queries by Wiql, create an iteration, look up work item type fields by process, look up teams, post an iteration to a team, look up iteration paths, update an iteration, delete an iteration) in Microsoft Azure DevOps Boards.
Microsoft Azure DevOps Boards work item management AI agent	Manages work item management tasks (that is, add an attachment, delete a work item, create a link between work items, create a service hook, delete a link between work items, update work item project details) inMicrosoft Azure DevOps Boards.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

If you want to use different connections in your flow, subflows, and actions, create the child alias and select the default alias record as its parent. To configure the child alias, perform the same steps that are needed to configure the parent alias. Depending on your requirement and set up, you can choose either the parent alias or child alias in your flow, subflows, and actions.

You can also use multiple Azure DevOps accounts. In this case, you should provide the respective **Password** while configuring the credential record and specify the relevant **Connection URL** while configuring the connection record.

- If you want to set up the Microsoft Azure DevOps Boards spoke using OAuth, see Set up the Microsoft Azure DevOps Boards spoke using OAuth.
- If you want to set up the Microsoft Azure DevOps Boards spoke using personal access token, see Set up the Microsoft Azure DevOps Boards spoke using personal access token.

Set up the Microsoft Azure DevOps Boards spoke using OAuth

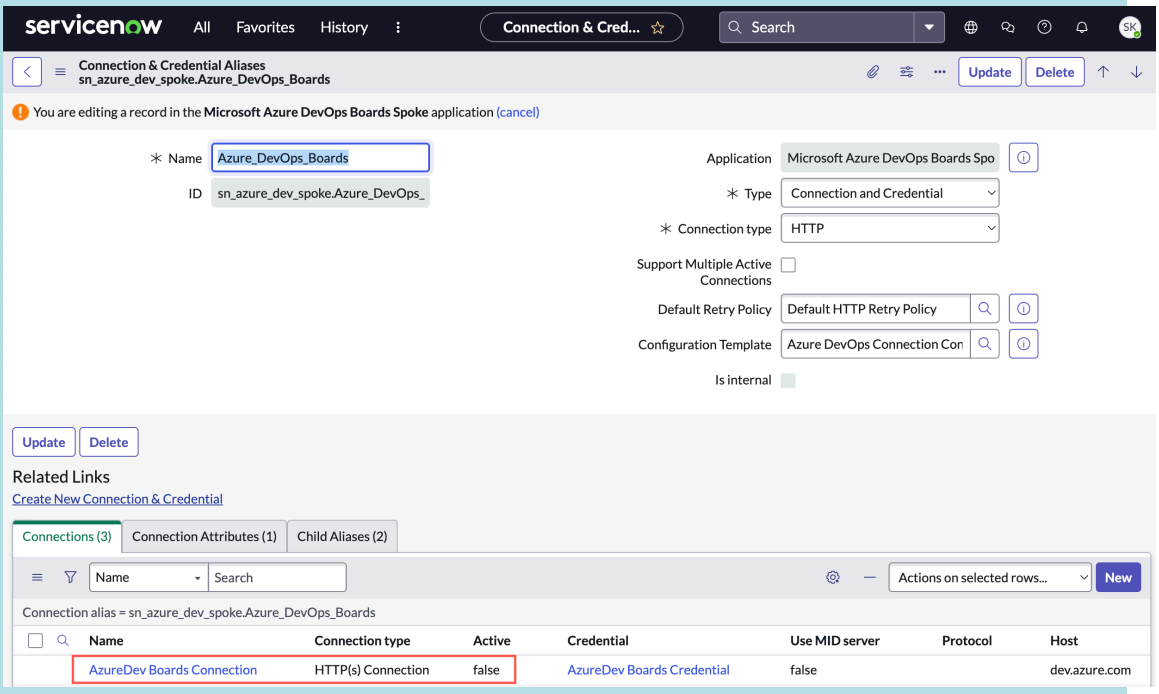
Integrate the ServiceNow instance and Azure DevOps Boards using OAuth 2.0 authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate Azure DevOps Boards spoke
- Role required: admin.

Important:

- If you are setting up the Azure DevOps Boards spoke using OAuth, you need not set up the spoke using personal access token.
- If the Azure DevOps Boards spoke is already configured and set up, ensure that you set the value of **Active** to **false** for the existing connection before you proceed to set up the spoke using OAuth.



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Register an application using the Microsoft Azure portal

Provide authorization to the ServiceNow instance by registering an application in the Microsoft Azure portal.

Before you begin

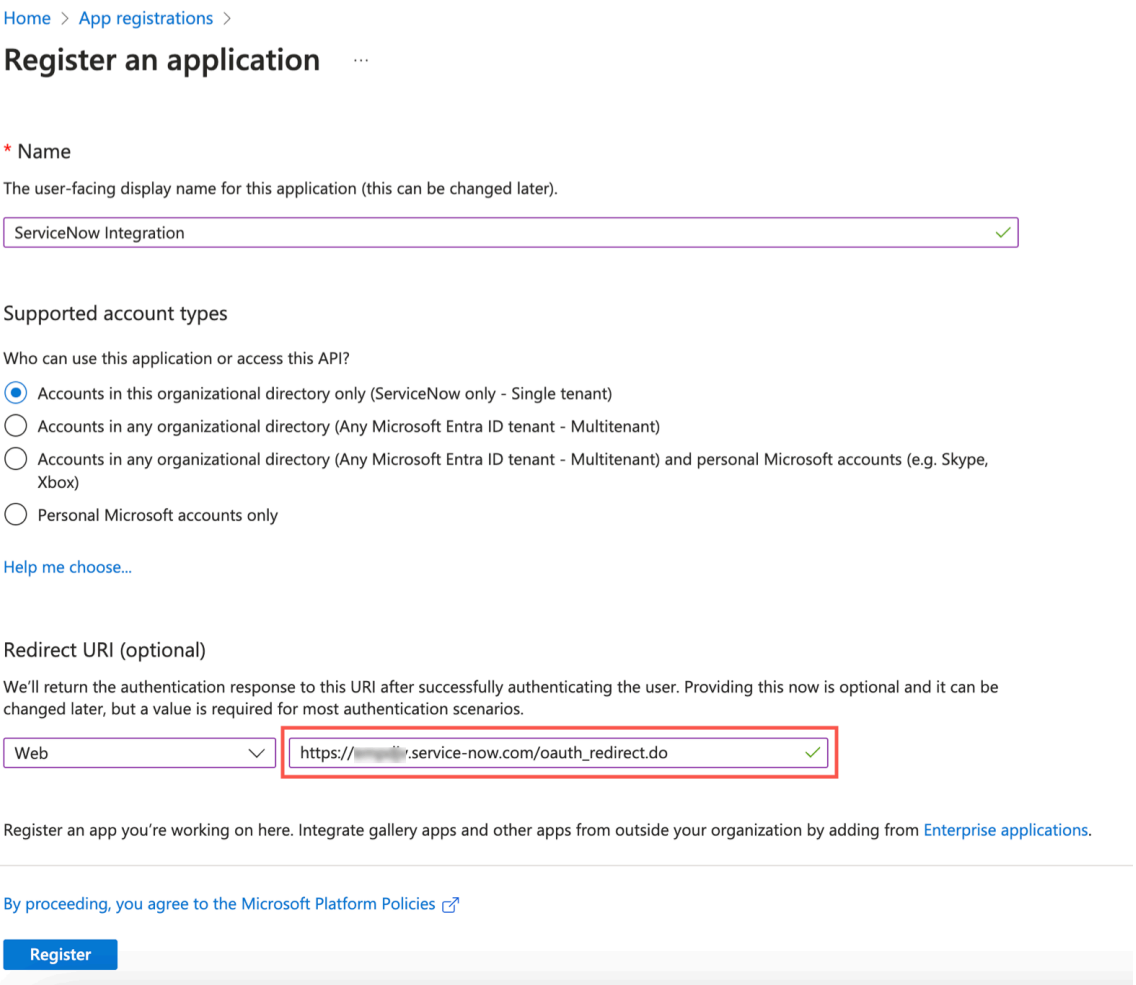
Role required: admin.

About this task

Complete these steps from the Microsoft Azure portal.

Procedure

1. Log in to the Microsoft Azure portal as an admin.
2. Click **App Registrations**.
3. Click **New registration**.
4. On the form, fill in fields as per your requirement.
   For Redirect URI, specify the ServiceNow instance URL in this format: `https://<ServiceNow-Instance-Name>.service-now.com/oauth_redirect.do`.



5. Click **Register**.
   The application is created and the values of **Application (client) ID** and **Directory (tenant) ID** are displayed.

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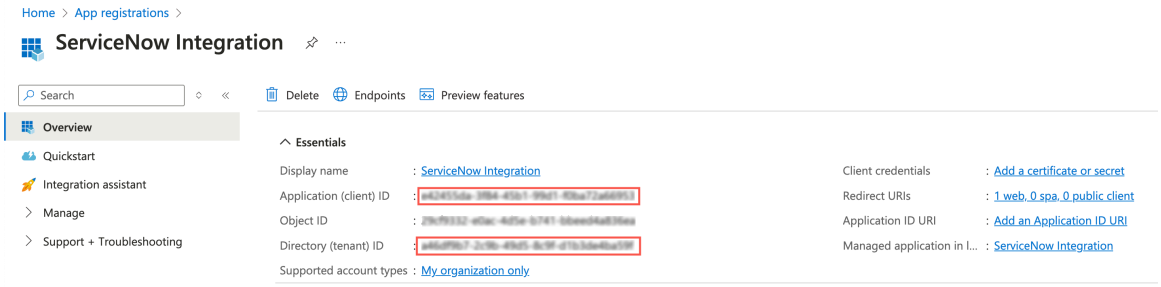
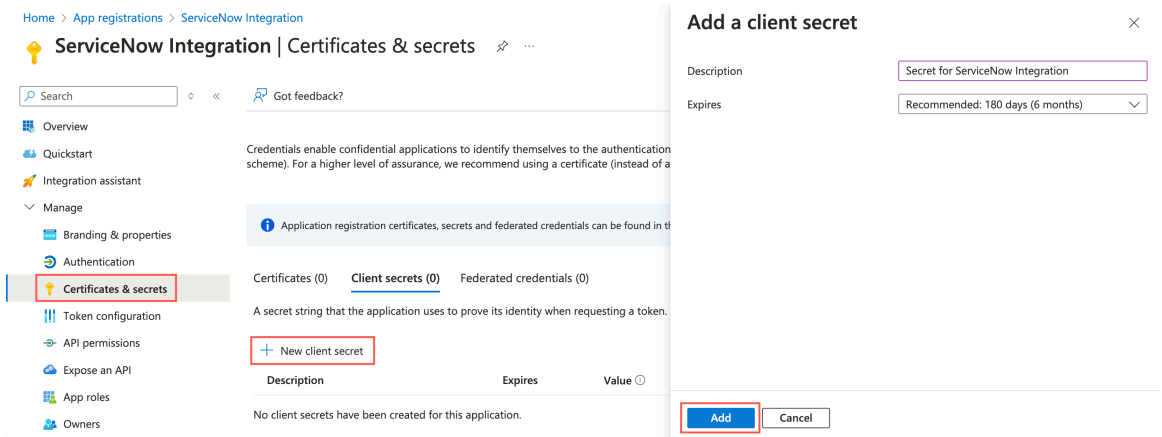
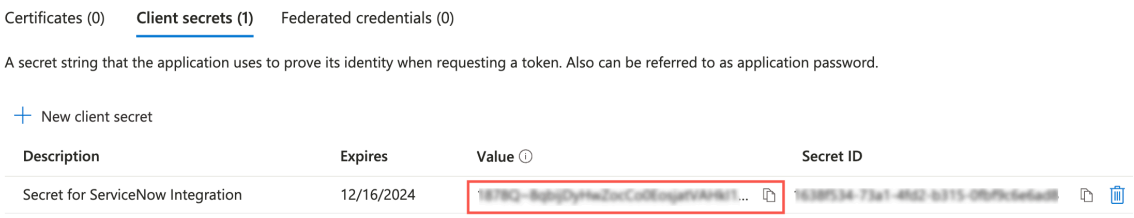


6. Copy and record the values of **Application (client) ID** and **Directory (tenant) ID**.
7. Generate a client secret for the application.
   a. Under **Manage**, click **Certificates & secrets**.
   b. Click **New client secret**.
   c. On the form, enter provide a description and specify the duration after which the secret expires.
   d. Click **Add**.



   The client secret is created and its value is displayed.

   e. Copy the value of client secret for later use.



8. Provide the required API permissions to the application.
   a. Under **Manage**, click **API permissions**.
   b. Click **Add a permission**.

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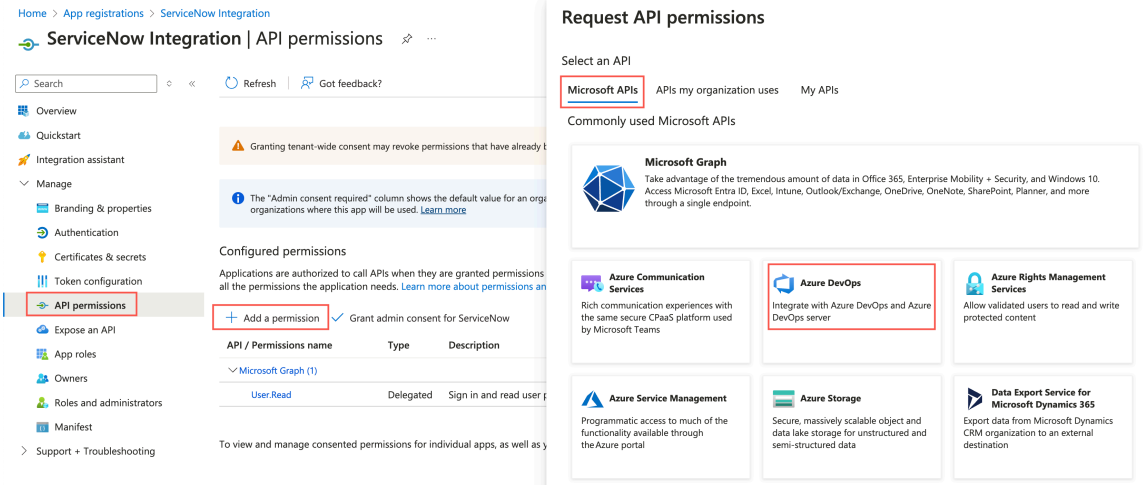
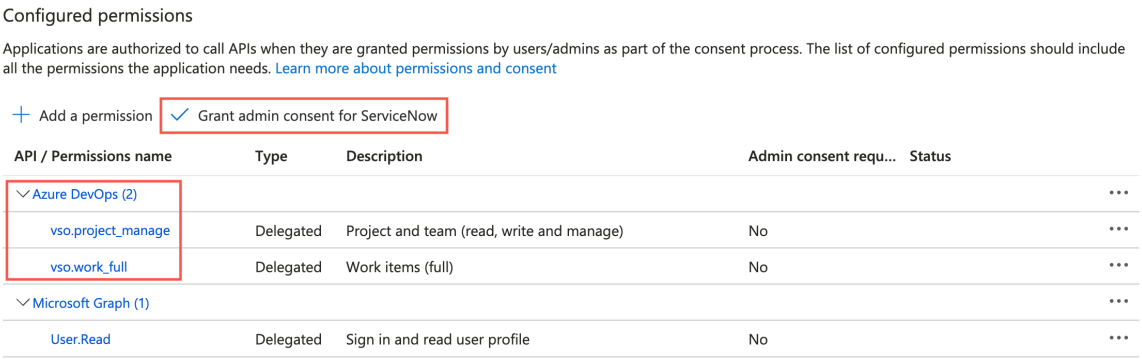
c. Under **Microsoft APIs**, click **Azure DevOps**.



d. Expand **vso** and select these permissions **vso.project_manage** and **vso.work_full**. The **User.Read** permission under **Microsoft Graph** is selected by default. Configure other permissions as per your requirement.

e. Click **Grant admin consent for ServiceNow**.



f. When prompted, confirm your choice to grant admin consent for ServiceNow.

Result

An application has been registered in Microsoft Azure portal. You can use this application to connect to your Azure DevOps project from ServiceNow instance.

Create a connection record for the Microsoft Azure DevOps Boards Spoke

Create a connection record that enables the ServiceNow instance to send connection requests to the Microsoft Azure DevOps Boards.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select **Integrations**.
3. In the Search all connections field, enter `Azure DevOps Boards`.

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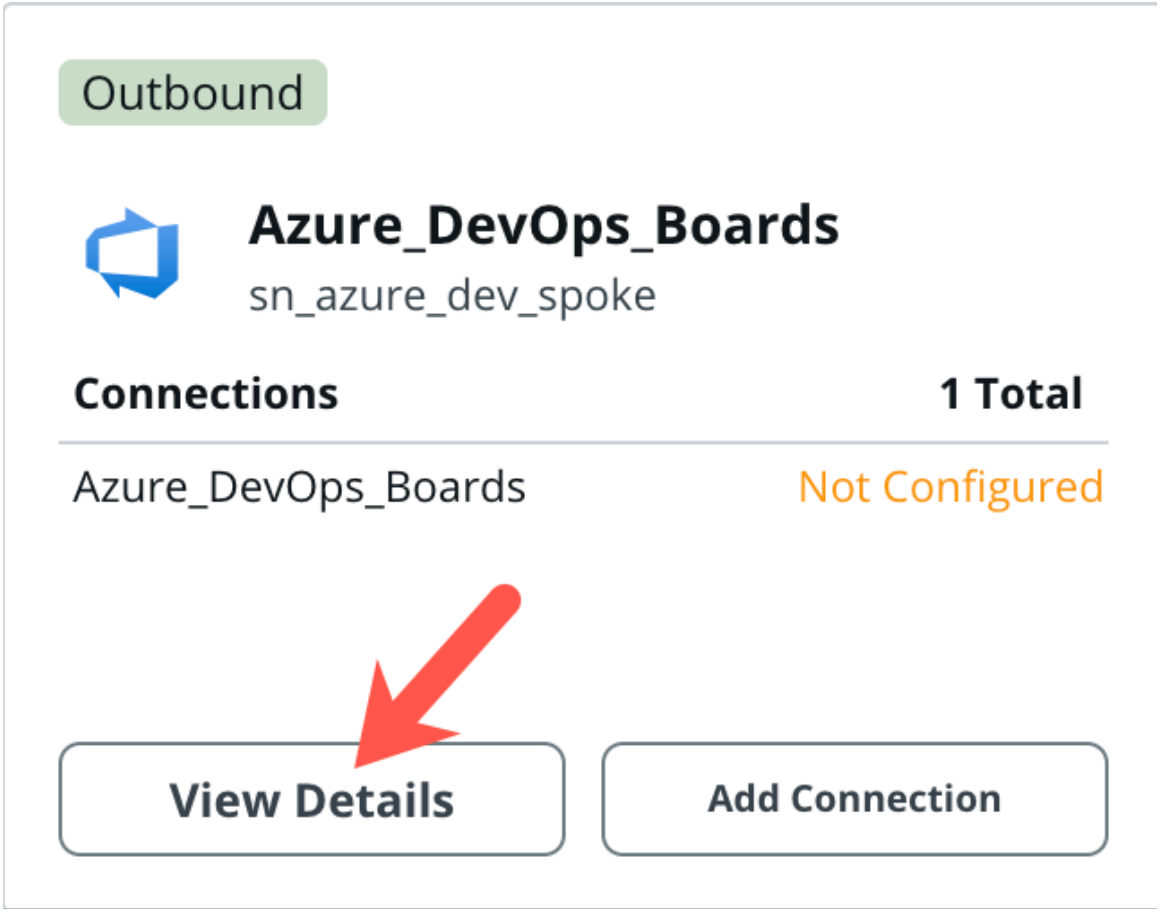
Confirm that the **Outbound** tab is selected.

4. In the Azure_DevOps_Boards tile, select **View Details**.



5. Select **Configure**.
6. Fill the form.

Azure DevOps Boards connection form

Field	Description
Connection Name	Option to provide the name of the connection record. The default and read-only name of the first connection record that you create is Azure_DevOps_Boards.
Connection URL	Option to provide the endpoint that the alias uses to interact with your Azure DevOps environment.
Client ID	Option to provide the client ID that you generated while registering an application on Microsoft Azure portal.
Client Secret	Option to provide the client secret that you generated while registering an application on Microsoft Azure portal.
OAuth Redirect URL	Option to provide the redirect URL. You must provide the redirect URL in the format `https://<your-instance-`

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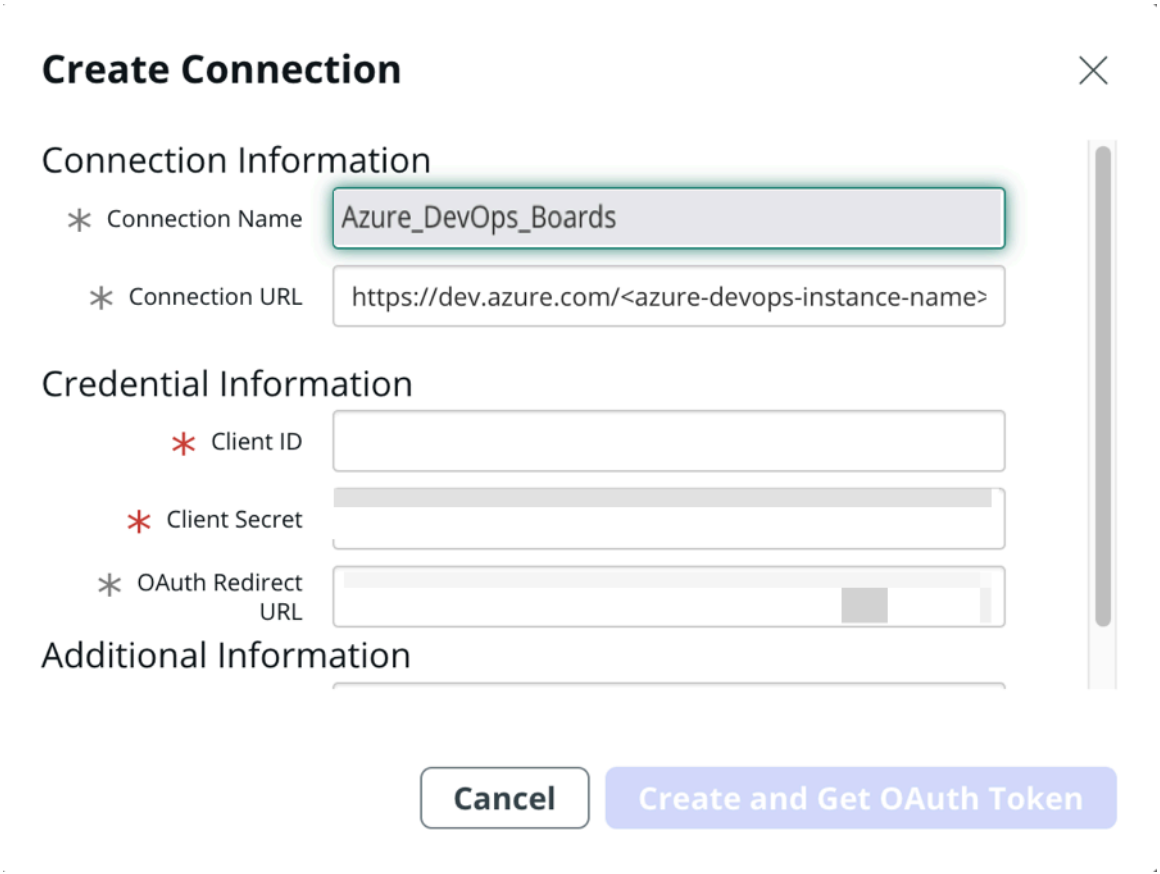
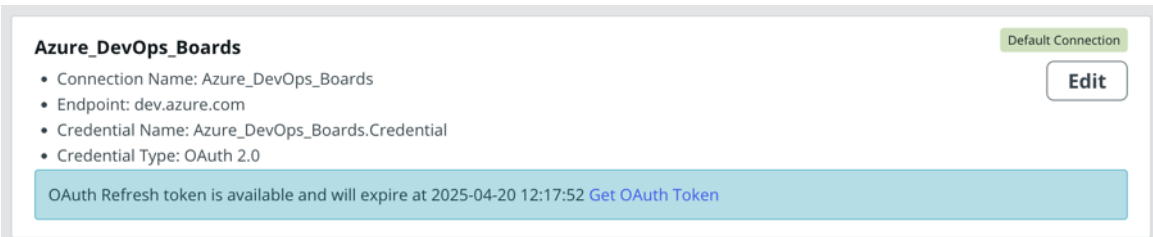
Field	Description
	`name>.service.now.com/oauth_redirect.do`.
Tenant ID	Option to provide the tenant ID that you generated while registering an application on Microsoft Azure portal.



7. Select **Create and Get OAuth Token**.
   You log in to the Microsoft Azure portal and upon successful authentication, OAuth token is issued.



Set up the Microsoft Azure DevOps Boards spoke using personal access token

Integrate the ServiceNow instance and Azure DevOps Boards using basic authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Azure DevOps Boards spoke.
- Role required: admin.

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About this task

If you want to use different connections in your flow, subflows, and actions, create the child alias and select the default alias record as its parent. To configure the child alias, perform the same steps that are needed to configure the parent alias. Depending on your requirement and set up, you can choose either the parent alias or child alias in your flow, subflows, and actions.
You can also use multiple Azure DevOps accounts. In this case, you should provide the respective **Password** while configuring the credential record and specify the relevant **Connection URL** while configuring the connection record.

Obtain the personal access token

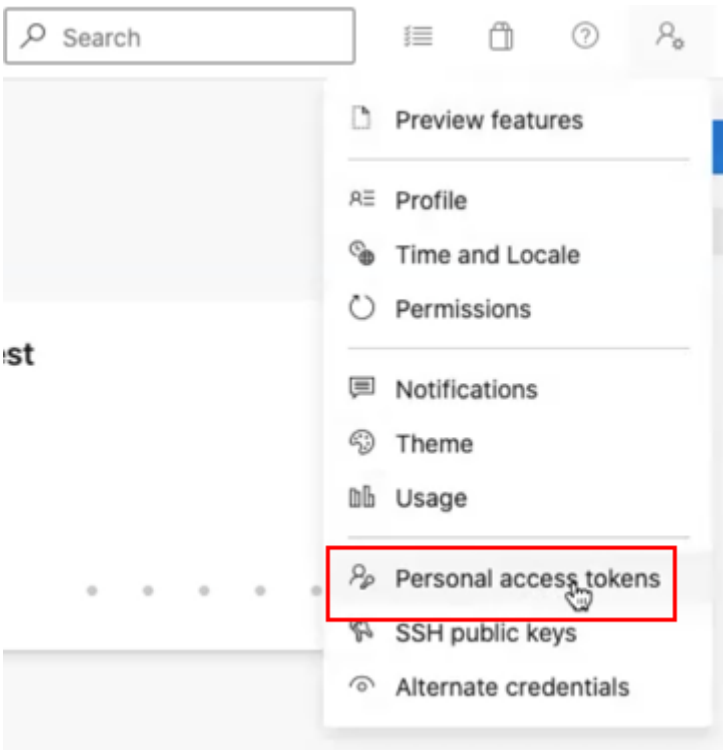
Authenticate Azure DevOps Boards by using the personal access tokens.

Before you begin

Role required: admin

Procedure

1. Log in to your Azure DevOps portal as an admin.
2. Navigate to **User Settings** > **Personal access tokens**.



3. Click **New Token**.
4. On the form, fill the required fields.

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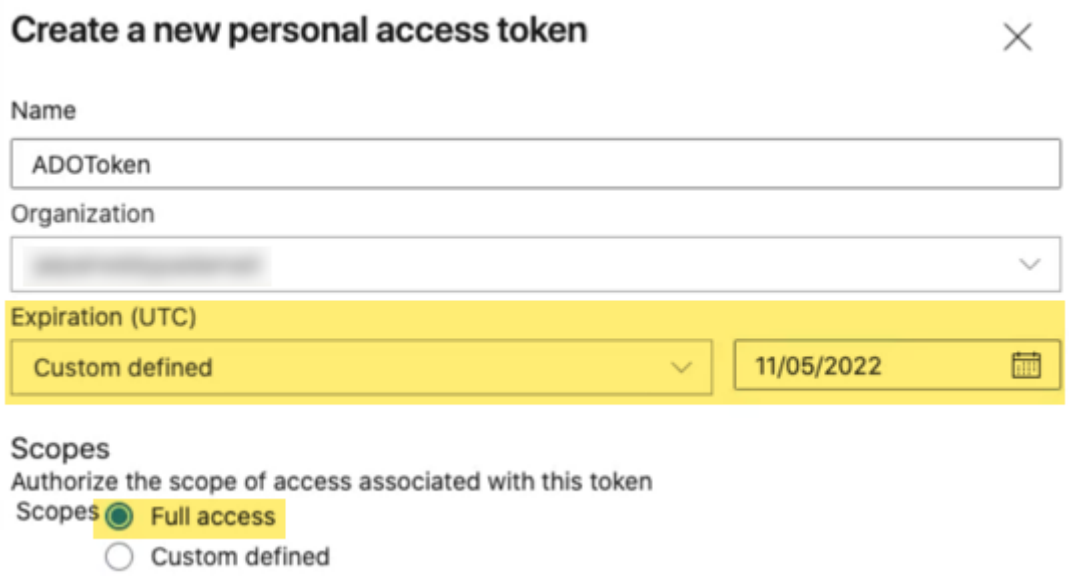
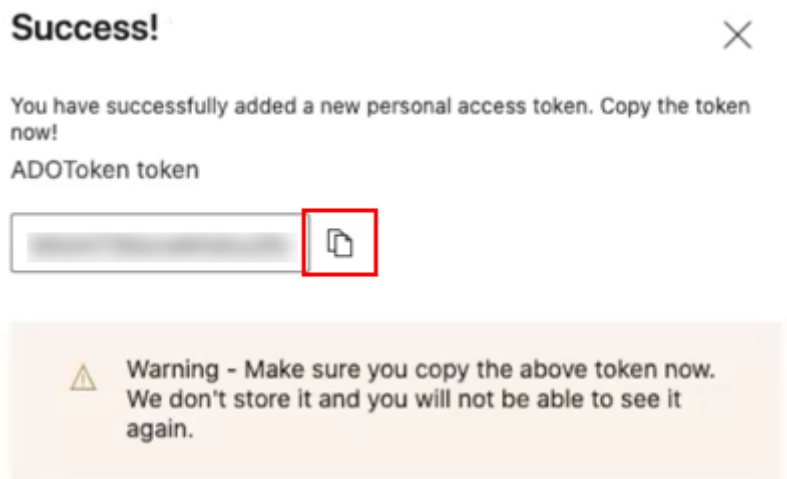


5. Click **Create**.



The token is displayed.

6. Copy and record the value of token for later use.

Configure a connection record for Microsoft Azure DevOps Boards Spoke

Add and configure a Azure DevOps Boards connection to authenticate ServiceNow requests.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Credentials**.
2. Select **New**.
3. Under What type of Credentials would you like to create?, select Basic Auth Credentials.
4. Fill the form.

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Credentials table

Field	Details
Name	Option to provide the name that identifies the record.
Order	Option to provide the order in which the credentials are used. For example, enter `100`.
User name	Option to provide the user name that you enter as credential.
Password	Option to provide the password that you enter as credential.
Active	Option to actively use the credential record. Select the option.

5. Select **Submit**.
   The credentials are created.
6. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Connection & Credential Aliases**.
7. Search for the alias Azure_DevOps_Boards.
8. Select the alias Azure_DevOps_Boards.
9. Under the **Connections** tab, select **New**.
10. Fill the form.

HTTP(s) Connection

Field	Description
Name	Option to provide a unique name of the connection.
Active	Option to indicate that this connection is active. **Note:** You can keep either the connection record for the OAuth 2.0 or that for the Basic Auth active. If you want to keep both connection records active, create one of the connection records under a child alias under the Azure_DevOps_Boards connection and credential alias.
Credential	Option to select the credential that you have created earlier.
Domain	Option to provide the domain to which the connection belongs.
Connection alias	Option to provide the parent connection alias. This field is automatically set to `sn_azure_dev_spoke.Azure_DevOps_Boards`.

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Field	Description
URL builder	Either manually enter the connection URL or use system to build the URL based on the inputs. Default is unchecked. If checked, the connection URL is calculated from the following fields: ○ Mutual authentication — Check box if mutual authentication is used. ○ Protocol — If mutual authentication is not used, enter protocol. The default is HTTPs. ○ Protocol profile — If mutual authentication is used, enter protocol profile from sys_protocol_profile. ○ Host ○ Port ○ Base path — Path of the connection string. **Note:** If mutual authentication is checked, connection URL is built: Protocol + :// + host:port +URL. If mutual authentication is unchecked, connection URL is built: Protocol profile + :// + host:port +URL
Connection URL	If URL builder is unchecked, enter the connection URL into this field. **Note:** If mutual authentication is checked, connection URL is built: Protocol + :// + host:port +URL. If mutual authentication is unchecked, connection URL is built: Protocol profile + :// + host:port +URL
Use MID server	Option to specify MID server.
Connection timeout	Number of milliseconds the system waits for a successful host connection. If a successful connection does not occur during this time, the connection request times out. Leave this field empty to use the system default connection timeout value.

11. Select **Submit**.
12. Navigate to **All** > **Process Automation** > **Workflow Studio**.
13. Click the **Integrations** tab.
14. Under **Connections**, toggle and enable the **Outbound** connections.
15. Locate the alias for **Azure_DevOps_Boards** and click **View Details**.

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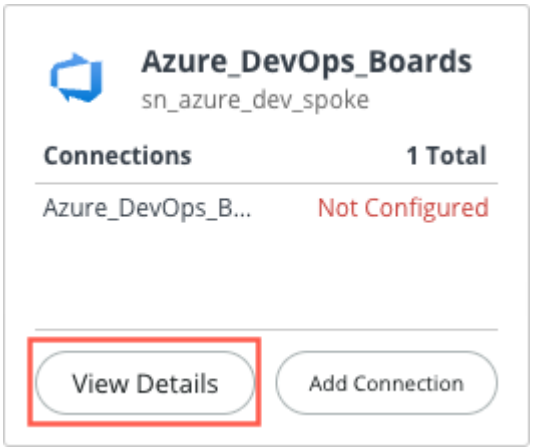
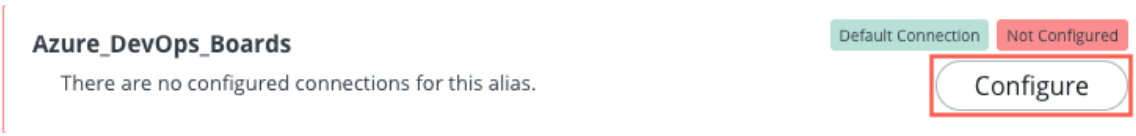
- To configure the default connection and credential alias record that is shipped along with the Azure DevOps Boards spoke, click **View Details**.



- To manage more than one Azure DevOps Boards spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



16. On the **Configure Connection** form, fill in the fields:

Field	Description
Connection Name	Name to uniquely identify the connection record. For example, enter `Azure DevOps Boards Connection`.
Connection URL	URL of the Azure DevOps instance. For example, enter the URL in this format: `https://dev.azure.com/<instance-name>`.
User name	User name to log in to your Azure DevOps instance.
Password	Personal access token to authenticate Azure DevOps.

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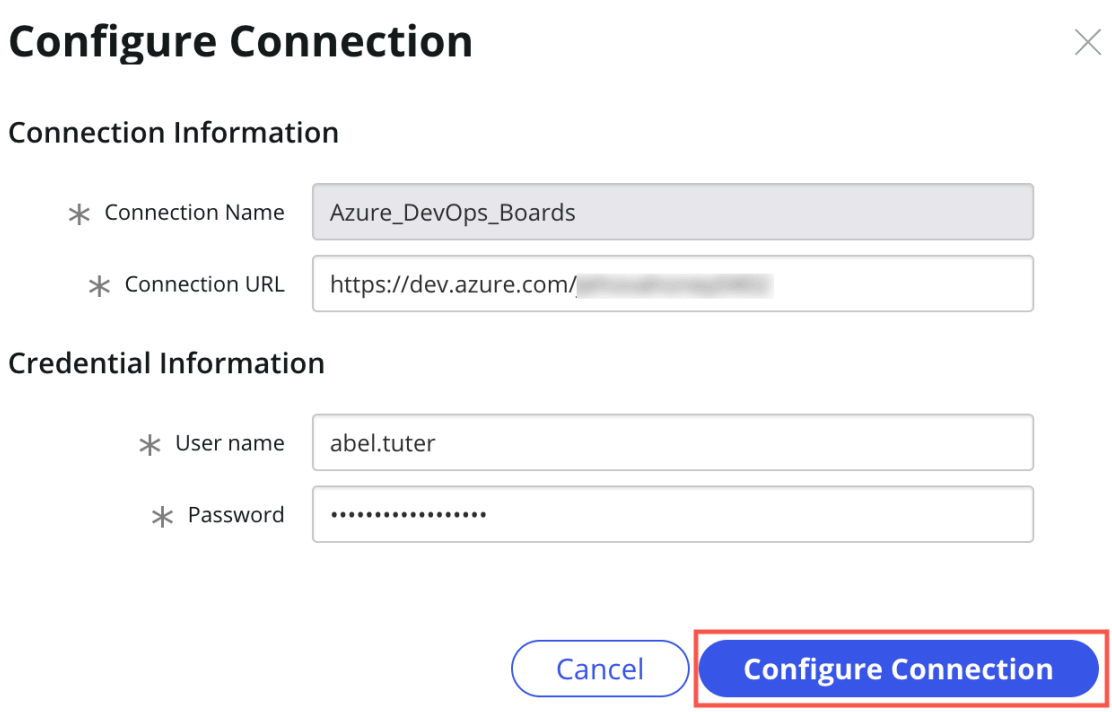

17. Click **Configure Connection**.

Result
The spoke connection is configured and ready to be used.

Set up triggers for the Microsoft Azure DevOps Boards spoke

Set up triggers for the Microsoft Azure DevOps spoke for the required events. The endpoint enables webhooks to connect with your ServiceNow instance.

Before you begin
Role required: admin

Configure triggers in ServiceNow instance

Configure endpoint for webhooks in Microsoft Azure DevOps that support the token authentication.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Toggle and enable the **Inbound** connections.

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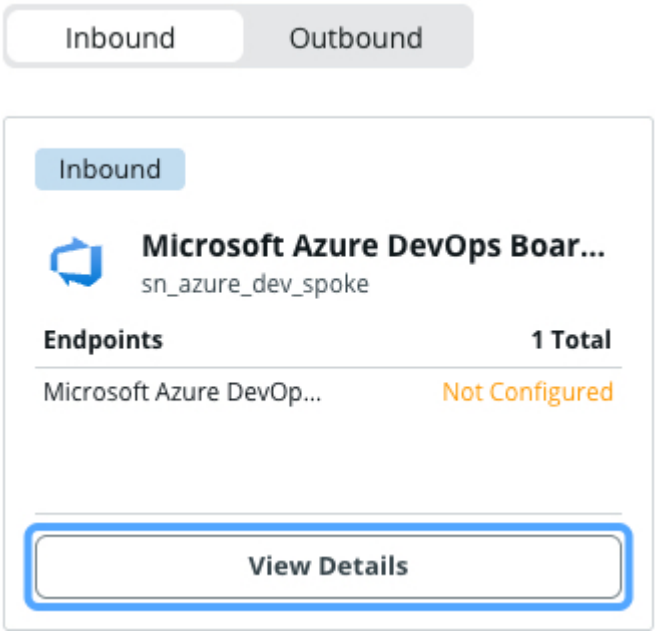
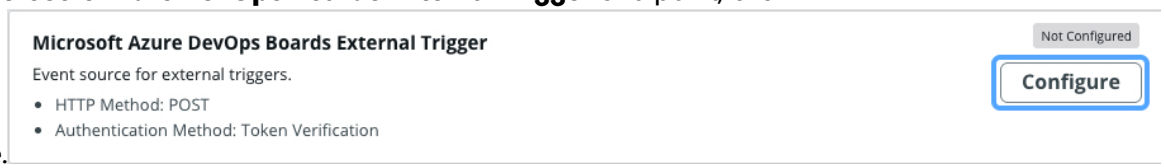
4. Locate the **Microsoft Azure DevOps Boards Spoke** endpoint and click **View Details**.



5. For the **Microsoft Azure DevOps Boards External Trigger** end point, click **Configure**.



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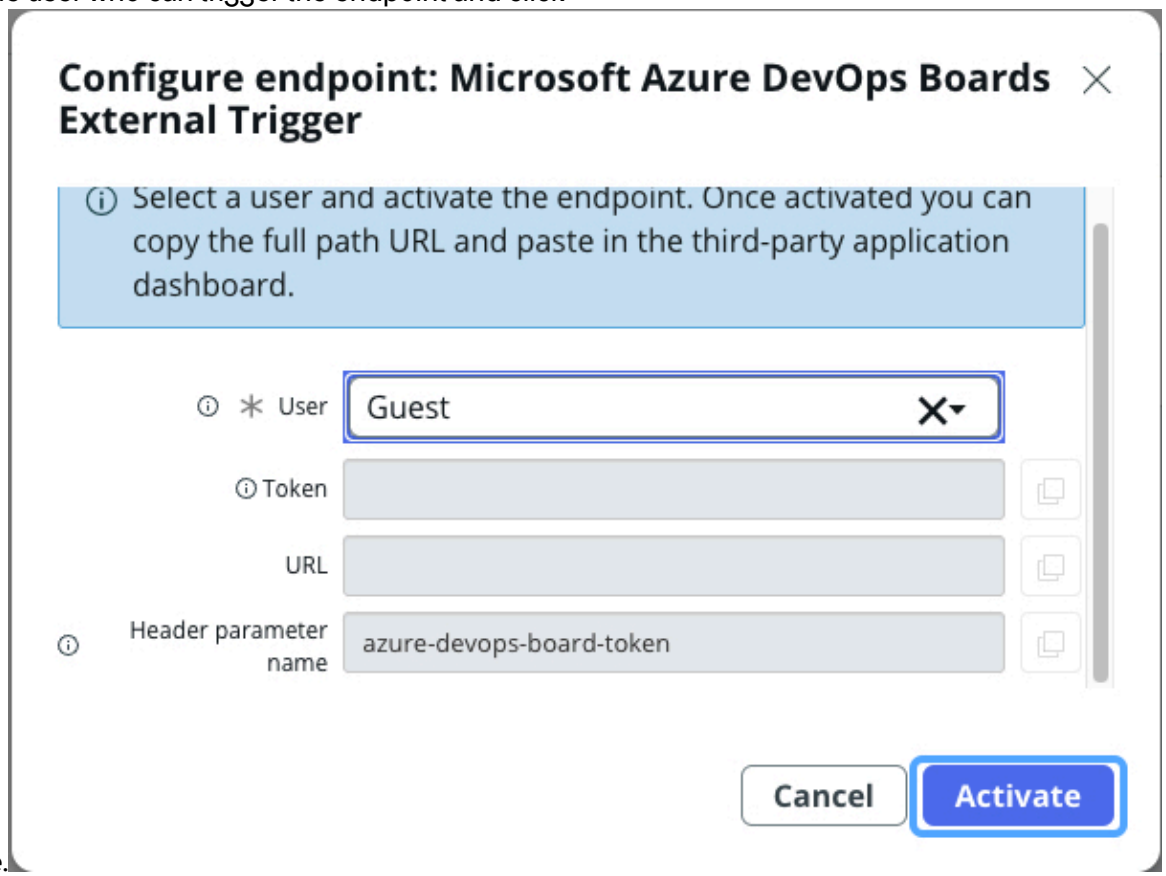
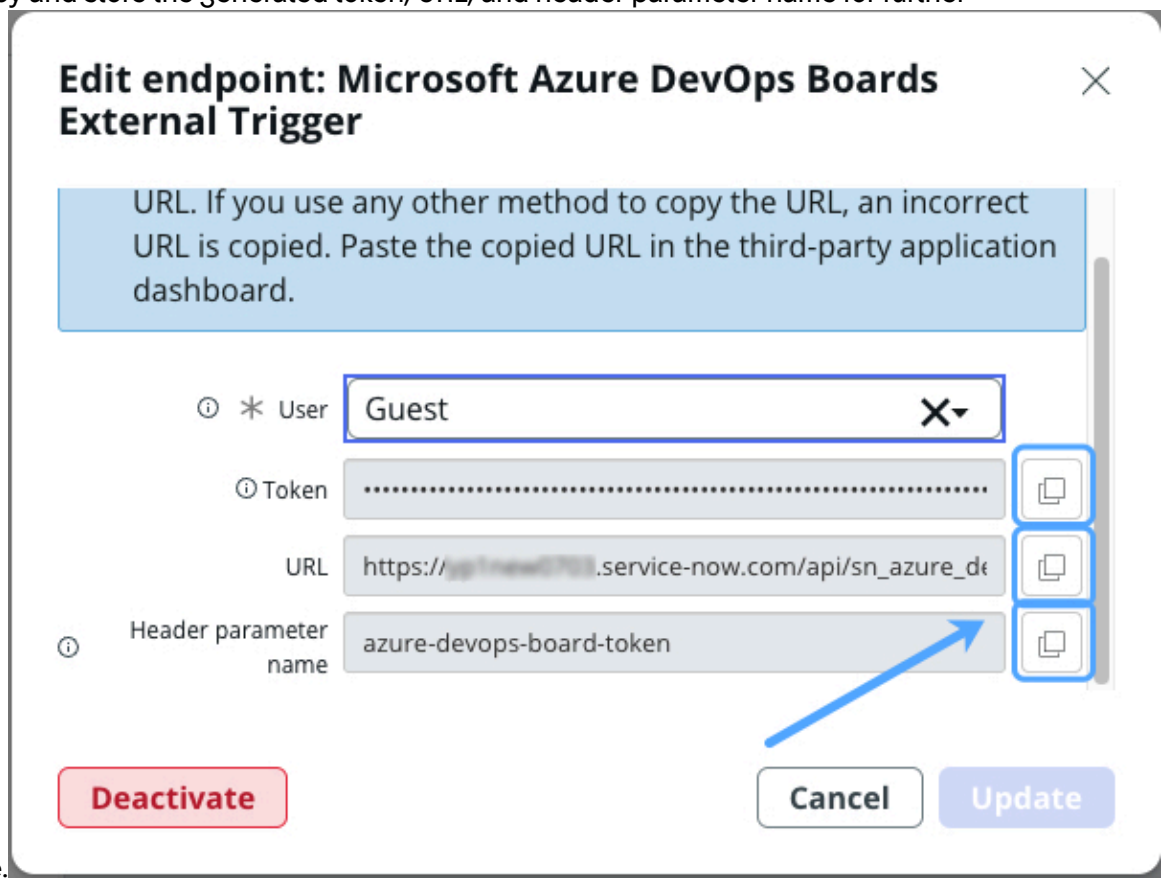
6. Select the user who can trigger the endpoint and click **Activate**.



Copy and store the generated token, URL, and header parameter name for further use.



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Create a service hook subscription for Microsoft Azure DevOps Boards spoke

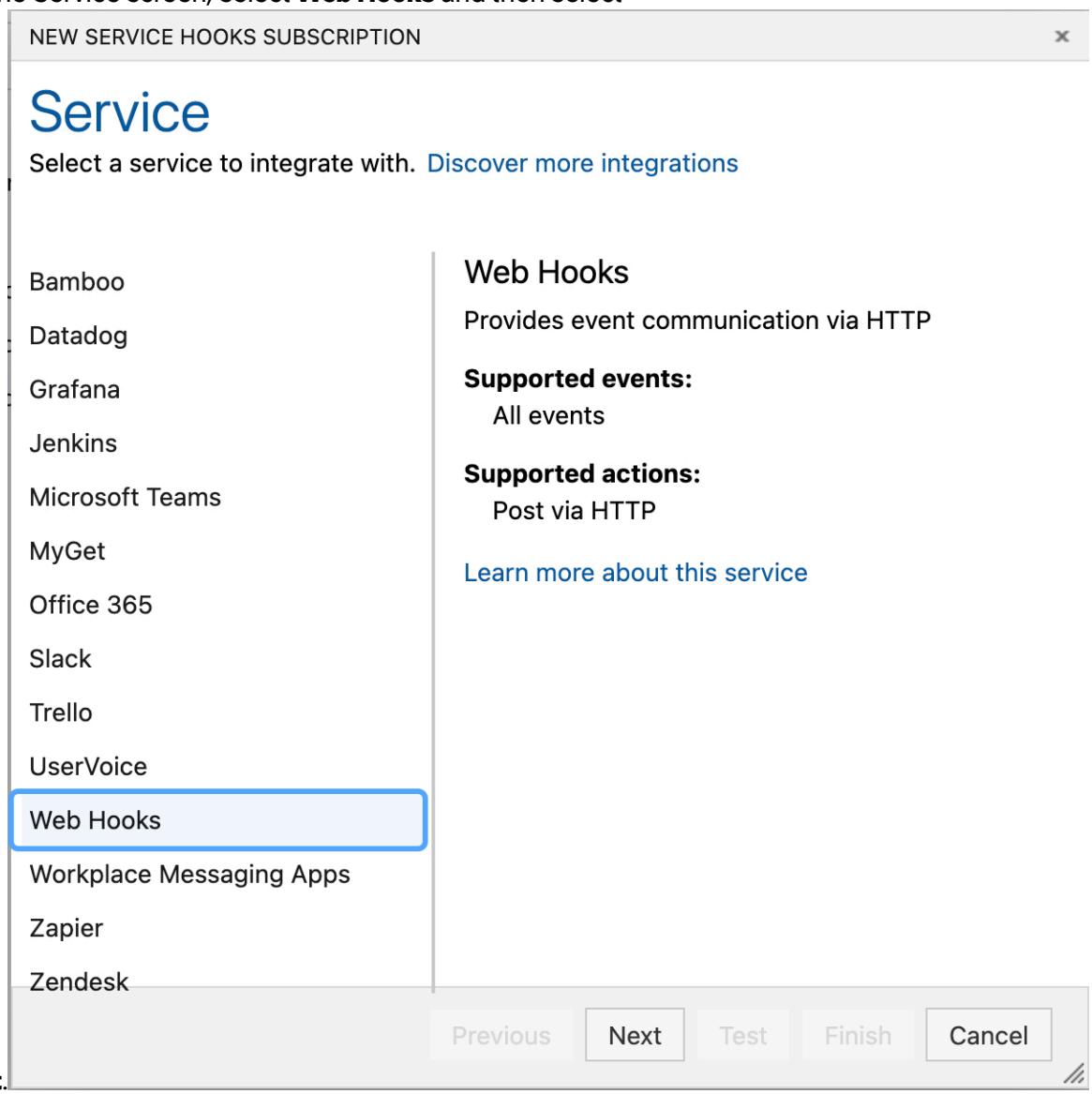
Create and configure a service webhook in Microsoft Azure Devops for Microsoft Azure DevOps Boards spoke.

Before you begin

- Role required: admin
- Configure triggers in ServiceNow instance

Procedure

1. In your Azure DevOps project, navigate to **Project settings** > **Service hooks** at https://<organization-name>/<project-name>/_settings/serviceHooks.
2. On the Service Hooks page, select the **+** icon or **Create subscription**.
3. On the Service screen, select **Web Hooks** and then select **Next**.



4. From the **Trigger on this type of event** list, select a supported Azure Devops event and click **Next**.

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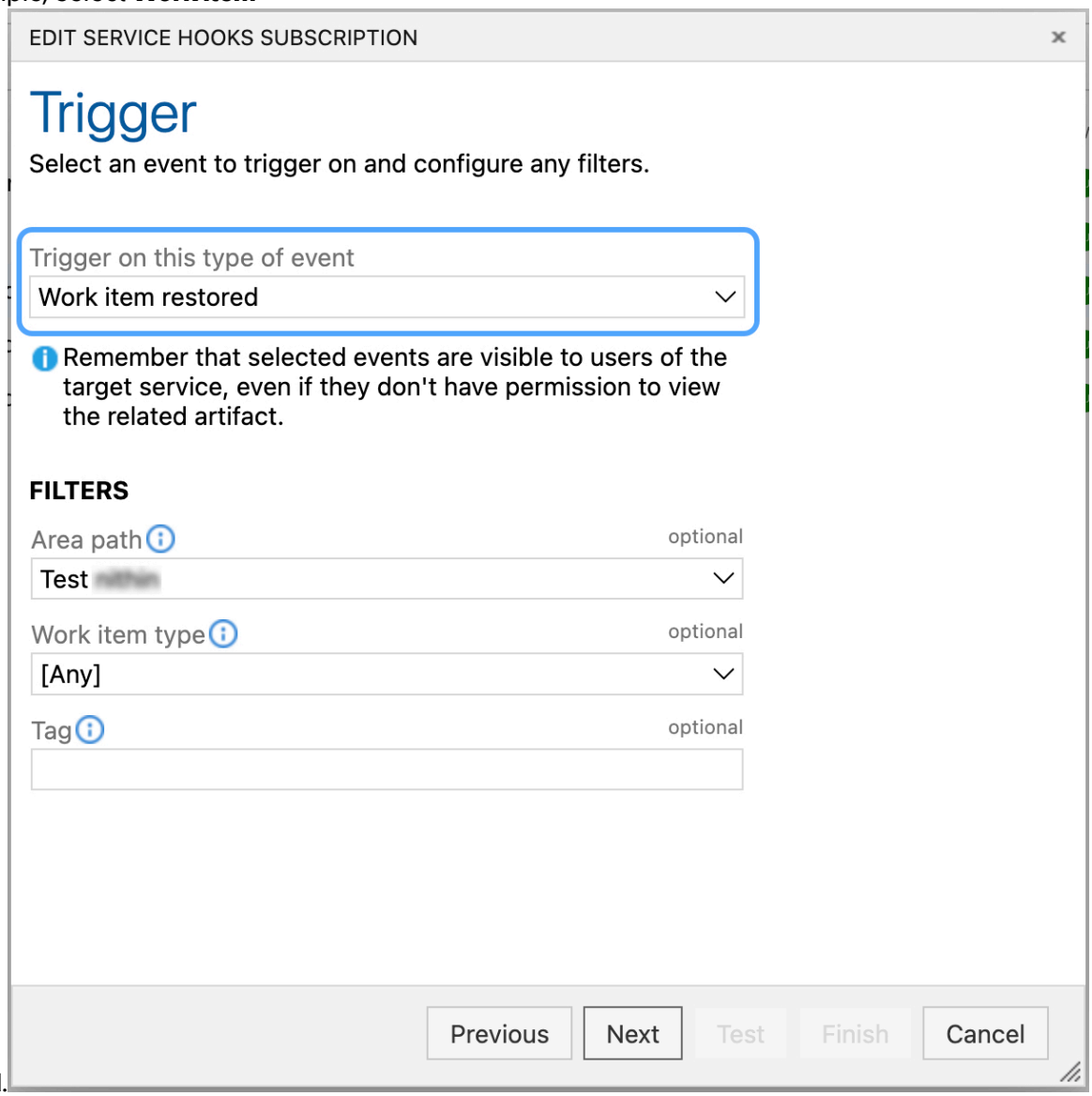
For example, select **Work item restored**.



5. On the NEW SERVICE HOOKS SUBSCRIPTION form, fill in the fields for an action.

Field	Description
URL	URL generated while configuring triggers in ServiceNow instance in the URL field.
HTTP headers	Key-value pair of header parameter and token generated in this format: `azure-devops-board-token: <token-value>`
RESOURCE VERSION	Select [Latest].

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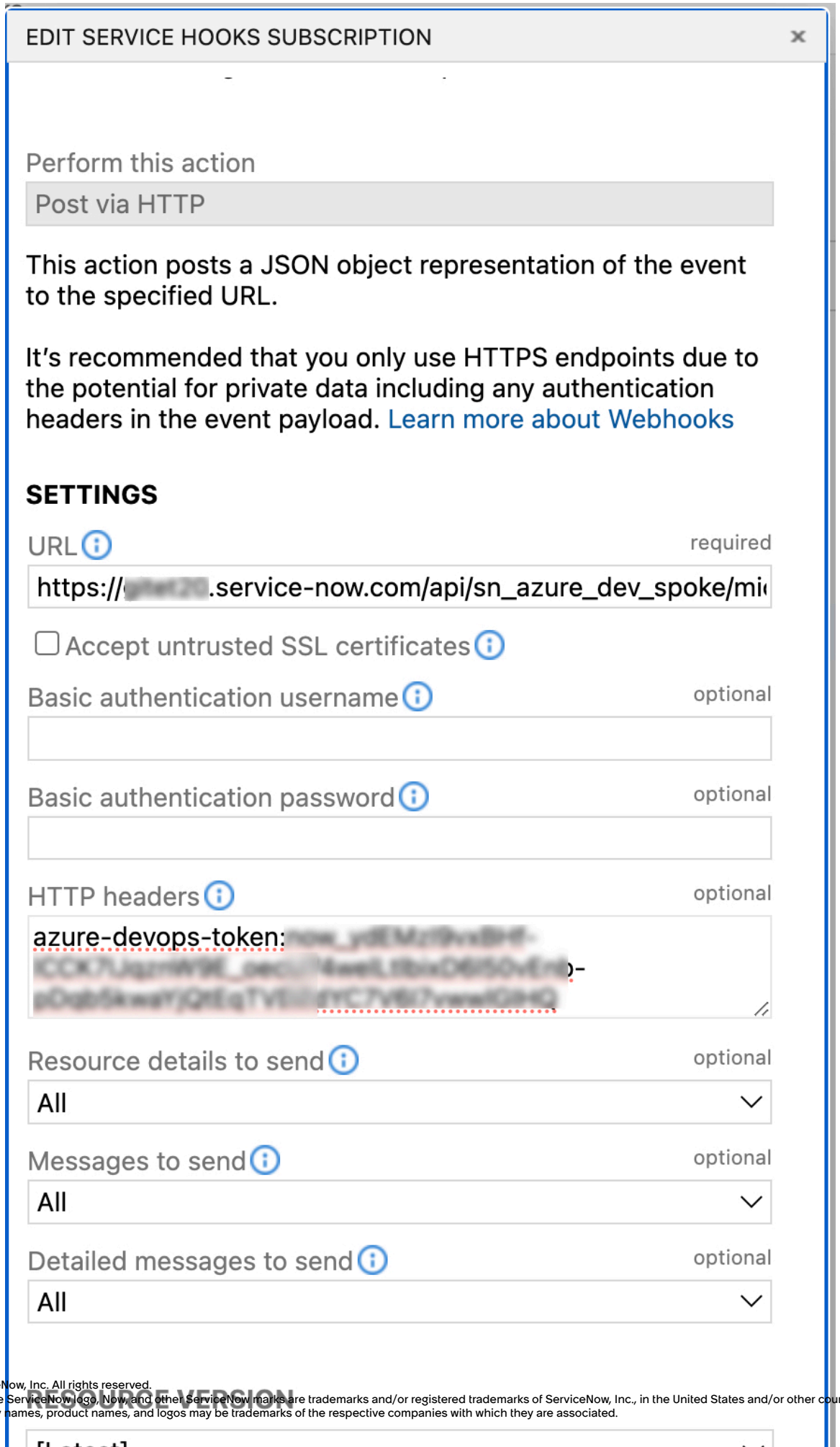

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RESOURCE VERSION

6. Click **Finish**.
7. Repeat the steps 2 through step 6 for the following supported event triggers:
   - Work item commented on
   - Work item created
   - Work item deleted
   - Work item restored
   - Work item updated

Result
Now you can create a flow and start using the supported trigger events in the flow.

Microsoft Azure DevOps Pipelines Spoke

The Microsoft Azure DevOps Pipelines spoke enables you to automate your work on pipelines on Azure DevOps. Create a flow with the actions that automate your work on Azure DevOps. For example, create a flow that automates the retrieval of the details of logs for a pipeline.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for Azure DevOps Pipelines REST API version 7.0 and Azure DevOps Server 2022 but may be compatible with the later versions.

Spoke version

Microsoft Azure DevOps Pipelines spoke v1.0.0 is the latest version. For version history of the spoke, see Microsoft Azure DevOps Pipelines Spoke release notes.

Spoke requirements

- Spoke dependencies are installed
- Personal access token is generated on Azure DevOps
- Microsoft Azure DevOps Pipelines alias is set up on your ServiceNow instance
- Microsoft Azure DevOps Pipelines spoke plugin is installed on your ServiceNow instance

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- com.glide.hub.action_type.datastream
- com.glide.hub.integration.runtime

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- com.glide.cobject
- com.glide.hub.action_step.rest

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke actions

The Microsoft Azure DevOps spoke provides actions to automate Azure DevOps Pipelines' tasks when events occur in your ServiceNow instance. Available actions include:

Note: To execute the actions, you must first set up an outbound integration by configuring the Microsoft Azure DevOps Pipelines spoke connection and credential record.

Category	Action	Description
Pipeline Management	Look up Pipelines Stream	Retrieves the details of all pipelines such as ID and name for an Azure DevOps project.
	Look up Pipeline	Retrieves the details of a pipeline such as the ID and name of the pipeline.
Run Management	Run Pipeline	Runs a pipeline based on the details you specify.
	Look up Run	Retrieves details of a run such as name and ID for a pipeline.
	Look up Runs	Retrieves the list of the top 10000 runs such as name and ID for a pipeline.
Log Management	Look up Logs	Retrieves the details of all logs such as URL and signed content for a corresponding pipeline run.
	Look up Log	Retrieves the details of a log object such as ID and URL for a corresponding pipeline run.
Artifact Management	Look up Artifact	Retrieves an artifact object from a pipeline run.
Utility Actions	Attach File to ServiceNow Record	Attaches the log or artifact file to a ServiceNow record.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For more information, see Connections and Credentials.

Set up Microsoft Azure DevOps Pipelines spoke

Integrate your ServiceNow instance and Azure DevOps Pipelines application by setting up a connection record.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Azure DevOps Pipelines spoke.
- Role required: admin.

Configure the default connection record

Configure the default connection record for your Azure DevOps Pipelines application that enables integration of your ServiceNow instance with the Azure DevOps Pipelines application.

Before you begin

Role required: admin

Procedure

1. Create a personal access token in Azure DevOps portal.
   Azure DevOps application authenticates the ServiceNow instance access request based on the personal access token presented.

   a. Log in to Azure DevOps portal.

   b. On the landing page, select the User Settings icon ( ).

   c. In the menu, select **Personal access tokens**.

   d. On the Personal Access Tokens page, select **+ New Token**.

   e. Fill the Create a new personal access token form.

Create a new personal access token

Field	Description
Name	Custom name of the personal access token.
Organization	It contains all the resources and settings related to the DevOps pipeline and project management. **Tip:** To locate the name of the organization, navigate to the home page of the DevOps Pipeline application. The name of the organization is provided above the Projects tab.
Expiration (UTC)	Expiration date of the personal access token.
Scopes	Resources or settings in Azure DevOps Pipelines application that you can access with the personal access token. Select Custom defined and under the Build section, select Read & execute.

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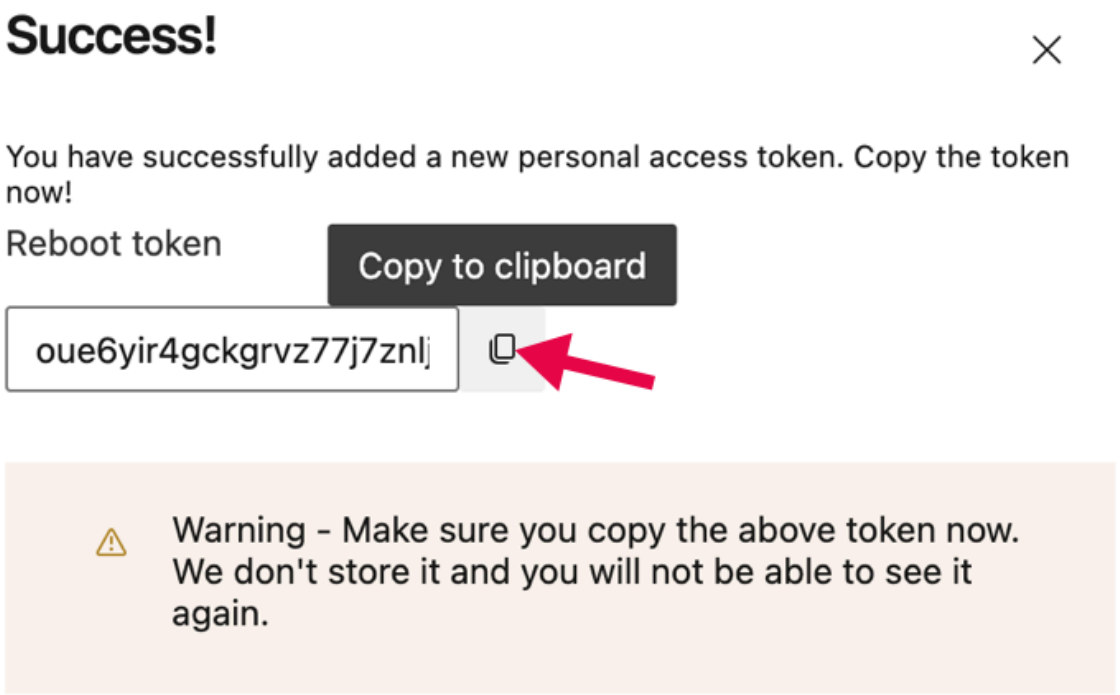
f. Select **Create**.

g. To copy the personal access token, click the Copy to clipboard button.



h. Select **Close**.

2. Configure the default connection record in your ServiceNow instance.

a. Log in to your ServiceNow instance.

b. Navigate to **All** > **Process Automation** > **Workflow Studio**.

c. Click the **Integrations** tab.

d. Select **Connections**.

e. In the Search all connections field, enter `Microsoft Azure DevOps Pipelines`.

f. In the Microsoft Azure DevOps Pipelines card, click **View Details**.

g. Click **Configure**.

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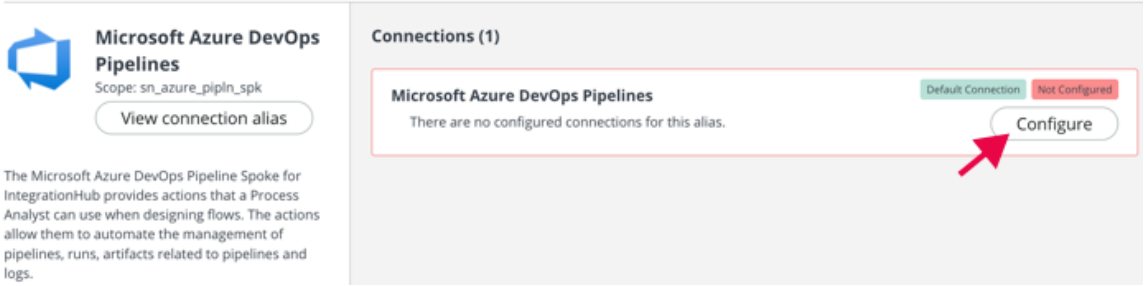
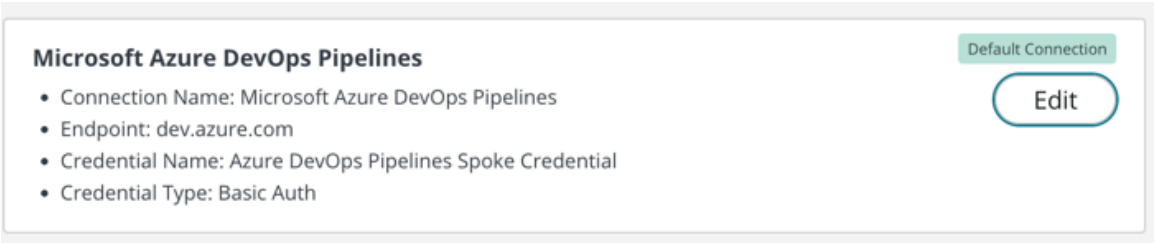


h. Fill the form.

Configure Connection

Field	Description
Connection Name	Name of the connection record. The default and read-only name of the first connection is Microsoft Azure DevOps Pipelines. **Note:** To provide a custom name of a connection, you must create a connection record. To create, select **Add Connection**.
Connection URL	URL to the Azure DevOps Pipelines application. The URL format is `https://dev.azure.com/<organization>`. Replace the placeholder <organization> with the organization name in the Azure DevOps Pipelines application. **Tip:** You can find the organization name under the Organization column of the Personal Access Tokens page.
Personal Access Token	Enter the personal access token you had created.

i. Select **Configure Connection**.
The connection record is created.



Microsoft Azure Managed Storage Spoke

Manage the Microsoft Azure managed disks from your ServiceNow instance.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

The Microsoft Azure Managed Storage spoke v2.0.0 is the latest version. For version history of the spoke, see Microsoft Azure Managed Storage spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Microsoft Azure Resource Management spoke (com.sn.ms.azure.resource.mgmt.spoke) is installed and configured on your ServiceNow instance.
- ServiceNow Integration Hub Action Template - Data Stream
- ServiceNow Integration Hub Action Step - get Connection Info
- Microsoft Azure Virtual Network spoke is installed and configured on your ServiceNow instance.

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for the API version 2023-10-02, but may be compatible with the later versions.

Spoke requirements

- User account with full access to the Microsoft Azure managed disks.
- Microsoft Azure Resource Management spoke

Spoke flows and subflows

This spoke has no flows or subflows.

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Spoke actions

The Microsoft Azure Managed Storage spoke provides actions to automate the Microsoft Azure disks and disk snapshots when events occur in the ServiceNow instance. Available actions include:

Spoke actions

Category	Action	Description
Disk Management	Revoke Access from Disk	Revokes access from the specified disk.
	Create Managed Upload Disk	Creates a disk with the specified upload size. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Update Disk Size	Updates the size of the specified disk.
	Set Disk Tags	Updates the tags of the specified disk. The provided tags will replace any existing tags on the disk.
	Grant Access to Disk	Grants access to the specified disk. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Update Disk Storage Account	Updates the details of the storage account associated with the specified disk. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Delete Disk	Deletes the specified disk.

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Spoke actions (continued)

Category	Action	Description
		Tip: Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Create Managed Disk	Creates a disk with the specified disk size in GB. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Look up Disk	Retrieves information about the specified disk in the specified resource group.
	Look up Disks Stream by Resource Group	Retrieves the list of disks in the specified Resource Group.
	Create Managed Disk from Snapshot	Creates a disk using a snapshot. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Look up Disks Stream by Subscription ID	Retrieves the list of disks in the specified Azure Subscription.
Disk Snapshot Management	Grant Access to Snapshot	Grants access to the specified snapshot. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.

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Spoke actions (continued)

Category	Action	Description
	Look up Snapshots Stream by Resource Group	Retrieves the list of snapshots in the specified Resource Group.
	Update Snapshot Size	Updates the size of the specified snapshot. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Update Snapshot Storage Account	Updates tags of the specified snapshot. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Look up Snapshots Stream by Subscription ID	Retrieves the list of snapshots in the specified Azure Subscription.
	Create Snapshot	Creates a snapshot from a disk. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Delete Snapshot	Deletes the specified snapshot. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.

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Spoke actions (continued)

Category	Action	Description
	Revoke Access from Snapshot	Revokes access to the specified snapshot. **Tip:** Find the current status of an operation by using the 'Look up Operational Status of Resource' action from Azure Resource Management spoke.
	Look up Snapshot	Retrieves specified snapshot information in the specified resource group.
	Set Snapshot Tags	Updates tags of the specified snapshot. The provided tags will replace any existing tags on the snapshot.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Microsoft Azure Resource Management spoke and .

Microsoft Azure Notification Hub Spoke

Integrate ServiceNow instance with Microsoft Azure Notification Hub. Manage Azure notification hubs from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Azure Notification Hub spoke v2.0.0 is the latest version. For version history of the spoke, see Microsoft Azure Notification Hub spoke release notes.

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Supported versions

This spoke was built for Azure Notification Hub version 2023-09-01, but may be compatible with later versions.

Spoke requirements

- Storage account in your Microsoft Azure portal for integration with your ServiceNow instance.
- Register the application in the Microsoft Azure portal and record the access keys and directory IDs.

Spoke dependencies

If you're having trouble installing the app, verify that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Flow Designer Action Step - Payload Builder (com.glide.hub.action_step.payload)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- Get Connection Info (com.glide.hub.action_step.get_connection_info)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)
- Microsoft Azure Resource Management Spoke is installed and the connection record configured on your ServiceNow instance.
- Microsoft Azure Notification Hub SAS connection and credential alias record is configured on your ServiceNow instance.

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Microsoft Azure Notification Hub Spoke provides actions to automate Azure Notification Hub tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Installation Management	Create or Update Installation	Creates or updates an installation.
	Delete Installation	Deletes an installation.
	Look up Installation	Retrieves installation based on the Installation ID.
	Update Installation	Partially updates an installation using the JSON-Patch.

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Category	Action	Description
	Look up Namespaces Stream by Resource Group	Returns the list of available namespaces within a resource group.
	Look up Namespaces Stream by Subscription ID	Returns the list of available namespaces within the subscription.
Namespace Management	Look up Namespace	Returns the details of the specified namespace.
	Create or Update Namespace	Creates or updates a Notification Hub namespace. **Note:** This operation is idempotent.
	Delete Namespace	Deletes an existing namespace. This operation also removes all associated Notification Hubs under the namespace.
	Update Namespace	Patches the existing namespace.
Notification Hub Management	Create or Update Notification Hub	Creates or updates a Notification Hub in a namespace.
	Delete Notification Hub	Deletes a notification hub associated with a namespace.
	Look up Notification Hub	Returns the details of the specified notification hub.
	Look up Notification Hubs Stream by Namespace	Returns the list of available notification hubs associated with a namespace.
Registration Management	Create APNS Registration	Creates a registration for an Apple Push Notification service (APNS) device. This method generates a registration ID that you can use to retrieve, update, and delete this registration.
	Create GCM Registration	Creates a registration for Google Cloud Messaging (GCM) device. This method generates a registration ID that you can use to retrieve, update, and delete this registration.
	Create Registration ID	Returns a registration ID (without creating a registration).
	Delete Registration	Deletes a registration.
	Look up Registration	Retrieves information about a registration.
	Update APNS Registration	Updates an existing APNS registration.
	Update GCM Registration	Updates an existing GCM registration.

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Category	Action	Description
	Look up Registrations Stream	Retrieves all registrations.
Notification Management	Send APNS Native Notification	Sends an APNS native notification through a Notification Hub.
	Send GCM Native Notification	Sends a GCM native notification through a Notification Hub.
	Send Notification to Device Handle	Sends a notification directly to a device handle (a valid token as expressed by the Notification type). **Note:** Users of this API don't need to use Registrations or Installations.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Microsoft Azure Notification Hub spoke.

Set up the Microsoft Azure Notification Hub spoke

Set up your ServiceNow instance to integrate with the Microsoft Azure Notification Hub. Setting enables the Microsoft Azure Notification Hub to authenticate requests from your ServiceNow instance.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Azure Notification Hub spoke.
- Role required: admin.

Set up Microsoft Azure Resource Management connection alias

Set up the Microsoft Azure Resource Management connection alias to do the actions under the Notification Hub Management and Namespace Management categories of the Microsoft Azure Notification Hub spoke.

Before you begin

Role required: admin

- To view the procedure to set up the Microsoft Azure Resource Management connection alias, see Set up the Microsoft Azure Resource Management spoke.

Set up Microsoft Azure Notification Hub SAS connection alias

Establish a connection between the Microsoft Azure Notification Hub SAS connection alias and the Microsoft Azure portal.

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Before you begin
Role required: admin

About this task
The Microsoft Azure Notification Hub SAS connection alias enables you to do the actions in the Installation Management, Notification Management, and Registration Management categories of the Microsoft Azure Notification Hub

spoke.

Procedure
1. Log in to your ServiceNow instance.
2. Navigate to **All** > **Process Automation** > **Workflow Studio**.
3. Select the **Integrations** tab.
4. Select **Connections**.
5. In the Search all connections field, search the Microsoft Azure Notification Hub SAS connection alias record.

   Note: The **Outbound** tab is enabled by default. Or else, toggle to enable it.

6. On the Microsoft Azure Notification Hub SAS connection alias tile, select **View Details**.
7. Select **Configure**.
8. Fill the form.

Microsoft Azure Notification Hub SAS alias setup information

Field	Description
Connection name	Name of the connection record.
Credential name	Name of the credential that is used to access the Microsoft Azure Notification Hub SAS.
Shared Access Key Name	Name of the shared access key to the Microsoft Azure Notification Hub SAS.
Shared Access Key	Shared access key to the Microsoft Azure Notification Hub SAS. Generate the key from the Microsoft Azure portal. To view the procedure, see Generate shared access key for Microsoft Azure Notification Hub SAS.

9. Select **Create**.

Generate shared access key for Microsoft Azure Notification Hub SAS

Generate a shared access key that you must provide to create a connection between the Microsoft Azure Notification Hub SAS connection alias and the Microsoft Azure portal.

Before you begin
Role required: admin.

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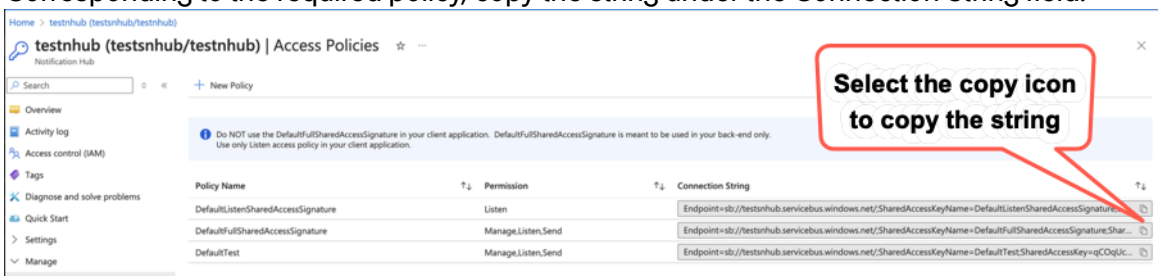
Procedure

1. Log in to https://portal.azure.com.
2. Select **Notification Hubs**.
3. Select the required notification hub and then select **Apply**.
4. Select a notification hub to open it.
   The spoke performs the actions on the notification hub that you open.
5. Under Manage, select **Access Policies**.
6. Corresponding to the required policy, copy the string under the Connection String field.



7. From the string that you copied, copy the shared access key.
   Copy the value of the SharedAccessKey in the string.

Related topics

Set up Microsoft Azure Notification Hub SAS connection alias

Microsoft Azure RBAC Spoke

Integrate ServiceNow instance with Microsoft Azure RBAC to manage roles and retrieve details about role assignments for groups and users.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Azure RBAC Spoke v1.0.2 is the latest version. For version history of the spoke, see Microsoft Azure RBAC Spoke release notes.

Supported versions

This spoke was built for Microsoft Graph REST API v1.0, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Microsoft Azure RBAC Spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description	Permissions Required (from least to most privileged)	
Group Management	Look up Groups by Role Stream	Lists all the groups that contains the given role.	Delegated (work or school account)	RoleManagement.Read.Directory, RoleManagement.Read.All, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	RoleManagement.Read.Directory, RoleManagement.Read.All, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All
Role Management	Assign Role to Group	Assigns the required role to a group.	Delegated (work or school account)	RoleManagement.ReadWrite.Directory
			Delegated (personal Microsoft account)	Not supported
			Application	RoleManagement.ReadWrite.Directory
	Assign Role to User	Assign the required role to a user.	Delegated (work or school account)	RoleManagement.ReadWrite.Directory
			Delegated (personal Microsoft account)	Not supported
			Application	RoleManagement.ReadWrite.Directory

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Category	Action	Description	Permissions Required (from least to most privileged)	
	Look up Roles	Retrieves details of the required role or retrieves details of all the roles in Entra ID if no inputs are provided.	Delegated (work or school account)	RoleManagement.Read.Directory, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	RoleManagement.Read.Directory, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All
	Look up Roles by Group	Lists details of all roles in a group.	Delegated (work or school account)	RoleManagement.Read.Directory, RoleManagement.Read.All, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	RoleManagement.Read.Directory, RoleManagement.Read.All, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All
	Look up Roles by User	Lists all roles of the user.	Delegated (work or school account)	RoleManagement.Read.Directory, RoleManagement.Read.All, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	RoleManagement.Read.Directory, RoleManagement.Read.All, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All
	Remove Role from a User or Group	Remove the required role for a user or group.	Delegated (work or school account)	RoleManagement.ReadWrite.Directory
			Delegated (personal Microsoft account)	Not supported

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Category	Action	Description	Permissions Required (from least to most privileged)	
			Application	RoleManagement.ReadWrite.Directory
User Management	Look up Users by Role Stream	Lists details all the users that have the required role.	Delegated (work or school account)	RoleManagement.Read.Directory, RoleManagement.Read.All, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	RoleManagement.Read.Directory, RoleManagement.Read.All, Directory.Read.All, RoleManagement.ReadWrite.Directory, Directory.ReadWrite.All

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up the Microsoft Azure RBAC spoke

Integrate the ServiceNow instance and Microsoft Azure RBAC using OAuth 2.0 authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate Microsoft Azure RBAC spoke.
- Role required: admin.

Register an application using the Microsoft Azure portal

Provide authorization to the ServiceNow instance by registering an application in the Microsoft Azure portal.

Before you begin

Role required: Privileged Role Administrator

1. Log in to the Microsoft Azure portal as an admin.
2. Under **Azure services**, click **Microsoft Entra Privileged Identity**.
3. Under **Tasks**, click **My roles**.

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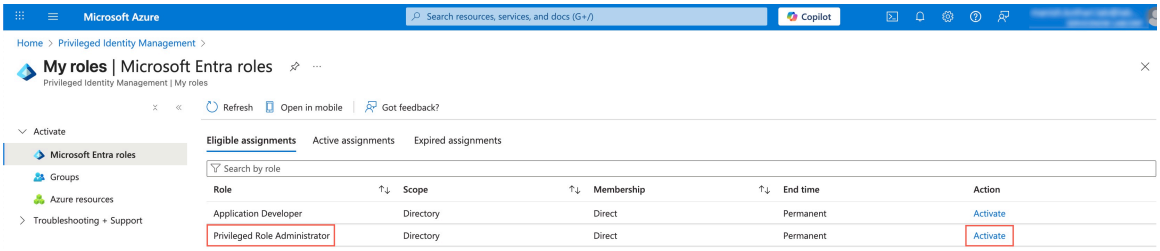
4. Ensure that **Privileged Role Administrator** role is available and is activated.

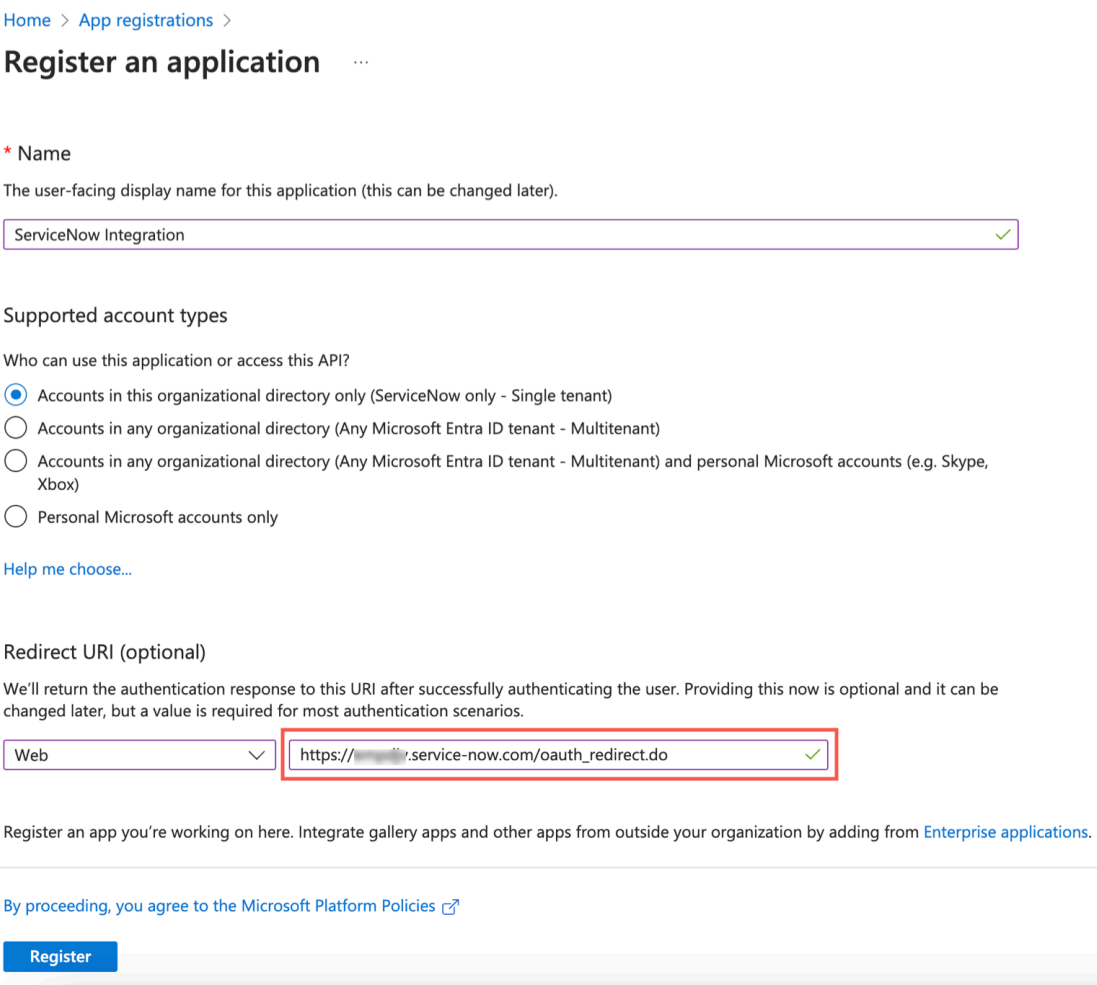


About this task

Complete these steps from the Microsoft Azure portal.

Procedure

1. Log in to the Microsoft Azure portal as an admin.
2. Click **App Registrations**.
3. Click **New registration**.
4. On the form, fill in fields as per your requirement.
   For Redirect URI, specify the ServiceNow instance URL in this format: `https://<ServiceNow-Instance-Name>.service-now.com/oauth_redirect.do`.



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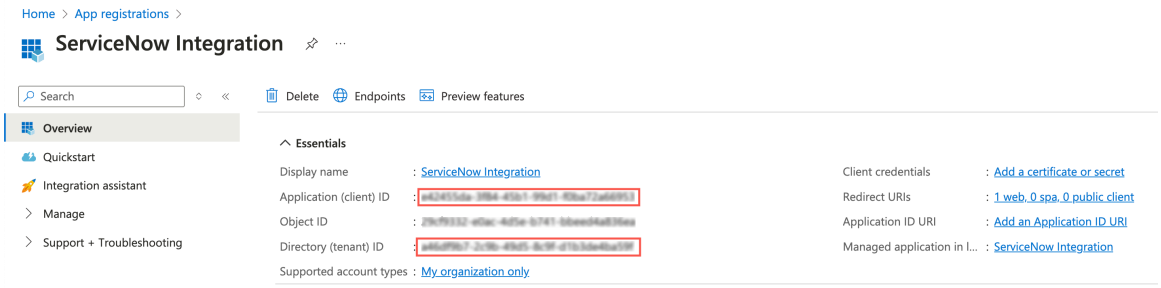
5. Click **Register**.
   The application is created and the values of **Application (client) ID** and **Directory (tenant) ID** are displayed.



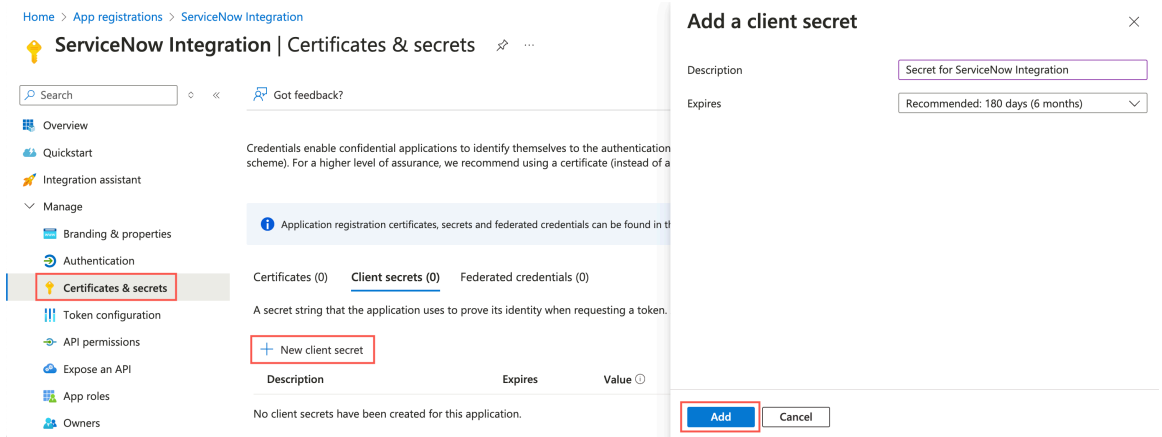
6. Copy and record the values of **Application (client) ID** and **Directory (tenant) ID**.
7. Generate a client secret for the application.

   a. Under **Manage**, click **Certificates & secrets**.

   b. Click **New client secret**.

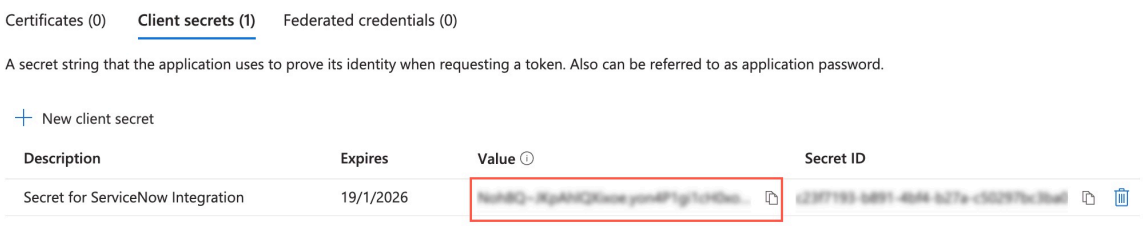
   c. On the form, enter provide a description and specify the duration after which the secret expires.

   d. Click **Add**.



   The client secret is created and its value is displayed.

   e. Copy the value of client secret for later use.



8. Provide the required API permissions.

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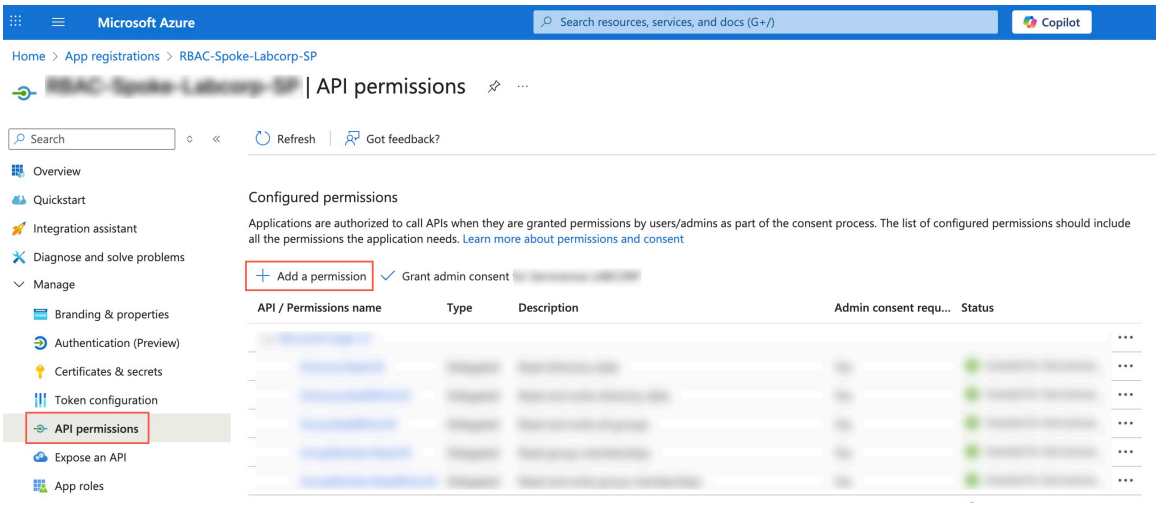
a. Under **Manage**, click **API permissions**.

b. Click **Add a permission** to add the required permissions to access the APIs.
For information about permissions needed to perform the required actions, see the Spoke actions section here: Microsoft Azure RBAC Spoke.



c. Click **Grant admin consent for ServiceNow**.
See Quickstart: Configure a client application to access a web API for more information.

Configure a connection record for the Microsoft Azure RBAC spoke

Add and configure a Microsoft Azure RBAC spoke connection to authenticate ServiceNow requests.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Azure RBAC** and click **View Details**.

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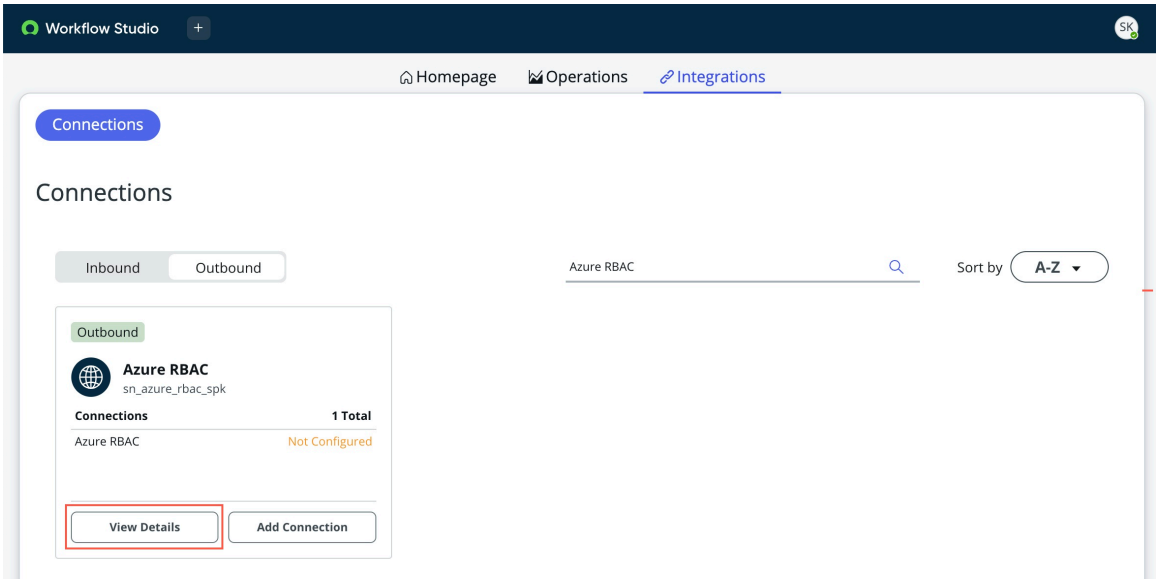
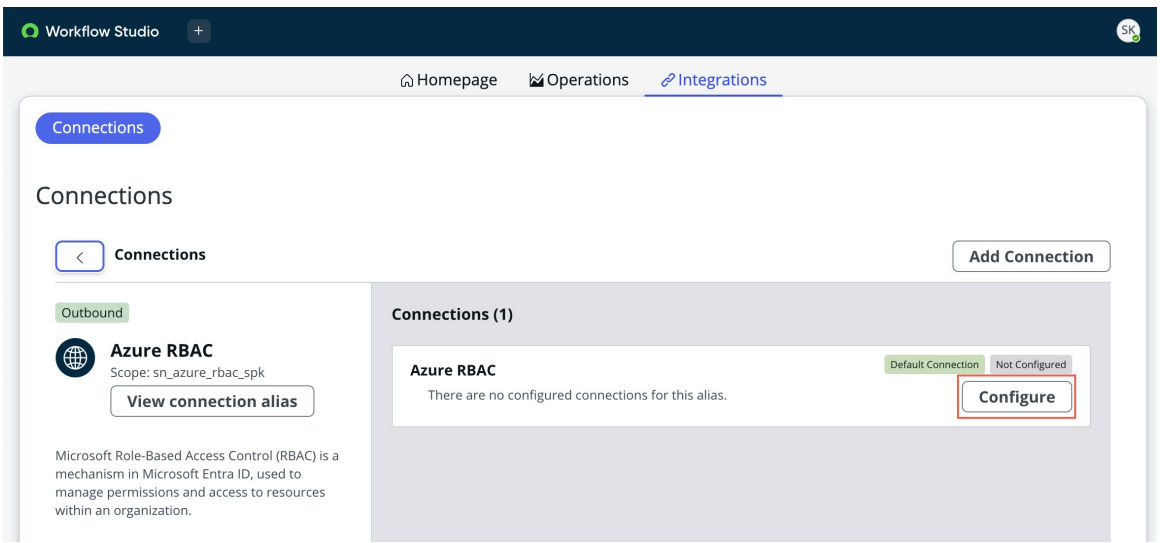
- To configure the default connection and credential alias record that is shipped along with the Microsoft Azure RBAC spoke, click **View Details**.



- To manage more than one Microsoft Azure RBAC spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the form, fill in the fields.

Connection form

Field	Description
Connection Information	
Name	Name to identify the connection record. By default, the name is **Azure RBAC**.
Credential Information	

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Field	Description
Auth URL	OAuth authorization code endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/authorize`.
Token URL	OAuth server token endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/token`.
Revoke token URL	OAuth server token revocation endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/revoke`.
OAuth Client ID	Application ID created during application registration.
OAuth Client Secret	Client secret created during application registration.
OAuth Redirect URL	OAuth callback endpoint. Enter `https://<instance-name>.service-now.com/oauth_redirect.do`.

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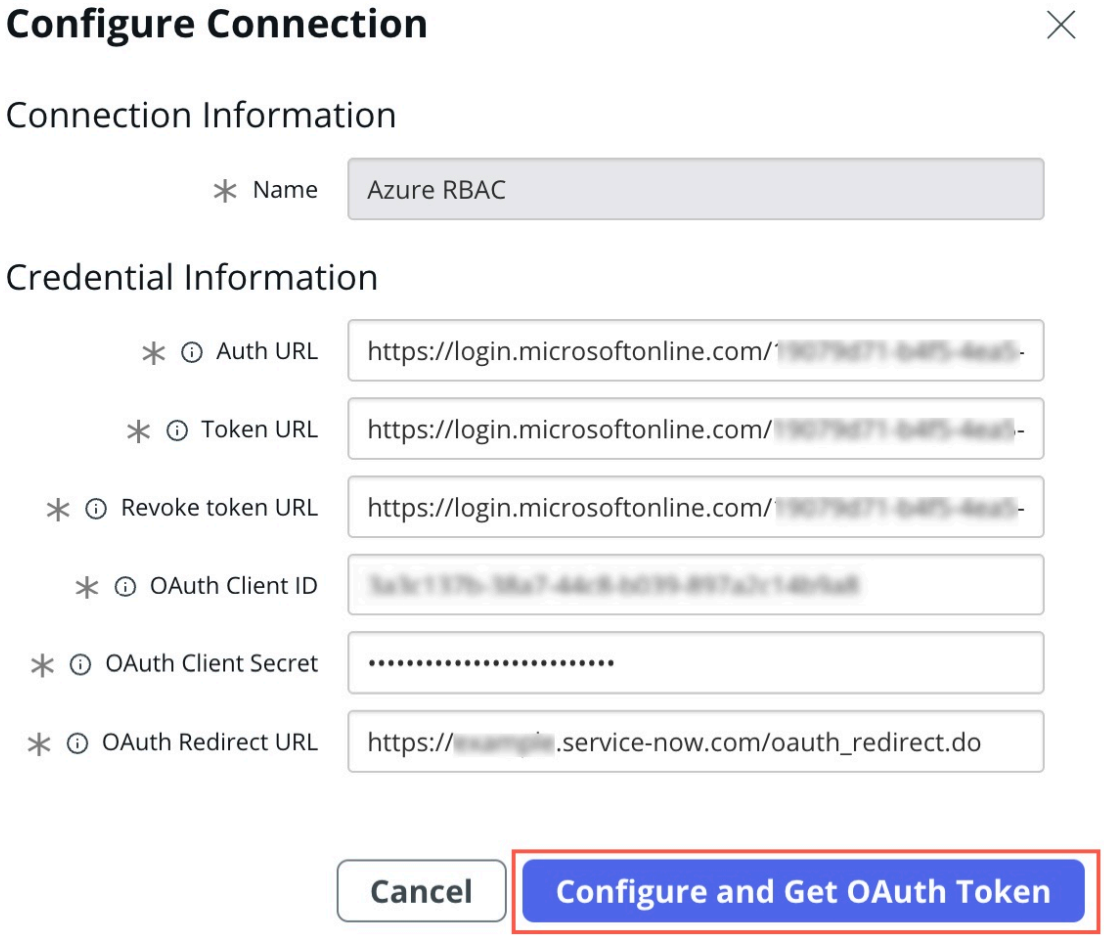

6. Click **Configure Connection**.

Result
The spoke connection is configured and is ready to be used.

Microsoft Azure Resource Management Spoke

Azure Resource Management enables you to create, update, and delete the resources in your Microsoft Azure subscription from within ServiceNow.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

IntegrationHub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

These spokes depend on the installation of the Microsoft Azure Resource Management spoke plugin and its setup for the execution of their actions.

- Microsoft Azure SQL Database spoke
- Microsoft Azure Virtual Network spoke

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- Microsoft Azure Managed Storage spoke
- Microsoft Azure Cosmos DB spoke
- Microsoft Azure Notification Hub spoke
- Microsoft Azure Traffic Manager spoke
- Microsoft Azure Automation spoke
- Microsoft Azure Virtual Machine spoke

Spoke version

Microsoft Azure Resource Management spoke v2.1.0 is the latest version. For version history of the spoke, see Microsoft Azure Resource Management spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for the API version 2021-04-01, but may be compatible with the later versions.

Spoke actions

The Microsoft Azure Resource Management spoke provides actions to automate the resource management tasks when events occur in the ServiceNow instance. Available actions include:

Category	Action	Description
Metadata Retrieval	Look up Databases	Retrieves a list of databases in a server.
	Look up Elastic Pools	Retrieves a list of elastic pools in Microsoft Azure.
	Look up Locations	Retrieves a list of locations.
	Look up Operational Status of Resource	Returns the operational status of the resource (virtual machine, network, disk, and so on) that is created or updated.
	Look up Resource Groups	Retrieves a list of resource groups.
	Look up SQL Servers	Retrieves a list of servers in a resource group.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Microsoft Azure Resource Management spoke.

Set up the Microsoft Azure Resource Management spoke

Integrate the ServiceNow instance and the Microsoft Azure Resource Management by configuring the Microsoft Azure Resource Management connection record on your ServiceNow instance.

Before you begin

- Request an Integration Hub subscription.
- Create a custom OAuth application on the Microsoft Azure portal.
- Activate the Microsoft Azure Resource Management spoke.
- Role required: admin.

Register Microsoft Azure Resource Management as OAuth provider

Create an OAuth application on Microsoft Azure that authenticates requests for OAuth tokens from your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Log in to https://portal.azure.com/.
2. Select **App registrations**.
3. Select **New registration**.
4. Fill the form.

OAuth application details

Field	Description
Name	Name of the OAuth application.
Supported account types	Option to specify who can use the OAuth application that you're creating to access Microsoft Azure Resource Management.
Redirect URI (optional)	Option to provide the redirect URI. The redirect URI format is https://<instance-name>.service-now.com/oauth_redirect.do. From the Select a platform list, select **Web**.

5. Select **Register**.
   The OAuth application is registered.
6. Copy the values from the following fields under the Essentials heading:

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- Application (client) ID
- Directory (tenant) ID

7. In the Client credentials field, select **Add a certificate or secret**.
8. Under the Client secrets heading, select **New client secret**.
9. In the Add a client secret window, do the following actions.

   a. In the Description field, enter a description of the client secret.

   b. In the Expires field, enter the expiry period of the client secret.

   c. Select **Add**.
   The client secret is generated.

10. Under the Value heading, copy and store the client secret at a secure place.
    Microsoft Azure Resource Management is registered as an OAuth provider and the information required to set up the connection record is available.

Create connection record

Integrate the ServiceNow instance and the Microsoft Azure Resource Management by configuring the Microsoft Azure Resource Management connection record on your ServiceNow instance.

Before you begin

Role required: admin.

Procedure

1. Log in to your ServiceNow instance.
2. Navigate to **All** > **Process Automation** > **Workflow Studio**.
3. Select the **Integrations** tab.
4. Select **Connections**.
5. In the Search all connections field, search the Microsoft Azure Resource Management connection alias record.

   Note: The **Outbound** tab is enabled by default. Or else, toggle to enable it.

6. On the Microsoft Azure Resource Management connection alias tile, select **View Details**.
7. Select **Configure**.
8. Fill the form.

Microsoft Azure Resource Management connection alias

Field	Description
Connection Name	Name of the connection alias record.
Authorization URL	URL that your ServiceNow instance uses to request OAuth tokens from the Microsoft Azure portal. The URL must in the following format: `https://login.microsoftonline.com/`

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Field	Description
	`{tenant ID}/oauth2/v2.0/authorize`.
Token URL	URL that your ServiceNow instance uses to get the OAuth token. The URL must in the following format: `https://login.microsoftonline.com/{tenant}/oauth2/v2.0/token`.
Token Revocation URL	URL that your ServiceNow instance uses to cancel the OAuth token. The URL must in the following format: `https://login.microsoftonline.com/{tenant ID}/oauth2/v2.0/revoke`. **Note:** This field is optional.
Client ID	Unique ID of the OAuth application that you created on the Microsoft Azure portal. The Microsoft Azure portal uses this ID to authenticate your ServiceNow instance requests.
Client Secret	The secret that Microsoft Azure portal uses to authenticate your ServiceNow instance requests. You generate the client secret when you create the OAuth application on Microsoft Azure portal.
Redirect URL	Specific address where the third-party application sends your ServiceNow instance back after the request is authenticated. You must set the redirect URL when you create the OAuth application on Microsoft Azure portal.

9. Select **Configure and Get OAuth Token**.
   You're required to log in to https://portal.azure.com/ before the OAuth token is provided.

   On successful authentication, the request is authenticated and the OAuth token is available.

Microsoft Azure SQL Database Spoke

Configure and manage the Microsoft Azure SQL databases from within the ServiceNow instance. When you install the Microsoft Azure SQL database spoke, you also get the Microsoft Azure SQL Resource Management spoke. The Microsoft Azure Resource Manager provides a management layer that enables you to create, update, and delete the resources in your Microsoft Azure subscription.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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IntegrationHub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Azure SQL Database spoke v2.0.0 is the latest version. For version history of the spoke, see Microsoft Azure SQL Database spoke release notes.

Supported versions

This spoke was built for the API version 2021-11-01, but may be compatible with the later versions.

Spoke requirements

User with full access to Microsoft Azure Azure Cloud Computing.

Spoke dependencies

If you're having trouble installing the app, confirm that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Azure Resource Management spoke (sn_azure_rm_spoke) v 2.0.0 is installed and a connection alias is created on your instance.

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation. For more information on the licenses, contact your account manager.

Spoke actions

The provides actions to automate Microsoft Azure Microsoft Azure SQL tasks when events occur in the ServiceNow instance. Available actions include:

Category	Action	Description
Database Management	Create Generic Database	Creates a generic database in Microsoft Azure.
	Create Hyperscale Database	Creates a Hyperscale database in Microsoft Azure.
	Create VCore Database	Creates a VCore database in Microsoft Azure.
	Delete Database	Deletes the required database in a server.
	Look up Database	Retrieves details of a database.
	Look up Databases Stream by Elastic Pool	Retrieves a list of databases in an elastic pool.

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Category	Action	Description
	Look up Databases Stream by Server	Retrieves a list of databases in a server.
	Look up Operational Status	Generates the operational status of a database that is created or updated.
	Rename Database	Renames a database.
	Update Database	Updates the SKU or the properties of a database.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Set up the Microsoft Azure SQL Database Spoke

To execute the actions of the Microsoft Azure SQL Database Spoke, you must first install and configure the Microsoft Azure Resource Management Spoke. No separate configuration of the Microsoft Azure SQL Database Spoke is necessary. To view the procedure to set up the Microsoft Azure Resource Management Spoke, see Set up the Microsoft Azure Resource Management spoke.

Microsoft Azure Traffic Manager Spoke

Integrate ServiceNow instance with Azure Traffic Manager. Manage DNS-based traffic distribution and load balancing from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Azure Traffic Manager spoke v2.0.0 is the latest version. For version history of the spoke, see Microsoft Azure Traffic Manager spoke release notes.

Supported versions

This spoke was built for Azure Traffic Manager 2022-04-01, but may be compatible with later versions.

Spoke requirements

Client ID and Client Secret of the Azure Traffic Manager registered in the Azure portal.

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Spoke dependencies

If you're having trouble installing the app, confirm that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Azure Resource Management spoke (sn_azure_rm_spoke) v 2.0.0 is installed and a connection alias is created on your instance.

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation. For more information on the licenses, contact your account manager.

Spoke actions

The Azure Traffic Manager Spoke provides actions to automate DNS-based traffic load-balancing tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Endpoint Management	Create Endpoint	Creates a Traffic Manager Endpoint.
	Delete Endpoint	Deletes a Traffic Manager Endpoint.
	Look up Endpoint	Retrieves the details of a Traffic Manager Endpoint.
	Update Endpoint	Updates a Traffic Manager Endpoint.
Profile Management	Create Profile	Creates a Traffic Manager Profile.
	Delete Profile	Deletes a Traffic Manager Profile.
	Look up DNS Name Availability	Checks the availability of a Traffic Manager Relative DNS name.
	Look up Profile	Look up a Traffic Manager Profile.
	Look up Profiles by Resource Group	Look up Traffic Manager Profiles by Resource Group.
	Look up Profiles by Subscription ID	Look up Traffic Manager Profiles by Subscription ID.
	Update Profile	Updates a Traffic Manger Profile.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

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Set up the Microsoft Azure Traffic Manager Spoke

To execute the actions of the Microsoft Azure Traffic Manager Spoke, you must first install and configure the Microsoft Azure Resource Management Spoke. No separate configuration of the Microsoft Azure Traffic Manager Spoke is necessary. To view the procedure to set up the Microsoft Azure Resource Management Spoke, see Set up the Microsoft Azure Resource Management spoke.

Microsoft Azure Virtual Machine Spoke

Manage the Microsoft Azure Virtual Machine (VM) from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

The Microsoft Azure Virtual Machine spoke v2.0.0 is the latest version. For version history of the spoke, see Microsoft Azure Virtual Machine spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Step - Get Connection Info (com.glide.hub.action_step.get_connection_info)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Microsoft Azure Resource Management Spoke v2.0. After installing, you must configure the connection for the Microsoft Azure Resource Management Spoke v2.0 connection record to request OAuth tokens from the Microsoft Azure portal.

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

This spoke was built for the Application Programming Interface (API) version 2024-03-01, but may be compatible with the later versions.

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Spoke requirements

- Microsoft Azure Resource Management spoke (com.sn.ms.azure.resource.mgmt.spoke)
- Microsoft Azure Virtual Network spoke (com.sn.ms.azure.virtual.network.spoke)
- Microsoft Azure Managed Storage spoke (com.sn.ms.azure.managed.storage.spoke)

Spoke flows and subflows

This spoke has no flows or subflows.

Spoke actions

The Microsoft Azure Virtual Machine spoke provides actions to automate the Microsoft Azure Virtual Machine tasks when events occur in the ServiceNow instance. Available actions include:

Spoke actions

Category	Action	Description
Image Management	Create Image from Virtual Machine	Creates an image from an existing virtual machine.
	Delete Image	Deletes an image. **Note:** Use the Look up Operational Status of Resource' action from Azure Resource Management spoke to find the status of the operation.
	Look up Image	Retrieves image information from a specified resource group.
	Look up Images Stream by Resource Group	Retrieves the list of images under a Resource Group.
	Look up Images Stream by Subscription ID	Retrieves the list of images in the subscription.
	Set Tags on Image	Sets the tags on image. **Note:** Use the Look up Operational Status of Resource' action from Azure Resource Management spoke to find the status of the operation.
Virtual Machine Management	Attach Disk	Attaches data disk to the virtual machine.
	Create virtual machine.	Creates a virtual machine.

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Spoke actions (continued)

Category	Action	Description
	Create Virtual Machine from Image	Creates virtual machines from an image.
	Deallocate Virtual Machine	Shuts down the virtual machine and releases the compute resources.
	Delete Virtual Machine	Deletes a virtual machine.
	Detach Disk	Detaches data disk from the virtual machine. **Note:** Use the Look up Operational Status of Resource' action from Azure Resource Management spoke to find the status of the operation.
	Generalize Virtual Machine	Sets the OS state of the virtual machine to generalized.
	Look up Virtual Machine	Retrieves information about a virtual machine.
	Look up Virtual Machine Runtime Details	Retrieves the information about the run-time state of a virtual machine.
	Look up Virtual Machines Stream by Resource Group	Retrieves the list of virtual machines under a Resource Group.
	Look up Virtual Machines Stream by Subscription ID	Retrieves all virtual machines in the specified subscription.
	Power Off Virtual Machine	Powers off a virtual machine or stops it.
	Redeploy Virtual Machine	Shuts down the virtual machine, moves it to a new node, and powers it back on.
	Resize Virtual Machine	Resizes the specified virtual machine. **Note:** This operation can take a while to complete.
	Restart Virtual Machine	Restarts a virtual machine.
	Start Virtual Machine	Starts a virtual machine.
Virtual Machine Image Resource Management	Look up Virtual Machine Image	Gets a virtual machine image.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up the Microsoft Azure Virtual Machine Spoke

To execute the actions of the Microsoft Azure Virtual Machine Spoke, you must first install and configure the Microsoft Azure Resource Management Spoke. No separate configuration of the Microsoft Azure Virtual Machine Spoke is necessary. To view the procedure to set up the Microsoft Azure Resource Management Spoke, see Set up the Microsoft Azure Resource Management spoke.

Microsoft Azure Virtual Network Spoke

Manage Microsoft Azure Virtual Network (VNet) from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Azure Virtual Network spoke v2.0.0 is the latest version. For version history of the spoke, see Microsoft Azure Virtual Network spoke release notes.

Spoke dependencies

If you're having trouble installing the app, confirm that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - Get Connection Info
- Azure Resource Management spoke (sn_azure_rm_spoke) v 2.0.0 is installed and a connection alias is created on your instance.

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation. For more information on the licenses, contact your account manager.

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Supported Versions

This spoke was built for API version 2023-09-01 for List Network Interface Names by ResourceGroup and Look Up Network Interfaces By Resource Group, 2019-11-01 for other actions but may be compatible with later versions.

Spoke requirements

- Microsoft Azure Resource Management spoke (com.sn.ms.azure.resource.mgmt.spoke)
- Microsoft Azure subscription with access to Azure Virtual Network service

Spoke flows and subflows

This spoke has no flows and subflows.

Spoke actions

The Microsoft Azure Virtual Network spoke provides actions to automate Microsoft Azure Virtual Network tasks when events occur in ServiceNow instance. Available actions include:

Spoke actions

Category	Action	Description
Network Interface Management	Create Network Interface	Creates a network interface.
	Delete Network Interface	Deletes the specified network interface.
	Look up Network Interface	Retrieves specified network interface information in a specified resource group.
	Look up Network Interfaces Stream by Resource Group	Lists all the network interfaces in the specified resource group. Page size is fixed to 100 as per Microsoft.
	Look up Network Interfaces Stream by Subscription ID	Lists all the network interfaces in the specified Subscription ID. Page size is fixed to 100 as per Microsoft.
	Update Network Interface Tags	Updates tags on network interface.
Public IP Address Management	Create Public IP Address	Creates a public IP address as per the provided Resource Group.
	Delete Public IP Address	Deletes the specified public IP address in a specified resource group.
	Look up Public IP Address	Retrieves specified the public IP address information in a specified resource group.
	Look up Public IP Addresses Stream by Resource Group	Lists all the public IP addresses in the specified

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Spoke actions (continued)

Category	Action	Description
		resource group. Page size is fixed to 100 as per Microsoft.
	Look up Public IP Addresses Stream by Subscription ID	Lists all the public IP addresses in the specified subscription. Page size is fixed to 100 as per Microsoft.
	Update Public IP Address Tags	Updates tags on Public IP Address.
Subnet Management	Create Subnet	Creates a subnet in the specified virtual network.
	Delete Subnet	Delete the specified subnet in a specified virtual network and resource group.
	Look up Subnet	Retrieves specified subnet information in a specified virtual network and resource group.
	Look up Subnets Stream	Lists all the subnets in the specified virtual network. Page size is fixed to 100 as per Microsoft.
Virtual Network Management	Create Virtual Network	Creates a virtual network in the specified resource group.
	Create Virtual Network with Subnet	Creates a virtual network with provided Subnet in the specified resource group.
	Delete Virtual Network	Deletes the specified virtual network in a specified resource group.
	Look up Virtual Network	Retrieves specified virtual network information in a specified resource group.
	Look up Virtual Network Usage Status Stream	Lists the virtual network usage status in a specified resource group. Page size is fixed to 100 as per Microsoft.
	Look up Virtual Networks Stream by Resource Group	Lists all the virtual networks in the specified resource group. Page size is fixed to 100 as per Microsoft.
	Look up Virtual Networks Stream by Subscription ID	Lists all the virtual networks in the specified Subscription. Page size is fixed to 100 as per Microsoft.

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Spoke actions (continued)

Category	Action	Description
	Update Virtual Network Tags	Updates tags on virtual network.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up the Microsoft Azure Virtual Network Spoke

To execute the actions of the Microsoft Azure Virtual Network Spoke, you must first install and configure the Microsoft Azure Resource Management Spoke. No separate configuration of the Microsoft Azure Virtual Network Spoke is necessary. To view the procedure to set up the Microsoft Azure Resource Management Spoke, see Set up the Microsoft Azure Resource Management spoke.

Microsoft Dynamics 365 for Finance and Operations Spoke

Provides baseline actions to integrate your ServiceNow instance with Microsoft Dynamics 365 Finance and Operations. You can retrieve and process business events that are triggered in Microsoft Dynamics 365 Finance and Operations application.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Dynamics 365 for Finance and Operations spoke v2.5.0 is the latest version. For version history of the spoke, see Microsoft Dynamics 365 for Finance and Operations spoke release notes.

Supported versions

This spoke was built for Microsoft Dynamics version: 10.0.16 PU40, but may be compatible with later versions.

Spoke requirements

Microsoft Dynamics 365 Finance and Operations account.

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

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- IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)
- ServiceNow IntegrationHub Starter Pack Installer (com.glide.hub.integrations)
- Explicit Roles (com.glide.explicit_roles)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Streaming (com.glide.hub.action_type.datastream)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Microsoft Dynamics 365 for Finance and Operations spoke provides sample flows to demonstrate automating the syncing data tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Microsoft D365 FinOps Record Sync	Synchronises data from Microsoft Dynamics 365 Finance and Operations with your ServiceNow instance.

Spoke subflows

The Microsoft Dynamics 365 for Finance and Operations spoke provides sample subflows to demonstrate automating Microsoft Dynamics 365 for Finance and Operations tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Create Fixed Asset Records	Creates multiple fixed asset records in Microsoft Dynamics 365 Finance and Operations.
Create Purchase Order and Purchase Order Lines	Creates purchase order and multiple purchase order lines in Microsoft Dynamics 365 Finance and Operations.
Download/Refresh Metadata	Downloads and refreshes the metadata from Microsoft Dynamics 365 Finance and Operations.
Update Purchase Order and Purchase Order Lines	Updates the purchase order and purchase order lines in Microsoft Dynamics 365 Finance and Operations.

Spoke actions

The Microsoft Dynamics 365 for Finance and Operations spoke provides actions to automate tasks when events occur in your ServiceNow instance. Available actions include:

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Category	Action	Description
Account Codes Management	Look up Account Codes Stream	Retrieves account codes from Microsoft Dynamics 365 Finance and Operations.
Delivery Location Management	Look up Delivery Location Stream	Retrieves delivery locations from Microsoft Dynamics 365 Finance and Operations.
Fixed Asset Management	Create Fixed Assets	Creates fixed asset records in Microsoft Dynamics 365 Finance and Operations.
Item Master Management	Look up Item Master Stream	Retrieves item masters from Microsoft Dynamics 365 Finance and Operations.
Legal Entity Management	Legal Entity Management	Retrieves legal entities from Microsoft Dynamics 365 Finance and Operations.
Metadata Retrieval	Look up Choices Metadata	Retrieves the choices values from Microsoft Dynamics 365 Finance and Operations.
	Look up Creatable Fields Metadata	Retrieves creatable fields for an entity from Microsoft Dynamics 365 Finance and Operations.
	Look up Editable Entities Metadata	Retrieves editable entities from Microsoft Dynamics 365 Finance and Operations.
	Look up Entity Filter Metadata	Retrieves filter fields of an entity from Microsoft Dynamics 365 Finance and Operations.
	Look up Navigation Properties Metadata	Retrieves navigation prosperities of an entity Microsoft Dynamics 365 Finance and Operations.
	Look up OData Metadata	Retrieves metadata document from Microsoft Dynamics 365 Finance and Operations.
	Look up Readable Entities Metadata	Retrieves all readable entities from Microsoft Dynamics 365 Finance and Operations.
	Look up Record Schema Metadata	Retrieves the schema table of a record from Microsoft Dynamics 365 Finance and Operations.
	Look up Related Record Schema Metadata	Retrieves schema of a related entity from Microsoft Dynamics 365 Finance and Operations.
	Look up Updatable Fields Metadata	Retrieves updatable fields of an entity from Microsoft Dynamics 365 Finance and Operations.
Purchase Order Management	Create Purchase Order	Creates a purchase order record from Microsoft Dynamics 365 Finance and Operations.
	Create Purchase Order Line	Creates a purchase order line record from Microsoft Dynamics 365 Finance and Operations.
Record Management	Create Record	Creates a record in Microsoft Dynamics 365 Finance and Operations.
	Delete Record	Deletes a record in Microsoft Dynamics 365 Finance and Operations.

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Category	Action	Description
	Look up Record by Business Keys	Retrieves details of a record for the specified business key from Microsoft Dynamics 365 Finance and Operations.
	Look up Records by Search Query	Retrieves records for the specified search query from Microsoft Dynamics 365 Finance and Operations.
	Look Up Records Stream	Retrieves records of a table through data streaming from Microsoft Dynamics 365 Finance and Operations.
	Look up Related Records	Retrieves the related records of an entity from Microsoft Dynamics 365 Finance and Operations.
	Update Record	Updates the specified record in Microsoft Dynamics 365 Finance and Operations.
Supplier Management	Look up Suppliers Stream	Retrieves suppliers information from Microsoft Dynamics 365 Finance and Operations.

Spoke module

The Microsoft Dynamics 365 for Finance and Operations spoke adds the application to your instance and includes these modules:

Module	Description
Microsoft D365 FinOps Metadata	Displays the details of all the Microsoft Dynamic 365 Finance and Operations entities. **Note:** The **Look up Updatable Fields Metadata** and **Look up Creatable Fields Metadata** actions use the entity records from this module to create dynamic input fields.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Microsoft Dynamics 365 for Finance and Operations spoke.

Set up the Microsoft Dynamics 365 for Finance and Operations spoke

Integrate the ServiceNow instance and Microsoft Dynamics 365 for Finance and Operations by creating a custom OAuth application in Microsoft Azure to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Dynamics 365 for Finance and Operations spoke.
- Role required: admin.

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Note: After configuring the connection and credential alias, make sure to retrieve the latest metadata from Microsoft Dynamics 365 Finance and Operations application.

Register Microsoft Dynamics 365 for Finance and Operations as an OAuth provider

Register Microsoft Dynamics 365 for Finance and Operations as the OAuth provider so that the ServiceNow instance can request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Open for the record for Microsoft D365 Fin and Ops Spoke OAuth.
3. On the form, fill these values.

Application Registries form

Field	Description
Name	Name to uniquely identify the record. For example, enter: `Microsoft Dynamics 365 for Finance and Operations OAuth`
Client ID	Client ID created during the Microsoft Dynamics 365 for Finance and Operations application configuration.
Client Secret	Client Secret created during the Microsoft Dynamics 365 for Finance and Operations application configuration.
Authorization URL	OAuth authorization code endpoint. Enter: `https://login.microsoftonline.com/<AzureTenantID>/oauth2/v2.0/authorize`
Token URL	OAuth server token endpoint. Enter: `https://login.microsoftonline.com/<AzureTenantID>/oauth2/v2.0/token`
Token Revocation URL	OAuth server token revocation endpoint.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`
OAuth API Script	Script to customize the request and response. Select .
Logo URL	URL that contains an image to use as the application logo.
Default Grant Type	Grant type used to establish the token. Select **Client Credentials**.
Refresh Token Lifespan	Time, in seconds, that the refresh token is valid. The default time is 8,640,0000 seconds.
PKCE required	Option to enable public clients to require PKCE for an authorization. **Note:** You can use only **Authorization Code** as the **Default Grant type** when **PKCE** is enabled.

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Field	Description
Application	Application scope that contains this record.
Accessible from	Application scope that this registry is accessible from.
Active	Option to actively use the application registry.
Use mutual authentication	Option to use mutual authentication for token request and revocation. This option requires a mutual authentication profile to be specified.

4. Right-click the form header, and click **Save**.

Create a connection record for the Microsoft Dynamics 365 for Finance and Operations

Create a connection record for your Microsoft Dynamics 365 for Finance and Operations. The Microsoft Dynamics 365 for Finance and Operations spoke connection and credential aliases use these connections to perform actions in Microsoft Dynamics 365 for Finance and Operations.

Before you begin

Role required: Admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for **MicrosoftD365FinAndOps**.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Microsoft Dynamics 365 for Finance and Operations Connection`.
Credential	Credential record created for Microsoft Dynamics 365 for Finance and Operations . Search and select `MicrosoftD365FinAndOps.Credential`.
Connection alias	Alias record associated with this connection. Enter `sn_ms_fin_ops_spk.MicrosoftD365FinAndOps`
Connection URL	Base URL to connect to **Microsoft Dynamics 365 for Finance and Operations**. Enter: `https://<instance_ID>.cloudax.dynamics.com/`
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

5. Click **Submit**.

Retrieve metadata from Microsoft Dynamics 365 Finance and Operations

Retrieve the metadata from Microsoft Dynamics 365 Finance and Operations and store it in your ServiceNow instance. Dynamic actions require the latest metadata from Microsoft Dynamics 365 Finance and Operations.

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Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Microsoft D365 FinOps Metadata** > **Microsoft D365 FinOps Metadata Content**.
2. Click **Get/Refresh Metadata**.
3. Select the alias to retrieve updated metadata from Microsoft Dynamics 365 Finance and Operation application and click **Ok**.

> **Note:** Make sure to retrieve the latest metadata whenever there any changes in the Microsoft Dynamics 365 Finance and Operations application.

Set up bi-directional webhook for the Microsoft Dynamics 365 for Finance and Operations Spoke

Configure webhook to subscribe to Microsoft Dynamics 365 for Finance and Operations Spoke with a ServiceNow callback URL.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Microsoft D365 FnO spoke** > **FnO Webhook Registries**.
2. Click **New**.
3. On the form fill in the fields.

Field	Description
Name	Unique name for the webhook registry. For example, `Microsoft Dynamics 365 for Finance and Operations webhook`.
Description	Optional description for the webhook.
Generate Callback URL	Option to generate a callback URL which is used to register the webhook in the Microsoft Dynamics 365 Finance and Operations portal.
Generate New Secret	Option to generate a secret key for Microsoft Dynamics 365 Finance and Operations webhook. **Note:** When you generate a new secret, ensure that you generate the callback URL also after generating the secret. Record the callback URL for registering the app in Azure portal.

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Customize bi-directional webhook in the Microsoft Dynamics 365 Finance and Operations spoke

Create webhook routing policy and subflow as per your requirement in the Microsoft Dynamics 365 Finance and Operations spoke.

Before you begin
Role required: admin

Procedure

1. **All** > **Process Automation** > **Workflow Studio**
2. Click **Subflows**.
3. Create a copy of the required subflow.
4. Customize the required subflow as per your requirement and publish it.
5. Navigate to **Microsoft D365 FnO Spoke** > **FnO WebHook Routing Policies**.
6. Click **New**.
7. On the form, fill in the fields.

Decision form

Field	Description
Label	Unique label to identify the routing policy.
Default answer	Option to specify if this is the default answer. Default answer is applicable when the conditions are not met. **a.** Click the Lookup icon. **b.** Select the required subflow from the **Document:** list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow]`.
Condition	Conditions to be met when the required events occur in Microsoft Dynamics 365 Finance and Operations. See Microsoft Dynamics 365 for Finance and Operations Spoke for information about the supported fields.
Answer	Subflow that has to be triggered when the specified conditions are met.

8. Click **Submit**.

Note: These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

Result
Routing policy and subflow are created.

Register an app in Microsoft Azure portal for Microsoft Dynamics 365 Finance and Operations spoke

Register your ServiceNow instance in Microsoft Azure portal in order to use Microsoft Dynamics 365 Finance and Operations spoke.

Before you begin
Role required: admin

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Procedure

1. Log in to Azure portal.
2. Navigate to App registrations and register an app for the webhook.
3. Create a key vault using the Azure portal.
   For more information, see Create a key vault using the Azure portal.
4. Navigate to **Access policies**.
5. Create an access policy.
6. Select **Get** under Secret permissions and click **Next**.
7. In the **Principal** tab, search for the name of the app registered earlier and click **Next**.
8. In the **Application (optional)** tab, click Next.
9. In the **Review + create** tab, click **Create**.
10. Navigate to **Secrets** section.
11. Click on **+ Generate/Import**.
12. On the Create a secret page, enter a name and provide the callback URL generated from your ServiceNow instance.
13. Click **Create**.
14. Log in to your Microsoft Dynamics 365 Finance and Operations portal.
15. Navigate to **System administration** > **Business events** > **Business events catalog**.
16. Navigate to the Endpoints tab and click **New**.
17. Select the endpoint type as HTTPS from the Standard view and click **Next**.
18. On the form, fill in the details.

Endpoint name	Name of the endpoint.
Endpoint type	Type of the endpoint.
Key Vault	Key vault created for the application.
Azure Active Directory Application ID	Object ID of the application.
Azure application secret	Secret created for the application
Key vault DNS name	Vault URI of the application.
Key vault secret name	Name of the key vault secret.

19. Click **Ok**.

> **Note:** Ensure that key vault access policy is created for the application. The access policy should allow the application registry to access secrets from the key vault.

20. Navigate to the Business Events tab and search for a category.
    For example, Purchase orders.
21. Select the required category from the list and click **Activate**.
22. In the Configure new business event section, select the legal entity and endpoint name.

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23. Click Ok.

Note: Ensure that these API permissions are enabled for the application.

- Access Dynamics AX Custom Service
- Access Dynamics AX data
- Access Dynamics AX online as organization users

Result
The app is registered in Azure and the webhook endpoint is configured.

Microsoft Dynamics CRM Spoke

Provide the baseline actions to interact with Microsoft Dynamic Entities through introspection.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Dynamics CRM spoke v1.10.1 is the latest version. For version history of the spoke, see Microsoft Dynamics CRM spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Infoblox spoke provides sample flows to create an opportunity in Dynamics CRM.

Flow	Description
Create Opportunity in Dynamics CRM	Creates an opportunity in Dynamics CRM and updates the opportunity record in your ServiceNow instance.

Spoke subflows

This spoke ships with the following subflows.

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Subflow	Description
Process Dynamics CRM Webhook	Receives the Dynamic CRM webhook notification and converts it into an array of objects and logs the details.
Process Dynamics CRM Webhook for Opportunity	Receives the Dynamic CRM webhook notification and updates the opportunity table record.

Available sample conversational subflows

Install Now Assist for Conversational Spokes and start using the conversational ability of Integration Hub spokes. For more information, see Now Assist in Conversational Spokes.

Conversational subflow	Usage
Look up Opportunities - Sample	Retrieves opportunity details from Microsoft Dynamics CRM based on the specified filter criteria.
Look up Contacts - Sample	Retrieves contact details from Microsoft Dynamics CRM based on the specified filter criteria.
Look up Accounts - Sample	Retrieves account details from Microsoft Dynamics CRM based on the specified filter criteria.
Look up Leads - Sample	Retrieves leads details from Microsoft Dynamics CRM based on the specified filter criteria.
Create Lead - Sample	Creates lead in Microsoft Dynamics CRM.

In this example, a lead is created for John Smith who is interested in CRM Software and is focused on improving sales processes.

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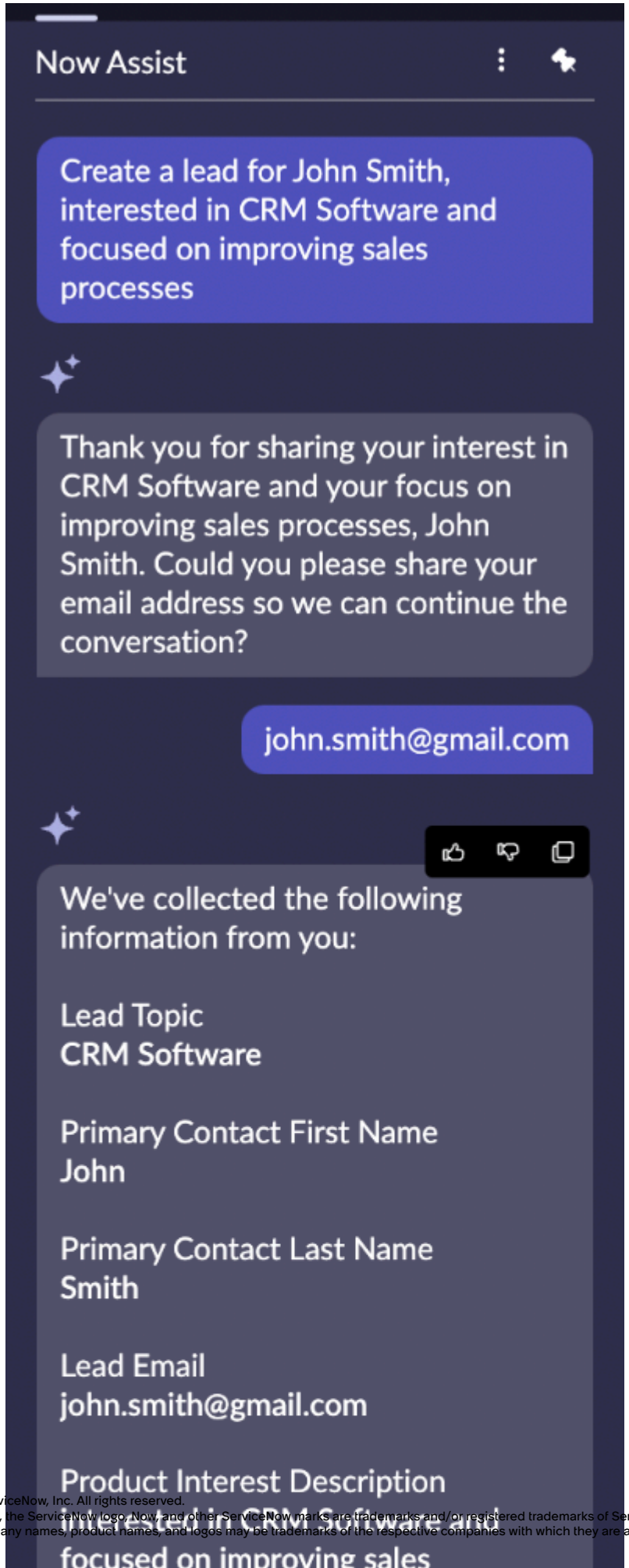

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Spoke actions

The Microsoft Dynamics CRM spoke provides the baseline actions to interact with Microsoft Dynamic Entities through introspection.

Available Microsoft Dynamics CRM spoke actions

Category	Action	Description
Account Management	Create Account	Create an account in Microsoft Dynamics CRM.
	Look up Account Details by Account ID	Retrieve the details of the required account in Microsoft Dynamics CRM.
	Look up Accounts Stream	Retrieve details of all the accounts in Microsoft Dynamics CRM.
Case Management	Create Case	Create case in Microsoft Dynamics CRM.
	Look up Case Details by Case ID	Retrieve details of the specified case in Microsoft Dynamics CRM.
Contact Management	Create Contact	Create contact in Microsoft Dynamics CRM.
	Look up Contact Details by Contact ID	Retrieve details of the required contact in Microsoft Dynamics CRM.
	Look up Contacts Stream	Retrieve details of all the opportunities in Microsoft Dynamics CRM.
Lead Management	Create Lead	Create lead in Microsoft Dynamics CRM.
	Look up Lead Details by Lead ID	Retrieve details of the required lead in Microsoft Dynamics CRM.
Metadata Retrieval	Look up Entities	Retrieve all the entities and their logical names in Microsoft Dynamics CRM.
	Look up Entity Metadata	Retrieve all the metadata available for the required entity type in Microsoft Dynamics CRM.
	Look up Entity URL	Retrieve all the entities and its entity set name (public URL name) available in Microsoft Dynamics CRM.
	Look up Field Choice List	Retrieve all the choice lists for the fields that are in the name and label pair format.
Opportunity Management	Create Opportunity	Create an opportunity in Microsoft Dynamics CRM.
	Look up Opportunities Stream	Retrieves details of all the opportunities in Microsoft Dynamics CRM.
	Look up Opportunity Details by Opportunity ID	Retrieve the details of the required opportunity in Microsoft Dynamics CRM.
Record Management	Create Record	Create a record in Microsoft Dynamics CRM.
	Delete Record	Deletes a record in Microsoft Dynamics CRM.
	Look up Primary Attributes and Logical Name	Retrieve primary attributes and logical name for the specified entity.

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Available Microsoft Dynamics CRM spoke actions (continued)

Category	Action	Description
	Look up Record by Record ID	Retrieve information of the specified record in an Entity.
	Look up Record by Search Query	Retrieve record based on the search query and entity selected from the choice list.
	Look Up Records (Before Paris Version)	Retrieve records based on the search query and specific entity.
	Look up Records Stream	Retrieve records based on the search query and specific entity.
	Subflow Helper Action	Parses the JSON input and converts it into an array object. This can action can be used for creating subflows.
	Update Record	Update a record in Microsoft Dynamics CRM.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Microsoft Dynamics CRM record management AI agent	Manages CRM records including deleting, and retrieving the required records.
Microsoft Dynamics CRM case management AI agent	Creates case in Microsoft Dynamics CRM and retrieves details of the specified case.
Microsoft Dynamics CRM contact management AI agent	Retrieves contact streams and contact details by ID, and creates new contacts.
Microsoft Dynamics CRM lead management AI agent	Creates lead in Microsoft Dynamics CRM and retrieves details of the required lead.

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AI agent	Description
Microsoft Dynamics CRM account management AI agent	Creates an account in Microsoft Dynamics CRM and retrieves details of the required accounts.
Microsoft Dynamics CRM opportunity management AI agent	Creates opportunities, retrieves opportunity details, parses CRM entity data, and manages opportunity streams.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke module

The Microsoft Dynamics CRM spoke adds a Microsoft Dynamics CRM module to your ServiceNow instance. The Opportunities module displays the details of the opportunities.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the Microsoft_Dynamics_CRM alias record to authorize actions.

Connection alias	Description	Connection URL
Microsoft_Dynamics_CRM	Connection to Microsoft Dynamics CRM	URL configured when you create your application in Azure. This URL ends with `dynamics.com`.

For information about setting up the spoke, see Set up Microsoft Dynamics CRM spoke.

Set up Microsoft Dynamics CRM spoke

Integrate the ServiceNow instance and Microsoft Dynamics CRM by using the Windows credentials to authenticate ServiceNow requests.

Before you begin

- Request Integration Hub subscription.
- Install Microsoft AD.
- Activate the Microsoft Dynamics CRM spoke.
- Role required: admin.

About this task

Perform these steps to use all Microsoft Dynamics CRM spoke actions.

Configure Microsoft Dynamics CRM application

Create a custom OAuth application from your Microsoft Dynamics CRM account to enable OAuth 2.0 authentication with the Microsoft Dynamics CRM.

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Before you begin

Microsoft Dynamics CRM requirements:

- Microsoft Dynamics CRM account
- Microsoft Azure account
- Role required: Microsoft Dynamics CRM admin

About this task

Complete these steps from your Azure Developer account. See the Azure product documentation for instructions on creating and configuring custom applications.

Procedure

1. Log in to the Microsoft Azure App registration portal with your organization credentials.
2. Register a new custom application by filling in the application name, the supported account type, and the redirect URI, and then click **Register**.
   An overview of the application's basic information is shown.
3. Copy the application ID to a text file.
   You will use this ID and the client secret generated in the next step to register the app as a third-party OAuth provider on your ServiceNow instance. You use the application ID as the client ID when you connect the application to ServiceNow.
4. Add a client secret.

   a. In Microsoft Azure, navigate to **Manage** > **Certificates & secrets**.

   b. Provide a description and an expiration date and click **Add**.

   > **Note:** The client secret is only displayed in plain text for a short time. You use the client secret when you connect the application to ServiceNow.

5. Enable the permissions you want the application to support.
   For more information, see the Microsoft Graph permissions reference.

   a. In Microsoft Azure, navigate to **Manage** > **API permissions**.

   b. Click the Microsoft Graph tile.

   c. Select the Delegated or Application permissions that the application supports.
   Delegated permissions enable the application to access the API as a signed-in user.
   Application permissions enable the application to run as a background service or daemon without a signed-in user.

   d. Click **Add permissions**.

What to do next

Register Microsoft Dynamics CRM as OAuth provider.

Register Microsoft Dynamics CRM as OAuth provider

Use the information generated during Microsoft Dynamics CRM account configuration to register Microsoft Dynamics CRM as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

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Before you begin

- Request Integration Hub subscription.
- Activate Microsoft Dynamics CRM.
- Create a Microsoft Dynamics CRM application.
- Role required: admin.

Procedure

1. In ServiceNow, navigate to **System OAuth** > **Application Registry**.
2. Click **New**.
3. On the screen titled **What kind of OAuth application**, select **Connect to a third-party OAuth Provider**.
4. On the form, fill in the fields.

Application Registries form

Field	Value required
Name	Enter any name to uniquely identify the record, for example `Dynamics CRM OAuth profile`.
Client ID	Enter the Application ID of the Microsoft Dynamics CRM application you created in Azure.
Client Secret	Enter the Client Secret you generated when you created the application in Azure.
Default Grant type	Select **Authorization Code**.
Authorization URL	Click the lock icon (🔒), enter `https://login.microsoftonline.com/common/oauth2/v2.0/authorize` followed by a question mark and the resource attribute of your instance, and then click the lock icon again. The resource attribute of the URL. For example, `?resource=https://mycompany.crm.dynamics.com`. This attribute is the URL of your Microsoft application.
Token URL	Click the lock icon (🔒), enter `https://login.microsoftonline.com/common/oauth2/v2.0/token`, and then click the lock icon again.
Redirect URL	Click the lock icon (🔒), enter `https://<instance>.service-now.com/oauth_redirect.do`, and then click the lock icon again.

5. In the **OAuth Entity Scopes** related list, edit the provided entity scope to include the URL of your Microsoft Dynamics CRM application.

   The name and the OAuth scope are often the same string.

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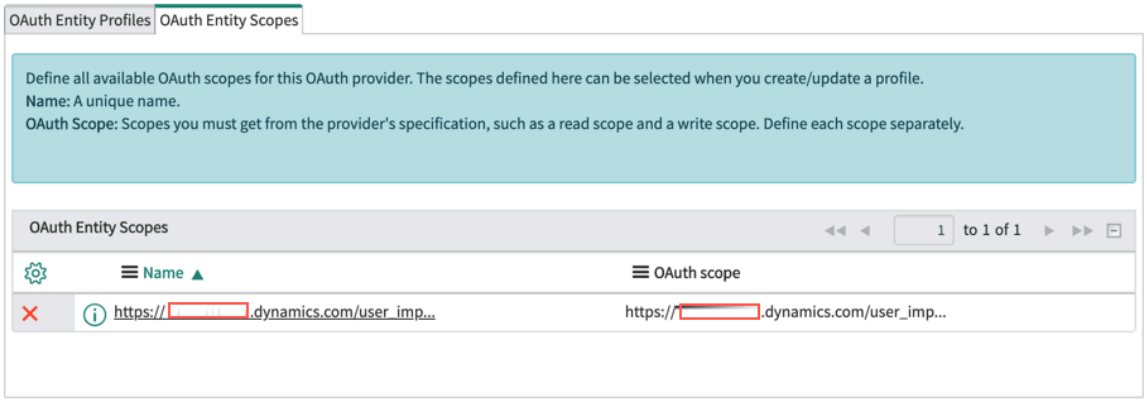

6. Right-click the form header, and click **Save**.
   The system validates the OAuth credentials.

What to do next

Create credential record for Microsoft Dynamics CRM.

Create Credential records for the Microsoft Dynamics CRM spoke

Create Credential records for the Microsoft Dynamics CRM custom OAuth application you created during Microsoft Dynamics CRM account configuration. The Microsoft Dynamics CRM spoke connection and credential aliases use these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **OAuth 2.0 Credentials**.
   The pop-up window displays a blank OAuth 2.0 Credentials form.
4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `Dynamics Credentials`.
Active	Enable
OAuth Entity Profile	Select the OAuth profile you created when you registered the custom Microsoft Dynamics CRM application as an OAuth provider. For example, select **Dynamics OAuth profile**.
Order	Select the order to apply this credential. For example, enter 100.

5. Save the record.
6. From Related Links, click **Get OAuth Token**.
   The system displays a confirmation message that the OAuth token flow is completed successfully. Review the details if the flow is not completed successfully.

Note: Ensure that you allow pop-up windows in your browser.

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Create Connection records for the Microsoft Dynamics CRM spoke

Create Connection records to your Microsoft Azure account. The Microsoft Dynamics CRM spoke connection and credential alias uses these connections to perform actions on Microsoft Dynamics CRM.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the connection and credential alias for the Microsoft Dynamics CRM application.
3. On the **Connections** tab, click **New**.
   The system displays a blank **HTTP(s) Connection** form.
4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `MS Dynamics CRM Connection`.
Credential	Select the Credential record you created for Microsoft Dynamics CRM. For example, select **MS Dynamics Credentials**.
Connection alias	Select the Connection alias record you created for Microsoft Dynamics CRM.
Active	Enable
Connection URL	Enter the root Dynamics URL. For example, `https://<SiteName>.dynamics.com`.

5. Click **Submit**.

Configure Microsoft Dynamics CRM webhook details

Register Microsoft Dynamics CRM webhook in ServiceNow to notify the ServiceNow application when certain events occur in Microsoft Dynamics CRM.

Before you begin

Role required: admin

- Microsoft Dynamics CRM requires registration through the Windows Plugin Registration Tool. To install the Windows Plugin Registration Tool, see the Microsoft document Download tools from NuGet.
- The Endpoint URL is the ServiceNow instance URL to which event information is posted. For example, `https://<instance-name>.service-now.com/api/sn_ms_crm_spoke/dynamics_webhook_callbacks`.
- The key-value pair you use to register the webhook in the Plugin Registration Tool is the same as the Name and Authorization Key in Dynamics CRM Webhook Details.

Procedure

1. Navigate to **All** > **Dynamics CRM Webhook Details** > **Client Details**.
2. Click **New**.

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3. In the **Name** field, enter the webhook's plugin key.
4. In the **Authorization Key** field, enter the value from the webhook's key-value pair.

Configure Microsoft Dynamics CRM webhook decision policy

Create webhook routing policy and subflow according to your requirements.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Flow Designer** > **Designer**
2. Click **Subflows**.
3. Create a copy of the default sample subflow, Process Dynamics CRM Webhook.
4. Customize the subflow according to your requirement and publish it.
   See Create a subflow in Workflow Studio for more information about creating and using subflows.
5. Navigate to **Dynamics CRM Webhook Details** > **Decision Policy**.
6. On the **Decisions** tab, click **New**.
7. On the form, fill in the fields.

Decision form

Field	Description
Label	Unique label to identify the routing policy.
Answer	Option to specify if this answer is the default answer. Default answer is applicable when the conditions are not met. **a.** Click the Lookup icon. **b.** Select the required subflow from the **Document:** list. **Note:** Ensure that the **Table name** is `Dynamics CRM Webhook Answer Subflow [sn_ms_crm_spoke_dynamic_crm_webhook_answer_subflow]`.
Condition	Conditions to be met when the required events occur in Microsoft Dynamics CRM.

8. Click **Submit**.

Note: These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

Result

Decision policy and subflow are created.

Microsoft Endpoint Configuration Manager Spoke

The Microsoft Endpoint Configuration Manager (MECM) spoke automates actions to manage user collections, device collections, devices, and application deployments.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Endpoint Configuration Manager spoke v1.10.2 is the latest version. For version history of the spoke, see Microsoft Endpoint Configuration Manager spoke release notes.

Supported versions

This spoke was built for Configuration Manager 2006, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step – PowerShell (com.glide.hub.action_step.powershell)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step – JDBC (com.glide.hub.action_step.jdbc)
- ServiceNow IntegrationHub Action Step – REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and need appropriate licenses, if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke subflows

The Microsoft Endpoint Configuration Manager spoke provides sample subflows to demonstrate automating tasks. To customize a sample subflow, copy it to the required application scope. Available sample subflows include:

Microsoft Endpoint Configuration Manager spoke subflow descriptions

Subflow	Description
Create Collection	Creates a collection in Microsoft Endpoint Configuration Manager and creates corresponding records for the new collection in the MECM Collections table. **Note:** This subflow is executed by AI agents.

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Microsoft Endpoint Configuration Manager spoke subflow descriptions (continued)

Subflow	Description
Delete Collection	Deletes the specified collection from Microsoft Endpoint Configuration Manager server and removes the corresponding records from the MECM Collections table. **Note:** This subflow is executed by AI agents.
Add Target Collection to Application	Adds a target collection to the specified application in Microsoft Endpoint Configuration Manager and creates a corresponding record in the MECM Deployments table accordingly. **Note:** This subflow is executed by AI agents.
Remove Target Collection from Application	Removes a target group from the specified application on Microsoft Endpoint Configuration Manager server and removes the corresponding records from the MECM Deployments table accordingly. **Note:** This subflow is executed by AI agents.
Configure Collection	Creates a collection and configure it with specified Application ID in the Microsoft Endpoint Configuration Manager Portal.
Create Software Configuration	Creates the software configuration record of the specified Microsoft Endpoint Configuration Manager application.
Look Up Collections	Returns the list of all instal or uninstall Collections associated with the given Microsoft Endpoint Configuration Manager Application ID.
Revoke Application	Adds a user or device to an uninstalled collection and then removes it from the installed collection in the MECM server.
Look up Configuration Data	Retrieves the configuration data for the requested item.
Deploy Application	Adds a user or a device to an installed collection and then removes it from the uninstalled collection in the MECM server.
Discover and Store Data	Finds the data from the server and then updates the records in the Application, Collection, and Deployment tables.

Note: These subflows are available only when the Client Software Distribution 2.0 application is installed.

Spoke actions

The Microsoft Endpoint Configuration Manager spoke provides actions to automate tasks when events happen on your ServiceNow instance. Available actions include:

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Microsoft Endpoint Configuration Manager spoke action descriptions

Category	Action	Description
Advanced Actions	Look up Device Collections Stream (Database)	Retrieves the device collection data from the MECM server using the Java Database Connectivity (JDBC) connection.
	Look up User Collections Stream (Database)	Retrieves the user collection data from the MECM server using the JDBC connection.
Applications	Look up Applications	Retrieves the application data from the MECM server.
Device Management	Look up CMPivot Response by Operation ID	Retrieves CMPivot response from the MECM server.
	Look up Device by ID	Retrieves the device data from the MECM server.
	Run CMPivot Query	Runs the CMPivot query and retrieves the operation IDs from the MECM server.
	Run MECM Script	Runs the MECM script and returns the operation ID from the MECM server.
	Look up MECM Script by Name	Retrieves the Globally Unique Identifier (GUID) of the MECM script from the MECM server.
	Look up MECM Script Response by Operation ID	Retrieves the MECM script response from the MECM server.
	Look up MECM Script Execution Response	Retrieves the MECM Script Execution Response from the MECM server.
Data Management **Note:** These actions are available only when the Client Software Distribution 2.0 application is installed.	Look up Configuration Data	Retrieves the configuration data from the requested item or software configuration.
	Prepare Deployment Data	Prepares the deployment data for the requested item.
	Prepare Revocation Data	Prepares the revocation data for the requested item.
	Store Discovered Data	Stores the applications and deployment data in the corresponding tables.

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Microsoft Endpoint Configuration Manager spoke action descriptions (continued)

Category	Action	Description
Deployments	Add device collection to application	Adds a Device Collection to a targeted application in Microsoft Endpoint Configuration Manager. **Note:** The application must have at least one deployment type and content distributed to a distribution point before deployment.
	Look up Deployments	Retrieves the deployment data from the MECM server.
	Remove User Collection from Application	Removes a user collection from an application in the MECM.
	Add User Collection to Application	Adds a user collection to a targeted application in MECM. **Note:** The application must have at least one deployment type and content distributed to a distribution point before deployment.
	Remove Device Collection from Application	Removes a device collection from an application in MECM.
Device Collections	Add to Device Collection	Adds the named device to the collection specified.
	Is Device in Collection	Checks if a device exists in the device collection in the MECM server.
	Look up Device Collections	Retrieves the device collection data from the MECM server.
	Remove from Device Collection	Removes the specified device from the collection in the MECM server.
	Create Device Collection	Creates a new device collection in MECM with a unique collection name.

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Microsoft Endpoint Configuration Manager spoke action descriptions (continued)

Category	Action	Description
		Note: Provide values for the following input fields: • **Collection Name**: Mandatory input. Name of the collection that is a group of devices or users that you manage together. • **Limiting Collection Name**: Optional input. An existing collection that will define which device can be the member of this new collection. Only the devices which are the member of Limiting collection can be added in this new collection. For device collections, default limiting collection is "All Systems".
	Delete Device Collection	Deletes a device collection from Microsoft Endpoint Configuration Manager (MECM) by Collection ID, avoiding ambiguity from duplicate collection names.
User Collections	Add to User Collection	Adds a user to a collection.
	Is User in Collection	Checks if a user exists in a user collection in the MECM server.
	Look up User Collections	Retrieves the user collection data from the MECM server.
	Remove from User Collection	Removes a user from a collection in the MECM server.
	Create User Collection	Creates a new user collection in MECM with a unique collection name. **Note:** Provide values for the following input fields: • **Collection Name**: Mandatory input. Name of the collection that is a group of devices or users that you manage together. • **Limiting Collection Name**: Optional input. An existing collection that will define which device can be the member of this new collection. Only the devices which are the member of Limiting collection can be added in this new collection. For device collections, default limiting collection is "All Systems".
	Delete User Collection	Deletes a user collection from MECM by Collection ID, avoiding ambiguity from duplicate collection names.
Software Management	Create Catalog Item	Creates a catalog item of the specified MECM Application.

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Spoke module

The MECM spoke adds the MECM application to your instance. The application includes the following modules and data accessed through the spoke modules stored in the respective tables:

Microsoft Endpoint Configuration Manager spoke module descriptions

Module	Description	Table
Applications	Displays the list of applications from the Microsoft Endpoint Configuration Manager server.	Application [sn_ms_epcfgmgr_spk_app
Configurations	Stores the software configuration details for the applications.	Configuration [sn_ms_epcfgmgr_spk_sf_c
Server Instances	Stores the details of the servers provided.	Server Instance [sn_ms_epcfgmgr_spk_ser
Deployments	Displays the list of deployments from the Microsoft Endpoint Configuration Manager server.	Deployment [sn_ms_epcfgmgr_spk_dep
Collections	Displays the list of collections from the Microsoft Endpoint Configuration Manager server.	Collection [sn_ms_epcfgmgr_spk_coll

Note: These modules are available only when the Client Software Distribution 2.0 application is installed.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Configure Microsoft Endpoint Configuration Manager and set up the spoke.

MID Server requirements

To use these actions, your instance must have a MID Server set up and configured to use PowerShell. For more information about running actions on the MID Server, see Integration steps. For information, see MID Server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Configure Microsoft Endpoint Configuration Manager and set up the spoke

Follow the Microsoft Endpoint Configuration Manager configuration procedures in the order shown.

Note: Ensure that user must be able to establish remote PowerShell sessions with the MECM server. The spoke scripts use *`Microsoft.PowerShell32`* configuration for creating sessions. For user permissions, see User permissions in Microsoft Learn.

Configure the Application Administrator role on the Microsoft Endpoint Configuration Manager server

Ensure that the Microsoft Endpoint Configuration Manager administrative user has the correct permissions to deploy software and that PowerShell is properly configured.

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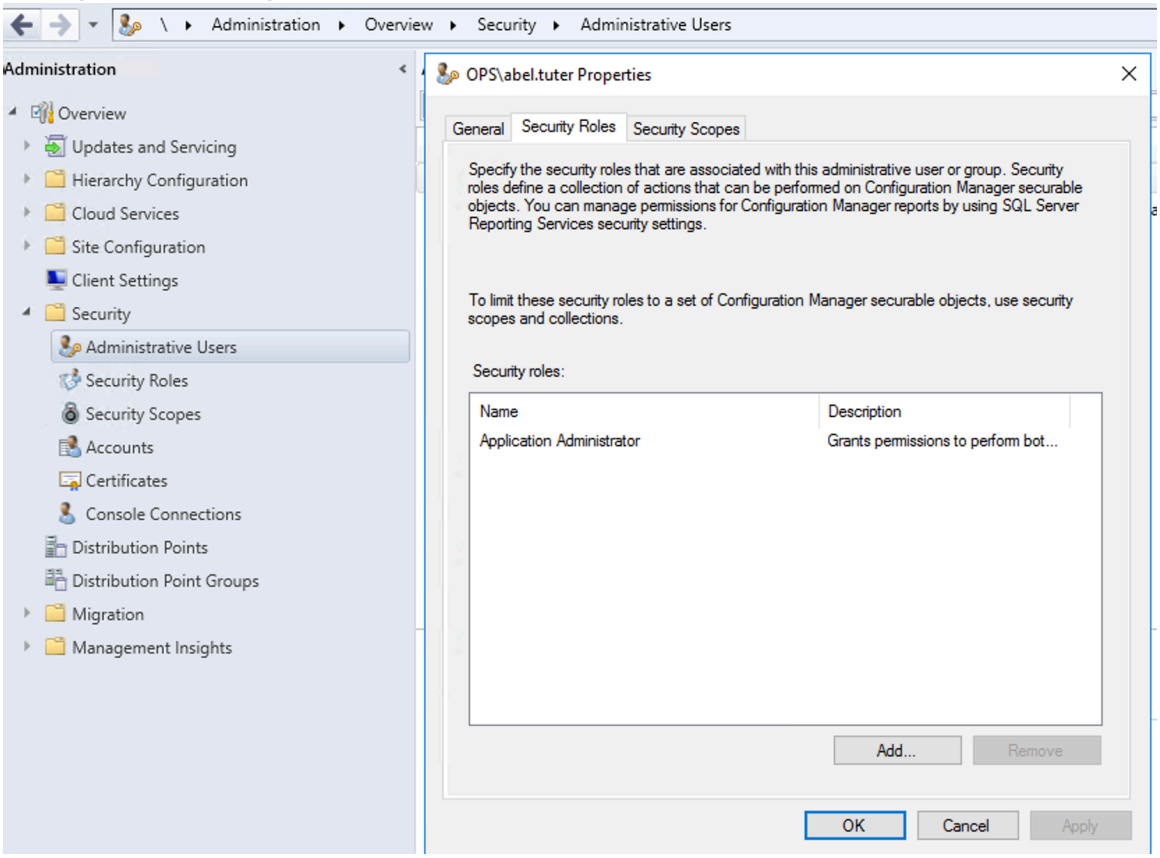
Before you begin
Role required: Microsoft Endpoint Configuration Manager Application Administrator

About this task
These instructions are for Microsoft Windows Server 2016 Standard.

Procedure
1. In the Microsoft Endpoint Configuration Manager console, navigate to **Administration** > **Security** > **Administrative Users**.
2. Right-click the user to whom you want to grant the Application Administrator role.
3. Select **Properties** from the drop-down menu.
4. In the Properties dialog box, select the **Security Roles** tab.
5. Ensure that the user has the Application Administrator role.
6. If the user does not already have this role, click **Add**, select this role from the list, and click **OK**.

Granting the Application Administrator role on the Microsoft Endpoint Configuration Manager server



7. Log into Microsoft Endpoint Configuration Manager as the user with the Application Administrator role.
8. Open the menu from the upper left corner of the console and select **Connect via Windows PowerShell**.

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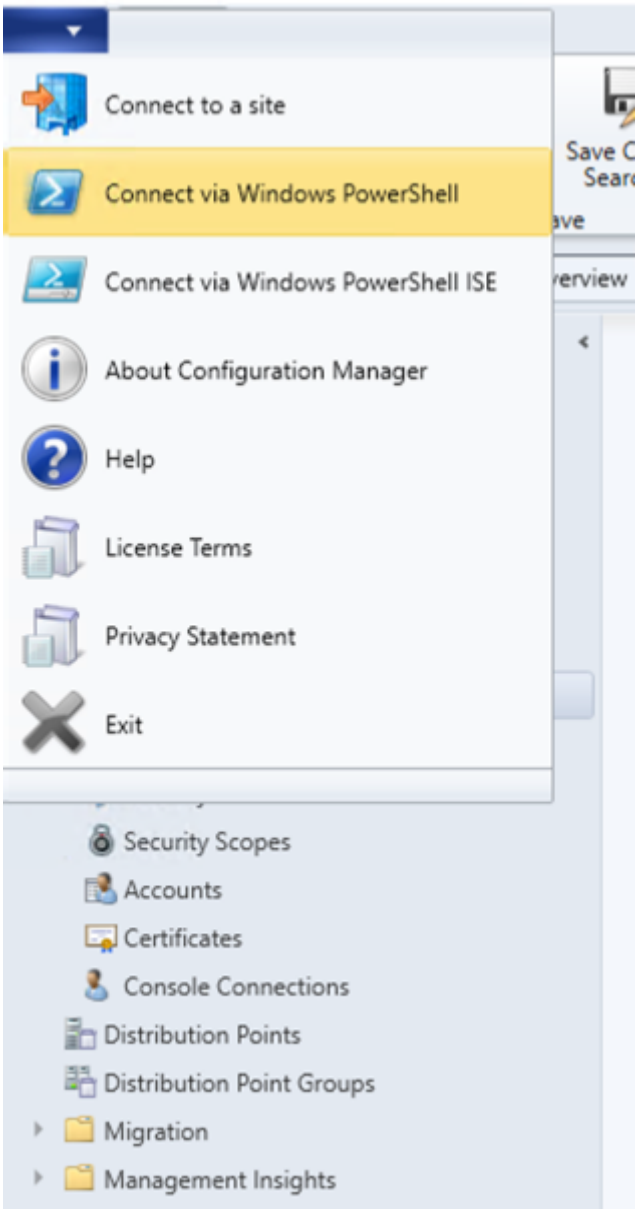
Connect to PowerShell



9. Ensure that the user can access the CM console.
   This action establishes the environment path to PowerShell for the logged in Application Administrator user.

Update the Microsoft Endpoint Configuration Manager cmdlet libraries

Ensure that the Microsoft Endpoint Configuration Manager Cmdlet Library is up-to-date.

Before you begin

Role required: Either Microsoft Endpoint Configuration Manager current user or system administrator, depending on settings.

About this task

The Microsoft Endpoint Configuration Manager Cmdlet Library installs and updates the Windows PowerShell module. Microsoft Endpoint Configuration Manager checks for library updates on a daily basis. Out-of-date libraries can cause Discovery of the Microsoft Endpoint Configuration Manager server to fail, because the system cannot parse the Microsoft Endpoint Configuration Manager activity output. This is an example warning message.

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```
WARNING: An update to the
    Microsoft Endpoint Configuration Manager  Cmdlet
Library is available. Please go to
'http://go.microsoft.com/fwlink/?LinkId=528947' to download the
 latest version.
Running cmdlet version: 5.0.8231.1004 Latest cmdlet version:
 5.0.8328.1155
```

Download the latest version of the cmdlet library from http://go.microsoft.com/fwlink/?LinkId=528947. For installation instructions, see https://technet.microsoft.com/en-us/library/dn958404(v=sc.20).aspx.

If you elect to use an earlier version library, use this procedure to disable the CM update check, which allows Discovery to proceed without issues.

Procedure

1. Log in to the Microsoft Endpoint Configuration Manager console as an administrator.
2. Open the menu from the upper left corner of the console.
3. Select **Connect via Windows PowerShell**.
4. Run one of these commands to disable the update check:
   - **Per-user**: *`Set-CMCmdletUpdateCheck -CurrentUser -IsUpdateCheckEnabled 0`*
   - **Per-system**: *`Set-CMCmdletUpdateCheck -System -IsUpdateCheckEnabled 0`*

   > **Important:** The per-system cmdlet must run in an elevated Windows PowerShell session.

5. Run the *`Get-CMCmdletUpdateCheck`* command to refresh the console and check the settings.
6. Ensure that the value of the *`IsEnabled`* configuration variable has changed to **False**. This indicates that the warning for an out of date cmdlet library is disabled for the users specified.
7. To re-enable the update check, run the *`-IsUpdateCheckEnabled 1`* command for either the current user or for the system.

Set up the Microsoft Endpoint Configuration Manager spoke

Integrate the ServiceNow instance and Microsoft Endpoint Configuration Manager account using the PowerShell and JDBC credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Endpoint Configuration Manager spoke.
- Role required: admin.

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Procedure

1. Configure the default connection and credential alias to authenticate requests.

   a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

   b. Open the record **Microsoft Endpoint Configuration Spoke**.

   c. Click the **Create New Connection & Credential** related link.

   d. On the form, fill these values.

Field	Description
Server Instance Name	Name of the Microsoft Endpoint Configuration Manager server.
Host	Provider domain name.
Credential Name	Name to identify the credential record.
User Name	User name to log in to the Microsoft Endpoint Configuration Manager server.
Password	Password to log in to the Microsoft Endpoint Configuration Manager server.

   e. Click **Create**.

2. To use the two advanced actions, Look up Device Collections Stream (Database) and Look up User Collections Stream (Database), configure the JDBC credential.

   Note: If you are using the Microsoft Endpoint Configuration Manager spoke with Client Software Distribution 2.0 application, you must configure the JDBC credential.

   a. Navigate to **Connections & Credentials** > **Credentials**.

   b. Open the record **Microsoft Endpoint Configuration JDBC**.

   c. Click the **Create New Connection & Credential** related link.

   d. On the form, fill these values.

Field	Description
Connection Name	Name to identify the JDBC connection record. For example, `JDBC Connection`.
Host	Host name or IP address of the database server.
Database name	Name of the database.
Credential Name	Name to identify the connection record. For example, `JDBC Credentials`.

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Field	Description
User name	User name to log in to the JDBC database. Ensure that the user role is at least public with db_datareader.
Password	Password to log in to the JDBC database.

e. Click **Create**.
If the MecmConnector jar is not present on the MID Server, restart the MID server so that the jar file gets synchronised from the instance to the MID server.

What to do next

To use the Microsoft Endpoint Configuration Manager spoke with Client Software Distribution 2.0 application, see CSD 2.0 for Microsoft Endpoint Configuration Manager.

Create a connection and credential record for the Microsoft Endpoint Configuration Manager spoke REST actions

Create a connection record for your Microsoft Endpoint Configuration Manager. The Microsoft Endpoint Configuration Manager connection and credential aliases use these connections to perform actions in Microsoft Endpoint Configuration Manager.

Before you begin

- To get the **Realm** value from the Microsoft Endpoint Configuration Manager server, do the following:
  1. Open **Programs** > **Administrative Tools** > **Active Directory Management**.
  2. Select **Active Directory Domains and Trusts**.

     The Active Directory domain names are listed. The Active Directory domain name is also the related Kerberos realm name and DNS domain name. Select the domain that you want to use for integration.
- After getting Realm details, run the following command from the Command Line to get the Key Distribution Center value.

  `nslookup -type=srv _kerberos._tcp.<REALM_NAME_IN_UPPER_CASE>`

  Copy the `svr hostname` value from the list and use it as the **Key Distribution Center** value.
- Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for **Microsoft Endpoint Configuration REST**.
3. From the **Related Links** tab, click **Create New Connection & Credential**.
4. On the form, fill these fields.

Connection form

Field	Description
Connection Name	Name to uniquely identify the connection. For example, `MS Endpoint Configuration Manager REST Connection`.

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Field	Description
Connection URL	Base URL to connect to **Microsoft Endpoint Configuration Manager**. Enter: `https://<computer_name>.com`
Credential Name	Credential record created for Microsoft Endpoint Configuration Manager. For example, `MS Endpoint Configuration Manager Cred`.
User Name	User name to connect to your Microsoft Endpoint Configuration Manager account. **Note:** You must provide the user name without prefixing with the domain name.
Password	Password to connect to your Microsoft Endpoint Configuration Manager account.
Key Distribution Center	Key distribution center of the Microsoft Endpoint Configuration Manager server.
Realm	Active Directory domain name in uppercase from the Microsoft Endpoint Configuration Manager server. For example, OPS . LAB3 . EXAMPLE . COM

Note: If either Key Distribution Center or Realm values is changed in the credential record, make sure to restart the MID server to sync the update. Because Key Distribution Center and Realm values are set as JRE properties on MID server.

5. Click **Submit**.

What to do next

Before using any REST based actions, make sure the MID JAR file, MecmConnector, is present at `<MID Folder>\agent\extlib` on MID server.

Microsoft Entra Entitlement Management Spoke

Retrieves details of access packages and access package assignments in Microsoft Entra Entitlement Management from your ServiceNow instance.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Entra Entitlement Management Spoke v1.0.0 is the latest version. For version history of the spoke, see Microsoft Entra Entitlement Management Spoke release notes.

Supported versions

This spoke was built for Microsoft Entra Entitlement Management v1.0, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Microsoft Entitlement Management account requirements

The Microsoft Entitlement Management spoke requires creating a custom app on your Microsoft Entra account to generate OAuth 2.0 tokens. See: Create a custom application in Azure portal.

Spoke actions

The Microsoft Entra Entitlement Management spoke provides actions to automate entitlement management tasks when events occurs in your ServiceNow instance. Available actions include:

Note: To use the actions, ensure that you provide at least one of the required permissions.

Category	Action	Description	Permissions Required (from least to most privileged)	
Access Package Assignment Management	Look up Access Package Assignment	Retrieves the details of the specified access package assignment.	Delegated (work or school account)	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All
	Look up Access Package Assignments Stream	Retrieves the list of all the assignments (both active and expired) that the caller has access to read, across all catalogs and access packages.	Delegated (work or school account)	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All
	Look up Access Package Assignments Stream by User	Retrieves the list of all the assignments (active and expired)	Delegated (work or school account)	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All

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Category	Action	Description	Permissions Required (from least to most privileged)	
		that the caller has access to read, across all catalogs and access packages where the signed-in user is the target. Signed-in user is the user whose Entra credentials were used while generating the token.	Delegated (personal Microsoft account)	Not supported
			Application	Not supported
Access Package Management	Look up Access Package	Retrieves the details of the specified access package.	Delegated (work or school account)	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All
	Look up Access Packages Stream	Retrieves the list of all access packages across all catalogs.	Delegated (work or school account)	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All
	Look up Access Packages Stream by User	Retrieves the list of all access packages across all catalogs for which the signed-in user is	Delegated (work or school account)	EntitlementManagement.Read.All, EntitlementManagement.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported

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Category	Action	Description	Permissions Required (from least to most privileged)	
		allowed to submit access requests. Signed-in user is the user whose Entra credentials were used while generating the token.	Application	Not supported

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up the Microsoft Entra Entitlement Management spoke

Integrate your ServiceNow instance and the Microsoft Entra account by creating a custom OAuth application in Microsoft Entra Entitlement Management to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Entra Entitlement Management spoke.
- Role required: admin.

Create a custom application in Azure portal

Create a custom app using your Azure portal to enable OAuth 2.0 authentication with the Microsoft Entra Entitlement Management spoke.

Before you begin

- Request Integration Hub subscription.
- Activate the Microsoft Entra Entitlement Management spoke.
- Microsoft Entra Entitlement Management spoke requirements:
  - Microsoft Entra Entitlement Management account
  - Microsoft Entra Entitlement Management administrator credentials
- Role required: admin

About this task

Complete these steps from your Azure portal. See the Microsoft identity platform documentation documentation for instructions on creating and configuring custom applications.

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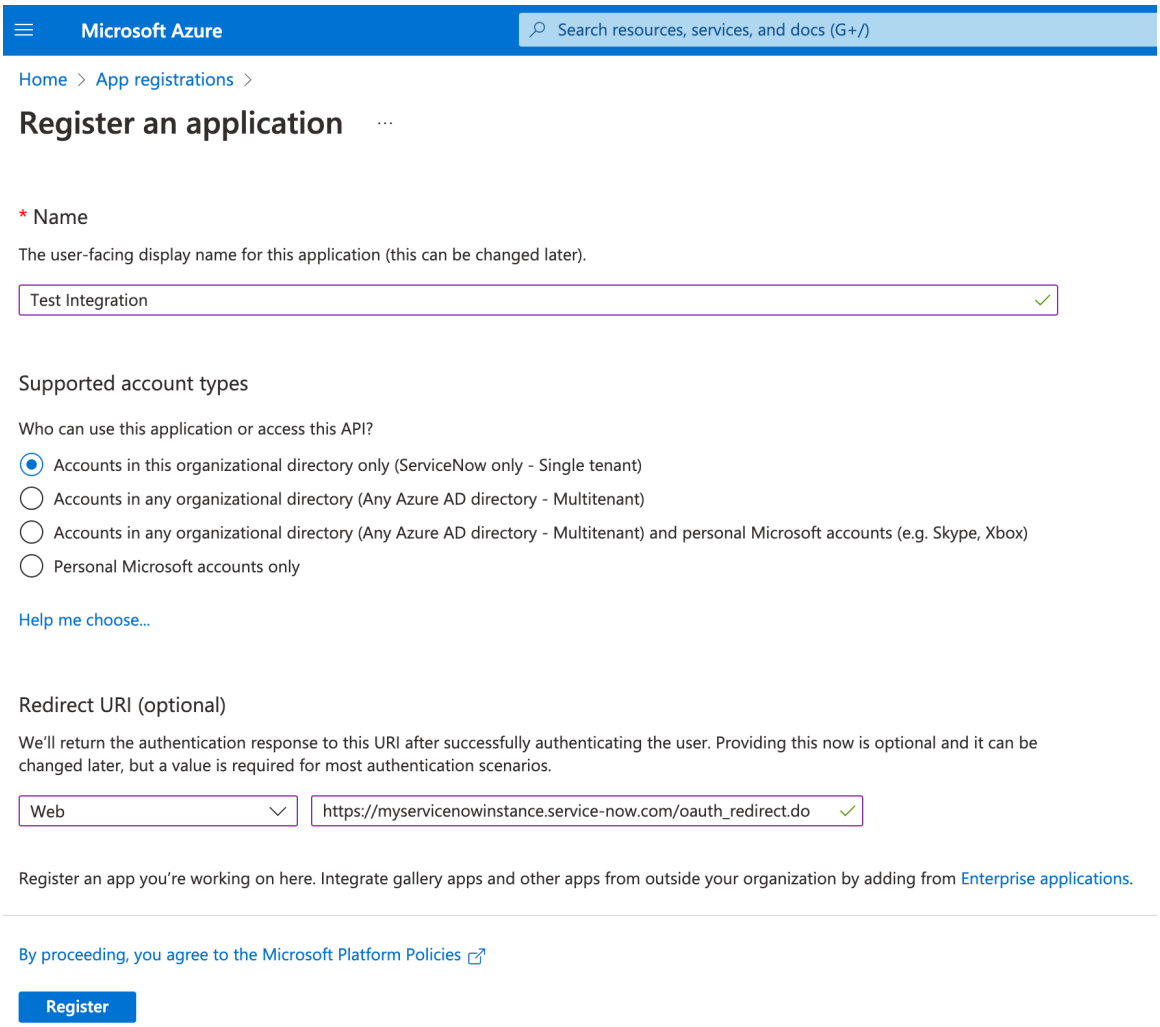
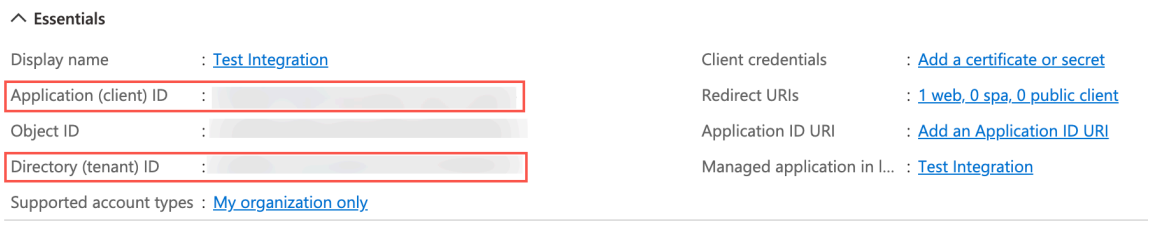
Procedure

1. From your Azure portal, navigate to **App registrations** and click **New registration**.
2. On the form, fill the values.
3. In **Redirect URI**, enter your ServiceNow instance URL in this format: `https://<Instance-Name>.service-now.com/oauth_redirect.do`.
   See Create a Microsoft Entra application and service principal that can access resources for instructions on registering and configuring an application.



4. Click **Register**.
   The application is created and the required details are displayed.
5. Copy and record the value of Directory ID.
   This value is required to register the app as a third-party OAuth provider on your ServiceNow instance.



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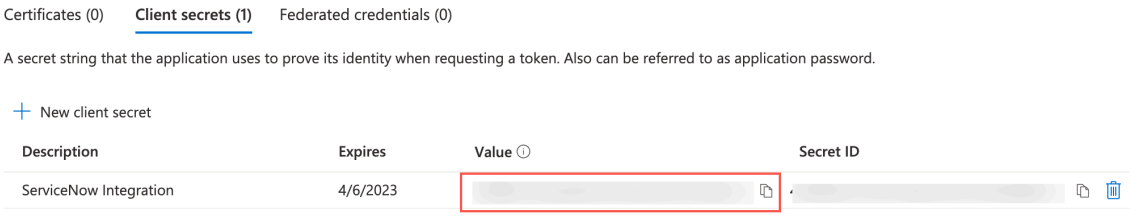
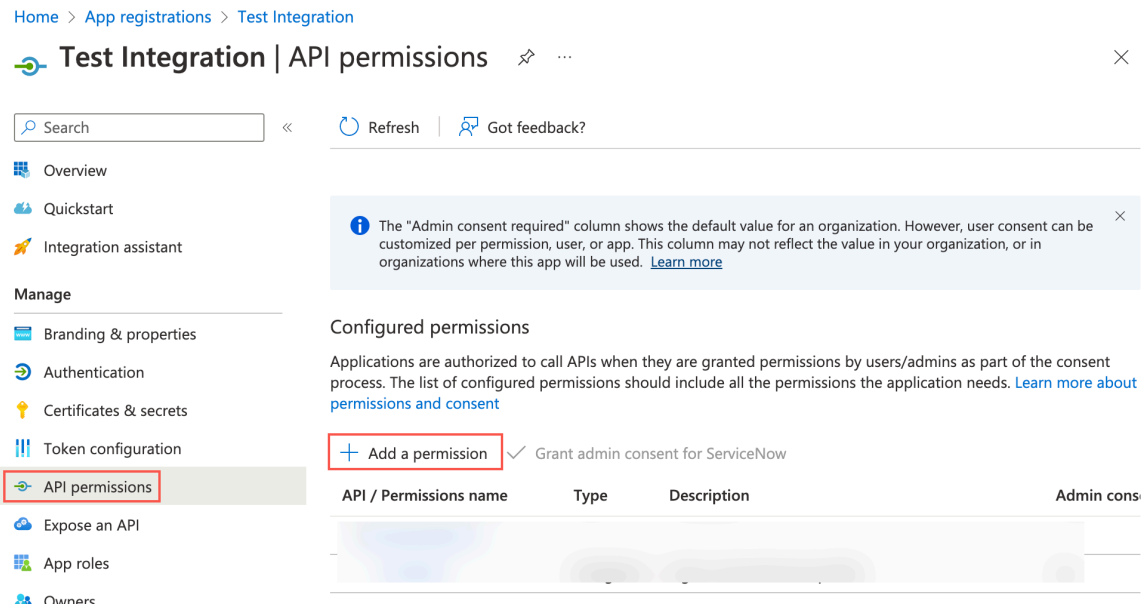
6. Click **Certificates & secrets**.
7. Click **New client secret**.
   Secret is generated and displayed.
8. Copy and record the value.
   This value is required to register the app as a third-party OAuth provider on your ServiceNow instance.



9. Click **API permissions**.
10. Click **Add a permission** to add the required permissions to access the APIs.

    For information about permissions needed to perform the required actions, see the Spoke actions section here: Spoke actions.



11. Grant admin consent to your application.
    See Quickstart: Configure a client application to access a web API for more information.

Configure a connection for the Microsoft Entra Entitlement Management spoke

Configure a connection to your Microsoft Entra Entitlement Management account. The Microsoft Entra Entitlement Management spoke connection and credential aliases use these connections to perform actions in the Microsoft Entra Entitlement Management.

Before you begin

Role required: admin.

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Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **EntraEntitlementManagement** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Entra Entitlement Management spoke, click **View Details**.
   - To manage more than one Entra Entitlement Management spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.
5. On the form, fill in these fields:

Field	Value required
Connection Information	
Name	Auto-generated name to identify the connection record.
Credential Information	
Auth URL	Authorization URL in this format: `https://login.microsoftonline.com/<Directory ID>/oauth2/v2.0/authorize`. Replace `<Directory ID>` with the directory ID in your Entra Entitlement Management configuration.
Token URL	Token URL in this format: `https://login.microsoftonline.com/<Directory ID>/oauth2/v2.0/token`. Replace `<Directory ID>` with the directory ID in your Microsoft Entra Entitlement Management configuration properties.
Revoke token URL	Revoke token URL in this format: `https://login.microsoftonline.com/<Directory ID>/oauth2/v2.0/revoke`. Replace `<Directory ID>` with the directory ID in your Entra Entitlement Management configuration properties.
OAuth Client ID	Client ID you created during the Entra Entitlement Management application registration.
OAuth Client Secret	Key value you created during the Entra Entitlement Management application registration.
OAuth Redirect URL	Redirect URL of your ServiceNow instance in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`.

6. Click **Configure and Get OAuth Token**.

Result

The Microsoft Entra Entitlement Management spoke is set up and integrated with the ServiceNow instance.

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Microsoft Entra ID Spoke (formerly Microsoft Azure Active Directory spoke)

Manage users, applications, groups, devices, tenants, service principals, and passwords. Apply licenses and provision users in Office 365.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Entra ID spoke (formerly known as Microsoft Azure Active Directory spoke) v4.7.5 is the latest version. For version history of the spoke, see Microsoft Entra ID Spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- IHUB Spoke Util Pack (com.snc.ihub_spoke_util_pack)
- ServiceNow IntegrationHub Action Step - PowerShell (com.glide.hub.action_step.powershell)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Remote Directory Sync

Spoke flows

The Microsoft Entra ID spoke provides sample flows in the draft state to demonstrate automating Microsoft Entra tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
User Offboarding	Disables an Entra ID user account and removes the user from the Entra ID groups when a ServiceNow user record is deactivated.
User Onboarding	Creates and enables an Entra ID user account when a ServiceNow user record is activated.

Spoke subflows

The Microsoft Entra ID spoke provides sample subflows in the draft state to demonstrate automating Entra tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Add User to Group	Looks up the groups that a ServiceNow User record belongs to, and adds the associated Entra ID user account to the same Entra ID groups.

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Available sample conversational subflows

Install Now Assist for Conversational Spokes and start using the conversational ability of Integration Hub spokes. For more information, see Now Assist in Conversational Spokes.

Sample conversational subflows

Conversational subflow	Description
Look up Groups - Sample	Retrieves information about the specified groups in the Entra ID.
Look up Group Members - Sample	Retrieves information about the specified group members in the Entra ID.
Look up Users - Sample	Retrieves information about users in the Entra ID.
Look up Direct Reports - Sample	Retrieves information about the direct reports in the Entra ID.
Add User to Group using Email Address - Sample	Adds the specified Entra ID user to the specified Entra ID group using the user's email address.
Add User to a group - Sample	Adds the specified Entra ID user to the specified Entra ID group.

Spoke actions

The Microsoft Entra ID spoke provides actions to automate Entra tasks when events occur in ServiceNow. Available actions include:

Note:

- For every action, required permissions from least to most privileged are mentioned. At least one, not all, of the mentioned permissions is required to call the API.
- Ensure that you are aware of these considerations:
  - Select the Delegated permission if you intend to use the **Authorization Code** grant type while registering Entra ID as an OAuth provider.
  - Select the Application permission if you intend to use the **Client Credentials** grant type while registering Entra ID as an OAuth provider.

Category	Action	Description	Permissions Required (from least to most privileged)	
Audit Logs	Look up Sign Ins Stream	Retrieve the list of sign ins.	Delegated (work or school account)	AuditLog.Read.All, Directory.Read.All
			Delegated (personal Microsoft account)	Not supported
			Application	AuditLog.Read.All , Directory.Read.All

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Category	Action	Description	Permissions Required (from least to most privileged)	
Group Management	Add Owner to Group	Add an owner to an existing group in Microsoft Entra ID.	Delegated (work or school account)	Group.ReadWrite.All, Directory.ReadWrit Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Group.ReadWrite.All, Directory.ReadWrit
	Add User to Group	Add an existing user to a group in Microsoft Entra ID. **Note:** Adding a user to a mail-enabled security group is not supported by the Microsoft Graph Security API. For more information, see https://learn.microsoft.com/en-us/graph/api/resources/groups-overview?view=graph-rest-1.0&tabs=http.	Delegated (work or school account)	GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrit Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	GroupMember.ReadWrite.All, Group.ReadWrite.All and Directory.Read
	Create Office 365 Group	Creates an Office 365 group that can be shared with the other members in the group.	Delegated (work or school account)	Group.ReadWrite.All, Directory.ReadWrit Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Group.Create, Group.ReadWrite.All, Directory.ReadWrite.All
	Look up Group Membership Stream by Directory	Retrieve the list of group membership.	Delegated (work or school account)	GroupMember.Read.All, Directory.Read. Group.Read.All, Group.ReadWrite.All, GroupMember.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	GroupMember.Read.All, Directory.Read. Group.Read.All, Group.ReadWrite.All, GroupMember.ReadWrite.All

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Category	Action	Description	Permissions Required (from least to most privileged)	
	Create Security Group	Creates a security group when you want to grant access permissions to a group of users.	Delegated (work or school account)	Group.ReadWrite.All, Directory.ReadWrit Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Group.Create, Group.ReadWrite.All, Directory.ReadWrite.All
	Look up Group	Returns the Group information found based on the search criteria.	Delegated (work or school account)	GroupMember.Read.All, Group.Read.All, Directory.Read.All, Group.ReadWrite.All, Directory.ReadWrit Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	GroupMember.Read.All, Group.Read.All, Directory.Read.All, Group.ReadWrite.All, Directory.ReadWrite.All
	Look up Group Members Stream	Retrieves the list of members of the specified group.	Application	GroupMember.Read.All, Group.Read.All, GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.Read.All
			Delegated (personal Microsoft account)	Not supported.
			Delegated (work or school account)	GroupMember.Read.All, Group.Read.All, GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.Read.All
	Look up Group Membership Stream	Retrieves the list of groups for the specified user as a complex object.	Delegated (work or school account)	User.Read, GroupMember.Read.All, Directory.Read.All, Directory.ReadWrite.A Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Directory.Read.All, Directory.ReadWrite.A
	Look up Group Transitive Membership Stream	Retrieves list of groups for the specified user as a complex object.	Delegated (work or school account)	Not supported.
			Delegated (personal	Not supported.

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Category	Action	Description	Permissions Required (from least to most privileged)	
			Microsoft account)	
			Application	Groups.Read.All, User.Read.All, Sites.FullControl.All, Sites.Selected
	Delete Group	Deletes the specified group from Entra ID.	Delegated (work or school account)	Group.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Group.ReadWrite.All
	Add Owners to Group	Adds the specified users as owners to the specified group in the Entra ID.	Delegated (work or school account)	Group.ReadWrite.All, Directory.ReadWrit
			Delegated (personal Microsoft account)	Not supported.
			Application	Group.ReadWrite.All, Directory.ReadWrit
	Remove Owner from Group	Removes the owner from a group in Microsoft Entra ID.	Delegated (work or school account)	Group.ReadWrite.All, Directory.ReadWrit Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Group.ReadWrite.All, Directory.ReadWrit
	Remove User from Group	Removes an existing user from a group in Microsoft Entra ID.	Delegated (work or school account)	GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrit Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrit
	Look up Groups Stream by Directory	Retrieves the list of groups in the directory integration.	Delegated (work or school account)	GroupMember.Read.All, Group.Read.All, Directory.Read.All, Group.ReadWrite.All, Directory.ReadWrit Directory.AccessAsUser.All
			Delegated (personal	Not supported.

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Category	Action	Description	Permissions Required (from least to most privileged)	
			Microsoft account)	
			Application	GroupMember.Read.All, Group.Read.All, Directory.Read.All, Group.ReadWrite.All, Directory.ReadWrite.All
	Look up Groups Stream	Lists all the groups in an organization.	Delegated (work or school account)	GroupMember.Read.All, Group.Read.All, Directory.Read.All, Group.ReadWrite.All, Directory.ReadWrit Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	GroupMember.Read.All, Group.Read.All, Directory.Read.All, Group.ReadWrite.All, Directory.ReadWrite.All
	Add Users to Group	Add existing users to a group in Microsoft Entra ID.	Delegated (work or school account)	GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrit
			Delegated (personal Microsoft account)	Not supported.
			Application	GroupMember.ReadWrite.All, Group.ReadWrite.All and Directory.Read
	Update Office 365 Group	Updates the specified office 365 group.	Delegated (work or school account)	Group.ReadWrite.All, Directory.ReadWrit
			Delegated (personal Microsoft account)	Not supported.
			Application	Group.ReadWrite.All, Directory.ReadWrit
License Management	Look up Subscribed SKU	Retrieves the details of the specified subscribed SKU.	Delegated (work or school account)	Organization.Read.All, Directory.Read.Al Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Organization.Read.All, Directory.Read.Al Directory.ReadWrite.All, Organization.ReadWrite.All

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Category	Action	Description	Permissions Required (from least to most privileged)	
	Look up Subscribed SKUs	Retrieves the list of commercial subscriptions that an organization has acquired.	Delegated (work or school account)	Organization.Read.All, Directory.Read.Al Directory.ReadWrite.All, Organization.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Organization.Read.All, Directory.Read.Al Directory.ReadWrite.All, Organization.ReadWrite.All
	Assign User License	Onboards an existing user in the Microsoft Entra ID to Office 365 and grant access to services.	Delegated (work or school account)	User.ReadWrite.All, Directory.ReadWrite.
			Delegated (personal Microsoft account)	Not supported.
			Application	User.ReadWrite.All, Directory.ReadWrite.
	Remove User License	Removes a license from a user in Microsoft Entra ID.	Delegated (work or school account)	User.ReadWrite.All, Directory.ReadWrite.
			Delegated (personal Microsoft account)	Not supported.
			Application	User.ReadWrite.All, Directory.ReadWrite.
Application Management	Look up App Roles Assignments Stream	Retrieves the list of the app roles that have been assigned to a user.	Delegated (work or school account)	User.ReadBasic.All, Directory.Read.All, AppRoleAssignment.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported
			Application	Directory.Read.All, AppRoleAssignment.ReadWrite.All
	Create Application Assignment	Creates an assignment for a specified application in Microsoft Entra ID.	Delegated (work or school account)	DeviceManagementConfiguration.Read DeviceManagementApps.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.

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Category	Action	Description	Permissions Required (from least to most privileged)	
			Application	DeviceManagementConfiguration.ReadW DeviceManagementApps.ReadWrite.All
	Delete Application Assignment	Deletes the specified application assignment in Microsoft Entra ID.	Delegated (work or school account)	DeviceManagementConfiguration.ReadW DeviceManagementApps.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	DeviceManagementConfiguration.ReadW DeviceManagementApps.ReadWrite.All
	Look up Application Assignments Stream	Lists all application assignments for the specified application in Microsoft Entra ID.	Delegated (work or school account)	DeviceManagementConfiguration.Read. DeviceManagementConfiguration.ReadW DeviceManagementApps.Read.All, DeviceManagementApps.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	DeviceManagementConfiguration.Read. DeviceManagementConfiguration.ReadW DeviceManagementApps.Read.All, DeviceManagementApps.ReadWrite.All
	Revoke User Application Access	Removes an app role assignment that has been granted to a user.	Delegated (work or school account)	AppRoleAssignment.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	AppRoleAssignment.ReadWrite.All
	Look up Applications Stream	Retrieves the list of applications.	Delegated (work or school account)	Application.Read.All, Application.ReadW Directory.Read.All
			Delegated (personal Microsoft account)	Application.Read.All and User.Read, Application.ReadWrite.All and User.Read
			Application	Application.Read.All, Application.ReadWrite.OwnedBy, Application.ReadWrite.All, Directory.Rea
Device Management	Add Device to Group	Adds an existing device to a group in the Entra ID.	Delegated (work or	GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrit

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Category	Action	Description	Permissions Required (from least to most privileged)	
			school account)	
			Delegated (personal Microsoft account)	Not supported
			Application	GroupMember.ReadWrite.All, Group.ReadWrite.All and Directory.Read
	Is Device in Group	Checks if an existing device is a member of a group in Entra ID.	Delegated (work or school account)	Device.Read.All, Directory.Read.All, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Device.Read.All, Device.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A
	Add Devices to Group	Adds the specified devices to the specified group in Entra ID.	Delegated (work or school account)	Group.ReadWrite.All, Directory.ReadWrit
			Delegated (personal Microsoft account)	Not supported.
			Application	Group.ReadWrite.All, Directory.ReadWrit
	Look up Devices Stream	Lists all the devices in an organization or devices that satisfy the specified filter query, if any.	Delegated (work or school account)	Device.Read.All, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Device.Read.All, Device.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A
	Remove Device from Group	Remove an existing device from a group in the Entra ID.	Delegated (work or school account)	GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrit
			Delegated (personal Microsoft account)	Not supported.
			Application	GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrit

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Category	Action	Description	Permissions Required (from least to most privileged)	
Organization Management	Look up Tenant	Retrieves details of the currently authenticated tenant.	Delegated (work or school account)	DeviceManagementServiceConfig.Read DeviceManagementServiceConfig.Read
			Delegated (personal Microsoft account)	Not supported.
			Application	DeviceManagementServiceConfig.Read DeviceManagementServiceConfig.Read
User Authentication	Revoke User SignIn Sessions	Revokes the user signin sessions so that administrators can automate invalidating all the sign in session of a specified user.		
Service Principal Management	Look up App Role Assigned to Service Principal Stream	Retrieves the list of service principal assignments.	Delegated (work or school account)	Application.Read.All, Directory.Read.All, Application.ReadWrite.All, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Application.Read.All, Directory.Read.All, Application.ReadWrite.All, Directory.ReadWrite.All
	Look up Service Principals Stream	Retrieves the list of service principals.	Delegated (work or school account)	Application.Read.All, Application.ReadW Directory.Read.All, Directory.ReadWrite.A
			Delegated (personal Microsoft account)	Not supported.
			Application	Application.Read.All, Application.ReadW Directory.Read.All
Password Management	Reset Password	Resets the password of the Entra ID user account. **Note:** This spoke action resets the password of users created in Entra ID only and does not reset the password of the federated users.	Delegated (work or school account)	User-PasswordProfile.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	User-PasswordProfile.ReadWrite.All

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Category	Action	Description	Permissions Required (from least to most privileged)	
	Look up Password Expiration	Retrieves Password expiration details for the provided user from Microsoft Entra ID.	Delegated (work or school account)	User.ReadBasic.All, User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A
	Change Password	Changes the password of a user in Microsoft Entra ID. Ensure that the password meets the Entra ID password requirements.	Delegated (work or school account)	User-PasswordProfile.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	Not supported.
	Generate Random Password	Generates the random password as per the default Entra ID password policy. **Note:** You must install the KMF plugin before executing this action.	Delegated (work or school account)	None.
			Delegated (personal Microsoft account)	
			Application	
User Management	Look up User	Retrieves a user account from Entra.	Delegated (work or school account)	User.ReadBasic.All, User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A
	Look up Users Stream by Directory	Retrieves the list of users from a directory.	Application	User.ReadBasic.All, User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.

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Category	Action	Description	Permissions Required (from least to most privileged)	
			Delegated (work or school account)	GroupMember.Read.All, Group.Read.All, GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.Read.All
	Revoke User SignIn Sessions	Invalidates all signed in sessions of a user.	Delegated (work or school account)	User.ReadWrite.All, Directory.ReadWrite.
			Delegated (personal Microsoft account)	Not supported.
			Application	Not supported.
	Create User	Creates a user with the given details.	Delegated (work or school account)	User.ReadWrite.All, Directory.ReadWrite. Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	User.ReadWrite.All, Directory.ReadWrite.
	Delete User	Deletes a user from Microsoft Entra ID.	Delegated (work or school account)	Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	User.ReadWrite.All
	Disable User	Disables a user in Microsoft Entra ID.	Delegated (work or school account)	User.ReadWrite, User.ReadWrite.All, User.ManageIdentities.All, Directory.ReadWrite.All, Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	User.ReadWrite
			Application	User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A
	Enable User	Enables a user account in the Microsoft Entra ID.	Delegated (work or school account)	User.ReadWrite, User.ReadWrite.All, User.ManageIdentities.All, Directory.ReadWrite.All, Directory.AccessAsUser.All
			Delegated (personal	User.ReadWrite

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Category	Action	Description	Permissions Required (from least to most privileged)	
			Microsoft account)	
			Application	User.ReadWrite.All, User.ManageIdentitie Directory.ReadWrite.All
	Fetch Latest Delta Token for Users	Returns the latest delta token for the users.	Delegated (work or school account)	User.ReadBasic.All, User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Application	User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A
	Is User Enabled	Checks whether the specified user account is enabled in Microsoft Entra ID.	Delegated (work or school account)	User.Read, User.ReadWrite, User.ReadBa User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	User.Read, User.ReadWrite
			Application	User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A
	Is User in Group	Checks whether the specified user account is a member of the specified group in Entra.	Delegated (work or school account)	User.ReadBasic.All, User.Read.All, Directory.Read.All, User.ReadWrite.All, Directory.ReadWrite.All, Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	Not supported.
			Application	User.ReadBasic.All, User.Read.All, Directory.Read.All, User.ReadWrite.All, Directory.ReadWrite.All
	Look up Users Stream	Lists all the users in an organization or users satisfying the specified search query, filter and next token if any.	Application	User.ReadBasic.All, User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All
			Delegated (personal Microsoft account)	Not supported.
			Delegated (work or school account)	GroupMember.Read.All, Group.Read.All, GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.Read.All

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Category	Action	Description	Permissions Required (from least to most privileged)	
	Update User	Updates user properties in Entra ID with the provided details. **Note:** Entra ID does not allow updating values to null. Null or empty values are discarded in Entra ID when null is passed as an input.	Delegated (work or school account)	User.ReadWrite, User.ReadWrite.All, User.ManageIdentities.All, Directory.ReadWrite.All, Directory.AccessAsUser.All
			Delegated (personal Microsoft account)	User.ReadWrite
			Application	User.ReadWrite.All, User.ManageIdentitie Directory.ReadWrite.All
	Does User owns Group	Checks if an existing user is a owner of a group in Entra ID.	Delegated (work or school account)	GroupMember.Read.All, Group.Read.All, GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.Read.All
			Delegated (personal Microsoft account)	Not supported.
			Application	GroupMember.Read.All, Group.Read.All, GroupMember.ReadWrite.All, Group.ReadWrite.All, Directory.Read.All
	Look up Incremental Changes for Users Stream	Retrieves the list of users in Entra ID. By using Delta Token, enables you discover changes to users without having to fetch the entire set of users.	Delegated (work or school account)	User.Read, User.ReadWrite, User.ReadBa User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A
			Delegated (personal Microsoft account)	Not supported.
			Application	User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.A

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

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- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Microsoft Entra ID user management AI agent	Automates user and group management tasks in Microsoft Entra ID. The AI agent creates, enables and disables users, manages security and office groups, and performs advanced queries such as, retrieving incremental changes or direct reports.
Microsoft Entra ID group management AI agent	Automates user and group management tasks in Microsoft Entra ID. The AI agent retrieves group details, manages group memberships, creates security groups, and automates user provisioning into Office 365.
Microsoft Entra ID license management AI agent	Automates the management of users, security groups, and office groups in Microsoft Entra ID. The AI agent retrieves details about the subscribed SKUs, assigns user licenses, and remove user licenses.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Microsoft Entra ID account requirements

The Microsoft Entra ID spoke requires creating a custom app on your Microsoft Entra account to generate OAuth 2.0 tokens. See: Create an Microsoft Entra ID application.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the AzureAD alias record to authorize actions on Microsoft Entra ID.

Connection alias	Description	Connection URL
AzureAD	Connection to Microsoft Entra ID.	https://graph.microsoft.com

For information about setting up the spoke, see Set up Microsoft Entra ID spoke.

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Set up Microsoft Entra ID spoke

Integrate the ServiceNow instance and your Microsoft Entra account by creating a custom OAuth application in Microsoft Entra ID to authenticate ServiceNow requests.

https://player.vimeo.com/video/1175223454?h=e057a5f42c&badge=0&autopause=0&player_id=0&%E2%80%A6

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Entra ID spoke.
- Role required: admin.

Create an Microsoft Entra ID application

Create a custom app using your Azure portal to enable OAuth 2.0 authentication with the Microsoft Entra ID spoke.

Before you begin

- Request Integration Hub subscription.
- Activate the Microsoft Entra ID spoke.
- Microsoft Entra ID spoke requirements:
  - Microsoft Entra ID account
  - Microsoft Entra ID administrator credentials
- Role required: admin

About this task

Complete these steps from your Azure portal. See the Microsoft identity platform documentation documentation for instructions on creating and configuring custom applications.

Procedure

1. From your Azure portal, access Microsoft Entra ID.
2. Create an Microsoft Entra ID application.
   Alternatively, you can use an existing application. Ensure that you configure the existing application as outlined here.
3. Navigate to **App registrations** and click **New registration**.
4. On the form, fill the values.
5. In **Redirect URI**, enter your ServiceNow instance URL in this format: `https://<Instance-Name>.service-now.com/oauth_redirect.do`.
   See Create a Microsoft Entra application and service principal that can access resources for instructions on registering and configuring an application.

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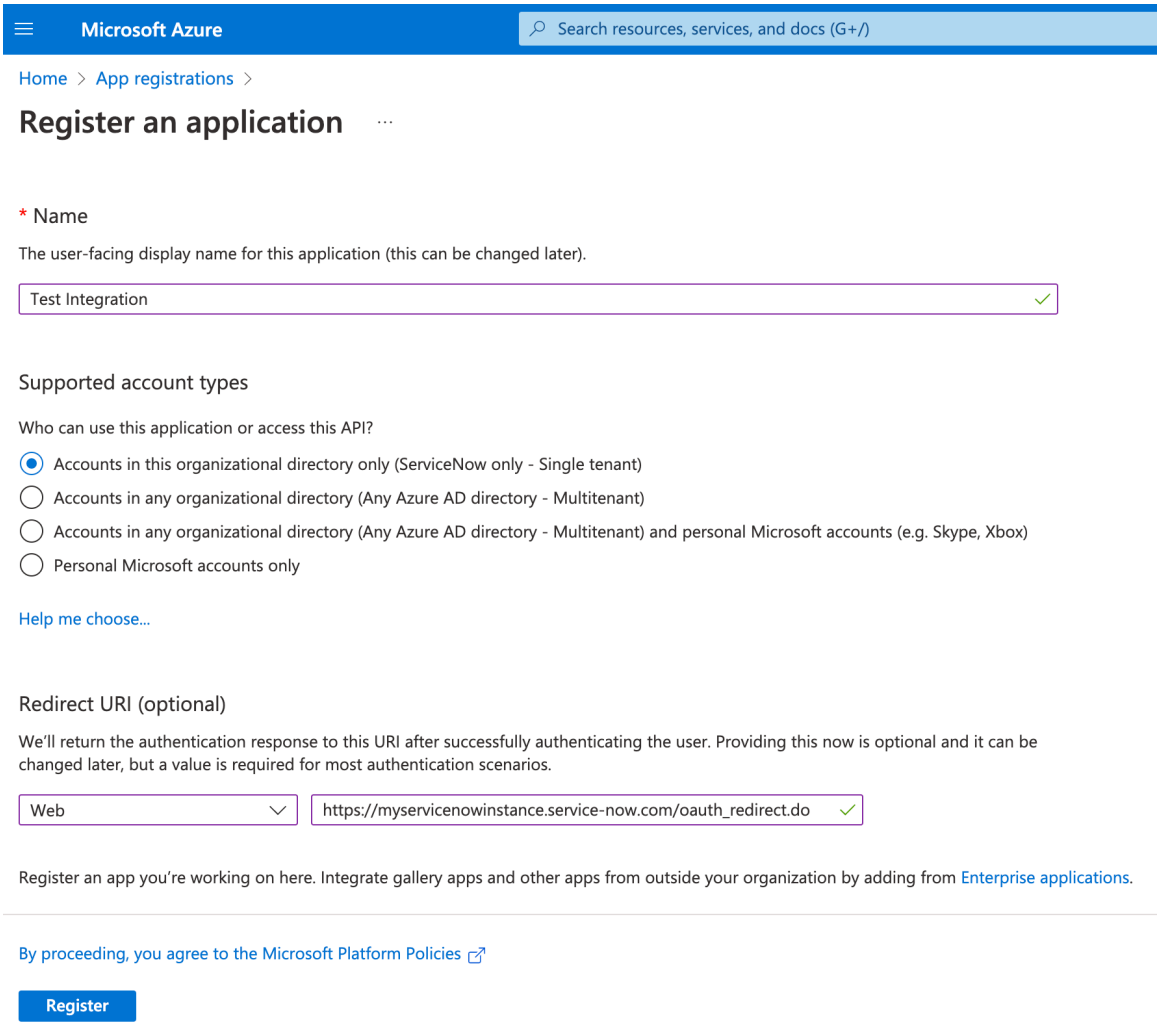

6. Click **Register**.
   The application is created and the required details are displayed.
7. Copy and record the value of Directory ID.
   This value is required to register the app as a third-party OAuth provider on your ServiceNow instance.



8. Click **Certificates & secrets**.
9. Click **New client secret**.
   Secret is generated and displayed.
10. Copy and record the value.
    This value is required to register the app as a third-party OAuth provider on your ServiceNow instance.

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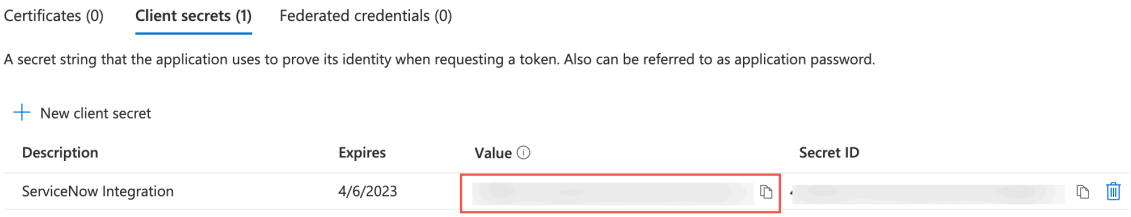
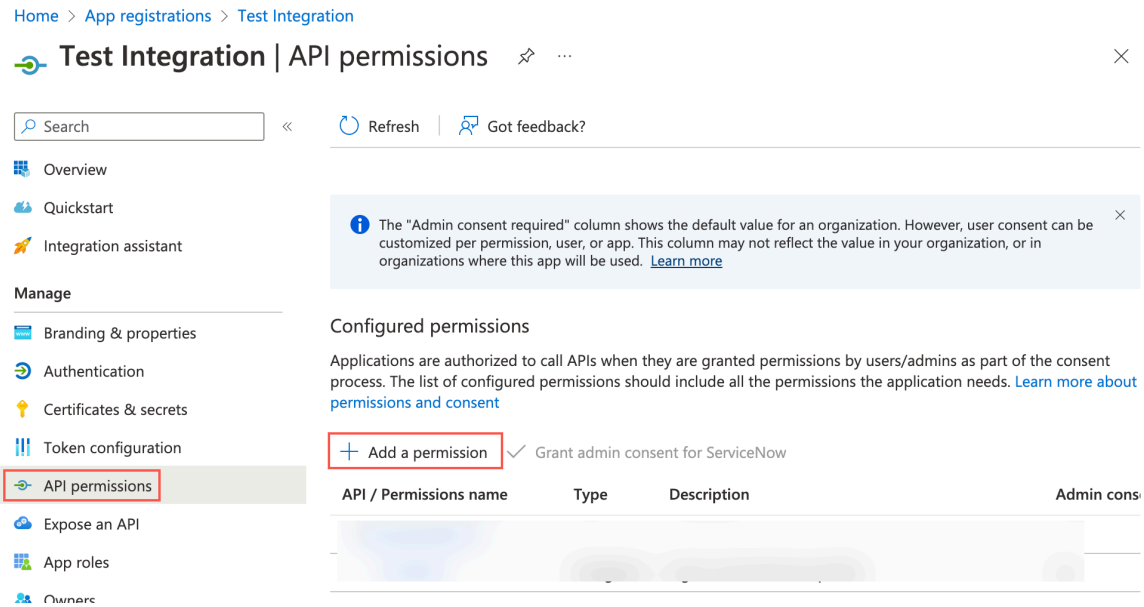


11. Click **API permissions**.
12. Click **Add a permission** to add the required permissions to access the APIs.

    For information about permissions needed to perform the required actions, see the Spoke actions section here: Spoke actions.



13. Grant admin consent to your application.
    See Quickstart: Configure a client application to access a web API for more information.

Configure a connection for the Microsoft Entra ID spoke

Configure a connection to your Microsoft Entra ID account. The Microsoft Entra ID spoke connection and credential aliases use these connections to perform actions in the Microsoft Entra ID.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **AzureAD** and click **View Details**.

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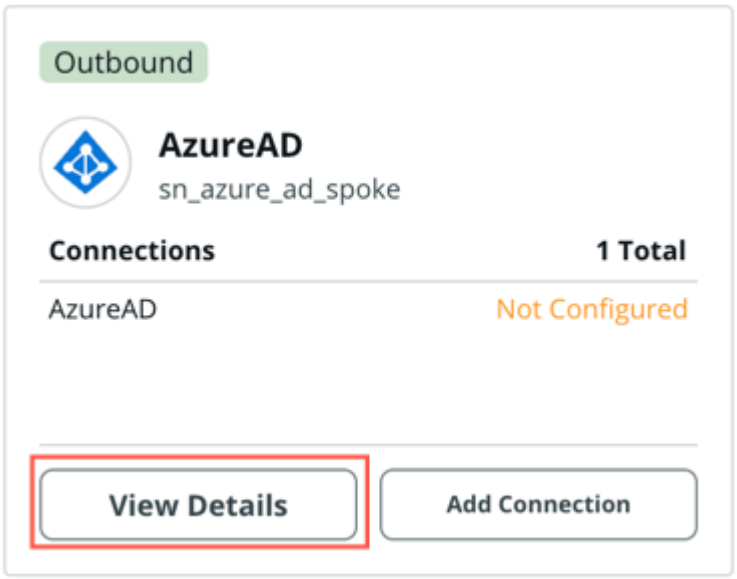
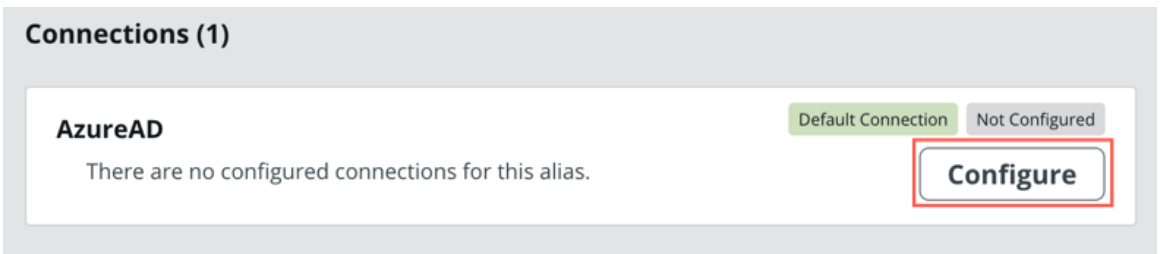
- To configure the default connection and credential alias record that is shipped along with the Entra ID spoke, click **View Details**.



- To manage more than one Entra ID spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the form, fill in these fields:

Field	Value required
Connection Information	
Name	Auto-generated name to identify the connection record.
Credential Information	
Auth URL	Authorization URL in this format: `https://login.microsoftonline.com/<Directory ID>/oauth2/v2.0/authorize`. Replace `<Directory ID>` with the directory ID in your Entra ID configuration.
Token URL	Token URL in this format: `https://login.microsoftonline.com/<Directory ID>/oauth2/v2.0/token`. Replace `<Directory ID>` with the directory ID in your Microsoft Entra ID configuration properties.
Revoke token URL	Revoke token URL in this format: `https://login.microsoftonline.com/<Directory ID>/oauth2/v2.0/revoke`. Replace `<Directory ID>` with the directory ID in your Entra ID configuration properties.

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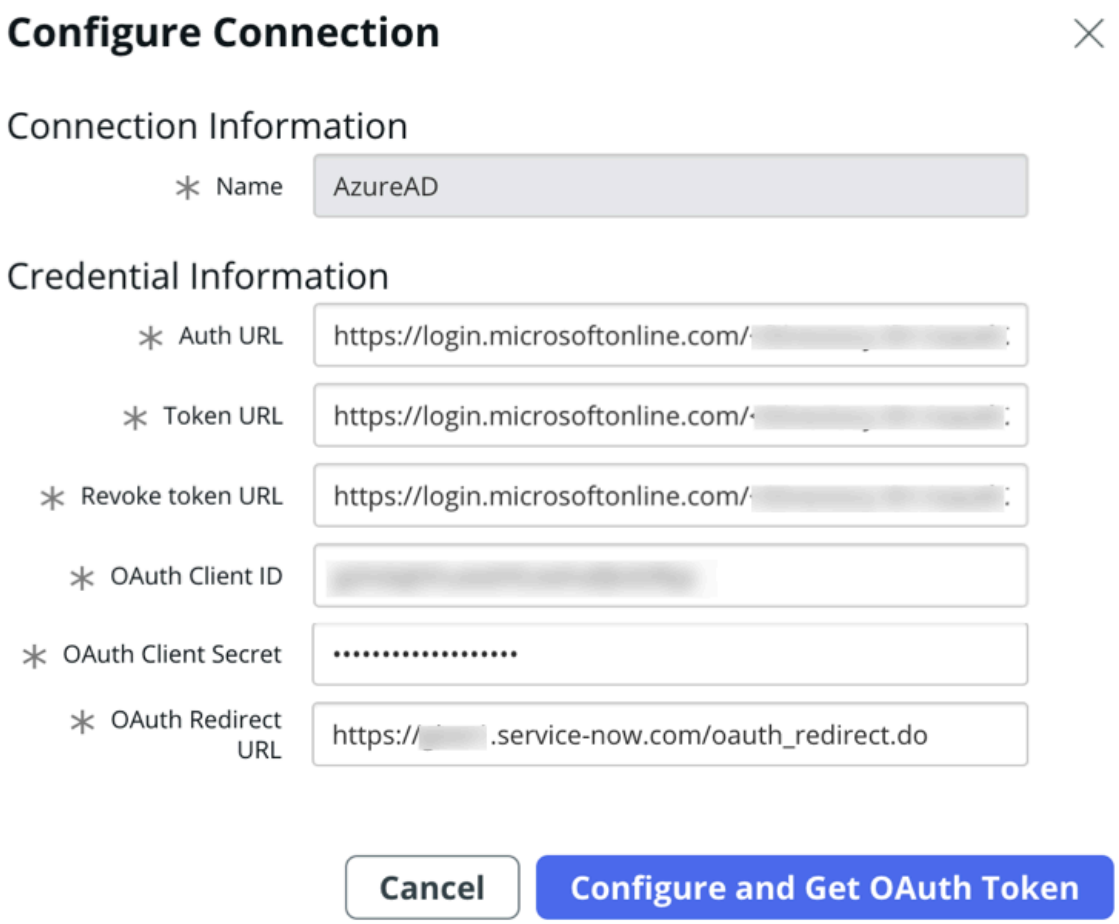
Field	Value required
OAuth Client ID	Client ID you created during the Entra ID application registration.
OAuth Client Secret	Key value you created during the Entra ID application registration.
OAuth Redirect URL	Redirect URL of your ServiceNow instance in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`.



6. Click **Configure and Get OAuth Token**.

Result
The Microsoft Entra ID spoke is set up and integrated with the ServiceNow instance.

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Note: By default, the grant type of the application registry record is set to **Authorization Code**.

- If you want to use credentials of an Azure user to obtain the OAuth token and run all flows with that user delegation, use **Authorization Code**. Currently, delegation of permission to each logged in ServiceNow user isn't supported.
- If you want to grant permission to an app instead of an individual user, change the grant type to **Client Credentials**. This ensures that all flows, either interactive or background, will use the app permissions to execute the flows. For more information on how to use Client Credentials, see KB0993701.
- In situations where you can't use one grant type but require both the **Authorization Code** and **Client Credentials** grant types to perform the actions, create a child alias.

Regenerate Entra ID OAuth token

Regenerate the Entra ID OAuth token when it expires.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select the Entra ID spoke OAuth Credential record.

   Example

   For example, select **Azure AD Credentials**.
3. From Related Links, click **Get OAuth Token**.

Microsoft Exchange Online Spoke

The Microsoft Exchange Online spoke creates and manages calendar and mail in Microsoft Exchange Online. To create, manage, or delete users and groups, use the Microsoft Azure AD spoke.

Note: User and group management can be done using Microsoft Azure AD only and not Microsoft Exchange Online spoke.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Exchange Online spoke v4.1.2 is the latest version. For version history of the spoke, see Microsoft Exchange Online Spoke release notes.

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Remote Tables (com.glide.script.vtable)
- System Import Data Source (com.glide.system_import_data_source)
- iHub Spoke Util Pack (com.snc.ihub_spoke_util_pack)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported version

Microsoft Graph REST API v1.0

Spoke module

The Microsoft Exchange Online spoke adds the Microsoft Exchange Online application to your instance and includes these modules:

Module	Description
Events	Displays the list of events in Microsoft Exchange Online.
Subscriptions	Displays the list of subscriptions in Microsoft Exchange Online.
Webhook Registry	Displays the list of webhook registries of Microsoft Exchange Online.
Calendars	Displays a list of calendars in Microsoft Exchange Online.
Calendar Events Transform Data	Displays the list of records from the data source.

Spoke flows

The Microsoft Exchange Online spoke provides sample flows in the published state to demonstrate automating renewing subscriptions. Available sample flows include:

Flow	Description
Renew Subscriptions	Retrieves all the subscription records and renews the subscriptions if a renewal is required, based on the expiration time. If any subscription has its status marked as 'Being deleted', then its record is deleted and isn't considered for renewal.

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Spoke subflows

The spoke provides subflows in the Published state to integrate with the Microsoft Exchange Online service. These subflows can be used as part of other subflows and flows.

Category	Subflows	Description
Webhook management	Check Event Subscription	Checks if a webhook subscription with specified event resource, or notification URL and change type exists.
	Create or Update Subscription Record	Checks if the specified subscription record exists in Microsoft Exchange Online and updates the subscription record if it exists. If the subscription record doesn't exist, a new subscription record is created.
	Create or Update Subscriptions for Resources	Checks for the subscriptions for the specified resources. If the subscription for the specified resources don't exist, then new subscriptions are created. **Note:** This subflow is available only when the Workplace Calendar Synchronization plugin is already installed.
	Delete Subscription	Deletes the specified subscription when the specified subscription is related only with the specified application.
	Recreate Removed Subscription	Recreates a removed webhook subscription using the details from the related subscription record.
	Subscription Lifecycle Management	Manages the lifecycle of a webhook subscription.
Calendar Management	Calendar Synchronization	Synchronizes the calendar by retrieving events from the Exchange Online Calendar Events Transformed Data table and adding the retrieved events to the Microsoft Exchange Online Events table. It creates a subscription if a valid subscription doesn't

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Category	Subflows	Description
		exist for the user's specified calendar.
	Create or Update Event Record	Checks for the specific existing event record and updates with the specified properties. If the specified event record does not exist, a new event record is created.
	Delete Calendar Scheduling Event	Deletes the specified event in Microsoft Exchange Online and the related records from events tables, related attachments, related records from event attendees and event to subscription m2m tables.
	Delete Event Record	Deletes the specified event record from events tables and the related attachments, related records from event attendees and event to subscription m2m tables.
	Event Lifecycle Management	Retrieves the event details and updates the records in event, attendees, event to subscription m2m tables accordingly.
	Look up and Update Attachments to Event Record	Retrieves the attachments of a specific event record from Microsoft Exchange Online and updates them.
	Look up and Update Calendar Scheduling Change	Retrieves the event details of a specified event record and updates them.
	Sync up Events	Synchronizes the calendar view based on the data from the Exchange Online Calendar Events Transformed Data table.
	Update Calendar Scheduling Event	Updates the properties of an event object in Microsoft Exchange Online and the related record in the events table.

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Note:

- Use the Microsoft Exchange Online Webhook Registry table to generate a callback URL and store the secret value (Client state) for webhook subscriptions.
- Make sure that webhook subscription is stored in the Microsoft Exchange Online Subscriptions table with the Status field set to Active.

Spoke actions

The Microsoft Exchange Online spoke provides actions to automate calendar and mail tasks when an incident is created in the ServiceNow instance. Available actions and their required permissions are:

Note: Required permissions from least to most privileged are mentioned. At least one, not all, of the mentioned permissions is required to call the API and run the action.

Microsoft Exchange Online spoke actions and required permissions

Category	Action	Description	Permission type	Permissions (from least to most privileged)
Calendar Management	Copy Attachment to Calendar Event	Copies a ServiceNow attachment to an Exchange calendar event.	Delegated (work or school account)	Calendars.ReadWrite
			Delegated (personal Microsoft account)	Calendars.ReadWrite
			Application	Calendars.ReadWrite
	Create Calendar Event	Creates an event in the user's default calendar and specifies the time zone for the start and end times of the event.	Delegated (work or school account)	Calendars.ReadWrite
			Delegated (personal Microsoft account)	Calendars.ReadWrite
			Application	Calendars.ReadWrite
	Create Recurring Calendar Events	Creates a recurring event in the user's default calendar and specifies the time zone for the start and end times of the event.	Delegated (work or school account)	Calendars.ReadWrite
			Delegated (personal Microsoft account)	Calendars.ReadWrite
			Application	Calendars.ReadWrite
	Delete Attachment	Deletes the specified attachment in the specified event.	Delegated (work or	Calendars.ReadWrite

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Microsoft Exchange Online spoke actions and required permissions (continued)

Category	Action	Description	Permission type	Permissions (from least to most privileged)
			school account)	
			Delegated (personal Microsoft account)	Calendars.ReadWrite
			Application	Calendars.ReadWrite
	Delete Calendar Event	Deletes a calendar event.	Delegated (work or school account)	Calendars.ReadWrite
			Delegated (personal Microsoft account)	Calendars.ReadWrite
			Application	Calendars.ReadWrite
	Find Meeting Times	Retrieves meeting times and locations based on the availability of the meeting organizer and attendees for the specified time and locations.	Delegated (work or school account)	Calendars.Read, Calendars.ReadWrite
			Delegated (personal Microsoft account)	Not supported.
			Application	
	Look up Attachments by Event ID	Retrieves all the attachments in the specified event.	Delegated (work or school account)	Calendars.Read
			Delegated (personal Microsoft account)	Calendars.Read
			Application	Calendars.Read
	Look up Calendar by ID	Retrieves the calendar details for the specified ID.	Delegated (work or school account)	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
			Delegated (personal Microsoft account)	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite

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Microsoft Exchange Online spoke actions and required permissions (continued)

Category	Action	Description	Permission type	Permissions (from least to most privileged)
			Application	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
	Look up Calendar Events by User ID	Retrieves the list of event objects in the user's mailbox.	Delegated (work or school account)	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
			Delegated (personal Microsoft account)	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
			Application	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
	Look up Calendar View Stream	Retrieves the list of meeting entries for the specified User ID for the specified time period.	Delegated (work or school account)	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
			Delegated (personal Microsoft account)	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
			Application	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
	Look up Calendars Stream	Retrieves details of the calendars of all the users.	Delegated (work or school account)	Calendars.ReadBasic, Calendars.Read, Calendars.Read.Shared, Calendars.ReadWrite
			Delegated (personal Microsoft account)	Calendars.ReadBasic, Calendars.Read, Calendars.Read.Shared, Calendars.ReadWrite
			Application	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
	Look up Event by ID	Retrieves the calendar event details for the specified ID.	Delegated (work or school account)	Calendars.ReadBasic, Calendars.Read
			Delegated (personal Microsoft account)	Calendars.ReadBasic, Calendars.Read

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Microsoft Exchange Online spoke actions and required permissions (continued)

Category	Action	Description	Permission type	Permissions (from least to most privileged)
			Application	Calendars.ReadBasic, Calendars.Read
	Look up Schedules	Retrieves the list of schedules.	Delegated (work or school account)	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
			Delegated (personal Microsoft account)	Not supported.
			Application	Calendars.ReadBasic, Calendars.Read, Calendars.ReadWrite
	Look up Out of Office Settings	Retrieves the details of the out-of-office settings for the specified recipients.	Delegated (work or school account)	Mail.Read, Mail.Read.Shared
			Delegated (personal Microsoft account)	Mail.Read
			Application	Mail.Read
	Look up Time Zones	Retrieves details of all the available time zones.	Delegated (work or school account)	User.Read, User.ReadBasic.All
			Delegated (personal Microsoft account)	User.Read
			Application	User.Read.All
	Update Calendar Event	Updates the properties of an event object.	Delegated (work or school account)	Calendars.ReadWrite
			Delegated (personal Microsoft account)	Calendars.ReadWrite
			Application	Calendars.ReadWrite
Mail Management	Delete Message	Deletes the message in a user's inbox or from a custom folder.	Delegated (work or school account)	Mail.ReadWrite

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Microsoft Exchange Online spoke actions and required permissions (continued)

Category	Action	Description	Permission type	Permissions (from least to most privileged)
			Delegated (personal Microsoft account)	Mail.ReadWrite
			Application	Mail.ReadWrite
	Look Up Mail Folders by User ID	Retrieves all the mail folders for a specified User ID.	Delegated (work or school account)	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
			Delegated (personal Microsoft account)	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
			Application	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
	Look Up Messages by Mail Folder ID	Retrieves all the messages in a mail folder.	Delegated (work or school account)	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
			Delegated (personal Microsoft account)	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
			Application	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
	Look Up Messages by User ID	Retrieves all the messages in the inbox folder of the user.	Delegated (work or school account)	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
			Delegated (personal Microsoft account)	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
			Application	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
	Send Mail	Sends an email with the message subject and message body to the specified list of recipients.	Delegated (work or school account)	Mail.Send
			Delegated (personal Microsoft account)	Mail.Send
			Application	Mail.Send

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Microsoft Exchange Online spoke actions and required permissions (continued)

Category	Action	Description	Permission type	Permissions (from least to most privileged)
	Set Mailbox Auto Reply	Sets the user's auto-reply message for the given time period.	Delegated (work or school account)	MailboxSettings.ReadWrite
			Delegated (personal Microsoft account)	MailboxSettings.ReadWrite
			Application	MailboxSettings.ReadWrite
Webhook Management	Look up Subscription by ID	Retrieves details of the webhook subscription for the specified ID.	Depending on the resource and the permission type (delegated or application) requested, the permission specified in the Get subscription - Permissions table is the least privileged required to call this API.	
	Look up Subscriptions Stream	Retrieves details of all webhook subscriptions.	Depending on the resource and the permission type (delegated or application) requested, the permission specified in the List subscription - Permissions table is the least privileged required to call this API.	
	Renew Webhook Subscription	Renews the subscription of the specified webhook.	Depending on the resource and the permission type (delegated or application) requested, the permission specified in the Update subscription - Permissions table is the least privileged required to call this API.	
	Subscribe Webhook	Creates a webhook subscription for the specified resource.	Depending on the resource and the permission type (delegated or application) requested, the permission specified in the Create subscription - Permissions table is the least privileged required to call this API.	
	Unsubscribe Webhook	Deletes the specified webhook subscription.	Depending on the resource and the permission type (delegated or application) requested, the permission specified in the Delete subscription - Permissions table is the least privileged required to call this API.	
Mailbox Management	Create MailBox	Creates mailboxes and user accounts simultaneously.	These actions uses powershell cmdlets and hence doesn't requires API permissions.	
	Delete MailBox	Deletes or disables mailboxes and user accounts simultaneously.		

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Microsoft Exchange Online spoke actions and required permissions (continued)

Category	Action	Description	Permission type	Permissions (from least to most privileged)
	Enable MailBox	Enables a mailbox in Microsoft Exchange Online. The mailbox can be in an archived state.		
	Look up MailBox	Retrieves the list of mailboxes.		
User Management	Look up Relevant Users Stream	Retrieves a stream of users who are most relevant to the specified user, based on collaboration and organizational context. Relevance is determined by the user's communication and collaboration patterns, and business relationships.	Delegated (work or school account)	People.Read, People.Read.All
			Delegated (personal Microsoft account)	People.Read
			Application	People.Read.All

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Microsoft Exchange Online calendar management AI agent	Automates workflows related to the calendar within Microsoft Exchange Online such as calendar event management, attachment handling, and time zone look ups.

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AI Agent	Description
Microsoft Exchange Online room management AI agent	Automates workflows related to the room management within Microsoft Exchange Online such as 'Look up Rooms Stream'.
Microsoft Exchange Online metadata retrieval management AI agent	Automates workflows related to the room metadata management within Microsoft Exchange Online such as looking up room metadata and time zone metadata.
Microsoft Exchange Online meeting scheduler AI agent	Automates calendar management tasks within Microsoft Exchange Online. It enables users to find the available meeting time slots and create the meetings accordingly.
Microsoft Exchange Online mail management AI agent	Automates mail management tasks within Microsoft Exchange Online such as look up mail folders and messages, delete messages, and set mailbox auto-replies.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Microsoft account requirements

The Microsoft Exchange Online spoke needs registering an application using the Microsoft Azure portal to generate OAuth 2.0 tokens.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Microsoft Exchange Online spoke.

MID Server requirements

To use these actions, your instance must have a MID Server set up and configured to use PowerShell. Make sure that Power Shell with EXO V2 module is installed. This module is required for executing the Mailbox management actions. Use the connection record associated with the Mailbox alias to configure where actions run as well as set MID Server selection attributes. For more information about the MID Server, see MID Server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up Microsoft Exchange Online spoke

Integrate the ServiceNow instance and Microsoft Exchange Online account by creating a custom OAuth application in Microsoft Exchange Online to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Exchange Online spoke.
- Role required: admin.

Register an application using the Microsoft Azure portal

Provide authorization to the ServiceNow instance by registering an application with Azure AD.

Before you begin

Role required: Azure Active Directory admin

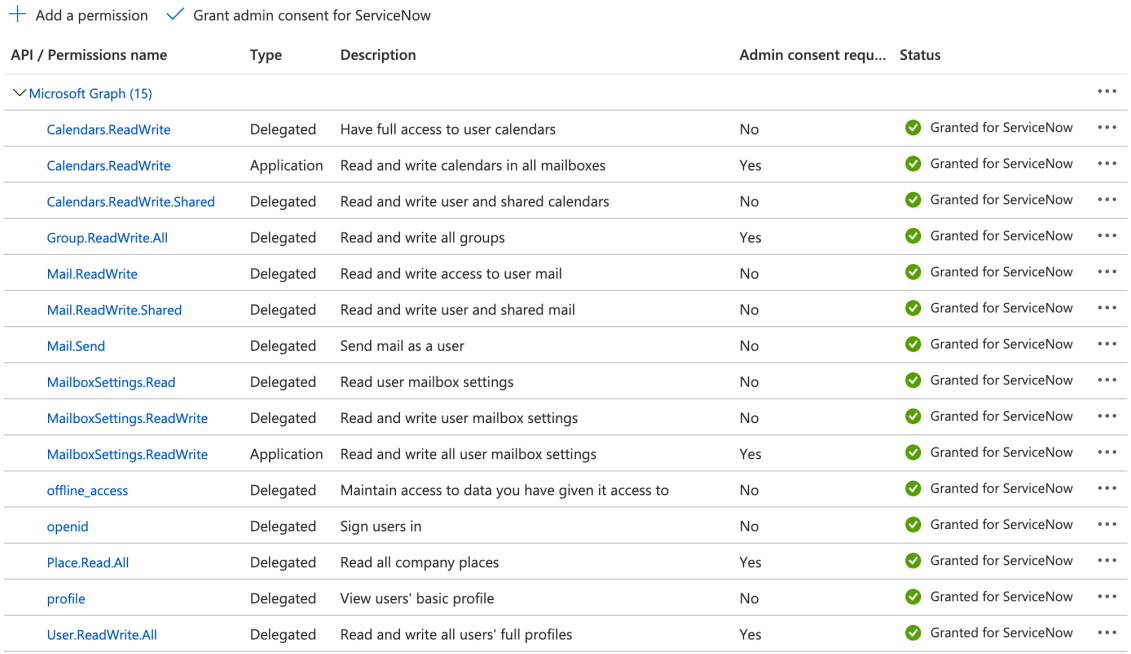
About this task

Complete these steps from the Microsoft Azure portal. For instructions on registering an application, see the Microsoft Azure documentation.

Procedure

1. In the Microsoft Azure portal, add the **Redirect URIs** in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`
2. For the **Required Permissions**, select **Microsoft Graph**.

   Note: The permissions displayed here are needed to use all the spoke actions. However if you want to use only some of the actions, you can add only the required permissions. For more information about the required permissions for each action, see Spoke actions.



+ Add a permission ✓ Grant admin consent for ServiceNow

API / Permissions name	Type	Description	Admin consent requ...	Status
Microsoft Graph (15)				
Calendars.ReadWrite	Delegated	Have full access to user calendars	No	Granted for ServiceNow
Calendars.ReadWrite	Application	Read and write calendars in all mailboxes	Yes	Granted for ServiceNow
Calendars.ReadWrite.Shared	Delegated	Read and write user and shared calendars	No	Granted for ServiceNow
Group.ReadWrite.All	Delegated	Read and write all groups	Yes	Granted for ServiceNow
Mail.ReadWrite	Delegated	Read and write access to user mail	No	Granted for ServiceNow
Mail.ReadWrite.Shared	Delegated	Read and write user and shared mail	No	Granted for ServiceNow
Mail.Send	Delegated	Send mail as a user	No	Granted for ServiceNow
MailboxSettings.Read	Delegated	Read user mailbox settings	No	Granted for ServiceNow
MailboxSettings.ReadWrite	Delegated	Read and write user mailbox settings	No	Granted for ServiceNow
MailboxSettings.ReadWrite	Application	Read and write all user mailbox settings	Yes	Granted for ServiceNow
offline_access	Delegated	Maintain access to data you have given it access to	No	Granted for ServiceNow
openid	Delegated	Sign users in	No	Granted for ServiceNow
Place.Read.All	Delegated	Read all company places	Yes	Granted for ServiceNow
profile	Delegated	View users' basic profile	No	Granted for ServiceNow
User.ReadWrite.All	Delegated	Read and write all users' full profiles	Yes	Granted for ServiceNow

3. Record the **Client Secret** for use in later configurations.

Result

The ServiceNow application is created with Microsoft Azure AD.

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Configure a connection for the Microsoft Exchange Online spoke

Perform actions in Microsoft Exchange Online by configuring connection records for your Microsoft Exchange Online account. The Microsoft Exchange Online spoke connection and credential alias uses these connections to perform actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Locate the **Microsoft_Exchange_Online** connection alias.
3. For **Configuration Template**, ensure that **Microsoft Exchange Online Authorization Code** is selected.
4. Click the Create New Connection & Credential related link.
5. On the form, fill in the fields.

Field	Description
Connection Information	
Name	Name to uniquely identify the connection. For example, `Microsoft_Exchange_Online`.
Connection URL	Enter `https://graph.microsoft.com`.
API Version	Enter `v1.0`.
Credential Information	
Name	Name to identify the credential record. For example, `Exchange_Online Creds`.
Authorization URL	OAuth authorization code endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/authorize`
Token URL	OAuth server token endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/token`
Token Revocation URL	OAuth server token revocation endpoint.
OAuth Client ID	Application ID created during application registration.
OAuth Client Secret	Client secret created during application registration.
OAuth Redirect URL	OAuth callback endpoint. Enter `https://<instance-name>.service-now.com/oauth_redirect.do`

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6. Click **Create and Get OAuth Token**.
7. Click the **Child Aliases** tab.
8. Click the **Microsoft_Exchange_Online_clientCred** connection record.
9. Click the Create New Connection & Credential related link.
10. On the form, fill in the fields.

Field	Description
Connection Information	
Name	Name to uniquely identify the connection. For example, `Microsoft_Exchange_Online_ClientCred`.
Connection URL	Enter `https://graph.microsoft.com`.
Credential Information	
Name	Name to identify the credential record. For example, `Exchange_Online_ClientCred Creds`.
Token URL	OAuth server token endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/token`
OAuth Client ID	Application ID created during application registration.
OAuth Client Secret	Client secret created during application registration.

11. Click **Create and Get OAuth Token**.

Result

The Microsoft Exchange Online spoke is set up and integrated with the ServiceNow instance.

Create a credential record for the Microsoft Exchange Online spoke Mailbox actions

Create a credential record for the Microsoft Exchange Online spoke Mailbox actions. The Microsoft Exchange Online spoke connection and credential alias uses these credentials to authorize Mailbox actions.

Before you begin

- Make sure that MID Server is setup and configured
- Make sure that Power Shell with EXO V2 module is installed. This module is required for executing Mailbox management actions.
- Role required: admin

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Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **Windows Credentials**.
4. On the form, fill in the fields.

Windows Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, MS Exchange Online Mailbox Cred.
Active	Option to actively use the credential record.
User name	UPN or login ID of the Entra ID user.
Password	Password of the Entra ID user.
Applies to	Option to specify if the credential applies to all MID Servers in your network, or to one or more **Specific MID servers**. Specify the MID Servers that should use this credential in the **MID servers** field.
Order	Order to apply this credential. For example, `100`.
Credential alias	Credential alias associated with the spoke.

5. Right-click the form header and click **Submit**.

Result
A Windows Credential record is created for the Microsoft Exchange Online spoke Mailbox actions.

Configure a connection record for the Microsoft Exchange Online spoke Mailbox actions

Configure a connection record for your Microsoft Exchange Online spoke Mailbox actions. The Microsoft Exchange Online spoke connection and credential aliases use these connections to perform only Mailbox actions.

Before you begin

- Make sure that MID Server is setup and configured
- Make sure that Power Shell with EXO V2 module is installed. This module is required for executing Mailbox management actions.
- Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the **Microsoft Exchange Online MID** record.
3. From the **Connections** tab, click **New**.

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4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `MS Exchange Online Mailbox Connection`.
Credential	Credential record created for Microsoft Exchange Online spoke Mailbox actions. For example, `MS Exchange Online Mailbox Cred`.
Connection alias	Alias record associated with this connection.
Connection URL	Base URL to connect to **Microsoft Exchange Online**. Enter: `127.0.0.1`
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use MID Servers for this connection. If the check box is selected, define the fields in the Advanced MID Server Configuration related list.

5. Click **Submit**.

Result
A connection record is created for Microsoft Exchange Online spoke Mailbox actions.

Regenerate the Microsoft Exchange Online OAuth token

Authorize the Microsoft Exchange Online spoke by regenerating the Microsoft Exchange Online OAuth token after it expires.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select the Microsoft Exchange Online spoke OAuth Credential record.
3. To regenerate the OAuth token, click the **Get OAuth Token** related link.

Result
The Microsoft Exchange Online spoke receives a new OAuth access token.

Microsoft Exchange Server Spoke

The Microsoft Exchange Server spoke creates and manages address list, mailbox, and calendar events in Microsoft Exchange mail system.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Exchange Server spoke v2.6.0 is the latest version. For version history of the spoke, see Microsoft Exchange Server spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - PowerShell (com.glide.hub.action_step.powershell)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

- Exchange Server 2016 installed on Windows Server 2016

  Note: The Create Calendar Event For User and Lookup Room Availability actions are supported only on Exchange Server 2013.

- Exchange Server 2013 installed on Windows Server 2012 R2

This spoke may be compatible with the earlier versions of Microsoft Exchange Server.

Spoke requirements

Powershell remoting must be enabled on the target Exchange Server. For more information about the Microsoft Exchange Server, see Exchange Server documentation.

Spoke flows

The Exchange Server spoke provides sample flows to demonstrate automating the Exchange Server tasks. To customize a sample flow, copy it to the required application scope. Available sample flows include:

Flow	Description
Pull From Subscriptions	Uses the Look up Items From Subscription ID subflow to periodically retrieve the modified items in an active subscription and saves the details in the ServiceNow instance.
Look up Calendar Item from Item ID Flow	Uses the Look up Items From Subscription ID subflow to display the details of the modified items in a subscription in the Subscription to Events Mapping module.

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Flow	Description
Renew Subscription	Uses the Renew Subscription subflow to renew subscription.

Note: Subscriptions are valid for 24 hours and flows renew the subscriptions periodically. If there are failures with the third-party applications, subscriptions will not be renewed. That is, **Active** is set to **False**. In the event of failure, you should use the create subscription flow to create a subscription.

Spoke subflows

The Exchange Server spoke provides sample subflows to demonstrate automating the Exchange Server tasks. To customize a sample subflow, copy it to the required application scope. Available sample subflows include:

Subflow	Description
Look up Items From Subscription ID	Saves the details of the modified items in a subscription to the Event to Subscription Mapping table.
Create Subscription	Creates a subscription for the specified mailbox and adds it to the Subscription table. If the subscription already exists, the subflow adds the application details to the subscription record.
Renew Subscription	Renews a subscription for the given mailbox.

Spoke actions

The Microsoft Exchange Server spoke provides actions to automate address list, mailbox, and calendar event tasks.

Microsoft Exchange Server spoke actions

Category	Action	Description
Address List Management	Create Address List Using Included Recipients	Creates a new address list in Exchange Server using the **Included Recipients** field.
	Create Address List Using Recipient Filter	Creates a new address list in Exchange Server using the **Recipient** field.
	Delete Address List	Deletes the required address list on a required Exchange Server.
	Get Address List Details	Retrieves the details of a required address list on a required Exchange Server.

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Microsoft Exchange Server spoke actions (continued)

Category	Action	Description
	Look Up Address List	Retrieves the address list details on a required Exchange Server using a search query.
	Look up Address List Details	Retrieves details of the specified address list by identity.
	Move Address List	Moves an address list to another location in the address hierarchy.
	Synchronize Address List	Refreshes email clients with the latest details, for a required address list in Exchange Server.
	Update Address List Using Included Recipients	Updates details and recipients of a required address list using a the **Included Recipients** field.
	Update Address List Using Recipient Filter	Updates details and recipients of a required address list details using the **Recipient Filter** field.
Mailbox Management	Create Calendar Event For User	Creates a calendar event in Exchange Server. Calendar event can be either a meeting or appointment. **Note:** • This action is supported only on Exchange Server 2013. • This action uses the Exchange_https connection and credential alias.
	Create Mailbox	Creates mailboxes and user accounts simultaneously.
	Delete Mailbox	Deletes a mailbox in Exchange Server.
	Disable Mailbox	Disables a mailbox in Exchange Server.
	Enable Mailbox	Enables a mailbox in Exchange Server.
	Look up Calendar by Event ID	Retrieves the list of calendar events.

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Microsoft Exchange Server spoke actions (continued)

Category	Action	Description
	Look up Mailbox	Retrieves mailbox properties for a given mailbox in Exchange Server.
	Look up Room Availability	Retrieves the availability response for a given array of room objects.
	Update Mailbox	Updates the properties of a mailbox in Exchange Server.
	Set Mailbox Auto Reply	Schedules the auto-reply for a given mailbox in Exchange Server.
	Lookup Room Mailboxes	Retrieves all the room mailboxes in Exchange Server.
Meeting Management	Look up Meeting Suggestions	Retrieves the meeting suggestions for the specified mailboxes.
	Update a Calendar Meeting	Updates an existing calendar event that has already been created. While updating the meeting, in addition to saving the modified appointment item to the calendar folder, the updated meeting request is sent to all attendees.
	Look up Meetings Stream	Retrieves details of the user's meetings within the specified start and end times.
	Look up Folder ID	Retrieves Folder ID of the required folder.
	Delete Calendar Event for User	Deletes the specified existing calendar event. The update is sent to all attendees.
	Look up User Availabilities	Retrieves the availability response for a given mailbox.
Subscription Management **Note:** The Exchange Server spoke supports the calendar events only.	Create Subscription	Creates a new subscription for given mailbox.
	Look up Calendar Item from Item ID	Retrieves the calendar information for the given calendar ID.
	Look up Events by Subscription ID	Retrieves the latest changes in the calendar folder for the subscription since the last watermark.

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Microsoft Exchange Server spoke actions (continued)

Category	Action	Description
Attachment Management	Copy Attachment to Event Record	Copies an calendar event's attachment to the specified record in the ServiceNow instance.
	Create Attachment	Adds attachment to an event.
	Delete Attachment	Deletes an attachment associated with the provided Attachment ID.
	Delete Attachments from Event Record	Deletes one or more attachments associated with the specified event record.
	Look up Attachment by Attachment ID	Retrieves the specified attachment.

Spoke modules

The Exchange Server spoke adds a Microsoft Exchange Server Spoke module to your ServiceNow instance. Data is these modules is populated when the associated flows are executed:

Module	Description
Subscriptions	Displays details of the subscriptions in Exchange Server. Data is populated in this module when the Create Subscriptions and Renew Subscriptions subflows are executed.
Events	Displays details of the events in Exchange Server. Data is populated in this module when the Look up Calendar Item from Item ID flow is executed.
Event Attendees	Displays details of the event attendees in the events. Data is populated in this module when the Look up Calendar Item from Item ID flow is executed.
Subscription to Events Mapping	Displays details of the subscriptions and events. Data is populated in this module when the Look up Items From Subscription ID subflow is executed.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Two connection and credential aliases are created when the Microsoft Exchange Server spoke is activated, Exchange and Exchange_https.

Note:

- The Exchange_https alias is supported only on Exchange Server 2013.
- The Exchange_https alias is required to use the Create Calendar Event For User and Lookup Room Availability actions.

For information about setting up the spoke, see Set up the Microsoft Exchange Server spoke.

MID Server requirements

Your instance must have a MID Server set up and configured to run PowerShell 2.0. Use the connection record associated with the Microsoft Exchange alias to configure where actions run as well as set MID Server selection attributes. For more information, see MID server .

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Microsoft Exchange Server spoke

Connect your ServiceNow instance with the Microsoft Exchange Server by setting up the connection and credential records for both the Microsoft Exchange Server that are provided when you install Integration Hub on your instance.

Before you begin

- Request an Integration Hub subscription.
- Activate the latest Microsoft Exchange Server spoke plugin on your ServiceNow instance.
- Role required: admin.

About this task

The Microsoft Exchange Server spoke provides two aliases: Exchange and Exchange_https and their respective configuration templates as out of the box components when you install the Microsoft Exchange Server . These out of the box components enable you to easily set up the connection and credential records for both the aliases by just providing the connection and credential information. The out of the box components are already configured for you. To learn how to create the connections and credential records, see:

- Configure a connection for the Exchange alias
- Configure a connection for the Exchange_https alias

You can perform all spoke actions except the Create Calendar Event For User and Lookup Room Availability actions. The Create Calendar Event For User and Lookup Room Availability actions are supported only on Exchange Server 2013.

Note: The user details that are provided in the credential record must have the application impersonation role.

To use the Create Calendar Event For User and Lookup Room Availability actions, perform the same steps again for the Exchange_https connection and credential alias. MID Server isn't necessary to perform this action.

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Configure a connection for the Exchange alias

Configure a connection for the Exchange alias to establish a connection between the ServiceNow® instance and the Microsoft Exchange Server host.

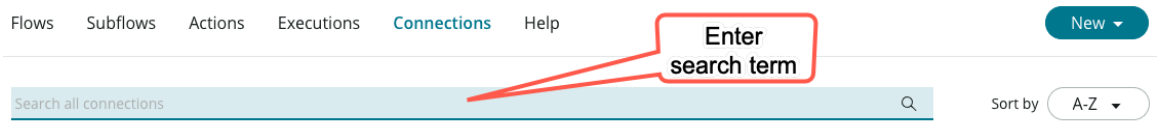
Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the **Exchange** alias.

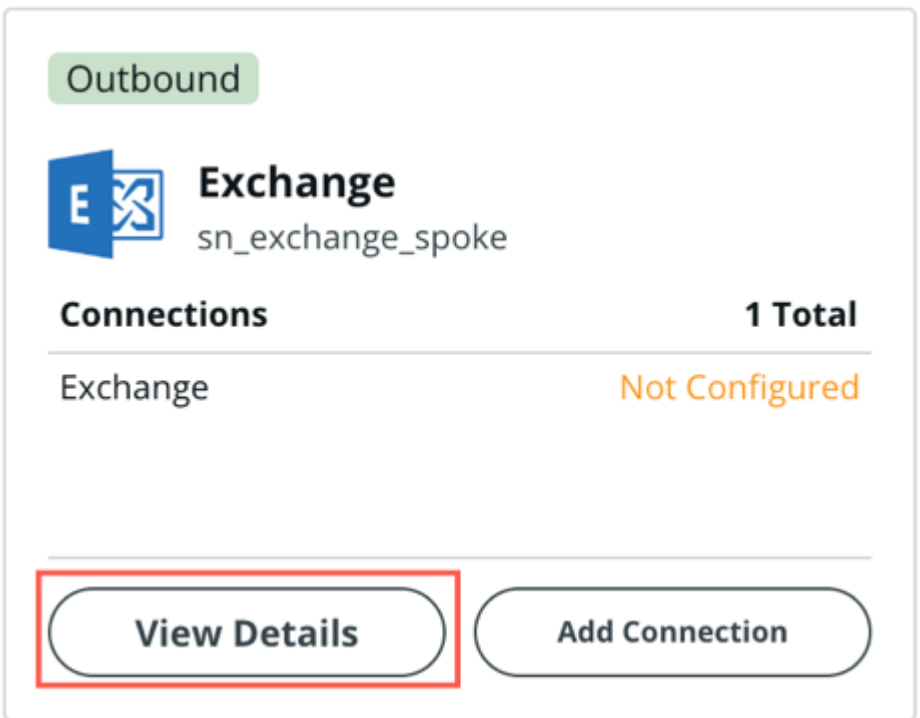
   Tip: To find the alias, in the Search all connections field, enter `Exchange`.

   Search the Exchange alias on the Connections tab

   The Exchange alias tile appears under the **Connections** tab.
5. Click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Microsoft Exchange Server spoke, click **View Details**

     Default connection record

   - To manage more than one Microsoft Exchange Server spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

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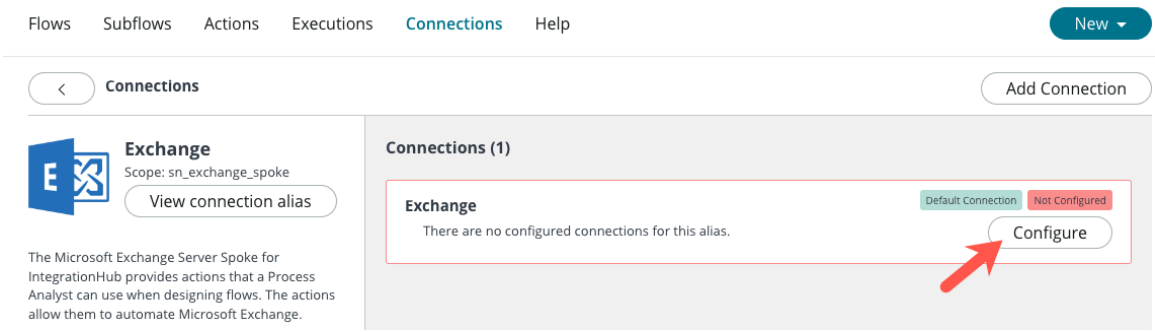
If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.

Configure button for Exchange alias



6. On the form, fill in the fields.

Exchange alias connection and credential form

Field	Description
Connection Name	Name that uniquely identifies the connection and credential record. For example, Microsoft Exchange. **Note:** The connection name of the first record is read-only. You can provide custom names for the subsequent records.
Host	Fully qualified domain name of the target host where the Microsoft Exchange Server is installed. For example, `<host>.<domain>.com`.
User Name	User name with access to the target Windows host.
Password	Password for the account.

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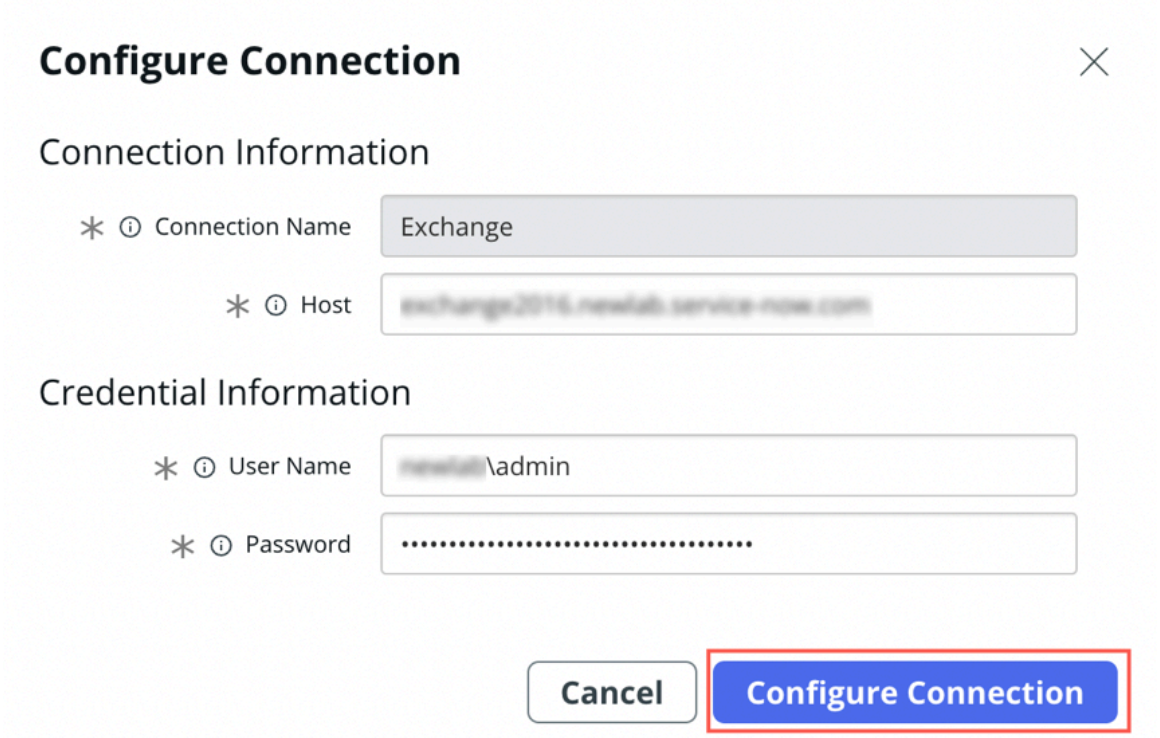
Configure Connection form



7. Select **Configure Connection**.
   The connection and credential record for the Exchange alias is created.

Configure a connection for the Exchange_https alias

Configure a connection for the Exchange_https alias to establish a connection between the ServiceNow® instance and the Microsoft Exchange Server host.

Before you begin

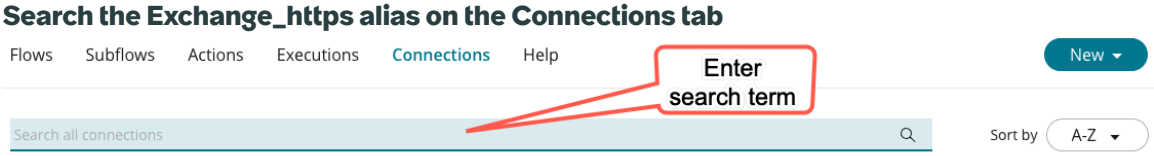
Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the **Exchange_https** alias.

   Tip: To find the alias, in the Search all connections field, enter `Exchange_https`.

   Search the Exchange_https alias on the Connections tab



   The Exchange_https alias tile appears under the **Connections** tab.
5. Click **View Details**.

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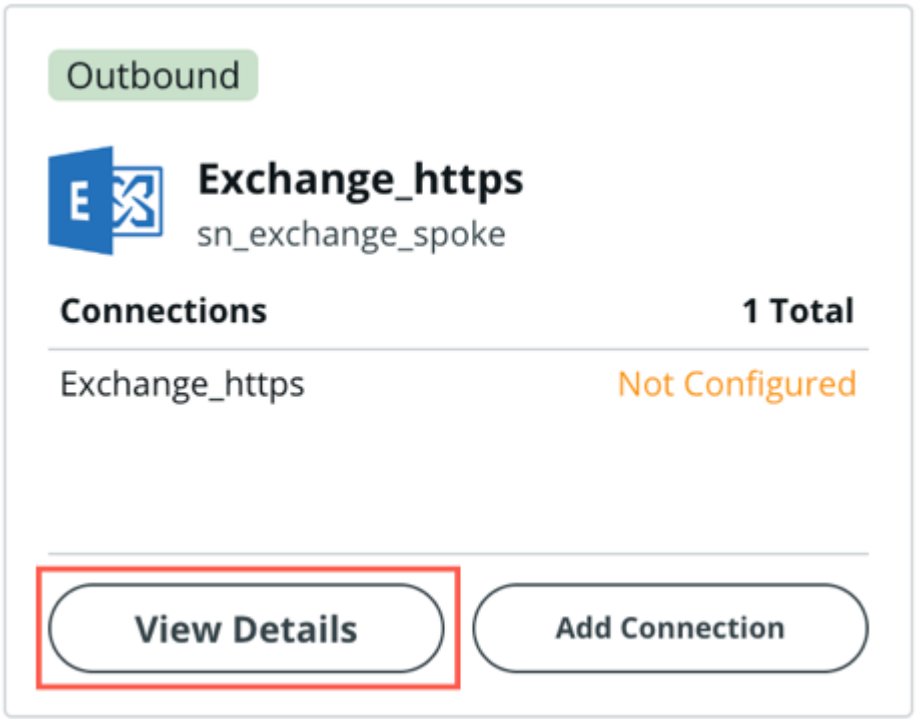
- To configure the default connection and credential alias record that is shipped along with the Microsoft Exchange Server spoke, click **View Details**

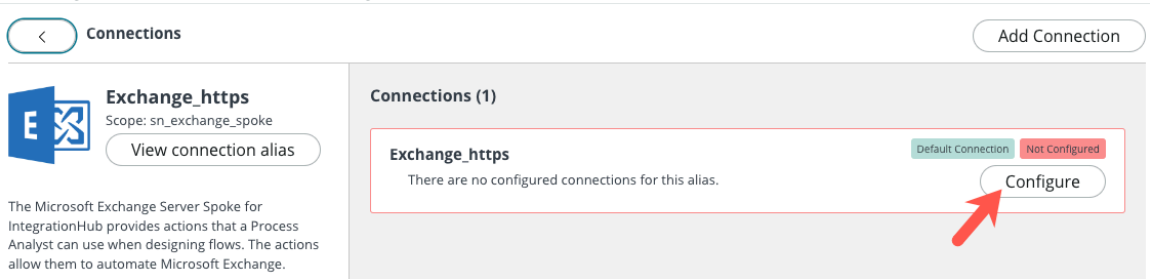
Default connection record



- To manage more than one Microsoft Exchange Server spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.

Configure button for Exchange_https connection record alias



6. On the form, fill in the fields.

Exchange_https connection form

Field	Description
Connection Name	Name that uniquely identifies the connection and credential record. For example, Exchange_https. **Note:** The connection name of the first record is read-only. You can provide custom names for the subsequent records.

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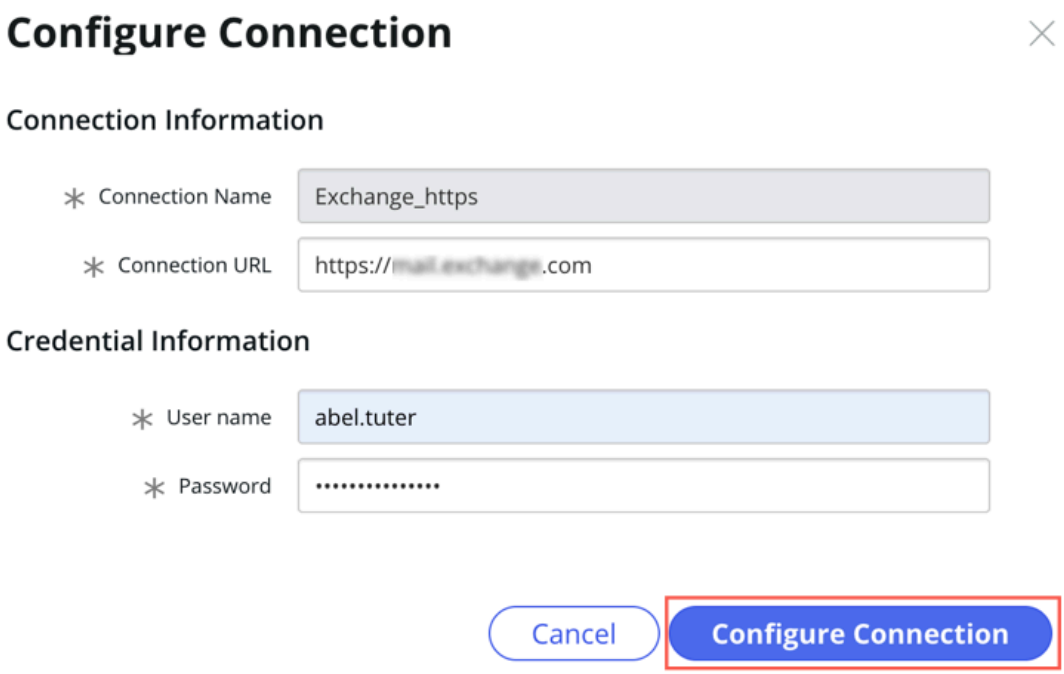
Field	Description
Host	Fully qualified domain name of the target host where the Microsoft Exchange Server is installed. For example, `https://mail.example.com/EWS/Exchange.asmx` can be the format of the host URL where ○ `mail.example.com` is the placeholder for your Exchange server's domain ○ `/EWS/Exchange.asmx` is the path to the Exchange Web Services (EWS) endpoint
User Name	User name with access to the target Windows host.
Password	Password for the account.

Configure Connection form



7. Select **Configure Connection**.
   The connection and credential record for the Exchange_https alias is created.

Microsoft Intune Spoke

Manage devices and applications in the Microsoft Intune account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

The Microsoft Intune spoke v2.0.1 is the latest version. For version history of the spoke, see Microsoft Intune spoke release notes.

Note: Deployment of applications on Android devices isn't supported.

Supported versions

This spoke was built for the Microsoft Intune Application programming Interface (API) version v1, but may be compatible with the later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Microsoft Entra ID Spoke (formerly Microsoft Azure Active Directory spoke)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation. For more information on licenses, contact your account manager.

Spoke subflows

The Microsoft Intune spoke provides sample subflows to demonstrate automating tasks. To customize a sample subflow, copy it to required application scope. Available sample subflows include:

Subflow	Description
Create Software Configuration	Enables a CSD agent to create the software configuration record of the specified Microsoft Intune application.
Configure Group	Enables a CSD agent to create and configure the Microsoft Intune group in Intune Admin Portal.
Deploy Application	Adds the provided user or device to a group in the Microsoft Intune server.
Discover and Store Data	Discovers the data from the Microsoft Intune server and updates the records in the Application [sn_ms_intune_spoke_application], Group [sn_ms_intune_spoke_group], and Deployment [sn_ms_intune_spoke_deployment] tables.

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Subflow	Description
Look up Application Details	Retrieves the additional deployment details for applications and updates the respective records in the deployment table.
Look up Configuration Data	Retrieves configuration data for the specified requested item or software configuration record.
Look up Groups	Returns the list of install groups or uninstall groups associated with given application id.
Revoke Application	Removes the provided user or device from the given group in the Microsoft Intune server.

Important: To use these subflows, install the Client Software Distribution 2.0 application.

Spoke actions

The Microsoft Intune spoke provides actions to automate tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Application Management	Get Managed Application	Retrieves the details of an application.
	Look up Application Assignments	Retrieves the application assignment data from the Microsoft Intune server.
	Look up Managed Applications	Retrieves a list of all the applications.
Device Management	Delete Managed Device	Deletes a managed device.
	Get Managed Device	Retrieves the details of a managed device.
	Look up Managed Devices	Retrieves the details of a managed device.
	Look up Managed Devices By Application	Retrieves the details of a managed device within an application.
	Sync Managed Device	Forces a managed device to check in with Microsoft Intune to retrieve and apply any pending actions, policies, and configuration updates.
	Look up Managed Devices By User	Retrieves the details of a managed device for a user.

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Category	Action	Description
	Update Managed Device	Updates the details of a managed device.
Metadata Retrieval	Look up Application ID	Returns the Application ID for the dynamic input of the Lookup Managed Devices By Application action.
Data Management **Important:** To use these actions, install the Client Software Distribution 2.0 application.	Look up Configuration Data	Retrieves the configuration data from a requested item or software configuration.
	Prepare Software Data	Prepares the software data for the specified requested item that can be used for deployment or revocation.

Spoke module

The Microsoft Intune spoke adds the Microsoft Intune application to your instance and includes these modules:

Module	Description	Table
Applications	Displays the list of applications from the Microsoft Intune server.	Application [sn_ms_intune_spoke_application]
Groups	Displays the list of groups from the Microsoft Intune server.	Group [sn_ms_intune_spoke_group]
Configurations	Stores software configuration details for the applications.	Configuration [sn_ms_intune_spoke_sf_config]
Deployments	Displays the list of deployments on the Microsoft Intune server.	Deployment [sn_ms_intune_spoke_deployment]
Server Instances	Stores details of the provider servers.	Server Instance [sn_ms_intune_spoke_server]

Important: To use these modules and tables, install the Client Software Distribution 2.0 application.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Microsoft Intune spoke.

Set up the Microsoft Intune spoke

Integrate your ServiceNow instance with the Microsoft Intune account by creating a custom OAuth application in Microsoft Intune.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Intune plugin.
- Role required: admin.

Register OAuth application using the Microsoft Azure portal

Provide authorization to the ServiceNow instance by registering an application on Microsoft Entra ID.

Before you begin

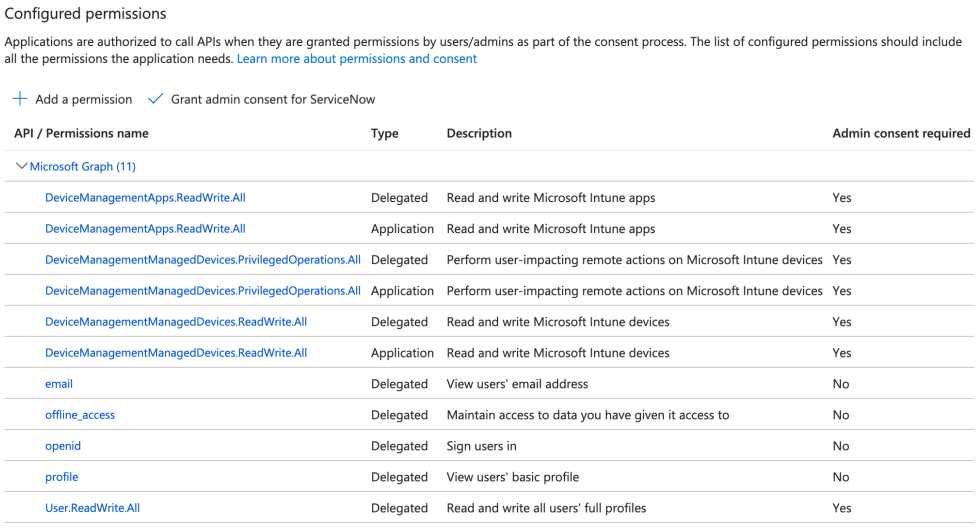
Role required: Azure Active Directory admin

About this task

Complete these steps from the Microsoft Azure portal.

Procedure

1. Log in to the Microsoft Azure portal.
   For instructions on registering an application, see Tutorial: Register an app with Azure Active Directory in the Microsoft Azure documentation.
2. In the Azure portal, add the **Redirect URIs**.
   The Redirect URI should be in the format `https://<instance-name>.service-now.com/oauth_redirect.do`. For more information, see Authentication and authorization for Azure Time Series Insights API.
3. For the **Required Permissions**, ensure that you provide these permissions:



Configured permissions

Applications are authorized to call APIs when they are granted permissions by users/admins as part of the consent process. The list of configured permissions should include all the permissions the application needs. Learn more about permissions and consent

+ Add a permission ✓ Grant admin consent for ServiceNow

API / Permissions name	Type	Description	Admin consent required
Microsoft Graph (11)			
DeviceManagementApps.ReadWrite.All	Delegated	Read and write Microsoft Intune apps	Yes
DeviceManagementApps.ReadWrite.All	Application	Read and write Microsoft Intune apps	Yes
DeviceManagementManagedDevices.PrivilegedOperations.All	Delegated	Perform user-impacting remote actions on Microsoft Intune devices	Yes
DeviceManagementManagedDevices.PrivilegedOperations.All	Application	Perform user-impacting remote actions on Microsoft Intune devices	Yes
DeviceManagementManagedDevices.ReadWrite.All	Delegated	Read and write Microsoft Intune devices	Yes
DeviceManagementManagedDevices.ReadWrite.All	Application	Read and write Microsoft Intune devices	Yes
email	Delegated	View users' email address	No
offline_access	Delegated	Maintain access to data you have given it access to	No
openid	Delegated	Sign users in	No
profile	Delegated	View users' basic profile	No
User.ReadWrite.All	Delegated	Read and write all users' full profiles	Yes

   Depending on your requirement, the permissions can be of the type, **Application**, or **Delegated**. For more information, see Quickstart: Configure a client application to access a web API in Microsoft Docs.
4. In the Azure portal, create a client secret.
   For more information, see Option 2: Create a new application secret.
5. Copy the client secret for later reference.

Result

The ServiceNow application is created with Microsoft Azure AD.

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Register Microsoft Intune as an OAuth provider

Use the information generated during the application configuration in Microsoft Azure portal to register Microsoft Intune as the OAuth provider so that the ServiceNow instance can request OAuth 2.0 tokens.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Open for the record, **Microsoft Intune**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Application ID created during application registration.
Client Secret	Client secret created during application registration.
Active	Option to actively use the application registry.
Authorization URL	OAuth authorization code endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/authorize`.
Token URL	OAuth server token endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/token`.
Token Revocation URL	OAuth server token revocation endpoint.
Redirect URL	OAuth callback endpoint. Enter `https://<instance-name>.service-now.com/oauth_redirect.do`.

4. Right-click the form header, and click **Save**.

Create a credential record for the Microsoft Intune spoke

Authorize the Microsoft Intune spoke actions by creating credential records for the application registered in the Microsoft Azure portal. The Microsoft Intune connection and credential alias uses these credentials to authorize actions.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`

3. Select **OAuth 2.0 Credentials**.

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4. On the form, fill in the fields.

OAuth 2.0 Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `MS Intune Cred`.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile created during the registration of Microsoft Intune as an OAuth provider. For example, `Microsoft Intune default_profile`.

5. Right-click the form header and click **Submit**.
6. To generate the OAuth token, click the **Get OAuth Token** related link.

Create a connection record for the Microsoft Intune spoke

Perform actions in Microsoft Intune by creating connection records for your Microsoft Intune account. The Microsoft Intune connection and credential alias uses these connections to perform actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record, **Microsoft_Intune**.
3. From the **Connections** tab, click **New**.
4. On the form, fill in the fields.

HTTP(s) Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `MS Intune Connection`.
Credential	Credential record created for Microsoft Intune spoke. For example, `MS Intune Cred`.
Connection alias	Alias record associated with this connection.
URL builder	**Note:** Do not select the check box.
Connection URL	Connection URL. Enter `https://graph.microsoft.com`.
Active	Option to actively use the connection.
Domain	Domain that the action or activity runs in.

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5. In the **Attributes** tab, specify `v1.0` for **u_version**.
6. Click **Submit**.

Result
The Microsoft Intune spoke is set up and Microsoft Intune is integrated with the ServiceNow instance.

Microsoft OneDrive Spoke

Automate file and folder management and collaboration in Microsoft OneDrive. Adds Microsoft OneDrive data to your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft OneDrive spoke v2.9.1 is the latest version. For version history of the spoke, see Microsoft OneDrive spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

API version v1.

Spoke flows

The Microsoft OneDrive spoke gives sample flows in the draft state to demonstrate automating Microsoft OneDrive tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Renew Subscriptions	Renews the expired subscriptions by updating the expiration date of the subscription.

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Spoke subflows

The Microsoft OneDrive spoke provides sample subflows in the draft state to demonstrate automating Microsoft OneDrive tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Download New OneDrive File to ServiceNow	Downloads the new files uploaded in a resource to a ServiceNow record
Subscribe to Webhook	Subscribes a listener application to receive notifications when data changes.
Sync Changes	Tracks changes to a drive and its children over time.
Get Document Latest URL	Gets the latest path of a file in OneDrive using the Sys ID of the document as an input. To use this subflow, a corresponding OneDrive connection and credential must be created, and a OneDrive authorization token should be available.
Reconnect Document from Microsoft OneDrive	Gets the latest web URL and webdav URL of a document from the Microsoft OneDrive by using the Document Sys ID, Provider Detail Sys ID, Target Table Name, Target Table Sys ID, and the Document Name. To use this subflow, a corresponding OneDrive connection and credential must be created, and a OneDrive authorization token must be available.

Spoke actions

The Microsoft OneDrive spoke provides actions to automate Microsoft OneDrive tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Drive Management	Look up Drive Info	Gets the metadata of a specific Microsoft OneDrive drive
Folder Management	Move File Or Folder Item	Moves a file or folder in Microsoft OneDrive to the target location.
	Create Folder	Creates a folder in Microsoft OneDrive.
	Update File Or Folder Name	Updates the name for a file or folder item by ID.
	Delete File Or Folder Item	Deletes a file or folder from Microsoft OneDrive.
File Management	Check In File	Checks in a drive item and sends a sharing invitation. When you check in a file, other users can access the checked-in file.
	Check Out File	Checks out a drive item from OneDrive. When you check out a drive item, other users cannot edit the document. Other users also cannot see the changes that you made in the document until you check in the document.

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Category	Action	Description
	Copy OneDrive File to Attachment	Copies a file in Microsoft OneDrive to an attachment in a record in a ServiceNow record.
	Copy Attachment to OneDrive	Copies an attachment record in ServiceNow to Microsoft OneDrive
	Copy File Or Folder Item	Asynchronously creates a copy of a Microsoft OneDrive item (including children), under a new parent item or with a new name.
	Look up Items	Retrieves a list of drive items from a path or the source and source ID of a drive item.
	Look up File Or Folder Item Info By ID	Gets file metadata information from the file or folder ID in Microsoft OneDrive.
	Look up File Or Folder Item Info By Path	Gets file metadata information from the file path in Microsoft OneDrive.
	Copy Attachment To OneDrive Using Path	Copies an attachment record in ServiceNow to OneDrive.
	Copy OneDrive File To Attachment Using File Path	Copies a file using its path in OneDrive to an attachment in a record in ServiceNow.
	Copy OneDrive File Version To Attachment	Copies a file in OneDrive to an attachment in a record in ServiceNow.
	Delete Version of a File	Deletes the specified version of a file from OneDrive.
	Look up All Versions of a File	Retrieves all the versions a file in OneDrive.
	Restore File Version	Restores the specified file version and make this version the latest.
	Upload and Replace File	Uploads the updated version of an existing file or replaces the existing file with a new file. **Note:** The maximum size of the file cannot exceed 4 MB.

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Category	Action	Description
Search Documents	Search Files or Folder Items	Searches the drive items (files or folders) based on metadata attributes such as the item name.
Document Sharing	Add Collaborator	Adds a collaborator and their permissions to a file or a folder. You can identify the collaborator by their Azure AD Alias or an Object ID.
	Look up Collaborators	Lists all the collaborator details associated with a file or folder in Microsoft OneDrive.
	Remove Collaborator	Removes a collaborator from a file or folder in Microsoft OneDrive.
Permission Management	Add Permission	Sends a sharing invitation for a drive item. A sharing invitation allows the recipients to access the drive item and optionally sends them an email with a sharing link.
	Create Sharing Link	Creates a sharing link which allows you to share a drive item with other users.
	Delete Permission	Removes access to a drive item.
	Look up Permissions	Retrieves the sharing permissions of a drive item.
	Update Permission	Updates the expiration date of the subscription.
Webhook Management	Subscribe Webhook	Creates a subscription that sends notifications when data changes.
	Unsubscribe Webhook	Deletes the specified subscription ID.
	Get SyncToken for Subscription	Retrieves the latest sync token for the specified subscription ID.
	Look up Subscriptions	Retrieves the list of active subscriptions.
	Renew Subscription	Updates the expiration date of the subscription.
	Sync Changes	Tracks changes to a drive and drive's children over time.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

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You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Microsoft OneDrive sharing management AI agent	Adds or removes a collaborator and manages their permissions for a file or folder in Microsoft OneDrive. Also, lists all the collaborator details associated with a file or folder.
Microsoft OneDrive drive management AI agent	Retrieves the metadata of a specific drive in Microsoft OneDrive.
Microsoft OneDrive file management AI agent	Manages files, file versions, and attachments in Microsoft OneDrive. Also, retrieves details of the required file.
Microsoft OneDrive folder management AI agent	Manages folders in Microsoft OneDrive.
Microsoft OneDrive permission management AI agent	Creates sharing link for a drive item and manages permissions.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke module

Bi-directional webhooks can be set up to get notifications about the required events. Routing policy defines conditions that must be met to notify the ServiceNow app. These conditions are based on the events in OneDrive that you want to be notified about. When the conditions are met, a routing policy triggers the associated subflow, which in turn automates the OneDrive tasks.

The bi-directional webhooks require separate setup and can be used independently without using the spoke actions. By default, the OneDrive Webhooks application is available in the OneDrive spoke and has the following modules:

Module	Description
OneDrive SyncToken	Enables you to view SyncTokens of OneDrive.
OneDrive Webhook Registries	Enables you to create and view the OneDrive webhooks in ServiceNow.
OneDrive Webhook Routing Policy	Enables you to create and view the routing policies for the OneDrive webhooks in

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Module	Description
	ServiceNow. You can also customize the conditions in the routing policies as per your requirement.

OneDrive Online account requirements

The Microsoft OneDrive spoke requires a custom app that you create in Microsoft Azure.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Single tenant

The OneDrive spoke includes the OneDrive alias record to authorize actions on Microsoft OneDrive. Select this alias in the Tenant record to authorize changes in Microsoft OneDrive for a single tenant.

For information about setting up the spoke, see Set up Microsoft OneDrive spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Microsoft OneDrive alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up Microsoft OneDrive spoke

Integrate the ServiceNow instance and Microsoft OneDrive spoke by using OAuth 2.0 credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft OneDrive spoke.
- Role required: admin.

Configure Microsoft OneDrive application

Create a custom OAuth application from your Microsoft OneDrive account to enable OAuth 2.0 authentication with the Microsoft OneDrive spoke.

Before you begin

Microsoft OneDrive requirements:

- Microsoft OneDrive account
- Microsoft Azure account
- Role required: Microsoft OneDrive tenant administrator credentials

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About this task

Complete these steps from your Azure Developer account. See the Azure product documentation for instructions on creating and configuring custom applications.

Procedure

1. Log in to the Microsoft Azure App registration portal with your organization credentials.
2. Register a new custom application.
   Fill in the application name, the supported account type, and the redirect URI, and then click **Register**.
   An overview of the application's basic information is shown.

   Note: Ensure that you enter the redirect URI in this format: `https://<instance>.service-now.com/oauth_redirect.do`.

3. Copy the application ID to a text file.
   You will use this ID and the client secret generated in the next step to register the app as a third-party OAuth provider on your ServiceNow instance. You use the application ID as the client ID when you connect the application to ServiceNow.
4. Add a client secret.

   a. In Microsoft Azure, navigate to **Manage** > **Certificates & secrets**.

   b. Provide a description and an expiration date and click **Add**.

   Note: The client secret is only displayed in plain text for a short time. You use the client secret when you connect the application to ServiceNow.

5. Enable the permissions you want the application to support.
   For more information, see the Microsoft Graph permissions reference.

   a. In Microsoft Azure, navigate to **Manage** > **API permissions**.

   b. Click the Microsoft Graph tile.

   c. Select the Delegated or Application permissions that the application supports.
   Delegated permissions enable the application to access the API as a signed-in user.
   Application permissions enable the application to run as a background service or daemon without a signed-in user. You must mention these API permissions in the **OAuth Entity scopes** tab while configuring the application registry.

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Note: You must ensure that these API permissions are provided for your custom app.

Name	OAuth scope
Calendars.ReadWrite	Calendars.ReadWrite
Calendars.ReadWrite.Shared	Calendars.ReadWrite.Shared
email	email
Files.Read	Files.Read
Files.Read.All	Files.Read.All
offline_access	offline_access

d. Click **Add permissions**.

Register Microsoft OneDrive as OAuth provider

Use the information generated during Microsoft OneDrive account configuration to register Microsoft OneDrive as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

- Request Integration Hub subscription.
- Activate Microsoft OneDrive spoke.
- Create Microsoft OneDrive application.
- If you are using a single tenant app registration, obtain the value of **Directory (tenant) ID** from the Azure portal.

Role required: admin

Procedure

1. In ServiceNow, navigate to **System OAuth** > **Application Registry**.
2. Click **New**.
3. On the screen titled **What kind of OAuth application**, select **Connect to a third-party OAuth Provider**.
4. Enter these values in the Application Registries form:

Field	Value required
Name	Enter any name to uniquely identify the record, for example `OneDrive OAuth profile`.
Client ID	Enter the Application ID of the OneDrive application you created in Azure.
Client Secret	Enter the Client Secret you generated when you created the application in Azure.
Default Grant type	Select **Authorization Code**.

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Field	Value required
Authorization URL	○ If you are using a multi-tenant app registration, click the lock icon , enter `https://login.microsoftonline.com/common/oauth2/v2.0/authorize`, and then click the lock icon again. ○ If you are using a single tenant app registration, click the lock icon , enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/authorize`, and then click the lock icon again. In the URL, replace `<Directory-ID>` with the value of **Directory (tenant) ID** obtained from the Azure portal.
Token URL	Click the lock icon , enter `https://login.microsoftonline.com/common/oauth2/v2.0/token`, and then click the lock icon again.
Redirect URL	Click the lock icon , enter `https://<instance>.service-now.com/oauth_redirect.do`, and then click the lock icon again.

5. In the **OAuth Entity Scopes** related list, add scopes to match the permissions you defined when you configured the Microsoft OneDrive application.
   Click **Insert a new row** and enter the name and the OAuth scope of the permission. The name and the OAuth scope are often the same string. Ensure that these scopes are provided.

Name	OAuth scope
Calendars.ReadWrite	Calendars.ReadWrite
Calendars.ReadWrite.Shared	Calendars.ReadWrite.Shared
email	email
Files.Read	Files.Read
Files.Read.All	Files.Read.All
offline_access	offline_access

Note: The scopes mentioned here must be same as the API permissions provided during the custom app configuration.

6. Right-click the form header, and click **Save**.
   The system validates the OAuth credentials.

Create Connection and Credential Alias for Microsoft OneDrive spoke

Create Connection records to your Microsoft OneDrive account. The Microsoft OneDrive spoke connection and credential aliases use these connections to perform actions in the Microsoft OneDrive.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **OneDrive**.
2. From **Related Links**, click **Create New Connection & Credential**.
3. On the form, fill in these fields:

Field	Value required
Connection Name	Name to identify the connection. This field is automatically set to Microsoft Onedrive Spoke Connection
Connection URL	The URL to make connection to the spoke. This field is automatically set to https://graph.microsoft.com
OAuth Entity Name	Name of the OAuth entity profile. This field is automatically set to Microsoft Onedrive Spoke Auth.
OAuth Client ID	Client ID of the OneDrive application you registered in Microsoft Azure App registration portal.
OAuth Client Secret	Client Secret generated when you registered the application in Microsoft Azure portal.
OAuth Redirect URL	The redirect URL. The format of the URL is https://<your-instance>.service-now.com/oauth_redirect.do

4. Click Create and Get OAuth Token.

Result
The Microsoft OneDrive spoke is set up and integrated with the ServiceNow instance.

Set up a bi-directional webhook for the Microsoft OneDrive spoke

Configure a webhook to subscribe to OneDrive with a ServiceNow callback URL.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft OneDrive spoke.
- Role required: admin.

Register a OneDrive webhook in ServiceNow

Register a OneDrive webhook in ServiceNow to notify the ServiceNow app when certain events occur in OneDrive.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Microsoft OneDrive Spoke** > **OneDrive Webhook Registries**.
2. Click **New**.
3. On the form, fill in the fields.

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Microsoft OneDrive Webhook Registries

Field	Description
Name	Unique name to identify the record. For example, `OneDrive webhook`.
Description	Description of the record.
Path	OneDrive path. By default, this path is set to `api/sn_onedrive_spoke/onedrive/subscription`
Secret Key	Secret key for accessing OneDrive webhook. **Note:** The **Secret Key** field value is auto-populated when the webhook registry record is saved.

4. Right-click the form header and click **Save**.
5. Click **CallBack URL**.
   The system displays the webhook callback URL.
6. Copy and record the webhook callback URL.

Customize OneDrive bi-directional webhook

Create a webhook routing policy and subflow according to your requirement.

Before you begin
Role required: admin

About this task
Routing policies in the OneDrive Webhook Routing Policy module triggers the subflows and notifies the ServiceNow instance when certain events occur in your OneDrive account. See OneDrive spoke for information about the fields that the routing policy and subflows support.

Procedure
1. Navigate to **All** > **Flow Designer** > **Designer**.
2. Click **Subflows**.
3. Create a copy of any of the default subflows, for example, Sync Changes.
4. Customize the subflow according to your requirement and publish it.
   See Building subflows for more information about creating and using subflows, and OneDrive spoke v1.6 for information about the supported subflows.
5. Navigate to **Microsoft OneDrive Spoke** > **OneDrive Webhook Routing Policy**.
6. Click **New**.
7. On the form, fill in the fields.

Decision form

Field	Description
Label	Unique label to identify the routing policy.

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Field	Description
Default answer	Option to specify if this is the default answer. The default answer is applicable when the conditions are not met. **a.** Click the lookup icon ( ). **b.** Select the required subflow from the Document list. **Note:** Ensure that the Table name is `Flow [sys_hub_flow]`.
Condition	Conditions to be met when the required events occur in OneDrive.
Answer	Subflow which is triggered when the specified conditions are met.

8. Click **Submit**.

Result
The routing policy and subflow are created.

Microsoft SCCM Spoke

Automate management of user collections, device collections, and application deployments on a Microsoft System Center Configuration Management (SCCM) server.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft SCCM spoke v1.1.2 is the latest version.

Spoke flows & subflows

This spoke has no sample flows or subflows.

Spoke actions

The Microsoft System Center Configuration Management (SCCM) spoke spoke provides actions to automate SCCM tasks when events occur in the ServiceNow AI Platform. Available actions include:

Category	Action	Description
Application Management	Get Applications	Retrieves the application data from the SCCM server.
Deployment Management	Get Deployments	Retrieves deployment data from the SCCM server.
Device Management	Add to Device Collection	Adds a device to a collection in SCCM.

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Category	Action	Description
	Get Device Collections	Retrieves device collection data from the SCCM server.
	Is Device In Collection	Checks if a specified device exists in a device collection.
	Remove From Device Collection	Removes a device from an existing device collection.
User Management	Add to User Collection	Adds a user to a collection in SCCM.
	Get User Collections	Retrieves user collection data from the SCCM Server.
	Is User In Collection	Checks if a specified user exists in a user collection.
	Remove From User Collection	Removes a user from a user collection.

To see inputs and outputs for these activities, see SCCM activity pack.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

This spoke uses the SCCM alias record to authorize actions on a Microsoft System Center Configuration Management (SCCM) server.

Connection alias	Description	Connection URL
SCCM	Connection to the SCCM server.	The URL of the host machine where the SCCM server is installed.

For information about setting up the spoke, see Set up the Microsoft SCCM spoke.

MID server requirements

To use these actions, your instance must have a MID Server set up and configured to use PowerShell. For more information about running actions on the MID Server, see Integration steps. For information, see MID Server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Microsoft SCCM spoke

Integrate the ServiceNow instance and SCCM using Windows credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft SCCM spoke.

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- Role required: admin.
- Configure the MID Server for SCCM activities.

Note: Ensure that user must be able to establish remote PowerShell sessions with the Microsoft SCCM server. The spoke scripts use *`Microsoft.PowerShell32`* configuration for creating sessions. For user permissions, see User permissions in Microsoft Learn.

Create Credential record for the SCCM spoke

Create a Credential record to the SCCM server. The SCCM spoke connection and credential alias uses this credential to authorize actions.

Before you begin

- Request Integration Hub subscription
- Role required: admin
- Configure the MID Server for SCCM activities

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **Windows Credentials**.
   A blank Windows Credentials form displays.
4. Enter these values, then click **Submit**.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `SCCM Credential`.
Active	Enable
User name	Enter a user name with access to the target Windows host. For more information about Windows permissions, see Windows credentials.
Password	Enter the password for the account.
Applies to	Select the MID Servers that can use this credential. For example, select **All MID servers**.
Order	Select the order to apply this credential. For example, enter `100`.

Create Connection record for the SCCM spoke

Create a Connection record to your SCCM host machine. The SCCM spoke connection and credential alias uses this connection to perform actions in SCCM.

Before you begin

- Request Integration Hub subscription
- Create Credential record for the SCCM spoke
- Role required: admin

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Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **SCCM**.
3. From the **Connections** tab, click **New**.
   The system displays a blank Basic Connection form.
4. Enter these values, then click **Submit**.

Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `SCCM Connection`.
Credential	Select the Credential record you created for Windows. For example, select **SCCM Credential**.
Host	Enter the fully qualified domain name of the target host where the SCCM server is installed. For example, `<host>.<domain>.com`.
Use MID server	Enable
Override default port	Enter the target port used by the connection. If blank, the system uses the default port.

What to do next

Configure MID Server as WinRM trusted host

Microsoft Security Response Center Spoke

Integrate the Microsoft Security Response Center API with your ServiceNow instance to investigate all reports of security vulnerabilities affecting the Microsoft products and services, and gather information to manage security risks and keep the system protected.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes .

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview .

Spoke version

Microsoft Security Response Center spoke v1.3.0 is the latest version. For version history of the spoke, see Microsoft Security Response Center Spoke release notes .

Supported versions

This spoke was built for Microsoft Security Response Center API version 2020, but may be compatible with later versions.

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Microsoft Security Response Center spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Abuse Management	Submit Abuse Report	Submits report to the Microsoft Computer Emergency Response Team using the Common Abuse Reporting system (CARS).
Security Management	Get Security Update Details	Retrieves information about the specific CVRF ID.
	Look up Security Updates	Retrieves the list of all Microsoft security updates.
	Look up Security Updates By Key	Retrieves the list of security updates based on the provided ID, CVE, or year.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agent is Microsoft Security Response Center security management AI agent. This AI agent retrieves details of the security updates based on the provided ID, CVE, or year.

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There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Microsoft Security Response Center spoke.

Set up the Microsoft Security Response Center spoke

Set up an outbound integration between your ServiceNow instance and the Microsoft Security Response Center instance by setting up a connection and credential record.

Before you begin

- Admin access to the Microsoft Security Response Center portal.
- Request an Integration Hub subscription.
- Activate the Microsoft Security Response Center spoke.
- Role required: admin

Procedure

1. Obtain the API key from the Microsoft Security Response Center portal that you must provide in the connection and credential record.
2. Navigate to **All** > **Process Automation** > **Workflow Studio**.
3. Click the **Integrations** tab.
4. Click the **Connections** tab.
5. In the Search all connections field, enter `Microsoft Security Response Center`.
6. In the Microsoft Security Response Center tile, select **View Details**.

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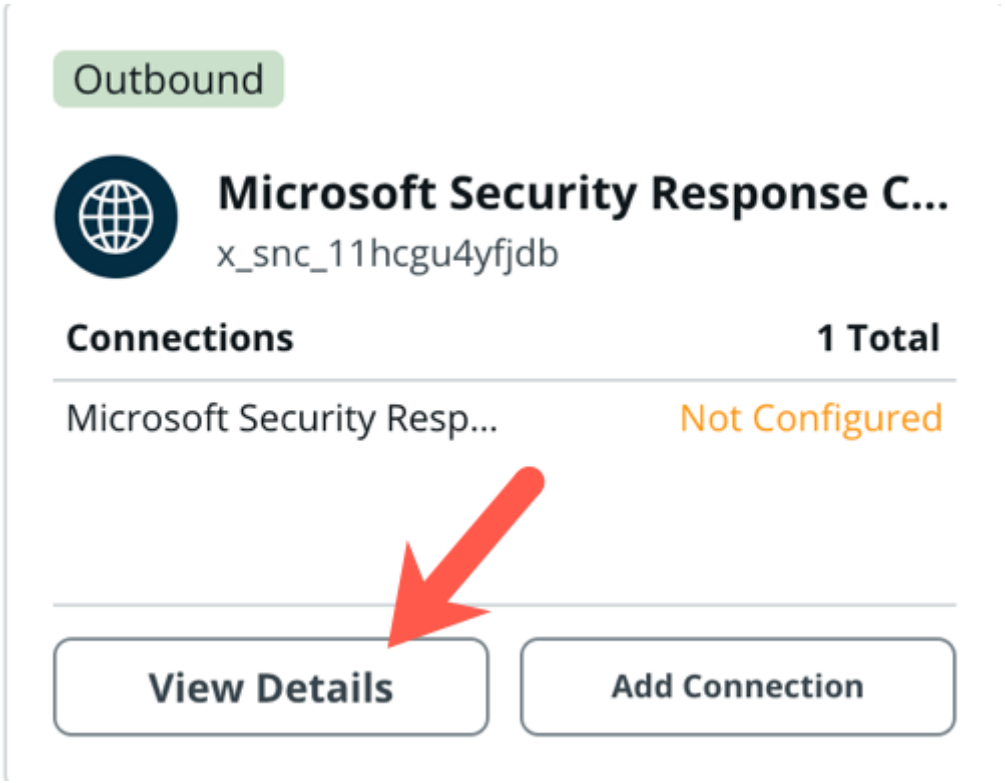
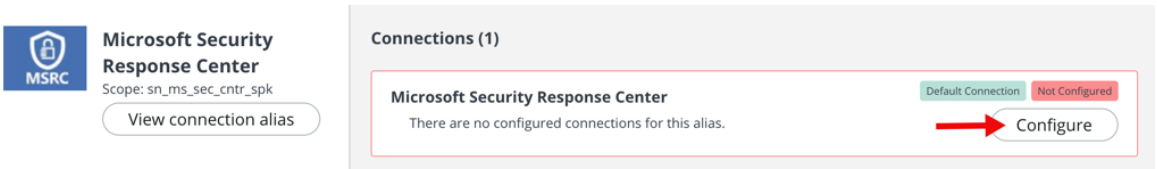


7. Select **Configure**.



8. Fill the Configure Connection form.

Configure connection

Field	Description
Connection Name	Unique name of the connection record. **Note:** The default and read-only name of the first connection record is Microsoft Security Response Center. To provide a custom connection name, select **Add Connection**to create a connection record.
Connection URL	The URL to the Microsoft Security Response Center server. The URL is https://api.msrc.microsoft.com.
API Key	API key that you copied from the Microsoft Security Update API page.

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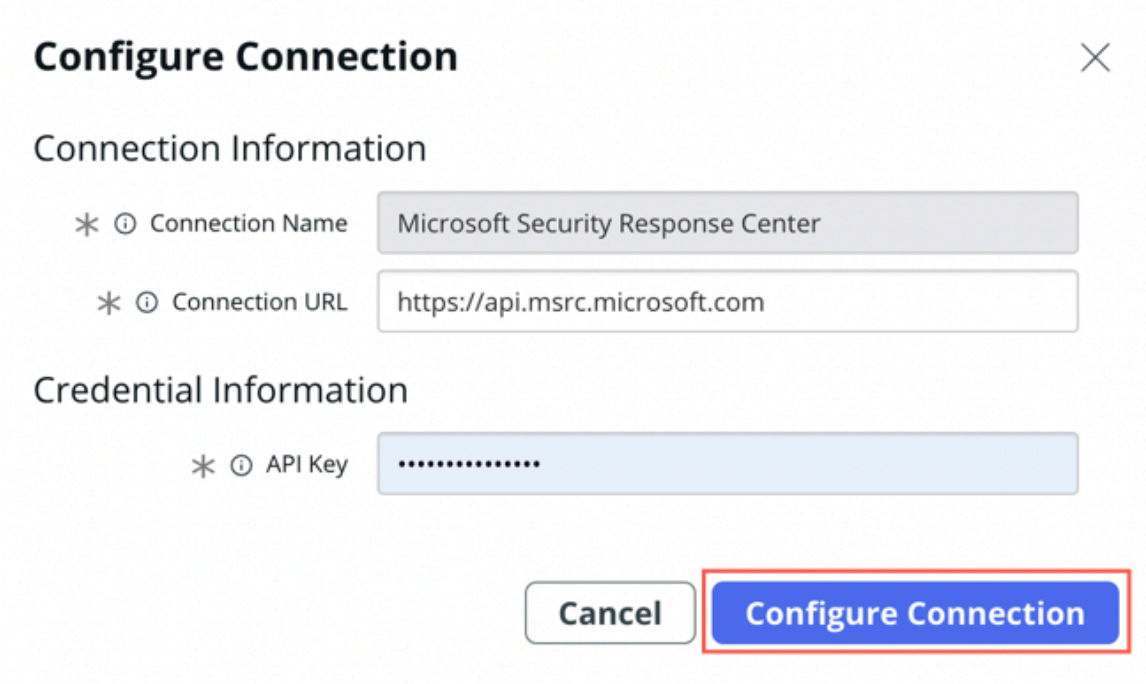

9. Select **Configure Connection**.

   The spoke connection is configured and ready to be used.

Microsoft SharePoint Online Spoke

The Microsoft SharePoint Online spoke integrates your ServiceNow® instance with Microsoft SharePoint Online so that you can automate various predefined actions as part of a Workflow. For example, you can rename a folder on Microsoft SharePoint Online when a record in the database is updated.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft SharePoint Online spoke v2.11.5 is the latest version. For version history of the spoke, see Microsoft SharePoint Online spoke release notes.

Note: The Microsoft SharePoint online spokes does not support the On-premise SharePoint.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

Microsoft SharePoint Application Programming Interface (API) version v1.

Spoke flows

The Microsoft SharePoint Online spoke provides sample flows in the draft state to demonstrate automating the Microsoft SharePoint Online tasks. To customize a sample flow, copy it to a new application scope. The following table shows the available sample flows.

Flow	Description
New Attachment on Record creates folder, and copies attachment	When an attachment is created in a database table, a folder is created for a knowledge record on the Microsoft SharePoint Online spoke. Then, the attachment is copied to the folder.
Create Site For Knowledge Base	When a knowledge base is created in the database table, the flow creates a site for it on the Microsoft SharePoint Online

Note:

- If the single sign-on (SSO) is set up, you can use the action Look Up User Information By Login Name and verify that you're approved to perform the spoke actions.
- Flow designers and action designers must ensure that the user authorization checks are performed before the flow or action is executed.

Spoke subflows

The Microsoft SharePoint Online spoke provides a sample subflow in the draft state to demonstrate automating Microsoft SharePoint Online tasks. To customize the subflow, copy it to a new application scope.

Subflow	Description
Remove Then Add A User To A Group	Removes a user from a Microsoft SharePoint Online group and adds a new user.
Delete Modern Site (without O365 Group)	Deletes the modern site associated with Non O365 Group (communication site).
Submit Modern Site (with O365 Group) for Deletion	Submits a modern Site (with O365 Group) for Deletion.

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Subflow	Description
	Note: It may take up to 30 minutes for site to move under deleted sites section of SharePoint Admin portal.

Note: Flow designers and action designers must ensure that user authorization checks are performed before the flow or action is executed.

Spoke actions

The Microsoft SharePoint Online spokeprovides actions to automate various Microsoft SharePoint Online tasks that are based on the triggers in the ServiceNow instance.

You can perform some actions by using the SharePoint Online connection and the remaining actions by using the SharePoint Graph connection.

The actions in the following table use the SharePoint Online connection and the credential alias record.

Actions using the Sharepoint Online connection and credential alias record		
Category	**Action**	**Description**
Site Management	Create Modern Site	Creates a modern site of types Communication sites and Non-group associated Team Sites.
	Create Subsite	Creates a subsite on Sharepoint Online. The Tenant determines the root location.
	Delete Modern Site	Deletes the modern site associated with non-O365 Group (communication site).
	Delete Subsite	Removes a subsite from Sharepoint Online. The Connection URL used determines what is the Root location.
	Look up Modern Site Information	Retrieves details of a modern site.
	Look up Changes For Site	Retrieves the changes for a site that is based on the query conditions.
	Look up Role Assignments	Retrieves all the role assignments that are defined on the site.
	Look Up Site Collection ID	Looks up a specific site ID.
	Look Up Subsite Details	Looks up information about a subsite.
	Update Site Information	Updates a Microsoft SharePoint Online site.
Folder Management	Create Folder	Creates a folder in a document library on a Microsoft SharePoint Online site.
	Delete Folder	Deletes a folder in Microsoft SharePoint Online.

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Actions using the Sharepoint Online connection and credential alias record		
Category	**Action**	**Description**
		Note: You receive no warning or notification before the folder is removed.
	List Files In A Folder	Gets a list of files in a folder.
	List Folders In A Folder	Gets a list of the folders in a folder.
	Look Up Folder	Looks up a folder in Microsoft SharePoint Online and returns its properties. For example, the output can contain the property "Relative URL".
	Rename A Folder	Renames a folder in Microsoft SharePoint Online.
	Share Folder With Group	Shares a folder with a group in Microsoft SharePoint Online. The group must belong to the Microsoft SharePoint Online tenant account.
	Share Folder With User	Shares a folder with a user inMicrosoft SharePoint Online. The user must belong to the Microsoft SharePoint Online tenant account.
	Unshare Folder With Group	Removes the access to a folder from a group. The group must belong to the Microsoft SharePoint Online tenant account.
	Unshare Folder With User	Removes the access to a folder from a user. The user must belong to the Microsoft SharePoint Online tenant account.
File Management	Attach Sharepoint File To A Record	Attaches a Microsoft SharePoint Online file to a ServiceNow record.
	Check-in File	Sets a file in the Microsoft SharePoint Online in the checked in state. To find the version number of the file after its state is set to checked in, use the Look Up File Details action, **Note:** The file is already uploaded and the action just updates the status of the file to be checked in.
	Check-out File	Sets a file in the Microsoft SharePoint Online in the checked out state. To find the version number of the file after its state is set to checked out, use the Look Up File Details action, **Note:** The file is already downloaded and the action just updates the status of the file to checked out.
	Copy Attachment To Folder	Copies a ServiceNow attachment to a Microsoft SharePoint Online folder.
	Copy File	Copies a file with a new name.

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Actions using the Sharepoint Online connection and credential alias record		
Category	**Action**	**Description**
	Create A Text File	Creates a text file with the information that you provide.
	Delete File	Deletes a file in Microsoft SharePoint Online.
	Look Up File Details	Looks up the file details in Microsoft SharePoint Online.
	Move File	Moves a file to another location in Microsoft SharePoint Online.
	Share File With Group	Shares a file with a group inMicrosoft SharePoint Online. The group must belong to the Microsoft SharePoint Online tenant account.
	Share File With User	Shares a file with a Microsoft SharePoint Online user. The user must belong to the Microsoft SharePoint Online tenant account.
	Unshare File With Group	Removes the access to a file from a Microsoft SharePoint Online group. The group must belong to the Microsoft SharePoint Online tenant account.
	Unshare File With User	Removes the access to a file from a Microsoft SharePoint Online user. The user must belong to the Microsoft SharePoint Online tenant account.
User Management	Look Up User Information By Login Name	Searches a Microsoft SharePoint Online site for information on a user and returns the information.
	Look Up User Information By Email	Searches the specified Microsoft SharePoint Online site for a given user and return SharePoint information about that account.
	Look Up User's Sharepoint Groups	Searches the Microsoft SharePoint Online site for information on all groups that a user is a member of and returns the information.
Search Management	Look up Search Query Results Stream	Searches the SharePoint Root site and retrieves the result based on the provided search query.
Group Management	Add Role To Site	Adds a role to a Microsoft SharePoint Online user or group.
	Add User To Group	Adds a user to a Microsoft SharePoint Online site group.
	Create Group	Creates a group in a Microsoft SharePoint Online site.
	Delete Group	Deletes a group on a Microsoft SharePoint Online site.
	Look Up Group By Name	Looks up a group by its name in a site location in the Microsoft SharePoint Online. If no site location is specified, the action searches the root site of the tenant.
	Remove Role From Site	Removes permissions from a group or a user.

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Actions using the Sharepoint Online connection and credential alias record		
Category	**Action**	**Description**
	Remove User From Group	Removes a user from a Microsoft SharePoint Online site group.
	Update Group Owner (User)	Updates a user as the group owner.
	Look up M365 Members by Site Group	Retrieves a list of the users and M365 groups associated with a Microsoft SharePoint Online Site Group.
List Management	Create List	Creates a list in a Microsoft SharePoint Online site with its title and description.
	Create List Subscription	Creates a webhook subscription for a list.
	Delete List By ID	Deletes a list in a Microsoft SharePoint Online site by its ID.
	Look Up List Details By ID	Looks up a list in a Microsoft SharePoint Online site by its ID.
	Look Up List ID By Title	Looks up a list in a Microsoft SharePoint Online by its title.
	Update list in a site by ID	Updates a list in a Microsoft SharePoint Online site by its ID.
List Item Management	Create List Item	Creates a list item inside a list.
	Delete List Item By ID	Deletes a list item by both the list ID and the list item ID.
	Look Up List Item By ID	Looks up a list item by both the list ID and the list item ID.
	Look Up List Items In A List	Gets a list of items from a list in different formats.
	Update List Item By ID	Updates a list item title by its ID.

Note: Flow designers and action designers must ensure that user authorization checks are performed before the flow or action is executed.

These actions use the SharePoint Graph connection and credential alias record:

Actions using the SharePoint Graph connection and credential alias record		
Category	**Action**	**Description**
Change Management	Get Change Query Properties	Retrieves the change query properties that are used to define a query that is performed against the change log.

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Actions using the SharePoint Graph connection and credential alias record		
Category	**Action**	**Description**
	Get Delta Link Token For Drive	Retrieves the latest delta link token for a drive.
	Get Next Token	Retrieves the next link token from the SharePoint Resource Next Link Token table.
File Management	Get File Download Link	Retrieves the download URL of the file.
	Look up File Permissions	Gets the permissions for a file.
	Look up Files	Retrieves all the files in a drive.
List Management	Create List Subscription	Creates a webhook subscription for a list.
	Renew List Subscription	Renews a webhook subscription for a list.
	Delete List Subscription	Deletes the webhook subscription for a list.
	Get List	Retrieves the details of a list from the SharePoint tenant.
	Look up Drives	Retrieves all the drives for a site.
Site Management	Delete Modern Site with O365 Group	Submit the modern site associated with the O365 Group (team site) for deletion. It deletes the associated 0365 group that deletes the site. **Note:** After execution, it can take up to 30 minutes for a site to be deleted.
	Look up Modern Site Group Information	Retrieves the associated O365 group details of a modern site (team site).
	Look up Site Collections	Retrieves all the site collections.
	Look up Subsites	Retrieves details of all the subsites in a site.
	Create Root Site Subscription	Creates a webhook subscription for a root site.
	Look up Site Permissions	Retrieves all permissions for a site.
	Get Site	Gets the site details.

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Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Microsoft SharePoint Online file management AI agent	Automates file-related tasks such as, sharing files with users or groups, copying files, moving files, creating text files, retrieving file details, and managing file permissions.
Microsoft SharePoint Online list management AI agent	Automates SharePoint operations such as, managing lists, creating and renewing subscriptions, retrieving list details, and automating workflows.
Microsoft SharePoint Online site management AI agent	Automates SharePoint operations such as, creating and deleting sites, managing site collections, retrieving site information, and automating SharePoint workflows.
Microsoft SharePoint Online group management AI agent	Automates group management processes such as, adding or removing users from groups, creating or deleting groups, updating group ownership, and managing roles within SharePoint sites.
Microsoft SharePoint Online list item management AI agent	Automates SharePoint operations such as, creating, updating, deleting, and retrieving list items.
Microsoft SharePoint Online user management AI agent	Automates user management tasks such as, a retrieving user's SharePoint groups, user information by login name, and user details by email.
Microsoft SharePoint Online folder management AI agent	Automates folder management tasks such as, renaming folders, creating folders, sharing and unsharing folders with users or groups, listing files and folders, and deleting folders.

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AI agent	Description
Microsoft SharePoint Online change management AI agent	Perform the Get Next Token and Get Delta Link Token For Drive actions.
Microsoft SharePoint Online search management AI agent	Retrieves the required search query results and enables users to streamline processes.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

SharePoint Online account requirements

The Microsoft SharePoint Online spoke requires that you create a custom app on your SharePoint Online account to generate OAuth 2.0 tokens. See Configure OAuth application in Microsoft Azure.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Single tenant

This spoke includes the MicrosoftSharepointOnline alias record to authorize actions on Microsoft SharePoint Online. Select this alias in the Tenant record to authorize changes in Microsoft SharePoint Online for a single tenant.

Multiple tenants

This spoke includes the MicrosoftSharepointOnline alias record to authorize actions on Microsoft SharePoint Online. Create a connection and credential alias record for each additional tenant site that you want to support. Select the correct alias in the Tenant record to authorize changes in Microsoft SharePoint Online. Create a connection and credential alias record for each additional tenant site that you want to support. Select the correct alias in the Tenant record to authorize changes in Microsoft SharePoint Online. See Create aliases for multiple tenants.

Note:

Three alias records are available by default with the spoke; Sharepoint Online, SharePoint Graph, and SharePoint Graph Root Site Subscription. Each alias record requires a tenant to be associated with it. If you intend to use all SharePoint Online, Graph, and Root Subscription actions in the spoke, you must ensure that you have created three tenant records in the Tenants tables of the Microsoft SharePoint Online spoke so that each tenant record is associated with its respective alias record.

- If configuring an integration for a single tenant, use the existing **MicrosoftSharepointOnline** alias record.
- You can use multiple tenants with the **Microsoft SharePoint Graph** connection alias only.

Configure OAuth application in Microsoft Azure

Create an OAuth application in Microsoft Azure to verify and authorize connection requests from your ServiceNow instance.

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Before you begin

Role required: admin

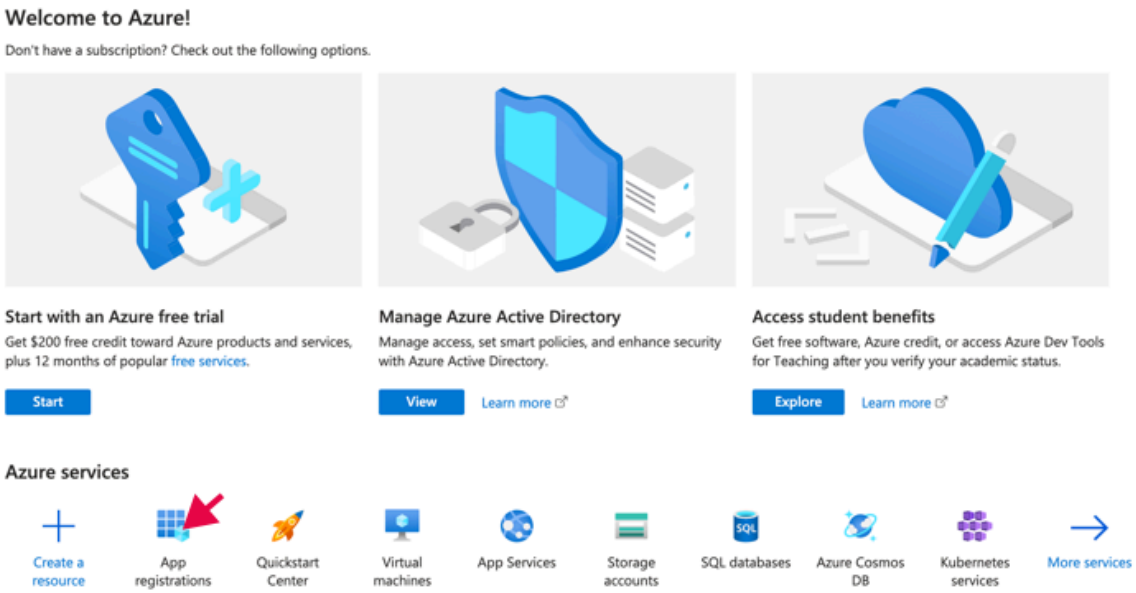
Access to Microsoft Azure portal to create an OAuth application.

Procedure

1. Register an application on Microsoft Azure.

   a. Log in to https://portal.azure.com/.

   b. Select **App registrations**.



   c. On the App registrations page, select **+ New registration**.

   d. Fill the form.

Register an application

Field	Description
Name	Custom name of the OAuth application that you are creating.
Supported account types	Accounts the tenant in Microsoft Azure AD directory supports.
Redirect URI	The redirect URL to your ServiceNow instance that requests connection to Microsoft SharePoint online. From the Select a platform list, select Web and enter your ServiceNow instance URL in the format `https://<instance-name>.service-now.com/oauth_redirect.do`.

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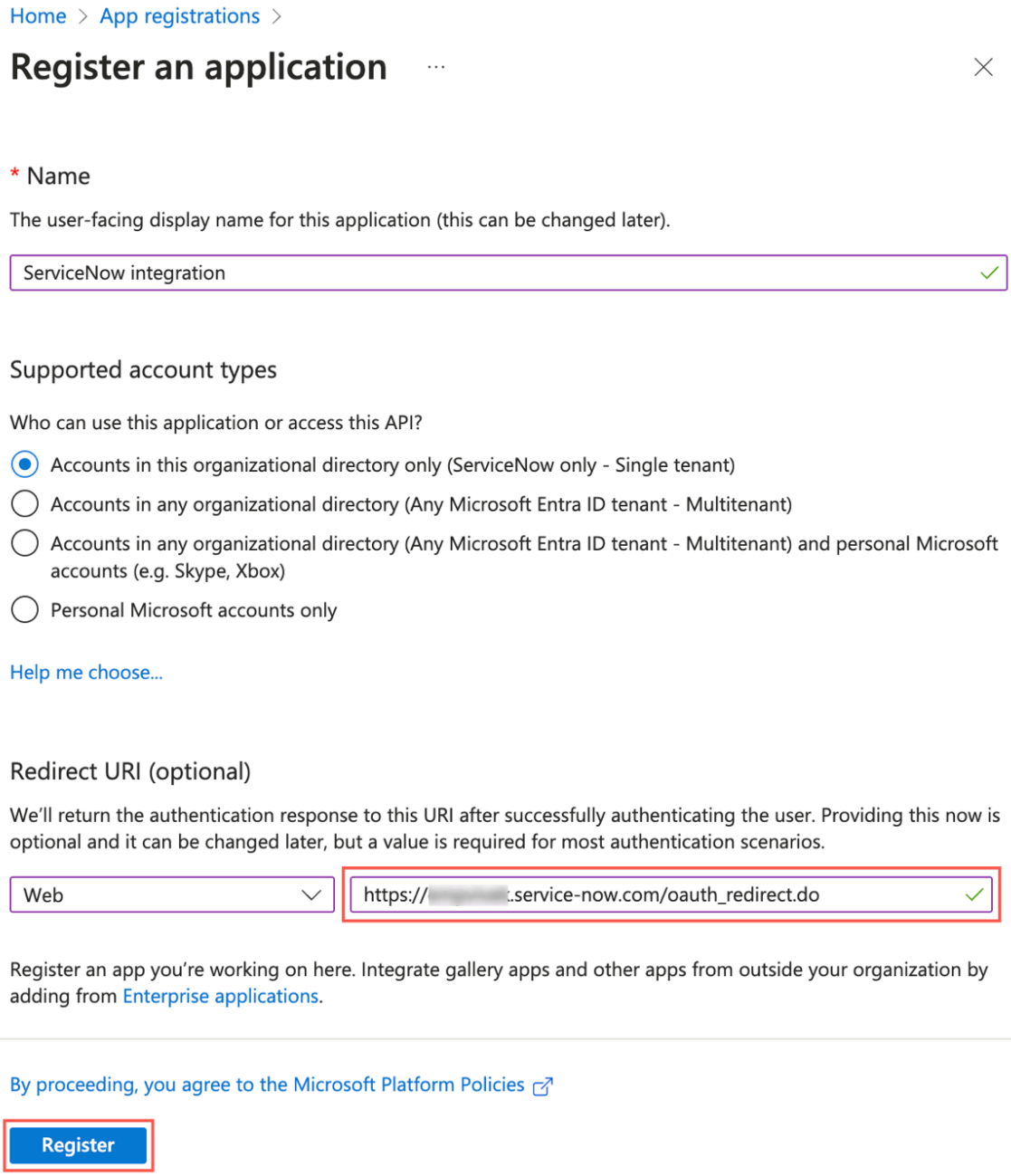
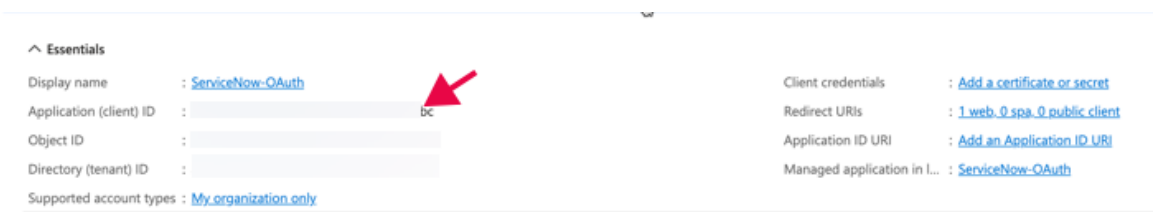


e. Select **Register**.
The OAuth app is registered.

2. To get the application ID, from the OAuth application page, copy the Application (client) ID.



You need the Application (client) ID when you set up the connection record for Microsoft SharePoint Graph.

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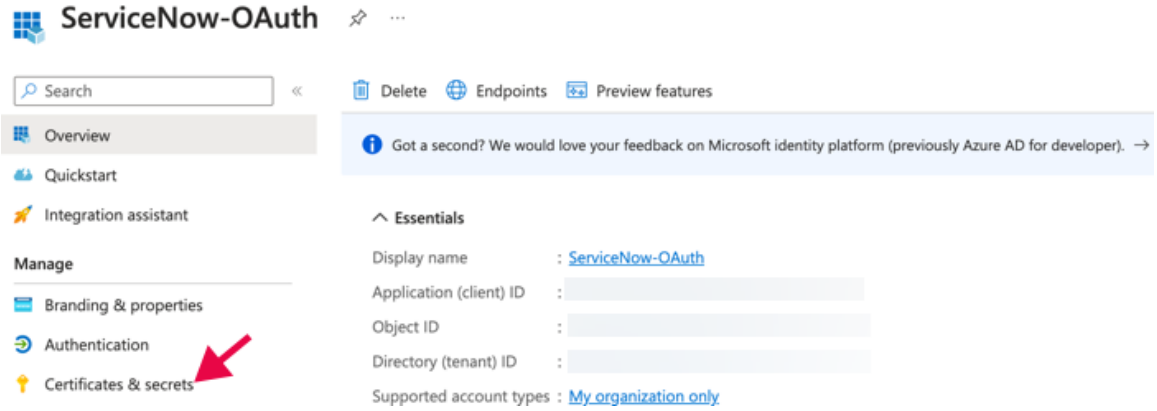
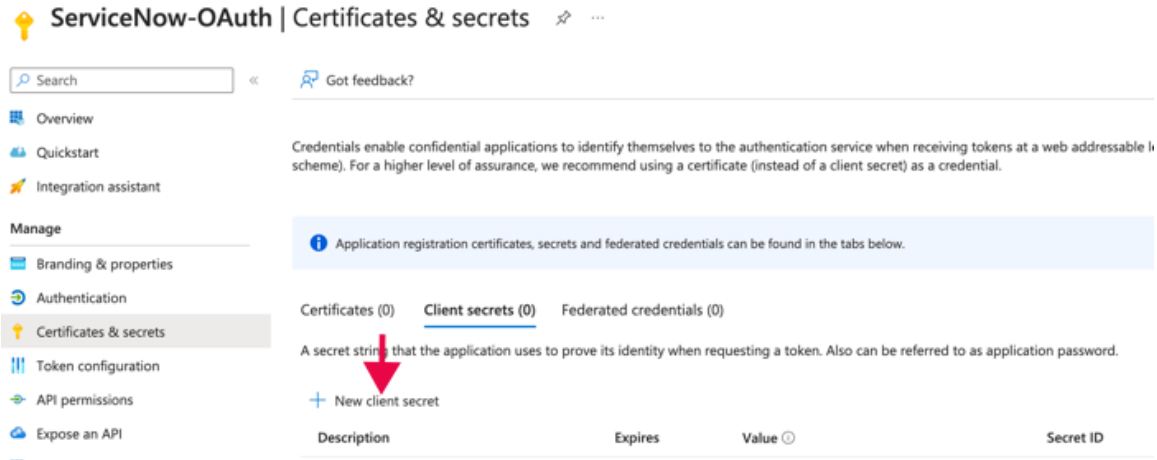
3. Get the client secret.

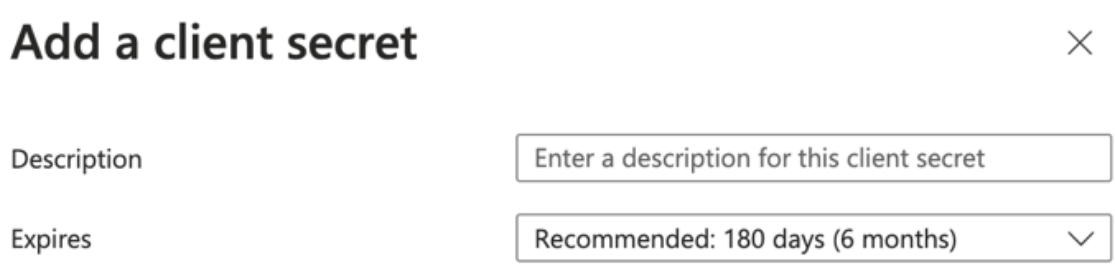
a. On the OAuth application page, select Certificates & secrets.



b. Select **+ New client secret**.



c. Set up the client secret.



- Description: A contextual description of the client secret.
- Expires: Time limit after which the client secret is invalid.

Note: You need the client secret when you set up the connection record for Microsoft SharePoint Graph.

d. Select **Add**.
The Client secret is generated.

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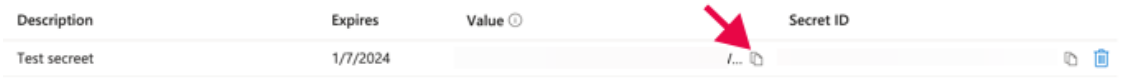
e. Copy the secret and store at a secure place.



Configure Microsoft SharePoint Graph connection

Configure a Microsoft SharePoint Graph connection and a connection record that enable your ServiceNow instance to integrate with the Microsoft SharePoint using the Microsoft Graph.

Before you begin

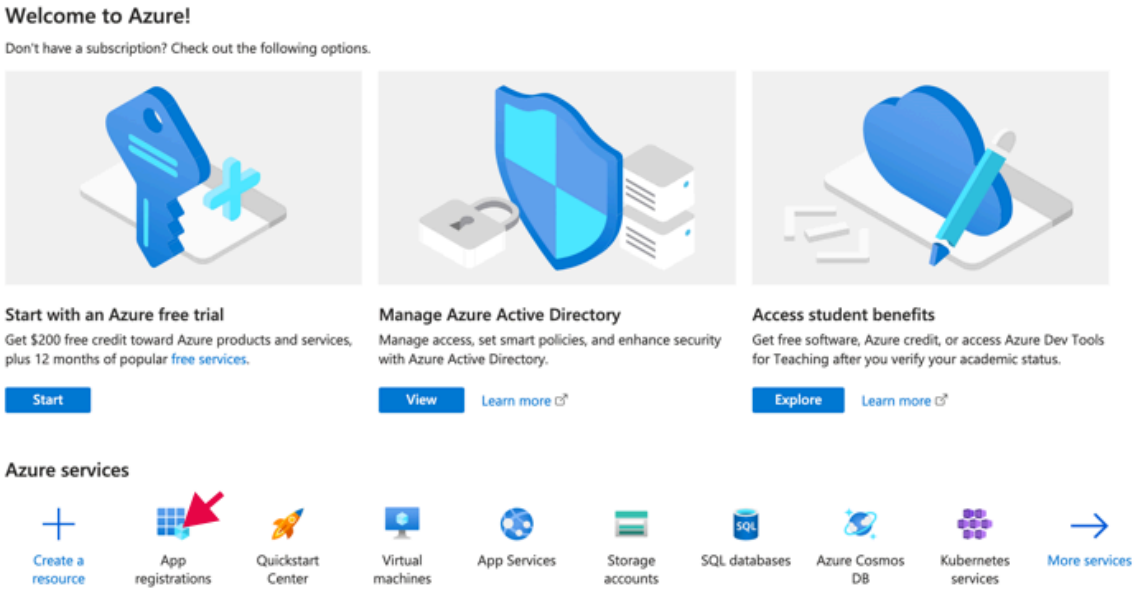
- Request an Integration Hub subscription.
- Activate the Microsoft SharePoint Online spoke.
- Access to Microsoft Azure portal.
- Create an OAuth application on Microsoft Azure portal.
- Role required: admin.

Procedure

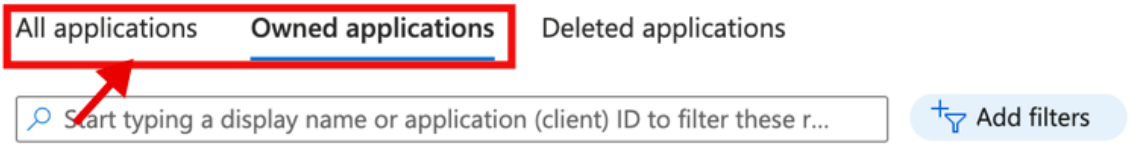
1. Configure a SharePoint Graph connection by adding permissions.

a. Log in to https://portal.azure.com/.

b. Select **App registrations**.



c. Select **All applications** or **Owned applications**.



d. In the search field, enter the name of the OAuth application you had created.

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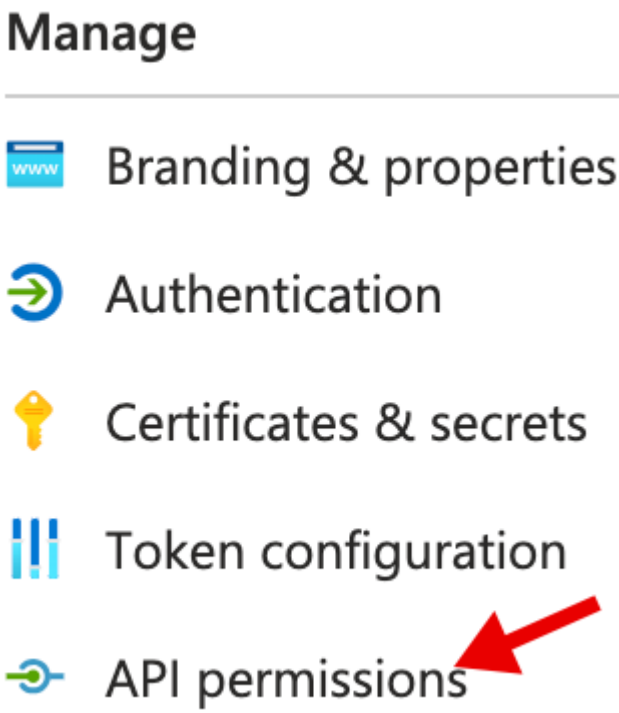
To learn how to configure an OAuth application, see Configure OAuth application in Microsoft Azure.

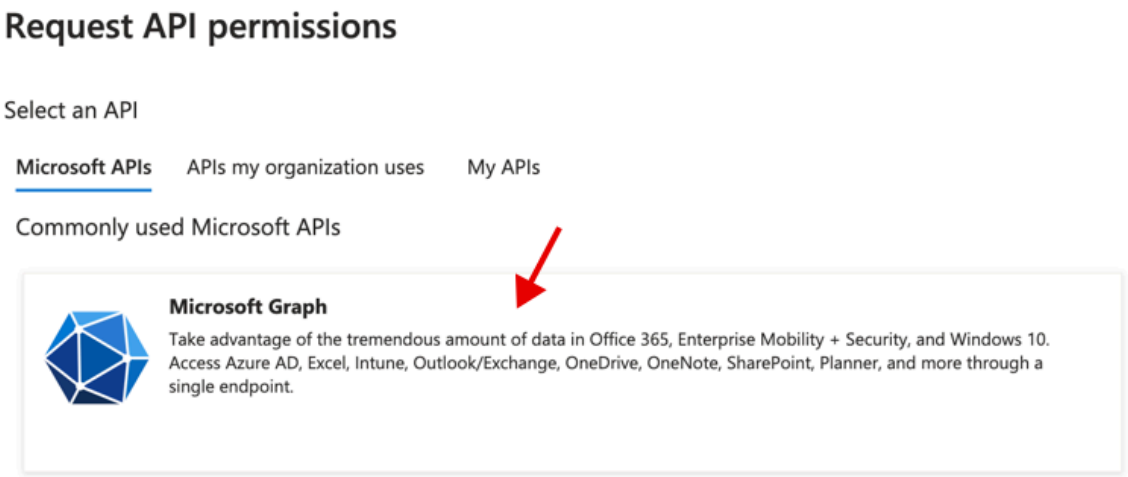
e. In the search results, select the name of the OAuth application you had configured.

f. On the left panel, under the Manage heading, select API permissions.



g. Under the Configured permissions heading, select **+ Add a permission**.

h. In the Request API permissions window, select **Microsoft Graph**.



i. Select **Delegated permissions**.

j. Under the Select permissions heading, enter `site` in the search field.

k. Expand the Sites list.

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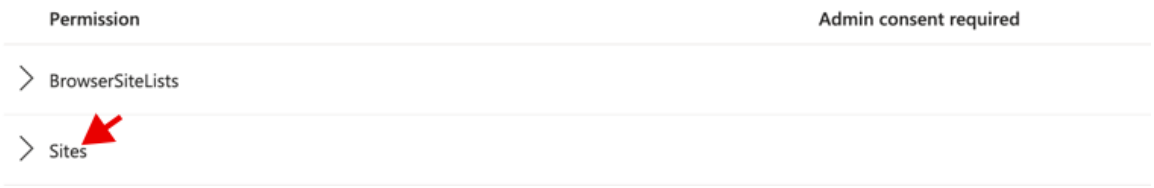
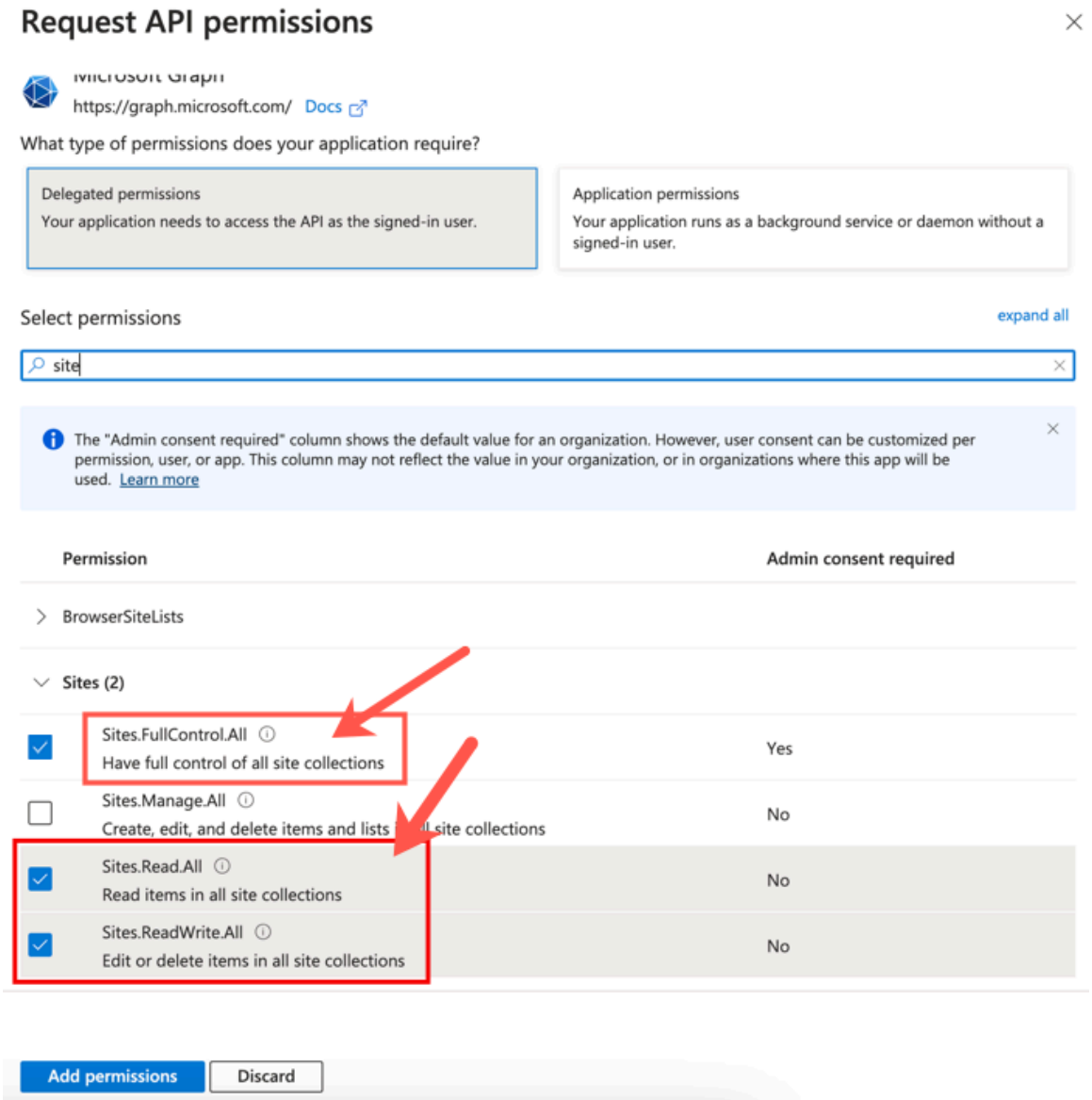


l. Select `Sites.FullControl.all`, `Sites.Read.All` and `Sites.ReadWrite.All`.



m. Under the Select permissions heading, enter `User.read` in the search field.

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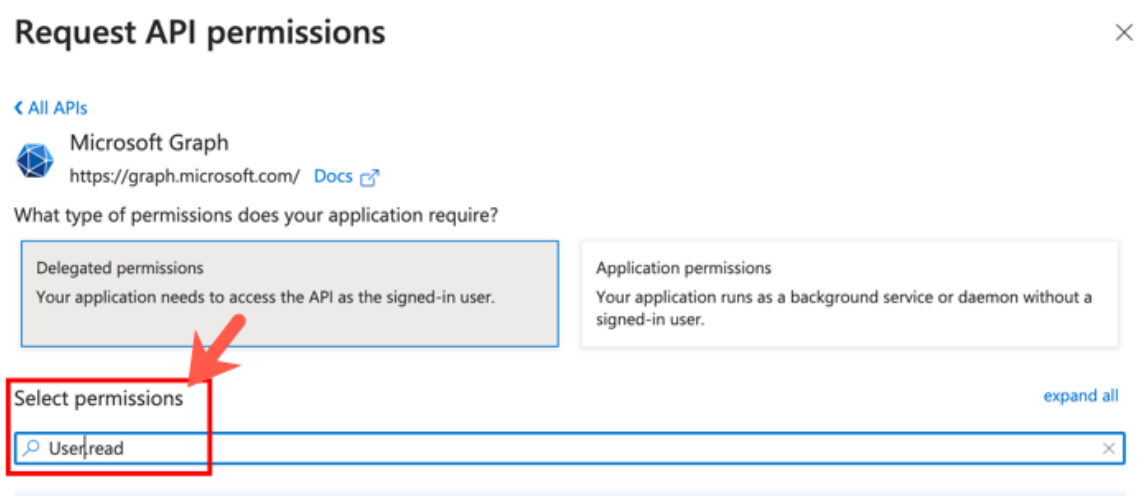

n. Select **Add permissions**.
The permission is added.



o. Optional: To grant admin consent, under the Configured permissions heading, select **Grant admin consent**.

p. Optional: Select **Yes**.
Admin consent is mandatory if the value under the Admin consent required column for the Sites.Read.All permission is Yes.

2. Configure the Microsoft SharePoint Graph connection record.

a. Log in to your ServiceNow instance.

> **Note:** The URL of the instance and that of the instance you had provided as the redirect URL must be the same.

b. Navigate to **All** > **Process Automation** > **Workflow Studio**.

c. Select the **Integrations** tab.

d. In the Search all connections field, enter `Microsoft SharePoint`.

> **Note:** The **Outbound** tab is selected by default. Confirm that the **Outbound** tab is already selected.

e. In the Search all connections field, enter `Microsoft SharePoint`.

f. In the MicrosoftSharePointGraph tile, click **View Details**.

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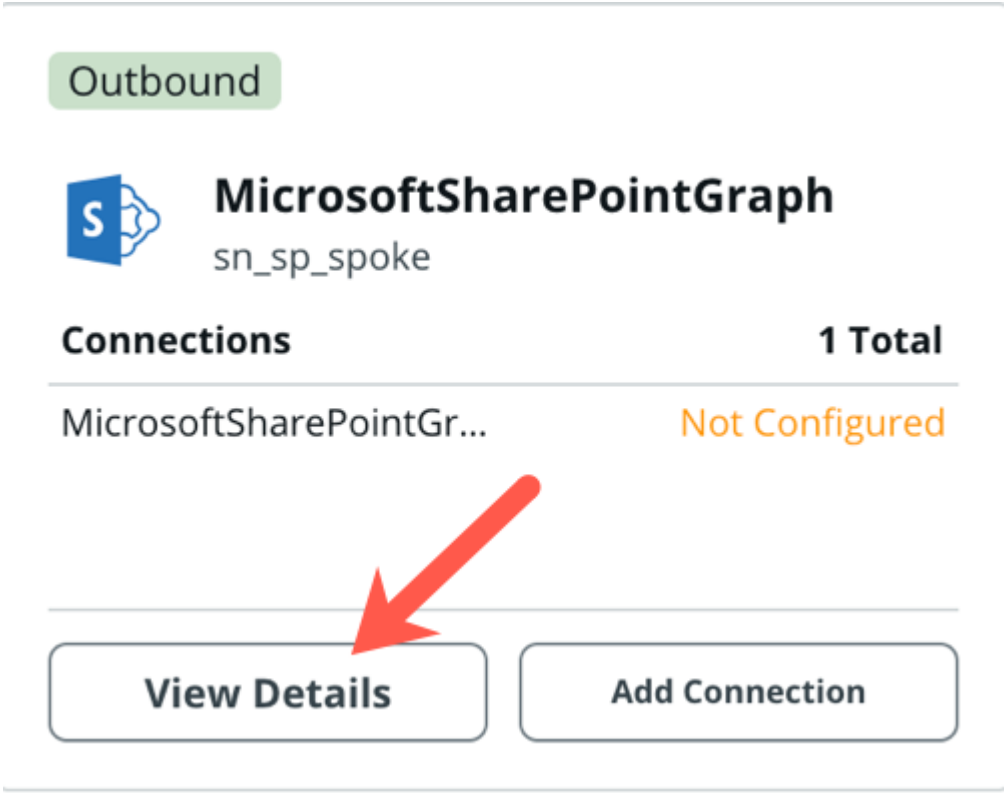
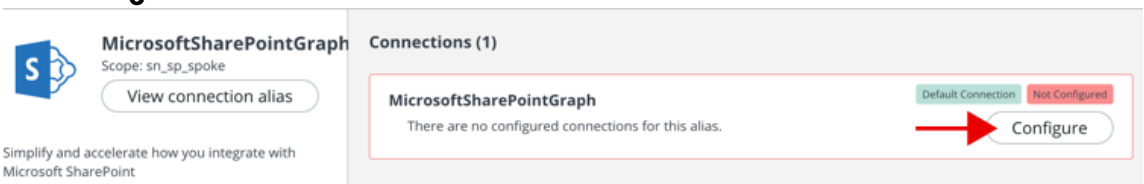


g. Click **Configure**.



h. On the form, fill these details.

Field	Description
Connection Name	The name of the connection record. The default and read-only name of the first connection record is MicrosoftSharePointGraph. To provide a custom name, you must create a connection record by clicking **Add connection**.
Connection URL	The URL to connect to the Microsoft Graph APIs. The URL is https://graph.microsoft.com/v1.0.
OAuth Entity Name	Name of the OAuth application that you created. To learn how to create an OAuth app, see Configure OAuth application in Microsoft Azure.
OAuth Client ID	Client ID that was generated when you created the OAuth app. To learn where to find the client ID, see Configure OAuth application in Microsoft Azure.

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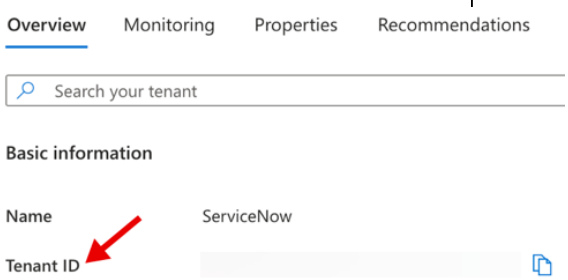
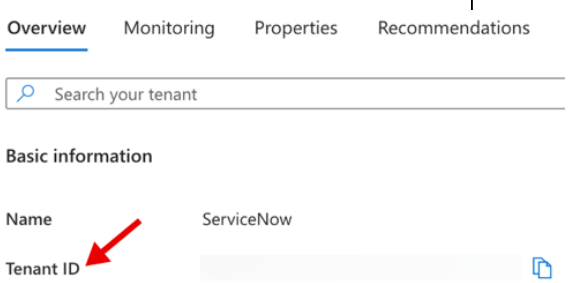
Field	Description
OAuth Client Secret	Client secret that was generated when you created the OAuth app. To learn where to find the client ID, see Configure OAuth application in Microsoft Azure.
OAuth Authorization URL	The URL must be in the format: `https://login.microsoftonline.com/<tenant-id>/oauth2/v2.0/authorize?response_mode=query`. **Tip:** To find the tenant ID, do the steps. i. Log in to https://portal.azure.com/. ii. Under the Manage Azure Active Directory heading, select **View**. The tenant ID is available under the Basic information heading. 
OAuth Token URL	The URL must be in the format: `https://login.microsoftonline.com/<tenant-id>/oauth2/v2.0/token`. **Tip:** To find the tenant ID, do the steps. i. Log in to https://portal.azure.com/. ii. Under the Manage Azure Active Directory heading, select **View**. The tenant ID is available under the Basic information heading. 

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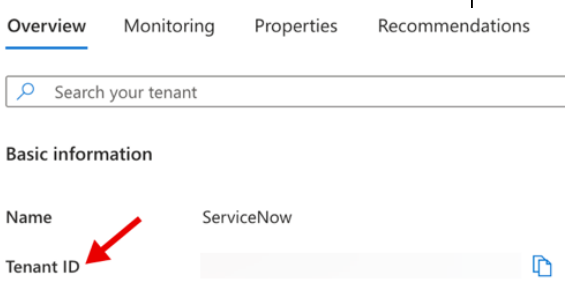
Field	Description
Token Revocation URL	The URL must be in the format: `https://login.microsoftonline.com/<tenant-id>/oauth2/v2.0/token`. **Tip:** To find the tenant ID, do the steps. i. Log in to https://portal.azure.com/. ii. Under the Manage Azure Active Directory heading, select **View**. The tenant ID is available under the Basic information heading. 
OAuth Redirect URL	The URL must be in the format: `https://<instance-name>.service-now.com/oauth_redirect.do`.

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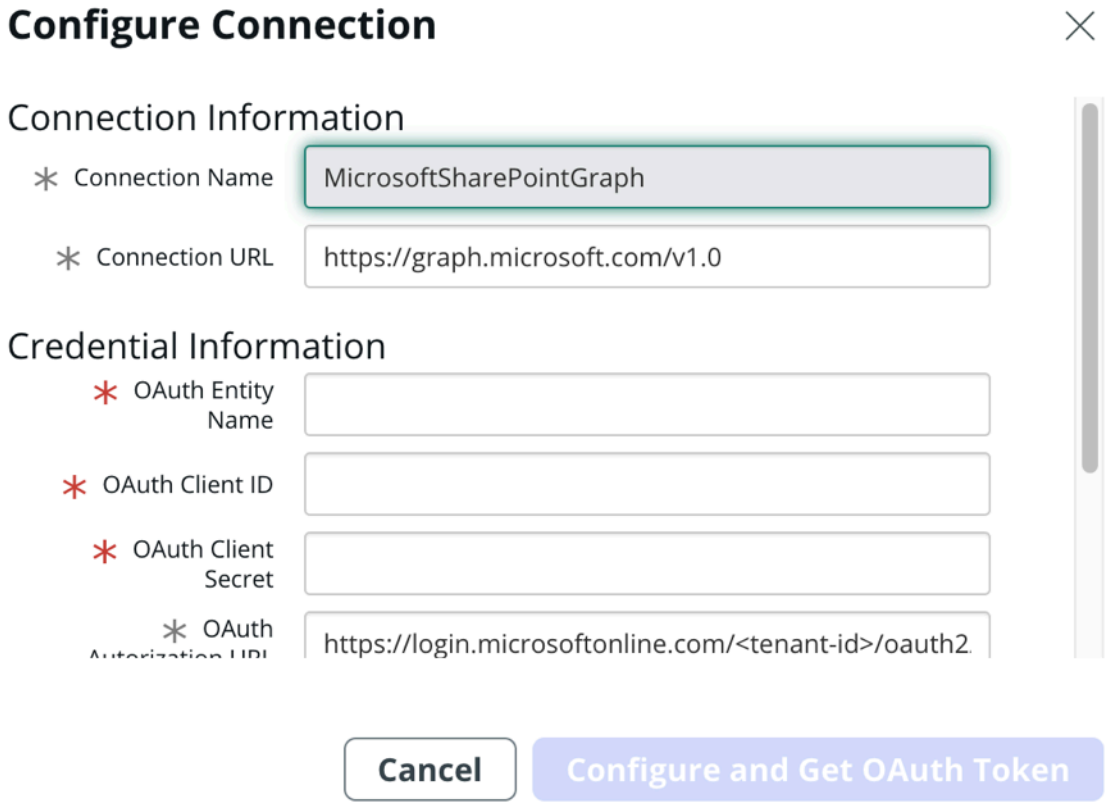

i. Select **Configure and Get OAuth Token**.

3. Click **Configure and Get OAuth Token**.
   The connection record is created.



4. To use the Microsoft Graph action, create a record in the Tenant table (sn_sp_spoke_tenant) on your ServiceNow instance.

Note: After you configure and get OAuth token, an application registry record is created with the details you have provided. In this application record, do not select any **OAuth API Script**.

Configure Microsoft SharePoint Online connection record

Integrate your ServiceNow instance with the Microsoft SharePoint Online by setting up the Microsoft SharePoint Online and a connection record.

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Before you begin

- Request Integration Hub subscription
- Activate Microsoft SharePoint Online Spoke
- Create an OAuth application on Microsoft Azure portal.
- Access to Microsoft Azure portal
- Role required: admin

Generate certificate for Windows

Generate a digital certificate file in the .cer format to upload it to Microsoft Azure.

Before you begin

Role required: admin

Procedure

1. Navigate to https://learn.microsoft.com/en-us/sharepoint/dev/solution-guidance/security-apponly-azuread#setting-up-an-azure-ad-app-for-app-only-access.
2. Execute the PowerShell script.
   The script generates two files with .PFX and .CER extensions.

   Note: Store or remember the password that is used to encrypt private key to generate the .PFX file and .CER files.

3. Use the .PFX file to create a Java Key Store (JKS) file.

   Note: Store or remember the password that is used to generate the .JKS file from the .PFX file.

Generate self-signed certificate for Mac

Generate a digital certificate file in the .cer format to upload it to Microsoft Azure.

Before you begin

Role required: admin

Procedure

1. Open the terminal on your Mac machine.
2. Replace the placeholder `<filename>` with a file name of your choice and execute this script `keytool -genkey -keyalg RSA -alias selfsigned -keystore <filename>.jks -storepass <enter password for keystore> -validity 720 -keysize 2048`.

   Note: The password to the keystore must contain at least six characters.

   The keystore asks you to enter certain information.

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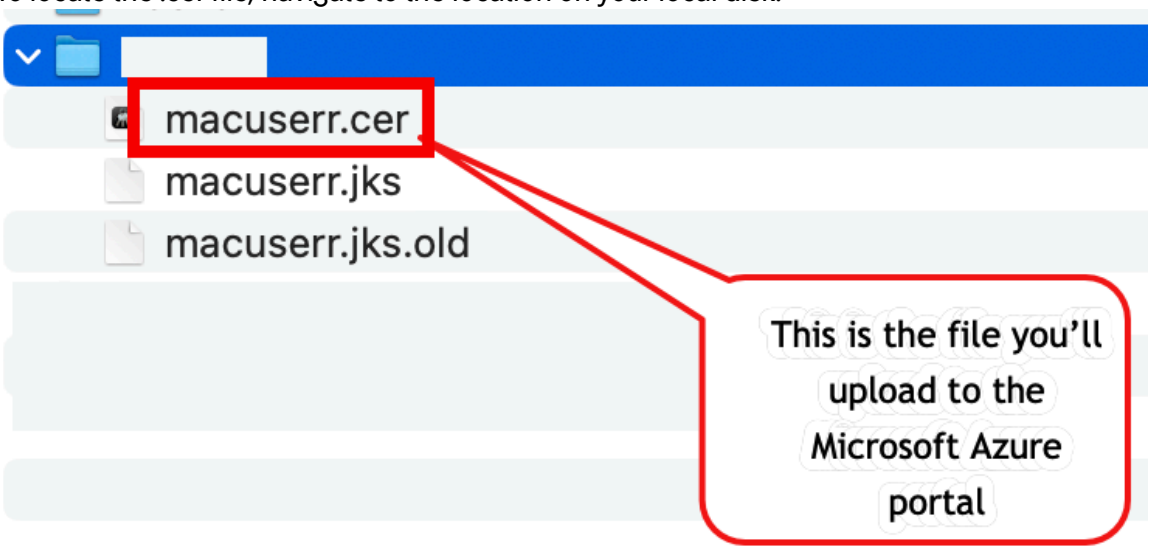
3. Enter your custom information, as given in the image for illustration.

```
What is your first and last name?
  [Unknown]:  John Smith
What is the name of your organizational unit?
  [Unknown]:  UIN
What is the name of your organization?
  [Unknown]:  UTR
What is the name of your City or Locality?
  [Unknown]:  Texas
What is the name of your State or Province?
  [Unknown]:  Texas
What is the two-letter country code for this unit?
  [Unknown]:  1
Is CN=John Smith, OU=UIN, O=UTR, L=Texas, ST=Texas, C=1 correct?
  [no]:  Yes
```

4. Press **Return**.
   You are advised to migrate to PKCS12 format.
5. Replace the placeholder `<filename>` with a file name of your choice and execute this script `keytool -importkeystore -srckeystore <filename>.jks -destkeystore <filename>.jks -deststoretype pkcs12`.
6. Enter the source keystore password.
   The migration to PKCS12 is successful.
7. Replace the placeholder `<filename>` with a file name of your choice and execute this script `keytool -exportcert -keyalg RSA -alias selfsigned -keystore <filename>.jks -storepass <password to the keystore> -rfc -file <filename>.cer`.
   The script generates the .cer file.
8. To locate the .cer file, navigate to the location on your local disk.



Configure an application in Microsoft Azure

Create a custom app using your Azure portal to authenticate requests.

Before you begin

- Access to Microsoft Azure portal
- Role required: admin

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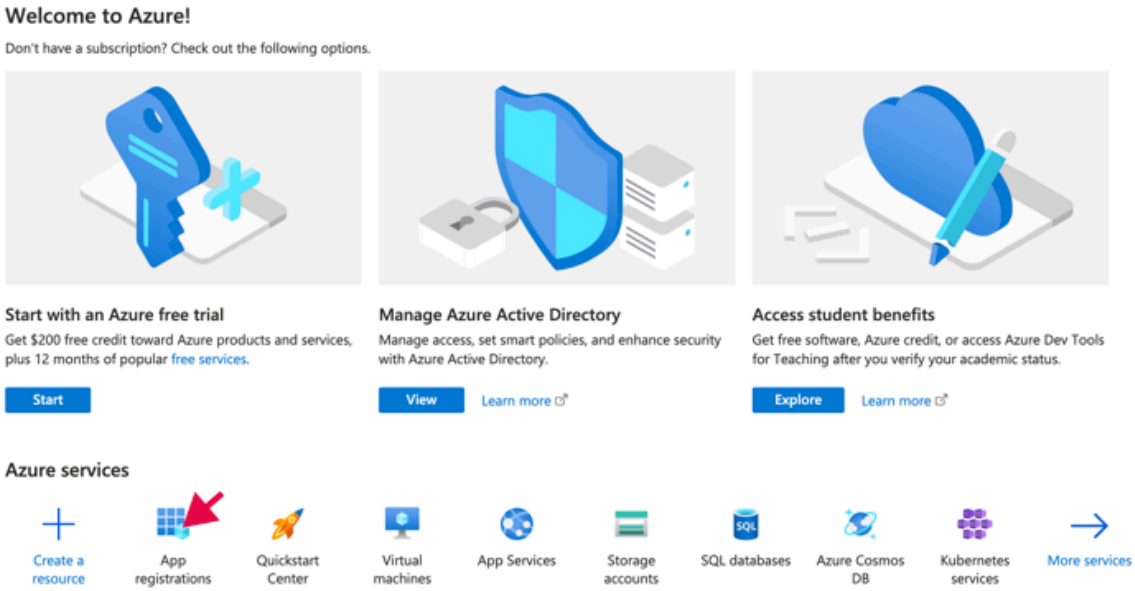
Procedure

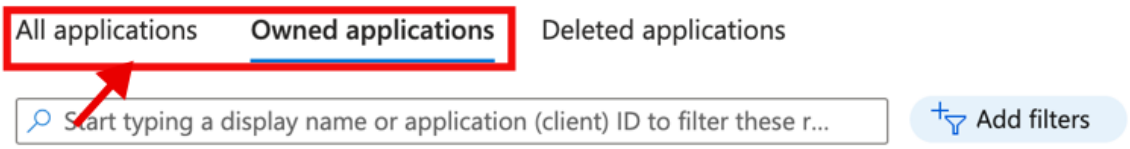
1. Upload the certificate to Microsoft Azure portal.

   a. Log in to https://portal.azure.com/.

   b. Select **App registrations**.



   c. Select **All applications** or **Owned applications.**



   d. In the search field, enter the name of the OAuth application you had created.
   To learn how to configure an OAuth application, see Configure OAuth application in Microsoft Azure.

   e. On the left panel, under Manage heading, select Certificates & secrets.

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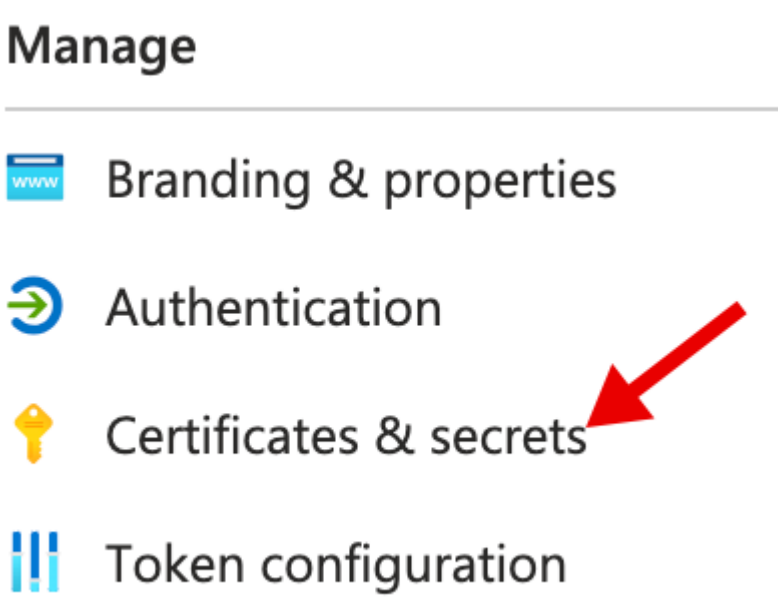
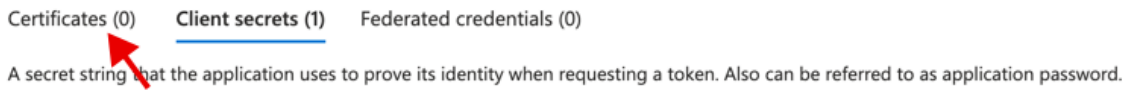


f. Under Certificates & secrets, select Certificates.



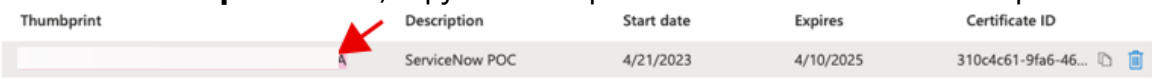
g. Select **Upload certificate**.

h. In the Upload certificate window, select the folder icon ( ) to navigate to the .cer file you had generated.

i. In the Description field, enter a description of the certificate.

j. Select **Add**.
The certificate is uploaded.

k. Under the **Thumbprint** column, copy the thumbprint value and store it at a secure place.



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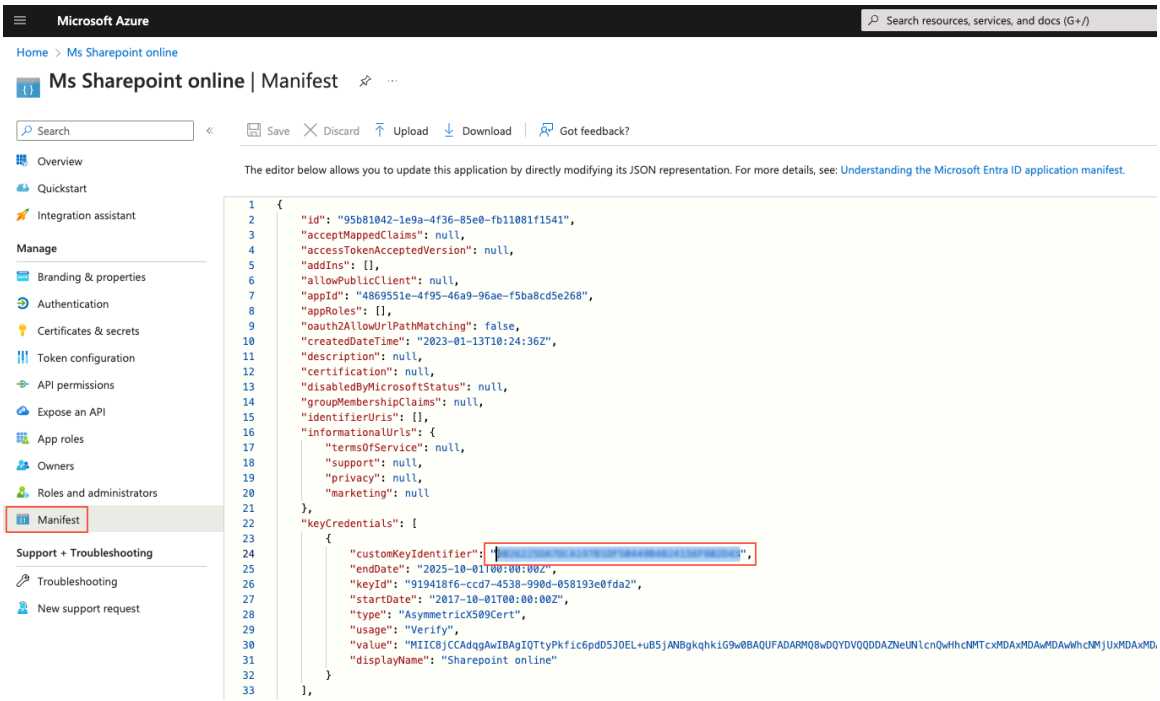
Note: Ensure that you copy the entire value of **Thumbprint**.

Alternatively, you can copy the **Thumbprint** by clicking **Manifest**.



I. Encode the Thumbprint value to a Base64 value and record the value for later use.

Note: You can use a Hexadecimal to Base64 (Hex to Base64) converter tool to encode the **Thumbprint** value to a Base64 value.

2. Obtain permissions to access the REST APIs that the spoke needs to automate actions.

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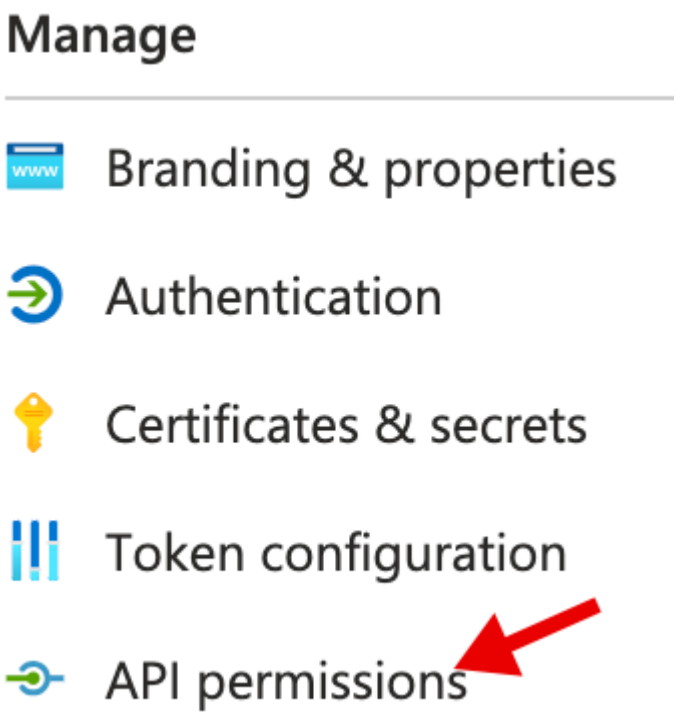
a. On the left panel, under the Manage heading, select API permissions.



b. Under the Configured permissions heading, select **+ Add a permission**.

c. In the Request API permissions window, select **SharePoint**.

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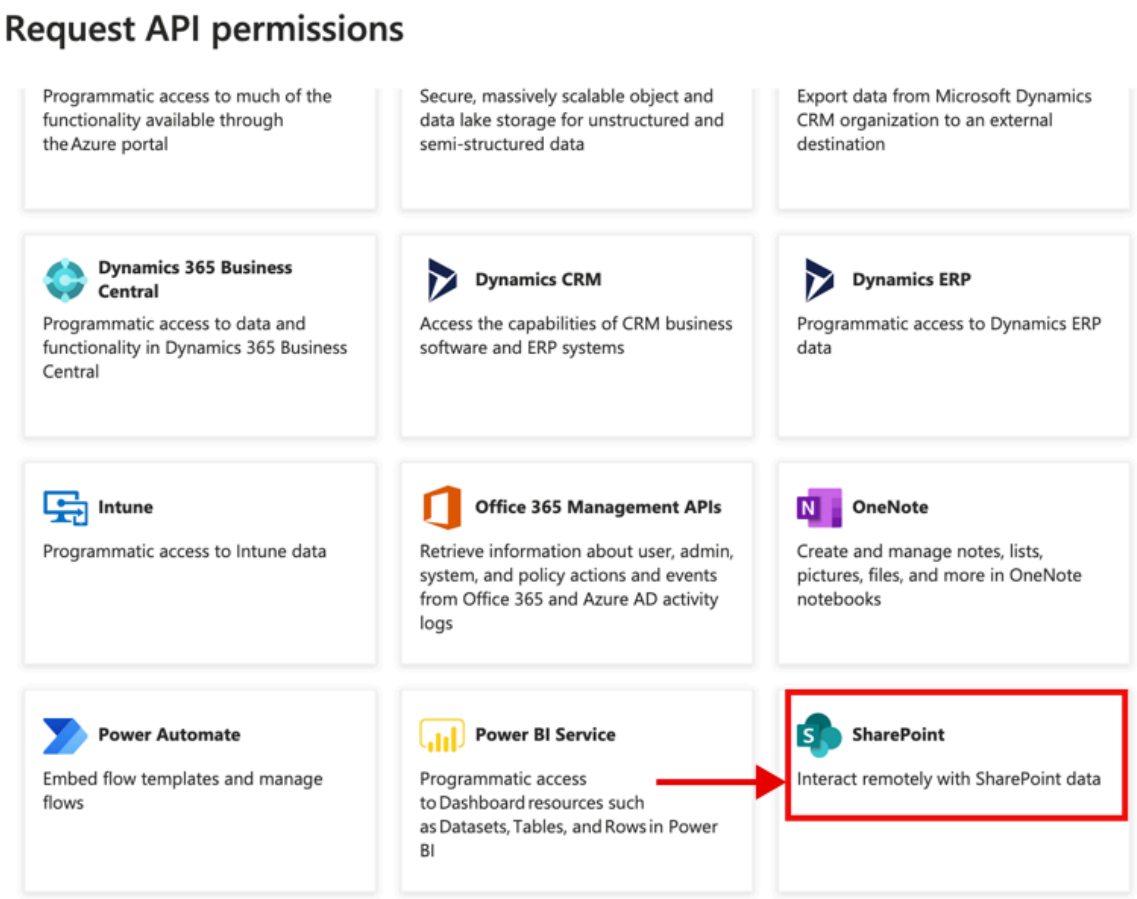
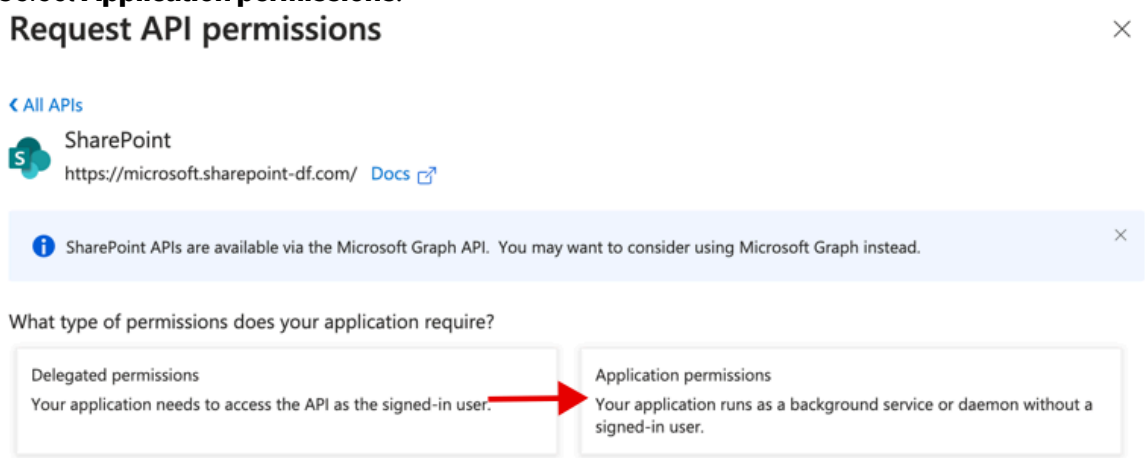


d. Select **Application permissions**.



e. Expand the Sites list.

f. Select Sites.FullControl.All.
Your ServiceNow instance now has full control of all sites in Microsoft SharePoint Online.

g. Select **Add permissions**.
The permissions are added.

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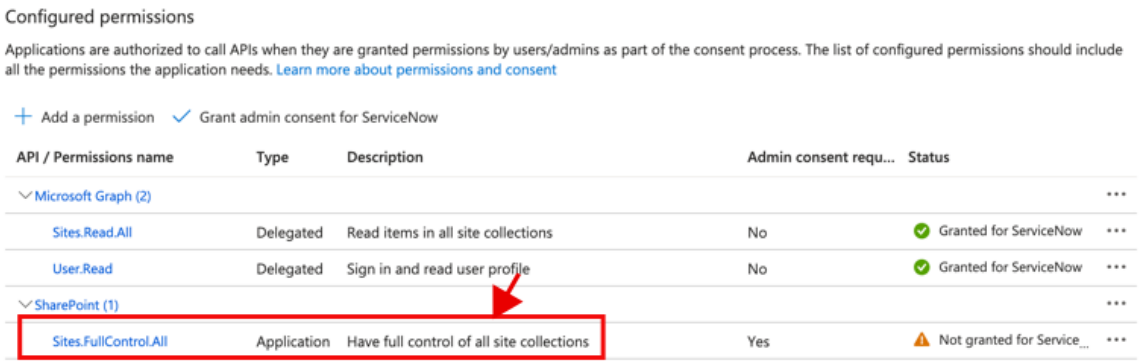
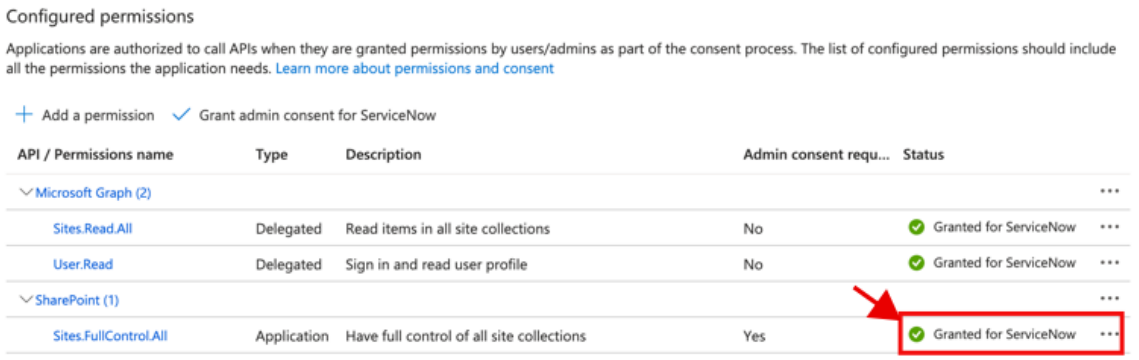


h. To grant admin consent, select **Grant admin consent for ServiceNow**.

i. In the Grant admin consent confirmation window, select **Yes**.
The admin consent is granted.



Tip: If you want to use other permissions apart from `Sites.FullControl.All`, contact your SharePoint and Azure administrators to determine the exact permissions that are needed for your organisational policies.

Attach a Java Key Store certificate

Enable the JWT Bearer Grant token authentication by attaching a valid Java Key Store (JKS) certificate.

Before you begin

- Valid Java Key Store certificate
- Role required: admin

Procedure

1. Navigate to **System Definition** > **Certificates**.
2. Open the record **Microsoft SharePoint Online Certificate**.

Note: Ensure that you use the default record **Microsoft SharePoint Online Certificate** only.

3. Enter the password associated with the JKS file in **Key store password**.
4. Select **Java Key Store** as the **Type**.
5. Click the attachments icon ( ) and attach the JKS certificate you had generated.

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For more information, see Configure OAuth application in Microsoft Azure.

6. Click **Validate Stores/Certificates**.
7. Click **Update**.

Configure the JWT signing key

Create a JSON Web Token (JWT) signing key to assign to your Java Key Store certificate.

Before you begin

Role required: admin

Procedure

1. Navigate to **System OAuth** > **JWT Keys**.
2. Open the record **Microsoft SharePoint Online JWT Keys**.
3. Enter the password that is used to encrypt private key to generate the .PFX file and .CER file in **Signing Key Password**.
4. Click **Update**.

Configure the JWT provider

Add a JSON Web Token (JWT) provider to your ServiceNow instance.

Before you begin

- Copy and record the value of **Application (client) ID** and **Directory (tenant) ID** of the application you had registered in the Azure portal.



- Role required: admin

Procedure

1. Navigate to **System OAuth** > **JWT Providers**.
2. Open the record **Microsoft SharePoint Online JWT Provider**.
3. Enter values for **iss**, **sub**, and **aud** in the Standard Claims related list.

Field	Value
aud	Microsoft Online URL in this format: `https://login.microsoftonline.com/<tenant-id>/oauth2/token`. Replace `<tenant-id>` with **Directory (tenant) ID** value of your application had registered in the Azure portal.
iss	**Application (client) ID** of the application you had registered in Azure portal.

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Field	Value
sub	**Application (client) ID** of the application you had registered in Azure portal.

4. Click **Update**.

Register Microsoft SharePoint Online as OAuth provider

Use the information generated during Microsoft SharePoint Online account configuration to register Microsoft SharePoint Online as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin.

Procedure

1. Navigate to **System OAuth** > **Application Registry**.
2. Click **New**.
   The system displays the message **What kind of OAuth application?**
3. Select **Connect to a third party OAuth Provider**.
   The system displays a blank Application Registries form.
4. Enter these values.

Field	Value required
Name	Name to uniquely identify the record. For example, enter `SharePoint OAuth profile`.
Client ID	Client ID in this format: `<ClientID>`.
Client Secret	Client Secret you created during the Microsoft SharePoint Online account configuration.
OAuth API Script	Select **OAuthUtilSPJWTOnline**.
Default Grant type	Select **Client Credentials**.
Token URL	Token URL in this format: `https://login.microsoftonline.com/<tenant-id>/oauth2/token`. Replace `<tenant-id>` with **Directory (tenant) ID** value of your application had registered in the Azure portal.

5. In the OAuth Entity Scopes related list, insert a record with these values.

Name	OAuth scope
scope	`https://<MS-SharePoint-tenant-name>.sharepoint.com/.default`

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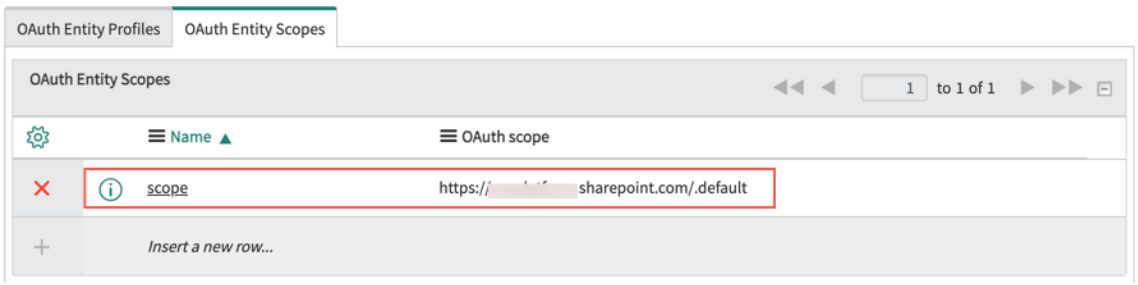

6. Right-click the form header, and click **Save**.
   The system validates the OAuth credentials and creates the OAuth Entity Profiles related list.

Result

The instance can request OAuth 2.0 tokens for the spoke.

Create credential records for the Microsoft SharePoint Online spoke

Create Credential records to the Microsoft SharePoint Online custom OAuth application you created during Microsoft SharePoint Online account configuration. The Microsoft SharePoint Online spoke connection and credential aliases use these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **OAuth 2.0 Credentials**.
   The pop-up window displays a blank OAuth 2.0 Credentials form.
4. Enter these values.

Field	Value required
Name	Enter any name to uniquely identify the record. For example, enter `SharePoint Credentials`.
Active	Enable
OAuth Entity Profile	Select the OAuth profile you created when you registered the custom Microsoft SharePoint Online application as an OAuth provider. For example, select **SharePoint OAuth profile**.
Applies to	Select the MID Servers that can use this credential. For example, select **All MID Servers**.
Order	Select the order to apply this credential. For example, enter `100`.

5. Save the record.

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Create connection records for the Microsoft SharePoint Online spoke

Create Connection records to your Microsoft SharePoint Online account. The Microsoft SharePoint Online spoke connection and credential alias uses these connections to perform actions on Microsoft SharePoint Online.

Before you begin

Role required: admin.

Procedure

1. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the connection and credential alias record for MicrosoftSharePointOnline.
3. From the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.
4. On the form, fill in the fields.

Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `SharePoint Connection`.
Credential	Select the Credential record you created for Microsoft SharePoint Online. For example, select **SharePoint Credentials**.
Connection alias	Select the Connection alias record you created for Microsoft SharePoint Online.
Active	Enable
Connection URL	Enter the root SharePoint URL. For example, `https://<SiteName>.sharepoint.com`.

5. In the **Attributes** tab, enter the Base64 encoded value of **Thumbprint**.

   Note: The **Thumbprint** value is a hexadecimal value. You can use a Hexadecimal to Base64 (Hex to Base64) converter tool to encode the **Thumbprint** value to a Base64 value.

6. Click **Submit**.
   The Microsoft SharePoint Online account is integrated with your ServiceNow instance and the spoke is ready to be used.

   Note: If the single sign-on is setup, configure your flows to retrieve the user details from Microsoft SharePoint Online using the spoke action, Look Up User Information By Login Name, to verify if the user is authorised to perform the required actions.

What to do next

1. Navigate to **Connections & Credentials** > **Credentials**.
2. Open the credential record you had created. For example, **SharePoint Credentials**.
3. From Related Links, click **Get OAuth Token**.

   The system displays a confirmation message that the OAuth token flow is completed successfully. Review the details if the flow is not completed successfully.

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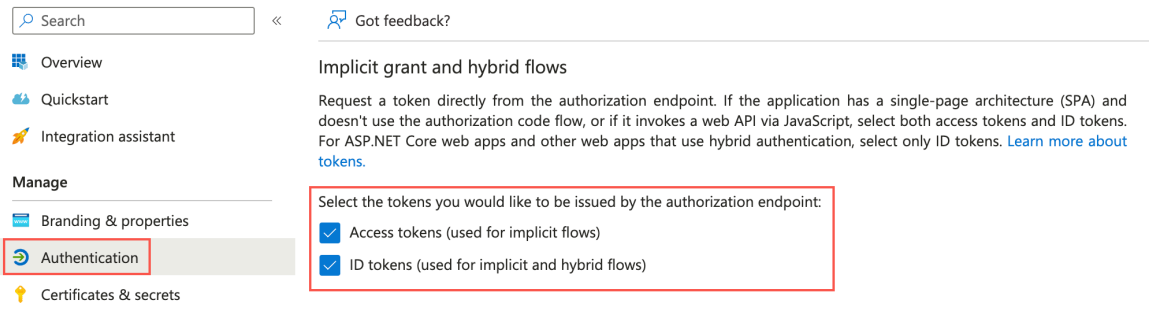
Note:

- Confirm that the thumbprint has been defined in the connection record
- Confirm that you allow pop-up windows in your browser.

The spoke setup is completed and you can use the flows as per your requirement.

Note: If the generated token doesn't work after the spoke setup, open your OAuth application in the Azure portal and select the two checkboxes under **Implicit grant and hybrid flows**.



Create aliases for multiple tenants

Create a connection and credential alias record for each additional tenant site that you want to support. Select the correct alias in the Tenant record to authorize changes in Microsoft SharePoint Online.

Before you begin

Role required: admin.

About this task

If configuring an integration for a single tenant, use the existing **MicrosoftSharepointOnline** alias record.

Note:

- You can use multiple tenants with the **Microsoft SharePoint Graph** connection alias only.
- Three alias records are available by default with the spoke; Sharepoint Online, SharePoint Graph, and SharePoint Graph Root Site Subscription. Each alias record requires a tenant to be associated with it. If you intend to use all SharePoint Online, Graph, and Root Subscription actions in the spoke, you must ensure that you have created three tenant records in the Tenants tables of the Microsoft SharePoint Online spoke so that each tenant record is associated with its respective alias record.

Procedure

1. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.
2. Click **New**.
   A blank Connection & Credential Alias record opens
3. On the **Connection & Credential Aliases** form, fill the following values.

Connection & Credential Aliases form fields

Field	Value
Name	Unique name

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Field	Value
Type	Connection and Credential
Connection type	HTTP

4. Click **Submit**.

What to do next
Associate a credential record and a connection record with the alias to authorize actions on the SharePoint tenant site. Create an alias record and associated connection and credential records for each tenant you want to support.

Define Microsoft SharePoint Online tenants

Define a profile for your Microsoft SharePoint Online tenant site. The Microsoft SharePoint Online spoke uses the tenant record and associated Connection and Credential alias to perform actions on Microsoft SharePoint Online.

Before you begin
Role required: admin.

Procedure
1. Navigate to **Microsoft Sharepoint Online** > **Tenants**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	Enter a name for the tenant.
Alias	Select a connection and credential alias. If configuring the integration for a single tenant, select the **MicrosoftSharepointOnline** alias. If configuring the integration for multiple tenants, select the desired alias.
Sharepoint Root URL	Enter the root SharePoint URL without the https:// prefix. For example, `<SiteName>.sharepoint.com`
Tenant Id	Enter the Tenant ID. This is the Directory ID for the Azure AD Directory that is supporting the Microsoft SharePoint Online tenant you want to connect to. See Configure OAuth application in Microsoft Azure.
Resource Id	Auto-populated with **00000003-0000-0ff1-ce00-000000000000**.

4. Click **Submit**.

What to do next
If configuring an integration with multiple Microsoft SharePoint Online tenants, create additional tenant profiles as needed.

Configure the SharePoint Graph Root Site Subscription connection and credential alias record

Integrate the ServiceNow instance and Microsoft SharePoint Online by creating a custom OAuth application in Microsoft SharePoint Online to authenticate ServiceNow requests.

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Before you begin

- Request Integration Hub subscription
- Activate Microsoft SharePoint Online spoke
- Role required: admin

About this task

If you intend to use the Create Root Site Subscription action and configure **SharePointGraphRootSiteSubscription** connection and credential alias record, you must create another tenant.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credential Aliases**.
2. Open the record, **SharePointGraphRootSiteSubscription**.
3. Click the **Create New Connection & Credential** related link.
4. On the form, fill these details.

Field	Description
OAuth Entity Name	Name to identify the OAuth application registry record.
OAuth Client ID	Client ID in this format: `<ClientID>@<TenantID>`.
OAuth Client Secret	Client Secret you created during the Microsoft SharePoint Online account configuration.
OAuth Token URL	Token URL in this format: `https://login.microsoftonline.com/<tenant-id>/oauth2/v2.0/token`

Note: You may change default values as per your requirement.

5. Click **Create and Get OAuth Token**.

Microsoft Teams Communications Spoke

Manage groups calls and meetings in the Microsoft Teams Communications account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Microsoft Teams Communications spoke v1.6.2 is the latest version. For version history of the spoke, see Microsoft Teams Communications spoke release notes.

Supported versions

This spoke was built for Microsoft Teams Communications API version v1 and beta version, but may be compatible with later versions.

Note: The Create Online Meeting and Mute Participants spoke actions use the beta API version. All the remaining actions use the API version v1.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Microsoft Teams Communications spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Call Management	Delete Group Call	Deletes the specified active group call.
	Get Group Call Details	Retrieves details of the specified active group call.
	Get Group Call Participant Details	Retrieves the properties and relationships of a participant object or list of participant objects from Microsoft Graph API.
	Invite Participants to Group Call	Invites participants to the specified active group call.
	Keep Group Call Alive	Keeps a group call alive if the keep alive request is made within 45 minutes of the previous request. If the request is not made within 45 minutes, the group call is considered as an inactive call.
	Mute Participants in Group Call	Mutes one or more participants in an active group call.
	Start Group Call	Initiates a group call.

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Category	Action	Description
Meeting Management	Create Meeting Event	Creates a Microsoft Teams-enabled calendar event with comprehensive meeting configuration options. This action allows you to schedule online meetings, manage attendee lists, configure meeting settings, and support both one-time and recurring meeting patterns.
	Create Notification Subscription	Creates a subscription to receive real-time notifications for Microsoft Teams resources. This action allows you to monitor changes to resources such as chats and online meeting artifacts such as transcripts and recordings, by subscribing to specified event types.
	Create User Online Meeting	Creates a user online meeting using the /users/{userId}/onlineMeetings Microsoft Graph API endpoint.
	Create Online Meeting	Creates a user online meeting using the /communications/onlineMeeting Microsoft Graph API endpoint.
	Look up meeting data	Retrieves meeting details associated with the specified event ID.
	Look up Meeting Recording Content	Retrieves the recording content of a specified online meeting.
	Look up transcript data	Retrieves the meeting transcript using the specified user ID and meeting ID.
	Look up transcripts	Retrieves Microsoft Teams transcripts using the specified user ID, meeting ID, and transcript ID.
	Update User Online Meeting	Updates the details of the specified user online meeting.
User Management	Look up User IDs Stream	Retrieves the user ID and display name for the specified users.
Metadata	Get User Online Meeting Additional Fields	Retrieves the metadata for the additional fields input for the Update Online Meeting action. This action returns the online-meeting settings you can update, along with each field's type and choice values, so the Additional Fields input renders as a dynamic template.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

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For information about setting up the spoke, see Set up the Microsoft Teams Communications spoke.

Set up the Microsoft Teams Communications spoke

Integrate the ServiceNow instance and Microsoft Teams Communications account by creating a custom OAuth application in Microsoft Teams Communications to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Teams Communications spoke.
- Role required: admin.

Create an app in Microsoft Teams to enable making calls

Create an app to make outbound calls from Microsoft Teams.

Before you begin

Role required: admin, Microsoft Teams admin, Microsoft Azure admin

Procedure

1. Log in to Microsoft Teams developer portal.

> **Note:**
>
> The Developer Portal for the Government Community Cloud (GCC) is accessible only through an application within Microsoft Teams. It is not available as a separate, standalone website. For more information, see Developer Portal for Teams. To create an app for GCC, you must create the app from Microsoft Teams.

2. Create an app.

   a. Navigate to **Apps** > **New app**.

   b. Enter a valid name for the app in the Add app pop-up page and select **Add**.

   c. On the App details page, fill in the fields.

App details page

Field	Description
Short name	Name of your application. For example, ServiceNow for Notify Microsoft Teams.
Full name	Full name of your application.
App ID	Unique identification number for the app. **Note:** This App ID is different from the Bot ID/App ID that will be generated in further steps.
Short description	Brief description of the app.
Long description	Detailed description of the app.

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Field	Description
Version	Version for the app. For example, 1.0.
Developer or company Name	Name of your company.
Website	Link to your company website.
Privacy policy	Link to the privacy statement for your app.
Terms of use	Link to the terms and conditions for your app.

d. Select **Save**.
An app is created in Microsoft Teams.

3. Create a bot for the new app.

a. Navigate to **Configure** > **App features**.

b. Select **Bot**.

c. Select **Create a new bot**.

d. Select **New Bot**.

e. Enter a valid name for bot in the Add bot pop-up page and select **Add**.

f. Copy to a notepad the Bot ID value of the new bot using one of the following options and this will be your app Client ID.

- Copy the ID from the browser URL.
- Navigate back to **Bots** > **Tools**, and copy the Bot ID.

g. Go to **Channels**, enable **Microsoft Teams**, and select **Save**.

h. Select **Client secrets** and enter a client secret for your bot.
A Client secret is generated.

Note: Ensure you copy the generated Client secret to a notepad because it will not appear again.

4. Copy the Client ID or Bot ID of the new bot to the Application (client ID).

a. Go to **Apps** and select the app you created.

b. Navigate to **Configure** > **Basic information**.

c. Paste the Client ID/Bot ID that you copied during step 3f in the **Application (client) ID** field and select **Save**.

5. Configure additional app features for new bot.

a. Go to **Apps** and select the app you created.

b. Navigate to **Configure** > **App features** > **Bot** > **Select an existing bot** and select the bot you created.

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c. Select **Support audio calls** and **Support video calls** from 'What can your bot do?'.

d. Select **Personal**, **Team**, and **Group chat** from 'Select the scopes in which people can use this command'.

6. Copy the new app attributes.

a. Log in to Microsoft Azure portal as Microsoft Azure admin.

b. Navigate to **Azure services** > **Azure Active Directory** > **Manage** > **App registrations**.

c. Search and open the new bot created for the spoke by name or by Application (client) ID.

d. Make a note of client ID/Application (client) ID, Object ID, and tenant ID to update these values in your ServiceNow instance in later procedures.

Note: Bot ID created in the Microsoft Teams Developer portal and Application (client) ID in the Microsoft Azure portal are the same.

Manage permissions and authenticate the app and bot in Microsoft Azure portal

Assign permissions to users to be able to authenticate successfully and participate in conference calls in Microsoft Teams.

Before you begin

Role required: Microsoft Azure admin

About this task

You can manage the permissions required by the app and bot to perform required actions for conference calls.

Procedure

1. Log in to Microsoft Azure portal.
2. Navigate to **Azure Services** > **Azure Active Directory** > **Manage** > **App registrations**.
3. Search and open the bot created in step 3 in the section Create an app in Microsoft Teams to enable making calls by name or by Application (client) ID.
4. Navigate to **Manage** > **API Permissions** > **Add a permission** > **Microsoft Graph** and select **Application Permissions**.
5. Search and select the following values using **Select permissions**, and then select **Add permissions** to grant the permission.
   - **User.Read.All** from User list.
   - **OnlineMeetings.ReadWrite.All** from OnlineMeetings list.
   - **Calls.InitiateGroupCall.All**, **Calls.JoinGroupCall.All**, **Calls.JoinGroupCallAsGuest.All** from Calls list.
6. Grant admins access to the Microsoft Azure applications that require admin approval.
   a. Select **Grant admin consent for <tenant>** in the API permissions page.
   b. Select **Yes** in the Grant admin consent confirmation pop-up page.

Create a Service user to make calls from Microsoft Teams

Create a service user role to be able to start online meetings on behalf of users in Microsoft Teams.

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Before you begin
Role required: admin

Procedure
1. Log in to Microsoft Azure portal.
2. Create a Service user.
   a. Navigate to **Azure services** > **User**.
   b. Select **New user**.
   c. On the form, fill the fields.

New user

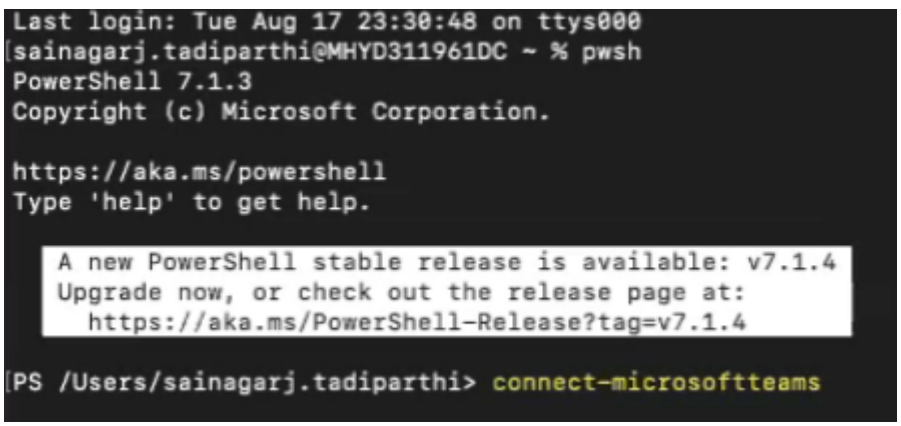
Field	Description
User name	Option to provide the user name for the user.
Name	Option to provide the name of the user.

   d. Select **Create**.
   e. Select the created user to view the details.

> **Note:** Ensure that the Service User has the required license/subscription and a valid usage location set to make conference calls from Microsoft Teams.

3. Run the PowerShell command from Terminal on macOS or from the Command prompt on Windows OS.
   a. Type the command `pwsh` and press **Enter**.
   b. Connect your Microsoft tenant with PowerShell.
   c. Run the following command in PowerShell.

```
connect-microsoftteams
```



Upon successful connection, a confirmation message is displayed in the browser.

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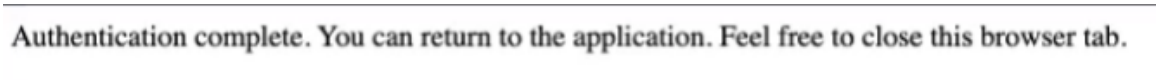
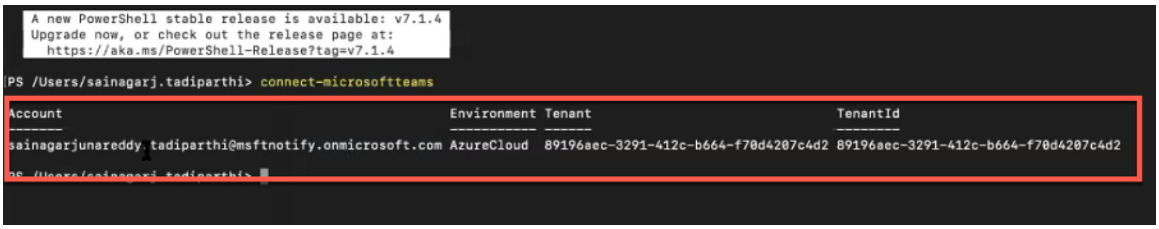


PowerShell will also display the tenant details.



4. Run the command below to create a new Application Access Policy in PowerShell.

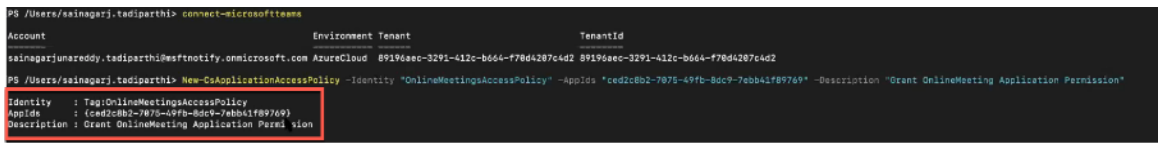
   Use the bot ID created in step 3 in the section Create an app in Microsoft Teams to enable making calls as the AppId for the command.

   For more information on the application access policy, see Configure application access to online meetings.

```
Syntax:

New-CsApplicationAccessPolicy -Identity "<PolicyName (can
 be anything)>" -AppIds "<AppIds>" -Description "<Policy
 Description>"

Example:
If you have a Self-configured (single tenant) setup, use the
 application ID from Azure portal.

For Example: New-CsApplicationAccessPolicy
 -Identity "OnlineMeetingsAccessPolicy" -AppIds
 "aaaaaaaa-1234-er4r-8dc9-123456789012" -Description "Grant
 OnlineMeeting Application Permission"
```



Upon successfully creating the policy, the details are displayed in PowerShell.



5. Run the user permission policy in PowerShell.

   a. Go to the Microsoft Azure portal.

   b. Navigate to **Home** > **Users**.

   c. Select the user created.

   d. Copy the **Object ID** of the user to notepad.

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e. Use the policy name created in the previous step as the **PolicyName** of the command and the **Object ID** as the **UserAzureID** respectively in the command to execute in PowerShell.

```
Syntax:

Grant-CsApplicationAccessPolicy -Identity "<UserAzureID>"
 -PolicyName "<PolicyName>"

Example:

Grant-CsApplicationAccessPolicy -Identity
 "fdcd9c17-ceae-468f-906f-2er76b4dd0f4" -PolicyName
 "OnlineMeetingsAccessPolicy"
```



Register Microsoft Teams Communications as an OAuth provider

Use the information generated during the application configuration in Microsoft Azure portal to register Microsoft Teams Communications as the OAuth provider so that the ServiceNow instance can request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Click **New**.
   The system displays this message: `What kind of OAuth application?`.
3. Select **Connect to a third party OAuth Provider**.
4. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Application ID created during application registration.
Client Secret	Client secret created during application registration.
Active	Option to actively use the application registry.
Authorization URL	OAuth authorization code endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/authorize`.
Token URL	OAuth server token endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/token`.

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Field	Description
Token Revocation URL	OAuth server token revocation endpoint.
Redirect URL	OAuth callback endpoint. Enter `https://<instance-name>.service-now.com/oauth_redirect.do`.
Default Grant type	Grant type used to establish the token. Select **Client Credentials**.

5. Right-click the form header, and click **Save**.
6. In the **OAuth Entity Scopes** tab, insert a row and fill these values:

Field	Description
Name	Name to identify the entity scope record. For example, `MS Teams Comm OAuth Scope`.
OAuth scope	OAuth entity scope. Enter `.default`.

7. Right-click the form header, and click **Save**.
8. In the **OAuth Entity Profiles** tab, open the default profile record.
9. In the **OAuth Entity Scopes** tab, insert a record.
10. Search and select the OAuth entity scope you had created.
11. Click **Update**.

Create a credential record for the Microsoft Teams Communications

Authorize the Microsoft Teams Communications spoke actions by creating credential records for the application registered in the Microsoft Azure portal. The Microsoft Teams Communications connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record, **MSTeamsCommunicationsSpoke**.
3. From the **Credentials** tab, click **New**.

   The system displays this message: `What type of Credentials would you like to create?`

4. Select **OAuth 2.0 Credentials**.
5. On the form, fill in the fields.

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OAuth 2.0 Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `MS Teams Comm Cred`.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile created during the registration of Microsoft Teams Communications as an OAuth provider. For example, `MS Teams Comm OAuth Prof`.

6. Right-click the form header and click **Submit**.
7. To generate the OAuth token, click the **Get OAuth Token** related link.

Microsoft Teams Graph Spoke

The Microsoft Teams Graph spoke manages applications, calendar, teams, channels, chats, notifications, and webhooks in Microsoft Teams. To create, manage, or delete users and groups, use the Microsoft Entra ID spoke (formerly Microsoft Azure Active Directory spoke).

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Note:

- Teams in the Microsoft Teams Graph spoke are created from the groups in Microsoft Entra ID (formerly Microsoft Azure Active Directory). To create a team using the Microsoft Teams Graph spoke, the associated group must be present in Microsoft Entra ID.
- User and group management can be done using Microsoft Entra ID only and not Microsoft Teams Graph spoke.
- Teams can be created from the Microsoft Office 365 group only.
- The team ID in Microsoft Teams is the same as the group ID of the associated group in Microsoft Entra ID.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Microsoft Teams Graph spoke v4.5.2 is the latest version. For version history of the spoke, see Microsoft Teams Graph Spoke release notes.

Supported version

Microsoft Graph REST API v1.0.

Spoke dependencies

If you're having trouble installing the app, confirm that these dependent plugins are installed:

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- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- Flow Designer Model (com.glide.hub.designer_backend.model)
- Complex Object (com.glide.cobject)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Remote Tables (com.glide.script.vtable)
- ServiceNow IntegrationHub Action Step - Get Connection Info (com.glide.hub.action_step.get_connection_info)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Microsoft Teams Graph spoke provides a sample flow, Post ServiceNow Incident Worknotes Updates to Microsoft Teams Chat, to demonstrate automating the task of posting a Microsoft Teams chat message to the assigned user with details about the latest work notes added to the incident.

Spoke subflows

The Microsoft Teams Graph spoke provides samples subflows to demonstrate automating the tasks. To customize a sample flow, copy it to the required application scope. Available sample subflows include:

Microsoft Teams Graph spoke subflows

Subflow	Description
Post Incident Details	Posts details of the required incident to a Microsoft Teams channel.
Process Inbound Notifications	Retrieves the details of the specified message based on the input data received from webhook subscription.
Renew Webhook Subscription Helper Subflow	Renews a subscription if renewal is required, which is decided based upon inputs.
Renew Webhook Subscriptions	Retrieves all the webhook subscriptions and renews them if renewal is required.
Subscribe Webhook	Creates a webhook subscription for the specified team's channel.

Spoke actions

The Microsoft Teams Graph spoke provides actions to automate team and channel tasks when an incident is created in the ServiceNow instance.

You can perform some actions by using the Microsoft Teams Spoke connection and the remaining actions by using the Microsoft Teams Graph Client Credentials connection.

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The actions in the following table use the Microsoft Teams Spoke connection and credential alias record. These actions require the delegated permissions.

Microsoft Teams Graph spoke actions that use the Microsoft Teams Spoke connection and credential alias

Category	Action	Description	Permissions required (from least to most privileged)	
Application Management	Install Application to User	Installs the specified application in the personal scope of the user.	Delegated (work or school account)	TeamsAppInstallation.ReadWriteS TeamsAppInstallation.ReadWriteF
	Look up User App Installation	Retrieves the details of the specified application's installation for the user.	Delegated (work or school account)	TeamsAppInstallation.ReadForUse TeamsAppInstallation.ReadWriteS TeamsAppInstallation.ReadWriteF
Calendar Management	Look up Schedules	Retrieves the availability information (free or busy) for a collection of users, distributions lists, or resources (rooms or equipment) for the specified time period.	Delegated (work or school account)	Calendars.Read, Calendars.ReadWrite
Channel Management	Add Member to Channel	Adds the specified member to the specified channel.	Delegated (work or school account)	ChannelMember.ReadWrite.All
	Create Channel	Create a new channel in a team.	Delegated (work or school account)	Channel.Create, Group.ReadWrite.All, Directory.ReadWrite.All
	Delete Channel	Removes the specified channel from the required team and deletes all conversations.	Delegated (work or school account)	Channel.Delete.All, Group.ReadWrite.All, Directory.ReadWrite.All
	Look up Channel	Retrieves the properties and relationships of a channel.	Delegated (work or school account)	Channel.ReadBasic.All, ChannelSettings.Read.All, ChannelSettings.ReadWrite.All, Group.Read.All, Group.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All

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Microsoft Teams Graph spoke actions that use the Microsoft Teams Spoke connection and credential alias (continued)

Category	Action	Description	Permissions required (from least to most privileged)	
	Look up Channel by Name	Retrieves the Channel ID and properties given a channel name and team ID.	Delegated (work or school account)	Channel.ReadBasic.All, ChannelSettings.Read.All, ChannelSettings.ReadWrite.All, Group.Read.All, Group.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All
	Look up Channel Members	Retrieves a list of channel members.	Delegated (work or school account)	ChannelMember.Read.All, ChannelMember.ReadWrite.All
	Look up Channel Messages	Retrieves the list of messages in a channel of a team.	Delegated (work or school account)	ChannelMessage.Read.All
	Look up Channels	Retrieves the list of channels in this team.	Delegated (work or school account)	Channel.ReadBasic.All, ChannelSettings.Read.All, ChannelSettings.ReadWrite.All, Group.Read.All, Group.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All
	Remove Member from Channel	Removes the specified user from the specified channel.	Delegated (work or school account)	ChannelMember.ReadWrite.All
Chat Management	Create Chat	Creates a chat between the users.	Delegated (work or school account)	Chat.Create, Chat.ReadWrite
	Look up Chat Message Deltas Stream	Retrieves the list of messages (without the replies) from a team's channel.	Delegated (work or school account)	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
			Delegated (personal Microsoft account)	Mail.ReadBasic, Mail.Read, Mail.ReadWrite
	Look up Chat Messages	Retrieves the list of messages in a chat.	Delegated (work or school account)	Chat.Read, Chat.ReadWrite
	Look up Chats	Retrieves the list of chats that the user is a part of.	Delegated (work or school account)	Chat.ReadBasic, Chat.Read, Chat.ReadWrite
	Look up Message	Retrieves the details of	Delegated (work or school account)	Chat.Read, Chat.ReadWrite

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Microsoft Teams Graph spoke actions that use the Microsoft Teams Spoke connection and credential alias (continued)

Category	Action	Description	Permissions required (from least to most privileged)	
		the specified message.		
	Look up Message Replies Stream	Retrieves the list of replies for the specified message from a team's channel.	Delegated (work or school account)	ChannelMessage.Read.All
	Post Message to Chat	Posts message to a Microsoft Teams chat.	Delegated (work or school account)	ChatMessage.Send, Chat.ReadWrite, Group.ReadWrite.All
Notification Management	Post Change Details	Posts details of the required change to a Microsoft Teams channel.	Delegated (work or school account)	ChannelMessage.Send, Group.ReadWrite.All
	Post Incident Details	Posts details of the required incident to a Microsoft Teams channel.	Delegated (work or school account)	ChannelMessage.Send, Group.ReadWrite.All
	Post Message	Posts message to a Microsoft Teams channel.	Delegated (work or school account)	ChannelMessage.Send, Group.ReadWrite.All
	Post Problem Details	Posts details of the required problem to a Microsoft Teams channel.	Delegated (work or school account)	ChannelMessage.Send, Group.ReadWrite.All
	Post Reply to Message	Posts a reply to the specified message.	Delegated (work or school account)	ChannelMessage.Send, Group.ReadWrite.All
	Post Record Details	Posts details of the specified record to the specified Microsoft Teams channel.	Delegated (work or school account)	ChannelMessage.Send, Group.ReadWrite.All
Team Management	Add Member to Team	Adds the specified user to the specified team.	Delegated (work or school account)	TeamMember.ReadWrite.All
	Archive Team	When a team is archived, users can no longer send or like	Delegated (work or school account)	TeamSettings.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrite.All

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Microsoft Teams Graph spoke actions that use the Microsoft Teams Spoke connection and credential alias (continued)

Category	Action	Description	Permissions required (from least to most privileged)	
		messages on any channel in team or make Team setting updates.		
	Create Team	Create a team from an existing Office 365 group. **Note:** The team ID is the same as the group ID.	Delegated (work or school account)	Group.ReadWrite.All, Directory.ReadWrite.All
	Delete Team	Deletes the specified team.	Delegated (work or school account)	Group.ReadWrite.All
	Look up Team	Retrieves the properties and relationships of a team.	Delegated (work or school account)	Team.ReadBasic.All, TeamSettings.Read.All, TeamSettings.ReadWrite.All, Group.Read.All, Group.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All
	Look up Team Members Stream	Retrieves list of team members.	Delegated (work or school account)	TeamMember.Read.All, TeamMember.ReadWrite.All
	Look up Teams by User	Lists teams of the user containing IDs and their display names.	Delegated (work or school account)	Team.ReadBasic.All, TeamSettings.Read.All, TeamSettings.ReadWrite.All, User.Read.All, User.ReadWrite.All, Directory.Read.All, Directory.ReadWrite.All
	Remove Member from Team	Removes the specified member from the specified team.	Delegated (work or school account)	TeamMember.ReadWrite.All
	Unarchive Team	Restores an archived team. Enables members to post to channels in the team, make comments, and like posts again.	Delegated (work or school account)	TeamSettings.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrite.All

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Microsoft Teams Graph spoke actions that use the Microsoft Teams Spoke connection and credential alias (continued)

Category	Action	Description	Permissions required (from least to most privileged)	
	Update Team	Updates the properties of a specific team.	Delegated (work or school account)	TeamSettings.ReadWrite.All, Group.ReadWrite.All, Directory.ReadWrite.All

The actions in the following table use the Microsoft Teams Graph Client connection and credential alias record. These actions require the application permissions.

Microsoft Teams Graph spoke actions that use the Microsoft Teams Graph Client Credentials connection and credential alias

Category	Action	Description	Permissions required (from least to most privileged)	
Calendar Management	Create Meeting	Creates an online meeting event in the MS Teams calendar.	Application	Calendars.ReadWrite
	Delete Meeting	Deletes meeting event from the MS Teams calendar.	Application	Calendars.ReadWrite
	Look up Meeting	Retrieves meeting event details from the MS Teams calendar.	Application	Calendars.Read
	Look up Meeting Occurrences	Retrieves recurrence child meeting ID from the MS Teams calendar.	Application	Calendars.Read
	Look up Meetings Stream	Retrieves meeting events details from the MS Teams calendar.	Application	Calendars.Read, Calendars.ReadWrite
	Update Meeting	Creates an online meeting event in the MS Teams calendar.	Application	Calendars.ReadWrite
Webhook Management	Look up Webhook Subscription	Retrieves details of the required webhook subscription.	Application	ChannelMessage.Read.All, Chat.Read.All

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Microsoft Teams Graph spoke actions that use the Microsoft Teams Graph Client Credentials connection and credential alias (continued)

Category	Action	Description	Permissions required (from least to most privileged)	
	Look up Webhook Subscriptions Stream	Retrieves details of all webhook subscriptions.	Application	ChannelMessage.Read.All, Chat.Read.All
	Renew Webhook Subscription	Renews the specified webhook subscription.	Application	ChannelMessage.Read.All, Chat.Read.All
	Subscribe Webhook	Creates a webhook subscription for the specified resource.	Application	ChannelMessage.Read.All, Chat.Read.All
	Unsubscribe Webhook	Deletes the specified webhook subscription.	Application	ChannelMessage.Read.All, Chat.Read.All

Important: Ensure that you're aware about these default spoke configurations.

- By default, the grant type is set to **Authorization Code**.
- All actions in the Application Management, Channel Management, Chat Management, Notification Management, and Team Management categories, and Look up Schedules action in the Calendar Management category use the **Microsoft Teams Spoke** connection and credential alias and these actions require delegated permissions.
- The Calendar and Webhook Management spoke actions (except Lookup schedules action in Calendar Management) use the **Microsoft Teams Graph Client Credentials** connection and credential alias and these actions require application permissions.

If you want to use the Microsoft Teams Graph Spoke without user interaction, you should change the grant type to **Client Credentials** so that the ServiceNow application can access the Microsoft Teams Graph API without user involvement. For instructions on how to change grant type and the required configurations, see the Knowledge Base article - KB1635160 on ServiceNow - NOW Support.

For more information about the required permissions, see Microsoft Teams documentation.

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Note: Some of the spoke actions require the channel ID, group ID, or team ID as one of the inputs. To learn these details, log in to Microsoft Teams, navigate to **Teams**, and click **Get link to channel** for the required channel. The channel link contains the required details. For example, if the channel link is `https://teams.microsoft.com/l/channel/19%3a1aa3730712e245a0af31e4095d66d613%40thread.skype /New%2520channel%2520in%2520team? groupId=7fb91938-5e8c-4968-bf7d-3987df7716f3 &tenantId=a46df9b7-2c9b-49d5-8c9f-d1b3de4ba59f`, the group ID and team ID are `7fb91938-5e8c-4968-bf7d-3987df7716f3`, and the channel ID is`19:1aa3730712e245a0af31e4095d66d613@thread.skype` or `1aa3730712e245a0af31e4095d66d613`.

For more information about accessing the channel ID and group ID through Microsoft Teams, see Microsoft Teams documentation.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Microsoft Teams application management AI agent	Automates tasks related to Microsoft Teams and Integration Hub. Performs actions such as looking up app installations and installing applications for the users.
Microsoft Teams channel management AI agent	Manages Microsoft Teams channels through IntegrationHub. It provides capabilities such as creating channels, managing members, and retrieving channel information.
Microsoft Teams chat management AI agent	Automates workflows between ServiceNow and Microsoft Teams by providing capabilities such as looking up chats and messages.
Microsoft Teams notification management AI agent	Automates communication between ServiceNow and Microsoft Teams by sending messages, updates, and replies to Microsoft Teams channels. The agent supports actions like 'Post Change Details', 'Post Message', and

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AI Agent	Description
	'Post Reply to Message' to ensure effective notification management for change requests.
Microsoft Teams team management AI agent	Automates tasks such as creating and managing Teams, adding or removing members, and retrieving team-related information. Enhances team management and communication workflows within an organization.
Microsoft Teams calendar management AI agent	Automates workflows between ServiceNow and Microsoft Teams. Provides calendar management capabilities. Performs actions such as deleting, and retrieving meeting details.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke modules

The Microsoft Teams Graph spoke adds the Microsoft Teams Graph Spoke to your ServiceNow instance and includes these modules.

Microsoft Teams Graph spoke modules

Module	Description
Delta Token	Displays the list of available Delta Tokens.
Webhook Registry	Displays the list of available webhook registries.
Webhook Decision Policy	Displays the list of decision policies.
Webhook Subscriptions	Displays the details of webhook subscriptions.

Microsoft account requirements

The Microsoft Teams Graph spoke requires registering an application using the Microsoft Azure portal to generate OAuth 2.0 tokens.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Microsoft Teams Graph spoke.

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MID Server requirements

The Microsoft Teams Graph spoke actions use REST calls, which can run on an instance or a MID Server. Use the connection record associated with the Microsoft alias to configure where actions run as well as set MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Microsoft Teams Graph spoke

Integrate the ServiceNow instance and Microsoft Teams account by creating a custom OAuth application in Microsoft Azure portal to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Microsoft Teams Graph spoke.
- Role required: admin.

Register an application using the Microsoft Azure portal

Provide authorization to the ServiceNow instance by registering an application in Microsoft Entra ID (formerly Microsoft Azure Active Directory).

Before you begin

Role required: Microsoft Entra ID admin

About this task

Complete these steps from the Microsoft Azure portal.

Procedure

1. In the Microsoft Azure portal, copy and record the **Directory ID** for later use.
   For more information, see Get tenant and app ID values for signing in in Microsoft Entra ID documentation.
2. Register your application in Azure portal. For instructions on registering an application, see Tutorial: Register an app with Microsoft Entra ID in the Microsoft Docs.
3. Copy and record the **Application ID** for later use.
4. Add the **Redirect URL** in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`.
   For more information, see Authentication and authorization for Azure Time Series Insights API in Microsoft Docs.
5. For the **Required Permissions**, select **Microsoft Graph**.

   For more information, see Permissions and consent in the Microsoft identity platform in Microsoft Docs.

   For information about the permissions required to use the spoke actions, see the Spoke actions section in Microsoft Teams Graph Spoke. Provide permissions as per your requirement. For more information about the permissions, see Microsoft Graph REST API v1.0 reference in Microsoft Docs.
6. Record the **Client Secret** for use in later configurations.

Result

The ServiceNow application is created with Microsoft Entra ID.

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Configure connections for the Microsoft Teams Graph spoke

Add and configure the Microsoft Teams connections to authenticate ServiceNow requests in the Microsoft Teams Graph spoke.

Before you begin

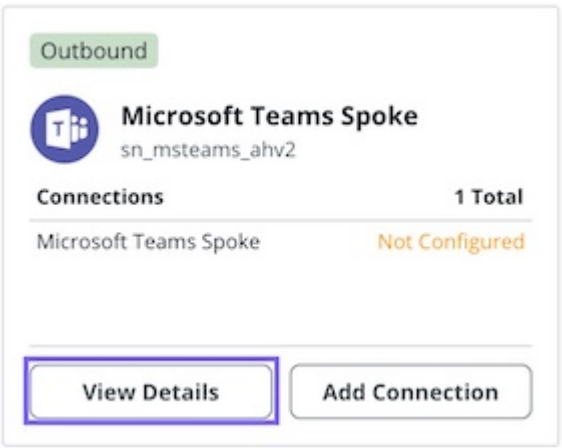
Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Configure the *Microsoft Teams* **Spoke** connection.

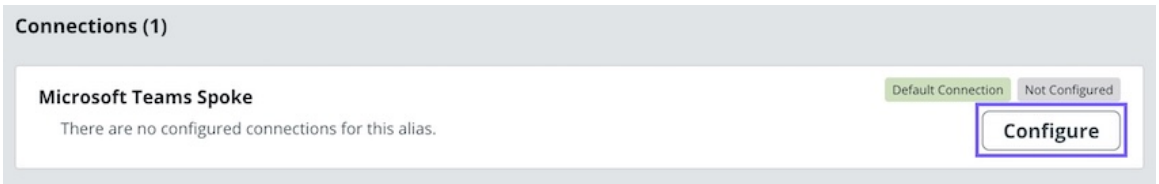
   a. Locate the *Microsoft Teams* **Spoke** connection alias and select **View Details**.

   - To configure the default connection and credential alias record that is shipped along with the Microsoft Teams spoke, select **View Details**.



   - To manage more than one Microsoft Teams spoke connection records, you should create a child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you're configuring the spoke for the first time, select **Configure**. Otherwise, select **Edit**.



   b. On the form, fill in these fields:

Field	Description
Name	Name to identify the alias record associated with this connection.
Connection URL	Connection URL. Enter `https://graph.microsoft.com`.

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Field	Description
API Version	The value is set to **v1.0** by default. If you're using any other API version, update the version number here.
Authorization URL	OAuth authorization code endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/authorize`.
Token URL	OAuth server token endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/token`.
Token Revocation URL	OAuth server token revocation endpoint.
OAuth Client ID	Application ID created during application registration.
OAuth Client Secret	Client secret created during application registration.
OAuth Redirect URL	OAuth callback endpoint. Enter `https://<instance-name>.service-now.com/oauth_redirect.do`.

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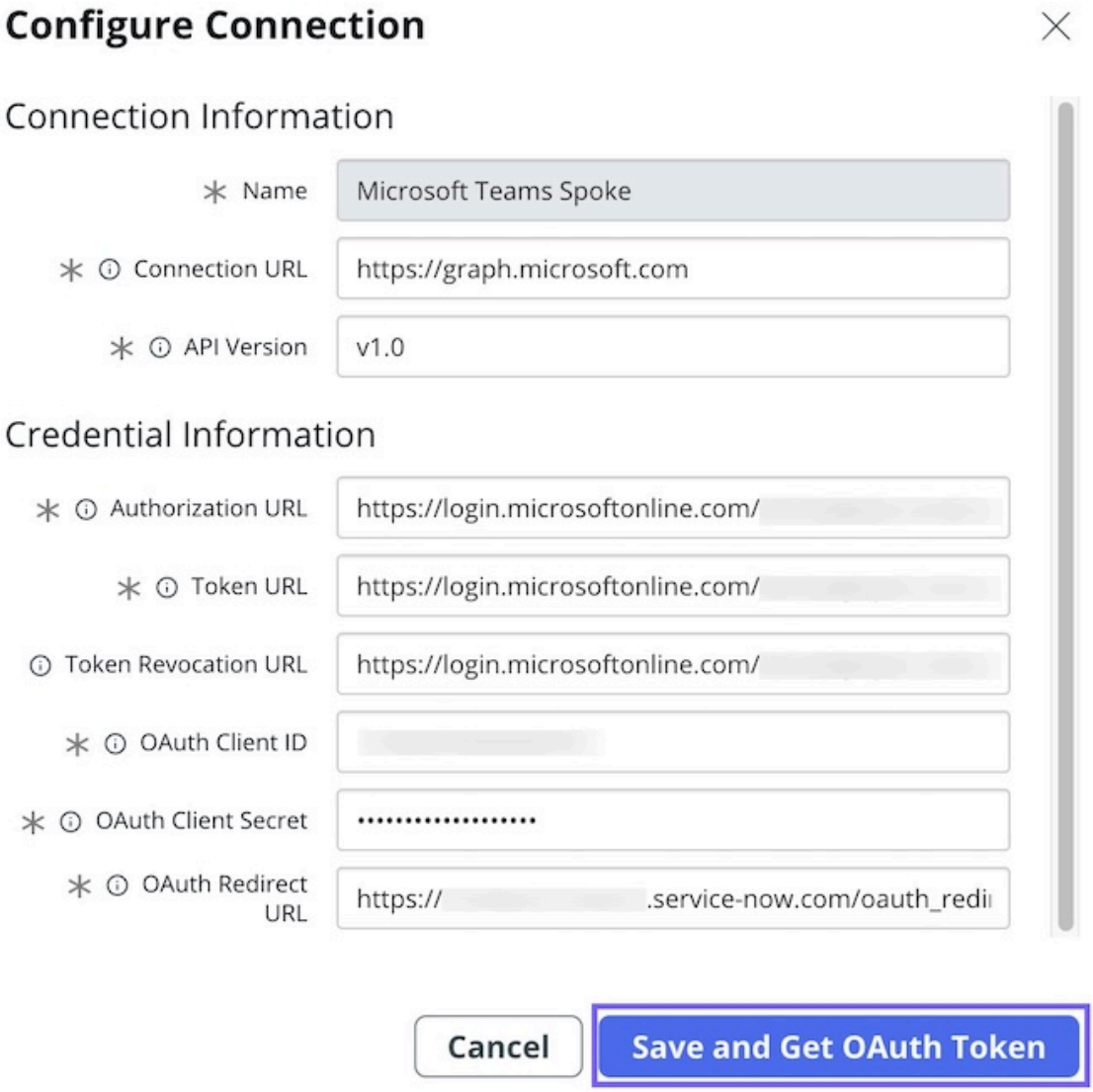

c. Select **Save and Get OAuth Token**.

5. Configure the **Microsoft Teams Graph Client Credentials** connection.
Except the Look up Schedules action, all the other calendar and webhook management spoke actions use this connection record.

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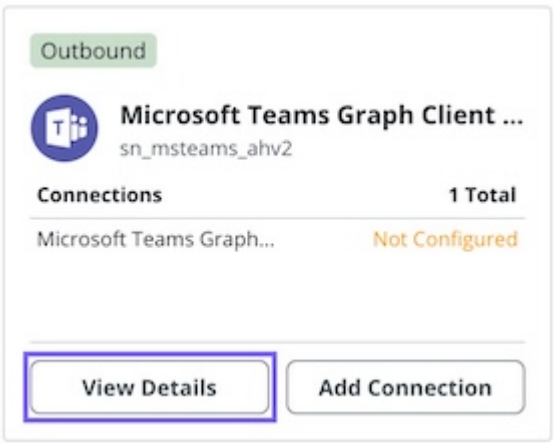
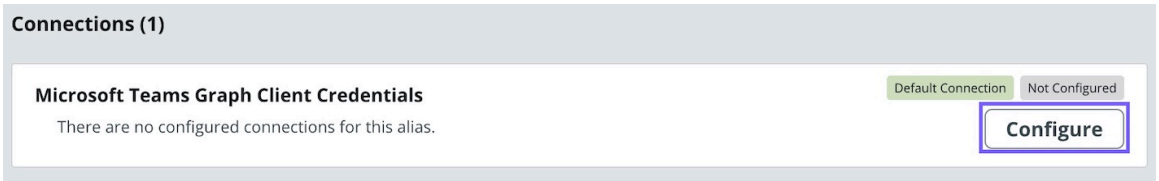
a. Locate the **Microsoft Teams Graph Client Credentials** connection alias and select **View Details**.

- To configure the default connection and credential alias record that is shipped along with the Microsoft Teams Graph Client Credentials, select **View Details**.



- To manage more than one Microsoft Teams Graph Client Credentials connection records, you should create a child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you're configuring the spoke for the first time, select **Configure**. Otherwise, select **Edit**.



b. On the form, fill in these fields:

Field	Description
Name	Name to identify the alias record associated with this connection.
Connection URL	Connection URL. Enter `https://graph.microsoft.com`.
API Version	The value is set to **v1.0** by default. If you're using any other API version, update the version number here.
Token URL	OAuth server token endpoint. Enter `https://login.microsoftonline.com/<Directory-ID>/oauth2/v2.0/token`.
OAuth Client ID	Application ID created during application registration.

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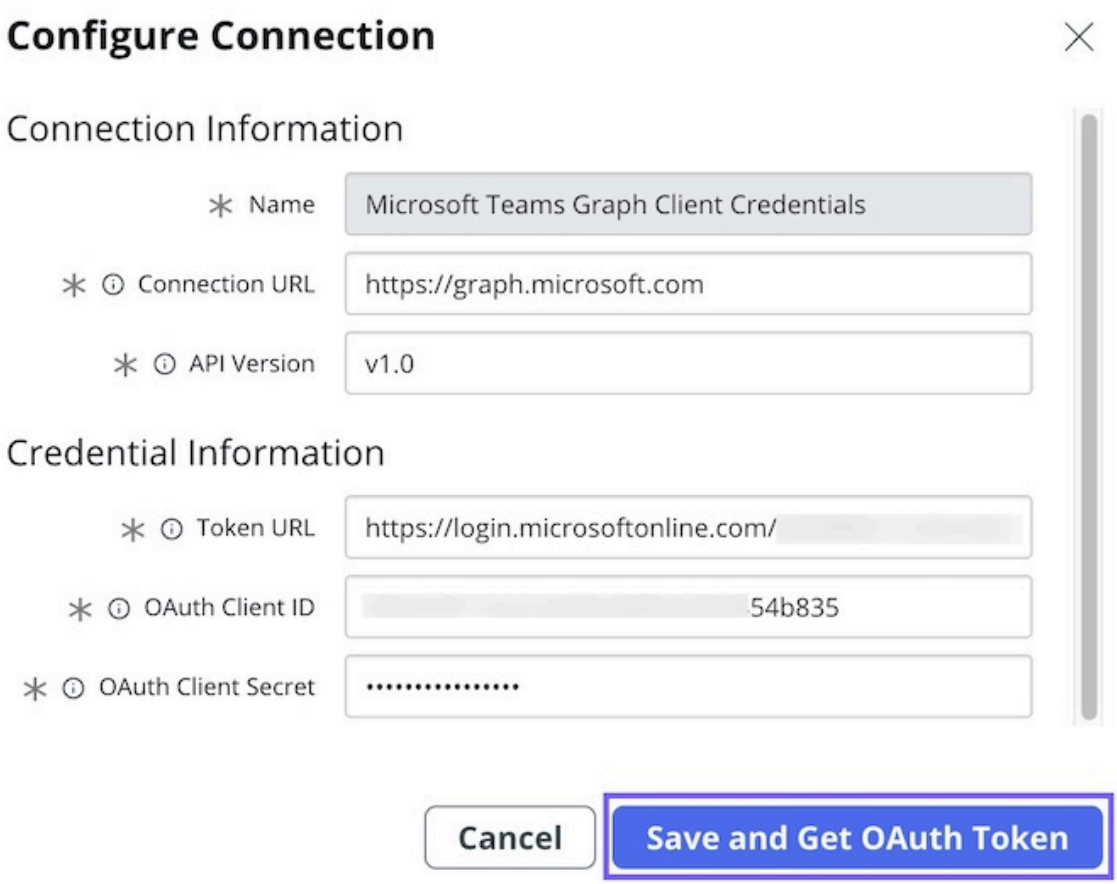
Field	Description
OAuth Client Secret	Client secret created during application registration.



c. Select **Save and Get OAuth Token**.

Result

The Microsoft Teams Graph spoke is set up and Microsoft Teams account is integrated with your ServiceNow instance.

Set up a bi-directional webhook for the Microsoft Teams Graph spoke

Configure a webhook to subscribe to Microsoft Teams with a ServiceNow callback URL.

https://player.vimeo.com/video/1017605866?h=b990f0cb15&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

- Request the required IntegrationHub subscription
- Activate the Microsoft Teams Graph spoke
- Role required: admin

Register a Microsoft Teams Graph webhook in ServiceNow instance

Register Microsoft Teams in your ServiceNow instance to notify the ServiceNow app when certain events occur in Microsoft Teams.

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Before you begin
Role required: admin

Procedure
1. Navigate to **Microsoft Teams Graph Spoke** > **Webhook Registry**.
2. Click **New**.
3. On the form, fill in these fields:

Name	Name to identify the webhook registry. For example, `MS Teams Graph webhook registry`.
Client State	Client State
Path	Microsoft Teams Graph webhook path. This field is auto-populated to `api/sn_msteams_ahv2/ms_teams_webhook`.
Description	Description of the webhook registry.

4. Right-click the form header and click **Save**.
5. Click **Callback URL**.
   The system auto-populates the webhook callback URL.

Create webhook subscription for a channel

Create a webhook subscription for the required channel in a team by testing the Subscribe Webhook subflow.

Before you begin
Role required: admin

Procedure
1. Navigate to **Process Automation** > **Workflow Studio**.
2. Click **Subflows**.
3. Open the **Subscribe Webhook** subflow.
4. Click **Test**.
5. On the form, fill in these values.

Field	Description
Webhook Registry Record Name	Name of the webhook record you had provided when you registered the webhook in ServiceNow instance. For example, `MS Teams Graph webhook registry`.
Change Type	Type of change in the subscribed resource that should send a change notification. The supported values are: `created`, `updated`,

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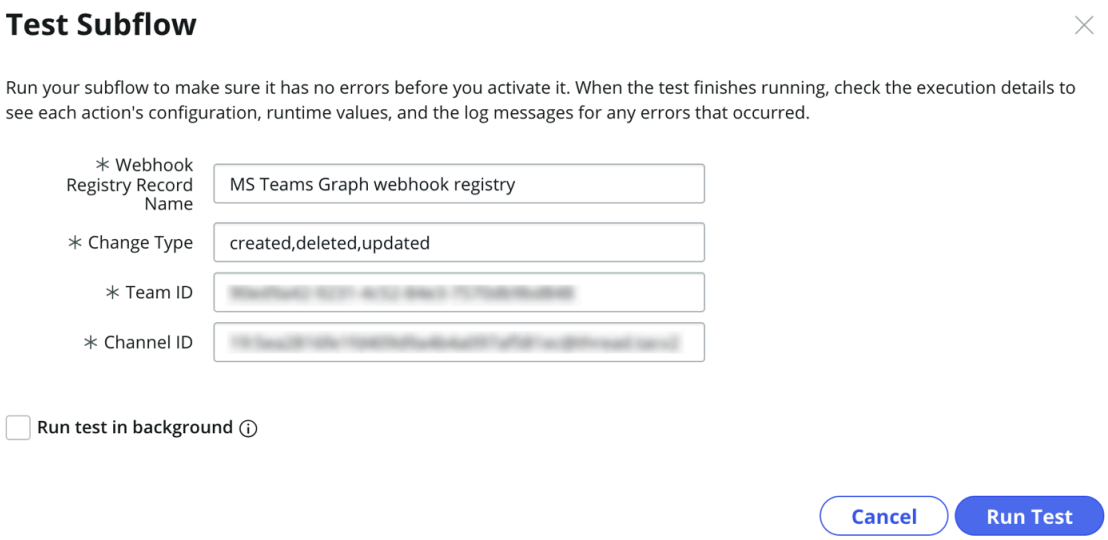
Field	Description
	and `deleted`. You can provide multiple comma-separated values.
Team ID	Unique identifier of the team.
Channel ID	Unique identifier of the channel.

Test the Subscribe Webhook subflow



6. Click **Run Test**.
   Subscription for the required channel is created.

   See Building subflows for more information about testing subflows.

Customize a spoke subflow

Customize the required subflow that is shipped along with the spoke by creating a copy of it.

Before you begin

Role required: admin

Procedure

1. Navigate to **Process Automation** > **Workflow Studio**.
2. Click **Subflows**.
3. Open the required subflow that is shipped along with the Microsoft Teams Graph spoke.
   For example, **Process Inbound Notifications** subflow.
4. Click the more actions icon ( ) and select **Copy subflow**.
5. In **New flow name**, enter a unique name you want the copied subflow to have.
   For example, **Copy of Process Inbound Notifications** subflow.
6. Click **Copy**.
   A copy of the subflow is created.
7. Customize the subflow according to your requirement and publish it.
   See Building subflows for more information about creating and using subflows.

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Configure Microsoft Teams Graph webhook decision policy

Create webhook routing policy and subflow according to your requirements.

Before you begin

Role required: admin

Procedure

1. Navigate to **Microsoft Teams Graph Spoke** > **Webhook Decision Policy**
2. Click **New**.
3. On the form, fill in the fields.

Decision form

Field	Description
Label	Unique label to identify the routing policy.
Answer	Subflow that should be triggered when the conditions are met. a. Click the Lookup icon. b. Select the required subflow from the **Document**: list. For example, **Copy of Process Inbound Notifications**.
Default Answer	Option to specify if this answer is the default answer. Default answer is applicable when the conditions are not met.
Condition	Conditions to be met when the incoming webhook delivers data from Microsoft Teams.

4. Click **Submit**.

Note: These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

Microsoft Teams Spoke

The Microsoft Teams spoke provides actions which post messages and ServiceNow incident, problem, and change record details to Microsoft Teams channels.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Important: Starting with the Yokohama release, Microsoft Teams Spoke is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported. Microsoft Teams Graph Spoke provides the latest experience for this functionality.

For more information, search for the term `Microsoft Teams Spoke for ServiceNow IntegrationHub` in .

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Spoke version

Microsoft Teams spoke v1.1.3 is the latest version.

Microsoft Teams actions

The Microsoft Teams spoke is an available integration through Integration Hub. You can specify the following Microsoft Teams actions within a flow:

Action	Description
Post a Message	Send a message to a Microsoft Teams channel using a Webhook Connector. Specify the Webhook URL, Title, and Message to send.
Post Change Details	Send details about a ServiceNow change record to a Microsoft Teams channel using a Webhook Connector. Specify the Webhook URL and Change record to send.
Post Incident Details	Send details about a ServiceNow incident record to a Microsoft Teams channel using a Webhook Connector. Specify the Webhook URL and Incident record to send.
Post Problem Details	Send details about a ServiceNow problem record to a Microsoft Teams channel using a Webhook Connector. Specify the Webhook URL and Problem record to send.

Microsoft Teams Inputs

The following inputs are common to the Microsoft Teams actions:

Input	Description
[Required] Webhook URL	The Microsoft Teams webhook for sending a message. Set up the webhook before configuring this action. Refer to the custom incoming webhook for Microsoft Teams documentation.
[Optional] Title	Title of the message.
[Optional] Additional Message	Add a message before the record details.
[Optional] Override Default Fields	You can provide a comma-separated list of field names to send instead of the default fields. Default fields are Short Description, Category, State, Priority, and Assignment Group.
[Optional] Theme Color (Hex)	Hex code value of color to highlight the message.
[Optional] Action URL	URL to the page that opens when you click the button. For more information, see https://learn.microsoft.com/en-us/microsoftteams/

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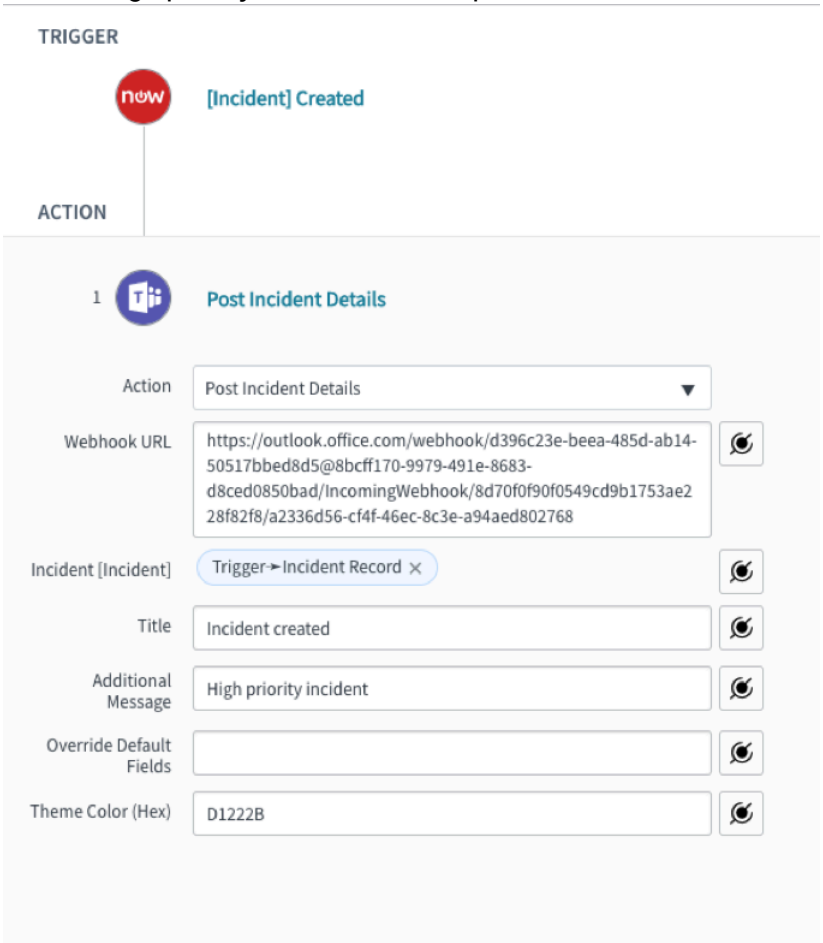
Input	Description
	platform/webhooks-and-connectors/how-to/connectors-using?tabs=cURL.
[Optional] Action Name	Name of the action that you can automate with the flow.

Example

You can add a Microsoft Teams Post Incident Details action to a flow which identifies newly created high priority incidents and a specified theme color.



Miro Spoke

The Miro spoke provides actions to view and analyze meaningful usage data for Miro software subscriptions. Analyze usage for your Miro Enterprise account to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Miro spoke v3.4.0 is the latest version. For version history of the spoke, see Miro Spoke release notes.

Supported version

This spoke was built for Miro Enterprise version v2 and Miro SCIM version v1, but may be compatible with later versions.

Spoke requirements

- Miro Company Admin account
- SSO/SAML enabled on your Miro account

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Miro spoke provides actions to automate Miro tasks when events occurs in your ServiceNow instance. Available actions include:

Note: To prevent unauthorised access, make sure that the required scope in Miro has the least privileges for the spoke actions.

Category	Action	Description	Miro required scopes
Board Item Management	Add Card Item to Board	Adds a card item to a board in Miro.	boards:write
	Add Shape Item to Board	Adds a shape item to a board in Miro.	boards:write
	Add Sticky Note Item to Board	Adds a sticky note item to a board in Miro.	boards:write
	Add Text Item to Board	Adds a text item to a board in Miro.	boards:write
Board Management	Create Board	Creates a board in Miro.	boards:write
	Delete Board	Deletes the specified board in Miro.	boards:write
	Look up Board	Retrieves information about the specified board from Miro.	boards:read

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Category	Action	Description	Miro required scopes
	Look up Boards Stream	Retrieves information about all the boards in Miro.	boards:read
	Update Board	Updates the specified board in Miro.	boards:write
Team Management	Add User to Team	Adds a Miro user to the team.	organizations:teams:write
	Create Team	Creates a new team in Miro.	organizations:teams:write
	Delete Team	Deletes a team from the organization.	organizations:teams:write
	Look up Team	Retrieves information about the specified team from Miro.	organizations:teams:read
	Look up Teams Stream	Retrieves the list of teams in the organization.	organizations:teams:read
	Remove User from Team	Removes a Miro user from the team.	organizations:teams:write
	Update Team	Updates the specified team in Miro.	organizations:teams:write
User Management	Activate User	Activates the specified user in Miro account.	Not applicable. This is a Miro SCIM action.
	Create User	Creates a user in Miro account.	Not applicable. This is a Miro SCIM action.
	Deactivate User	Deactivates a Miro user account.	Not applicable. This is a Miro SCIM action.
	Delete User	Deletes a user from a Miro account.	Not applicable. This is a Miro SCIM action.
	Look up Authenticated User	Retrieves information about the authenticated user account.	None.
	Look up Organization Members Stream	Retrieves the details of all the members in an organization.	organizations:read
	Look up User	Retrieves information of the specified user.	Not applicable. This is a Miro SCIM action.
	Look up Users Stream	Retrieves the list of users in an organization.	Not applicable. This is a Miro SCIM action.
	Update User	Updates the specified user in Miro.	Not applicable. This is a Miro SCIM action.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

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- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Miro board item management AI agent	Manages board items tasks (that is, add a sticky note item to a board, add a shape item to a board, add a card item to a board, add a text item to a board) in Miro.
Miro team management AI agent	Manages team management tasks (that is, update a team, remove a user from a team, delete a team, add a user to a team, look up a team, create a team) in Miro.
Miro user management AI agent	Manages user management tasks (that is, look up an authenticated user, delete a user, create a user, activate a user, deactivate a user, update a user, look up a user) in Miro.
Miro board management AI agent	Manages board management tasks (that is, create a board, update a board, look up a board, delete a board) in Miro.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke flows

The Miro spoke provides sample flows to demonstrate automating the Miro tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Add User to Miro Team	Looks up a user and the related team in Miro based on the group member and group in your ServiceNow instance and then add the user to the Miro team.
Remove Deactivated User from Miro Teams	Looks up a user in Miro teams, group members in your ServiceNow instance and then removes the user from each team in Miro.

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Spoke module

The Miro spoke adds a Miro Spoke module to your ServiceNow instance. The Miro Spoke module syncronizes and stores information about Miro Teams and Miro Users. The Miro spoke contains the following tables:

- Miro Teams (sn_miro_spoke_teams)
- Miro Users (sn_miro_spoke_users)

Module	Description
Miro Teams	Lists all the teams in Miro.
Miro Users	Lists all the users in Miro.

Integration Hub imports

The Miro spoke adds the following Integration Hub imports to your ServiceNow instance. The Integration Hub imports help you import data from Miro account to your ServiceNow instance in an automated way. For more information about Integration Hub imports, seeIntegration Hub - Import.

Import	Description
Create or Update Miro Teams Records	Imports teams details from Miro account into the Miro Teams table.
Create or Update Miro Users Records	Import users details from Miro account into Miro Users table.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Miro spoke.

Set up the Miro spoke

Integrate the ServiceNow instance and Miro by creating a custom OAuth application in Miro to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Miro spoke.
- Role required:
  - ServiceNow admin
  - Miro Company Admin

Create a Miro Enterprise OAuth 2.0 application

Create a Miro Enterprise OAuth 2.0 application to enable access to the Miro API.

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Before you begin
Role required: Miro company admin.

Procedure
1. From a web browser, open the Miro Platform.
2. If you have not created any teams within your organization or you want to build and test the OAuth 2.0 application using fake data, get a developer team.
3. On the page header of the Miro Platform, click **Your Apps**.
   The sign up page opens.
4. Sign in using your Company Admin credentials.
   Your default organization profile opens.
5. At the top of the left navigation pane, click the organization profile icon to select the organization that you want to build the OAuth 2.0 application for.
   The profile for the selected organization opens.
6. On the left navigation pane, click **Profile settings**.
7. Select the **API, SDK & Embed** tab of your profile settings.
8. In the Your apps section, select the **I agree to the Terms and Conditions** check box and then click **Create new app**.
   The Create new app dialog box opens.
9. On the dialog box, fill in the fields.

Create new app dialog box

Field	Description
App name	Name of the OAuth 2.0 application.
Description	Brief description of the OAuth 2.0 application.

10. Select the team that you want to build the OAuth 2.0 application for.
11. Click **Create app**.
    The settings for your newly created app open.
12. In the Your app <*app-name*> section, copy the values in the **Client id** and **Client secret** fields. Save them in a secure location for later use.
13. In the Redirect URLs section, enter the URL of the OAuth provider that users are redirected to after authentication and then click **Add**.
    Enter `https://`*`instance`*`.service-now.com/oauth_redirect.do`, where <*instance*> is the name of your ServiceNow instance.
14. In the OAuth scopes section, enable the **organizations:read** OAuth scope.
    OAuth scopes specify the level of access that the application has to your protected resources. The organizations:read OAuth scope enables your application to read information about your organizations and organization members.

What to do next
Keep your organization profile open so that you can enable SCIM (System for Cross-domain Identity Management) on your Miro Enterprise account.

Enable SCIM on your Miro Enterprise account

Enable SCIM (System for Cross-domain Identity Management) on your Miro Enterprise account so that you can generate an API access token for authenticating your Miro API requests.

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Before you begin
Role required: Miro Company Admin

Procedure
1. On the left navigation pane of your Miro organization profile, click **Security**.
2. On the Security page, select the option to **Enable SSO/SAML**.
3. After SSO/SAML is enabled, select the option to enable **SCIM Provisioning**.
   Miro automatically generates and displays your API access token in the **Api Token** field.
4. **Optional:** Select the **Send email notifications to users provisioned by SCIM** check box to allow Miro to send email notifications to all users that have been provisioned using SCIM.
5. Copy the API access token in the **Api Token** field.
   Save it in a secure location for later use.

Create a Miro Enterprise connection

Create a connection between your Miro Enterprise applications and your ServiceNow instance.

Before you begin
Role required: admin

Procedure
1. From your ServiceNow instance, navigate to **All** > **Process Automation** > **Workflow Studio**.
   The Workflow Studio launches in a new tab.
2. Click the **Integrations** tab.
3. Under **Connections**, the **Outbound** connections are displayed by default.
4. Click **View Details** for your Miro Enterprise connection.
5. From your Miro Enterprise connection details, click **Add Connection**.
   The Create Connection dialog box opens.
6. On the dialog box, fill in the fields.

Create Connection dialog box

Field	Description
Connection Information	
Connection Name	Name of the Miro Enterprise connection. This field populates automatically.
Credential Information	
OAuth Client ID	Client ID that is assigned to your Miro Enterprise OAuth 2.0 application.
OAuth Client Secret	Client secret that is assigned to your Miro Enterprise OAuth 2.0 application.
OAuth Redirect URL	URL of the OAuth provider that users are redirected to after authentication. This field populates automatically based on the redirect URL that you specified in Create a Miro Enterprise OAuth 2.0 application.

7. Click **Create and Get OAuth Token**.
   The Miro OAuth authorization dialog box opens.

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8. On the dialog box, locate the team that you built the Miro Enterprise OAuth 2.0 application for and then click **Install**.
   The OAuth access token becomes available for authorizing your Miro Enterprise connection.

Create a Miro Enterprise SCIM connection

Create a connection between the Miro Enterprise SCIM and your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. From your ServiceNow instance, navigate to **Process Automation** > **Flow Designer**.
   The Flow Designer launches in a new tab.
2. Select the **Connections** tab.
3. Click **View Details** for your Miro Enterprise SCIM connection.
4. From your Miro Enterprise SCIM connection details, click **Add Connection**.
   The Create Connection dialog box opens.
5. On the dialog box, fill in the fields.

Create Connection dialog box

Field	Description
Connection Information	
Connection Name	Name of the Miro Enterprise SCIM connection. This field populates automatically.
Credential Information	
API Token	API access token for authenticating Miro API requests. Enter the same API access token that you generated and copied in Enable SCIM on your Miro Enterprise account.

6. Click **Create Connection**.

monday.com Spoke

The monday.com spoke provides actions to view and analyze meaningful usage data for monday.com software subscriptions. Analyze usage for a monday.com account to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke requirements

monday.com admin account.

Spoke version

monday.com v1.2.3 is the latest version. For version history of the spoke, see monday.com Spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The monday.com spoke provides actions to automate monday.com tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Board Management	Add Subscribers to Board	Adds the specified subscribers to a board.
	Archive Board	Archives the specified board.
	Create Board	Creates a board.
	Delete Board	Deletes the specified board.
	Delete Subscribers from Board	Deletes the specified subscribers from a board.
	Duplicate Board	Creates duplicates of the specified board.
	Look up Board Activities Stream	Retrieves the activities of the specified board.
	Look up Board by ID	Retrieves the details of the specified board.
	Look up Boards Stream	Retrieves a list of the boards.

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Category	Action	Description
	Update Board Description	Updates the description of the specified board.
Column Management	Create Column	Creates a column in the specified board.
	Look up Columns by Board ID	Retrieves details of all columns in the specified board.
	Update Column Title	Updates the title of the specified column.
Column Values Management	Look up Column Values	Retrieves details of the column values in the specified board and item.
File Management	Add File to File Column	Adds a file to the file column of a specific item.
	Add File to Update	Adds a file to the specified update.
	Look up File by ID	Retrieves details of the specified file.
	Look up Files by Board ID	Retrieves details of files in the specified board.
Group Management	Archive Group	Archives the specified group.
	Create Group	Creates an empty group in the specified board.
	Delete Group	Deletes the specified group.
	Duplicate Group	Creates a duplicate of the specified group.
	Look up Group by ID	Retrieves the group details for the specified board ID and group ID.
	Look up Groups by Board ID	Retrieves the details of all the groups in a board.
Item Management	Archive Item	Archives the specified item.
	Clear Item's Updates	Clears all updates on a specific item, including replies and likes.
	Create Item	Creates an item in a group.
	Create Subitem	Creates a new subitem for the specified parent item. **Note:** For creating subitems via the API, the board should already have a subitems column, or at least one subitem created.

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Category	Action	Description
	Delete Item	Deletes the specified item from a group.
	Duplicate Item	Creates a duplicate of the specified item in a group.
	Look up Items	Retrieves details of the items in the specified board and group.
	Look up Items by IDs	Retrieves details of the specified items.
	Look up Items Stream by Board ID	Retrieves the items for the specified board.
	Move Item to Group	Moves an item between groups in the same board.
Notification Management	Create Notification	Creates a notification with the specified details.
Tag Management	Create or Look up Tag	Creates a tag when the specified type of tag does not exist. If the tag already exists, the details of the tag are retrieved.
	Look up Shareable or Private Tags	Retrieves details of the board-specific private or and shareable tags.
	Look up Tag by ID	Retrieves details of the specified public tag that is displayed on the main boards. By default, the main boards are accessible to all member-level and viewer-level users.
	Look up Tags	Retrieves details of all the public tags that are displayed on the main boards. By default, the main boards are accessible to all member-level and viewer-level users.
Team Management	Look up Team by ID	Retrieves details of the specified team.
	Look up Teams	Retrieves details of the teams.
Update Management	Create an Update	Adds an update to the specified item.
	Delete an Update	Deletes the specified update of an item.
	Look up Updates Stream	Retrieves the list of updates.
User Management	Look up Users	Retrieves details of the specified type of users.
	Look up Users by IDs	Retrieves details of the specified users.

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Category	Action	Description
	Look up Users Stream	Retrieves the list of the users.
Webhook Management	Create Webhook	Creates a webhook subscription based on the specified event.
	Delete Webhook	Deletes the specified webhook.
Workspace Management	Add Teams to Workspace	Adds the specified teams to the required workspace.
	Add Users to Workspace	Adds the specified users to the required workspace and defines if the users will be added as regular subscribers or as owners of the workspace.
	Create Workspace	Creates a workspace.
	Delete Teams from Workspace	Deletes the specified teams from the required a workspace.
	Delete Users from Workspace	Deletes the specified users from a workspace.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Spoke module

The monday.com spoke adds Monday Spoke application to your instance and includes the following modules:

Module	Description
Users	Displays the list of users in monday.com.
Boards	Displays the list of all boards from monday.com.
Routing Policies	Displays the list of routing policies for monday.com spoke.
Webhook Registry	Displays the list of webhook registries for monday.com spoke.

Spoke subflows

The monday.com spoke provides subflows in the Published state to integrate with monday.com application.

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Category	Subflow	Description
Webhook Management	Process Monday Webhooks	Runs when an associated subscribed event triggers in monday.com

Spoke table

The monday.com spoke adds the following table:

Table	Description
Monday Boards	Stores all the boards present in your monday.com account.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the monday.com spoke.

Set up the monday.com spoke

Integrate the ServiceNow instance and monday.com by creating a custom OAuth application in monday.com to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the monday.com spoke.
- monday.com role required: admin.
- Role required: admin.

Create a monday OAuth2 application

Create a monday OAuth2 application to authorize access to the monday.com API.

Before you begin

Role required: monday.com admin.

About this task

A monday application enables you to build workflows, user experiences, and products on top of the existing monday.com work operating system (Work OS). When you configure a monday application to use OAuth2, it is granted access to the monday.com API so that it can read and modify user data.

Procedure

1. From a web browser, go to monday.com.
2. Log in using your admin credentials.
3. At the bottom of the left navigation menu, click your profile icon and then select **Developers**.

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The My Apps page opens.

4. Click **Create App**.
   The Basic Information page for the new application opens.
5. In the Display Information section, fill in the fields.

Display Information

Field	Description
Name	Name of the monday application.
Short Description	Description of the application.

6. **Optional:** In the same section, add your own application icon by clicking the auto-generated icon and then selecting an icon image.
   You can also change the icon color by clicking **App Color** and then selecting either a preset or custom color. If you do not add your own application icon or select an icon color, the application uses the auto-generated icon and default icon color.
7. In the App Credentials section, copy the values in the **Client ID** and **Client Secret** fields. Save them in a secure location for later use.
8. Click **Save App**.
9. From the left navigation menu of the new application, navigate to **General** > **OAuth**.
   The **Scopes** tab of the OAuth & Permissions page opens.
10. In the Scopes section, specify how the application can access or use different types of user data by selecting the checkboxes for the following OAuth scopes according to your requirement:
    - **me:read**
    - **boards:read**
    - **boards:write**
    - **workspaces:read**
    - **workspaces:write**
    - **users:read**
    - **users:write**
    - **account:read**
    - **notifications:write**
    - **updates:read**
    - **updates:write**
    - **assets:read**
    - **tags:read**
    - **teams:read**
    - **webhooks:write**

    For more information about permission scopes, see Set Up Permission Scopes.
11. Click **Save Feature**.
12. Select the **Redirect URLs** tab of the OAuth & Permissions page.

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13. In the Redirect URLs section, enter the URL of the OAuth provider that users are redirected to after authentication.
    Enter `https://instance.service-now.com/oauth_redirect.do`, where <*instance*> is the name of your ServiceNow instance.
14. Click **Save Feature**.
15. Navigate to **Manage** > **App Versions**.
16. Click the three dot menu under **Actions** and select **Promote to live**.
    For more information, see Promoting a draft version to live.
17. From the **Promote selected version** pop-up, click **Promote**.

Create a monday connection

Create a connection between your monday applications and your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. From your ServiceNow instance, navigate to **Process Automation** > **Flow Designer**.
   The Flow Designer launches in a new tab.
2. Select the **Connections** tab.
3. Locate your monday connection and then click **Add Connection**.
   The Create Connection and Credential dialog box opens.
4. In the dialog box, fill in the fields.

Create Connection and Credential dialog box

Field	Description
Connection Name	Name of the connection.
Connection URL	Base URL for the monday.com API. This field is automatically set to `https://api.monday.com/v2`.
OAuth Client ID	Client ID that is assigned to your monday application.
OAuth Client Secret	Client secret that is assigned to your monday application.
OAuth Redirect URL	URL of the OAuth provider that users are redirected to after authentication. This field populates automatically based on the redirect URL that you specified in Create a monday OAuth2 application.

5. Click **Create and Get OAuth Token**.
   The Authorize App dialog box opens.
6. In the dialog box, sign in using the same monday.com credentials that you used to create your monday application.
7. Click **Allow**.
   The OAuth access token becomes available for authorizing your monday connection.

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Set up bi-directional webhook for the monday.com spoke

Configure a webhook to subscribe to monday.com with a ServiceNow callback URL.

Before you begin

- Request an Integration Hub subscription.
- Activate the monday.com spoke.
- Set up the monday.com spoke.
- Role required: admin.

Register the monday webhook in ServiceNow

Register a monday webhook in ServiceNow to notify the ServiceNow app when certain events occur in monday.com

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Monday Spoke** > **Webhook** > **Routing Policies** > **Webhook Registry**.
2. Click **New**.
3. On the form, fill in the fields.

Field	Description
Name	Name to uniquely identify the webhook registry. For example, `monday spoke webhook registry`.
Path	monday webhook path.
Token	Authentication token from your ServiceNow instance which is used for validating monday.com spoke requests.

4. Right-click the form header and click **Save**.
5. Click **Callback URL**.
   The system displays the webhook callback URL.
6. Copy and record the webhook callback URL.

Result

The monday webhook is registered in your ServiceNow instance and callback URL is generated.

Add a callback URL in monday.com

Specify a webhook callback URL in your monday account to create a webhook.

Before you begin

- Register monday webhook and generate callback URL in your ServiceNow instance.
- Role required: admin

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Procedure

1. Login to monday.com.
2. Navigate to **Workspace** > **Integrate** > **Integrations Center** > **Webhooks** > **Add to board**.
3. Open a workspace and right-click on **Integrate**.
4. In the **Integrations Center** tab, click **Webhooks**.
5. Select an event type and click **Add to board**.
6. Specify the generated callback URL from ServiceNow instance and click **Connect**.

Customize the bi-directional webhook in the monday.com spoke

Create a webhook routing policy and customize a subflow according to your requirements.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Click **Subflows**.
3. Create a copy of one of the available sublflows.
4. Customize the subflow according to your requirement and publish it.
5. Navigate to **Monday Spoke** > **Routing Policies**.
6. Click **New**.
7. On the form, fill in the fields.

Field	Description
Label	Unique label to identify the routing policy.
Answer	Option to specify if this answer is the default answer. Default answer is applicable when the conditions are not met. **a.** Click the Lookup icon. **b.** Select the required subflow from the **Document**: list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow].`
Condition	Conditions to be met when the incoming webhook delivers data from monday.com.

8. Click **Submit**.

Note: These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

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Metrikus spoke

Metrikus spoke provides actions to retrieve data from various sensors (such as occupancy sensor, air quality sensor, temperature sensor etc.) that are found at a workplace.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Metrikus spoke - IntegrationHub overview.

Supported versions

This spoke was built for Metrikus Beta v1.0.

Key features

Metrikus Spoke integrates with Flow Designer Integration Hub. It fetches the occupancy sensor data from Metrikus and provides the following:

- Get event data. For example, when an employee enters a meeting room,when an employee occupies a desk).Get occupancy data for Workplace Connectors space records from Metrikus.
- Get occupancy data.
- The occupancy data is used for configuring automatic reservation check in.
- Workplace Service Delivery Location Directory shows Occupancy state for a selected location or space.

Spoke requirements

- Ensure that you have Metrikus login credentials.
- Metrikus provided Client ID and Client Secret key.

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime [com.glide.hub.integration.runtime]
- ServiceNow IntegrationHub Action Step - OpenAPI [com.glide.hub.action_step.openapi]
- Metrikus Spoke [com.sn.wsd.metrikus.spoke]

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Metrikus Spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

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Actions

Actions	Description
Look up Space Tree	Get all the spaces along with the location hierarchy from Metrikus.
Look up Space Occupancy Batches	Gets batches of spaces (for example, 2000) and get occupancy data from Metrikus for all batches to combine and map it.
Look up Latest Desk Occupancy	Gets occupancy data for desks in a batch (for example, 2000.)
Look up Latest Space Occupancy	Gets occupancy data for spaces in a batch (for example, 2000)
Look up Desks Occupancy Batches	Gets batches of desks (for example, 2000) and get occupancy data to combine and map it with Metrikus Spoke.

Spoke subflows

The Metrikus Spoke provides sample subflows to demonstrate automating Workplace Connectors tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Get All occupancy by Ids	Retrieves occupancy data of both Workplace Connectors spaces and desks.
Get Occupancy by desks by Ids	Retrieves occupancy data of all desks. Invoked by **Get All Occupancy by Ids**sub flow.
Get Occupancy by spaces	Retrieves occupancy of all spaces. Invoked by the **Get All Occupancy by Ids** sub flow.

Spoke user roles

The Metrikus spoke provides the System Administrator user role to control access to data:

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up Metrikus spoke

Integrate the ServiceNow instance and Metrikus Spoke. Create a connection and credential alias in the Metrikus spoke to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Ensure that you have activated the Metrikus Spoke plugin dependencies.

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- Activate the Metrikus Spoke plugin (sn_wsd_metrikus_spoke).
- Metrikus Client ID and Client secret key.
- Role required: admin.

Integrate Metrikus with your ServiceNow instance

Create the connection records to your Metrikus account. The Metrikus Spoke connection and credential aliases use these connections to perform actions in Metrikus.

Procedure

1. Navigate to **All** > *Integration Hub* > **Connections & Credentials** > *Metrikus*.
2. Select the **Create New Connections & Credential** related link.
3. On the form, fill in the fields:

Enter the Connection Information

Field	Description and value required
Connection Name	Name to identify the connection. This field is automatically set to Metrikus Spoke connection.
Connection URL	The URL to make connection to the spoke. This field is automatically set to https://nextgen-api.metrikus.io.

Enter the Credential Information

Field	Description and value required
Credential Name	Name of the Metrikus Spokec credential. For example, **Metrikus Credential**
Token URL	Token URL address https://nextgen-api.metrikus.io/oauth/token.
OAuth Client ID	Client ID of the Metrikus application to register in the registration portal.
OAuth Client Secret	Client Secret key that is generated while registering the Metrikus application in the Metrikus portal.

4. Select **Create and Get OAuth Token**.

   The Metrikus Spoke is set up and integrated with your ServiceNow® Store instance.

What to do next

Navigate to **All** > *Workplace Connectors* > **Provider Connector Configuration** table. The Workplace Core locations provided in this table are mapped with the external Ids provided by Metrikus. The external IDs provided by Metrikus are transformed to retrieve workplace occupancy data in Workplace Connectors Space Occupancy Data table.

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Navex EthicsPoint Spoke

The Navex EthicsPoint spoke enables you to pull employee relation cases from a Navex EthicsPoint instance into a ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Navex EthicsPoint spoke v1.0.3 is the latest version. For version history of the spoke, see Navex EthicsPoint spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - JSON Parser [com.glide.hub.action_step.jsonparser]
- IntegrationHub Standard Spokes [com.glide.hub.action_step.xmlparser]

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke actions

The Navex EthicsPoint spoke provides actions to automate tasks when events occur in the ServiceNow instance.

Category	Action	Description
Attachment Management	Look up Case File - Attachment File	Retrieves the case file attachment.
	Look up Case Text File	Retrieves the case text file.
Case Management	Add Child Note	Adds a child note to the specified case.
	Add Participant	Adds a participant to the specified case.

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Category	Action	Description
	Look up Full Case	Retrieves the full case for the specified case ID.
	Look up Participant	Retrieves the participant for the specified ID.
	Look up Query Case Stream	Retrieves the query case stream for the case.
	Update Case	Updates the case for the specified case ID.
	Update Participant	Updates the participant for the specified case.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up Navex EthicsPoint spoke spoke.

Set up Navex EthicsPoint spoke spoke

Integrate the ServiceNow instance and Navex EthicsPoint spoke instance using the Basic Auth credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Navex EthicsPoint spoke.
- Role required: admin.

Create basic auth credentials

Integrate the ServiceNow instance and the Navex EthicsPoint instance by using the Basic Auth credentials to authenticate ServiceNow requests.

Before you begin

Role required: admin

Procedure

1. Navigate to **Connections & Credentials** > **Credentials**.
2. Click **New**.
3. Select **Basic Auth Credentials**.
4. On the form, fill in the fields.

Field	Description
Name	Name to identify the record.
User name	User name to be entered as credential.

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Field	Description
Password	Password to be entered as credential.
Active	Option to actively use the credential record. Select the option.
Order	Order that the credentials are used. For example, enter 100.

5. Right-click the form header and click **Save**.

Create connection records

Create connection records to your Navex EthicsPoint instance. The Navex EthicsPoint spoke connection and credential alias uses these connections to perform actions in Navex EthicsPoint instance.

Before you begin

Role required: admin

Procedure

1. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the following records and create connections for each of the record. For each connection, you must also Create basic auth credentials.
   - NavexConnection for Attachment
   - NavexConnection for Case Management
   - NavexConnection for Lookup List
3. From the **Connections** tab, click **New**.
4. On the form, fill in the fields.

HTTP(s) Connection form

Field	Value required
Name	Name to uniquely identify the connection record.
Credential	Basic Auth credential record that you created for Navex EthicsPoint.
Connection alias	Alias record associated with this connection.
Connection URL	URL of the Navex EthicsPoint instance.
Active	Option to actively use the connection. Select the option.
Domain	Domain that the action or activity runs in.

5. In the **Attributes** tab, fill in the value in the **Password** and **Username** fields.
6. Click **Submit**.

Okta Spoke

Use Okta to manage users, passwords, and groups.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Okta spoke v4.8.3 is the latest version. For version history of the spoke, see Okta Spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- com.glide.cobject:sys,com.glide.script.vtable
- com.snc.remote_directory_sync
- XML Parser for ServiceNow IntegrationHub (com.glide.hub.action_step.xmlparser)
- Flow Designer Model (com.glide.hub.designer_backend.model)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Supported versions

API version v1.

Spoke flows

The Okta spoke provides sample flows in the draft state to demonstrate automating user and group management tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Add User to Okta Group	When a user is created, it adds the user to the specified group.

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Flow	Description
Onboard User in Okta	When a user is created in ServiceNow, creates and activates the user in Okta.
Remove Okta Group Membership on Deactivation	When a user is deactivated, it removes the user from all Okta groups.

Note: Okta has the ServiceNow_UD application to provision users in ServiceNow. ServiceNow can also be configured to provision users at Okta. Therefore, ServiceNow administrators must confirm that circular user creation doesn't occur.

Spoke subflows

The Okta spoke provides sample subflows to demonstrate automating Okta tasks. Available subflows are:

Subflow category	Subflow	Description
Webhook management	Check Activate Application Event Hook	Verifies if an event hook for the application-lifecycle-activate exists in Okta.
	Inbound Integration from Okta to ServiceNow	Allows inbound integration from Okta to a ServiceNow instance. Verifies if an event hook exists for an application. If the event hook doesn't exist, a new event hook is created. **Note:** Make sure that **Configuration URI** field value is in this format: `https://<instance-name>.service-now.com/api/sn_okta_spoke/oktawebhook`
Group Management	Get Groups	Updates an existing group or creates a group at Okta.
Application Management	Create or Update Okta Applications Record	Creates an Okta application record or updates an existing Okta application record.

Available sample conversational subflows

Install Now Assist for Conversational Spokes and start using the conversational ability of Integration Hub spokes. For more information, see Now Assist in Conversational Spokes.

Sample conversational subflows

Conversational subflow	Description
Expire User Password - Sample	Expires the user's password in Okta.

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Sample conversational subflows (continued)

Conversational subflow	Description
Reset to Temporary Password - Sample	Resets the user's password in Okta to a temporary password.
Look up Group Details - Sample	Retrieves details of the required group in Okta.
Look up User Profile - Sample	Retrieves details of the required user profile in Okta.
Add User to Group - Sample	Adds user to the required group.
Look up Group Members - Sample	Retrieves details of users in the required group in Okta.
Is User in Group - Sample	Specifies if the user is a member of the provided group.
Look up Users by Application - Sample	Retrieves details of users that have access to the specific application.

Spoke modules

The Okta spoke adds the Okta application to your ServiceNow instance and includes these modules:

Module	Description
Okta Applications	Shows the list of applications. Click **New** to create an application record.
Okta groups	Shows the list of user groups at Okta. Click **Fetch Okta Groups** to retrieve details of the Okta groups. For more information, see Fetch Okta groups.
Okta Users	Shows the list of users at Okta. This is a remote table. When you click the **Okta Users** module, Okta Users [sn_okta_spoke_users] remote table definition is triggered and user details are cached in memory. For more information about the remote tables, see Remote tables. You can modify script definition of the Okta Users [sn_okta_spoke_users] remote table definition as per your requirement.
Okta Webhook Registry	Shows the list of webhook registries. Click **New** to create a webhook registry. For more information, seeSet up a bi-directional webhook for Okta spoke.

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Spoke actions

The Okta spoke provides actions to authenticate and manage users and groups. Available actions include:

Category	Action	Description
User Management	Activate User	Starts the process of activating a user at Okta by enabling new or returning users to configure their Okta account from an activation URL. This action can either have Okta send the activation URL to the user as an email, or it can return the activation URL as a data pill for use in a later action to send an email or notification.
	Clear User Session	Clears all active sessions you have with Okta, which forces the user to log back in the next time they use Okta.
	Create User	Creates the specified user at Okta with the specified standard, optional, and mandatory field values. **Note:** Okta has the ServiceNow_UD application to provision users in ServiceNow. ServiceNow can also be configured to provision users at Okta. Therefore, ServiceNow administrators must confirm that circular user creation doesn't occur.
	Deactivate User	Deactivates the specified user at Okta, which removes the user's groups and application assignments, and changes the user status to DEACTIVATED. This action is commonly used when a user departs the company indefinitely. **Note:** Don't perform this action on users with a DEPROVISIONED status.
	Delete User	Deletes the specified user within Okta, which completely removes the user. This action is commonly used to clean up your user base after compliance regulations have been met.
	Is User Account Locked	Determines if a user account is locked.
	Lookup Okta User ID	Retrieves the Okta user ID for the specified Okta login ID or login short name.
	Lookup User Account Details by User ID	Retrieves user details for the specified Okta user ID.
	Lookup User Profile by User ID	Retrieves user profile details for the specified Okta user ID.
	Restart User Activation	Restarts the specified user's activation within Okta. Use this action if the user didn't complete their activation with the activation code or link provided by the **Activate User** Action.

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Category	Action	Description
	Suspend User	Suspends the specified user within Okta by changing the user status from ACTIVE to SUSPENDED. For example, use this action to suspend access for users who are on temporary leave. To reactivate a suspended user, use the **Unsuspend** action.
	Unsuspend User	Unsuspends the specified user at Okta.
	Update User Profile	Updates the user profile details for the specified user at Okta.
	Look up Users Stream	Retrieves users from Okta based on the filter value.
Password Management	Change User's Password	Changes the specified user's password after validating the user's current password.
	Expire User Password	Expires the specified user's password within Okta. This action is commonly used as a reaction to stop breaching attempts.
	Reset to Temporary Password	Resets the specified user's password within Okta to a temporary password. This action is commonly used to get a user logged in who has forgotten their password.
	Reset User Factors	Resets all of the multi-factor access devices for the specified user within Okta. This action is commonly used when a user loses their multi-factor authentication device or method.
	Set User Password	Sets the specified user's password in Okta.
	Unlock User	Unlocks the specified user in Okta.
Group Management	Add User To Group	Adds the specified user to the specified group in Okta.
	Create Group	Creates the specified group in Okta.
	Get Groups	Retrieves all new and updated groups in Okta.
	Is User In Group	Determines if the specified user is a member of the specified group in Okta.
	Lookup Group Details by Group ID	Retrieves group details for the specified Okta group ID.
	Lookup Group ID By Name	Retrieves group details and group ID for the specified Okta group name.
	Remove User From Group	Removes the specified user from the specified Okta group ID.
	Update Group	Updates the group details for the specified Okta group ID.

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Category	Action	Description
	Look up Groups Stream	Retrieves groups from Okta, based on the filter criteria.
Group Membership Management	Look up Group Members Stream	Retrieves users from the specified Okta group.
	Look up User Groups Stream	Retrieves the group information from Okta to which the user belongs to.
Application Access Management	Look up Users by Application ID Stream	Retrieves users who have access to the specified application.
	Look up Groups by Application ID Stream	Retrieves groups who have access to the specified application.
	Revoke User Application Access	Revokes access to an application for the required user.
Application Management	Look up Applications Stream	Retrieves applications from Okta, based on the filter criteria. For more information about the criteria you can specify in the **Filter** input, see List applications in Okta Developer Documentation.
	Look up Application by Application ID	Retrieves details of the specified application ID in Okta.
	Look up App Launcher Applications Stream	Retrieves applications that are either active or are assigned to users.
Logs Management	Look up Okta Logs Stream	Retrieves the logs in Okta that are filtered by the given filter value and within the specified time duration. For more information about the event types and system logs, see Event Types in Okta Developer Documentation.
Metadata Retrieval	Look up Additional Fields for User	Retrieves the metadata of the additional fields for a user in Okta.
	Look up Applications Metadata	Retrieves the metadata of applications in Okta.
	Look up Event Hooks Metadata	Retrieves the metadata of the event hooks in Okta.

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Category	Action	Description
		Note: Make sure that you use this action along with the actions that use Event Hook ID as a dynamic input.
	Look up Groups Metadata	Retrieves the metadata details of the groups in Okta.
Webhook Management	Activate Event Hook	Changes the status of the specified event hook to active in Okta.
	Create Event Hook	Creates an active event hook in Okta. **Note:** Make sure that **Configuration URI** field value is in this format: `https://<instance-name>.service-now.com/api/sn_okta_spoke/oktawebhook`
	Deactivate Event Hook	Sets the status of the specified Okta event hook to inactive.
	Look up Event Hook by ID	Retrieves details of the Okta event hook for the specified ID.
	Look up Event Hooks	Retrieves details of all the event hooks in Okta.
	Update Event Hook	Updates the specified event hook in Okta. **Note:** Make sure that **Configuration URI** field value is in this format: `https://<instance-name>.service-now.com/api/sn_okta_spoke/oktawebhook`
	Verify Event Hook	Verifies and retrieves an external service endpoint configured for an event hook in Okta.

Available conversational actions

Install Now Assist for Conversational Spokes and start using the conversational ability of Integration Hub spokes. For more information, see Now Assist in Conversational Spokes.

Available conversation action is Create Group that creates a group in Okta with the provided details.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

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You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Okta group management AI agent	Automates group-related tasks in Okta using Integration Hub such as those related to managing of groups, handling user memberships, and retrieving group details.
Okta password management AI agent	Automates password-related workflows in Okta from Integration Hub. Automate actions such as reset password to temporary values, set new password, expire passwords, unlock user accounts, reset user authentication factors, and change user passwords.
Okta group membership management AI agent	Automates group-related workflows in Okta from Integration Hub. Automate actions such as Look up User Groups Stream', and 'Look up Group Members Stream'.
Okta user management AI agent	Automates user management workflows in Okta from Integration Hub. Automate actions such as manage user accounts, sessions, and statuses.
Okta application access management AI agent	Automates access management workflows in Okta from Integration Hub. Automate actions such as look up users and groups by application ID stream, and revoking user application access.
Okta application management AI agent	Automates application management-related workflows in Okta from Integration Hub. Automate actions such as look up applications, retrieve application details by ID, and create or update Okta application records.
Okta logs management AI agent	Automates log management-related workflows in Okta from Integration Hub. Automate actions such as 'Look up Okta Logs Stream'.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

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Okta account requirements

The Okta spoke requires generating and configuring your Okta account to use a web API key.

Credential and connection alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

This spoke uses the Okta Connection & Credential Alias record to authorize actions. For information about setting up the spoke, see Set up Okta spoke.

MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. Use the connection record associated with the Okta alias to configure where actions run and, if needed, specify MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up Okta spoke

Integrate the Okta spoke with Okta to automate various actions on Okta. For example, you can automate the activation of a user on Okta. To integrate, connect your ServiceNow instance and Okta using an API key or OAuth authentication.

Before you begin

- Request Integration Hub subscription.
- Activate the Okta spoke on your ServiceNow instance.
- Account with the Okta developers portal.
- Role required: admin.

About this task

Depending on your requirement, you can set up the spoke using an API key or OAuth credentials. However, you can use only one alias at a time for a ServiceNow domain.

Set up Okta spoke using API key

Integrate the ServiceNow instance and your Okta account using an API key to authenticate ServiceNow requests.

Generate an API key to request authentication

Generate an API key on your Okta organization or developer account to have the connection record authenticated by the Okta developer's or organizational account.

Before you begin

Okta requirements:

- Okta organization or developer account
- Role required: Okta administrator

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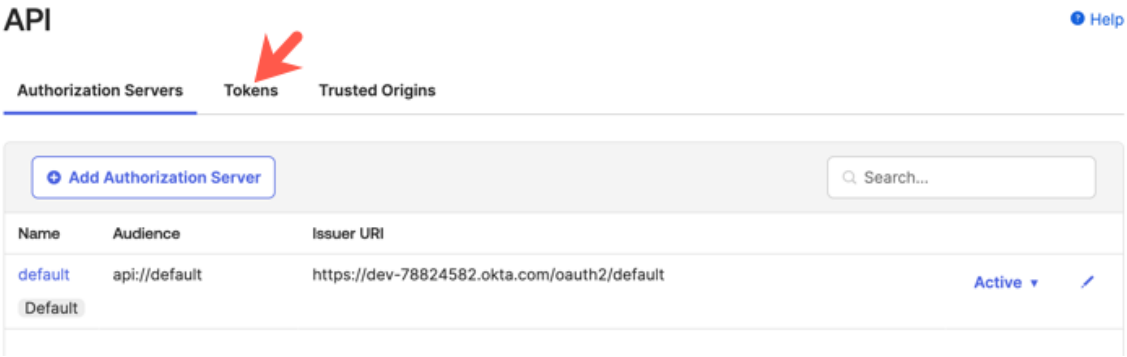
About this task

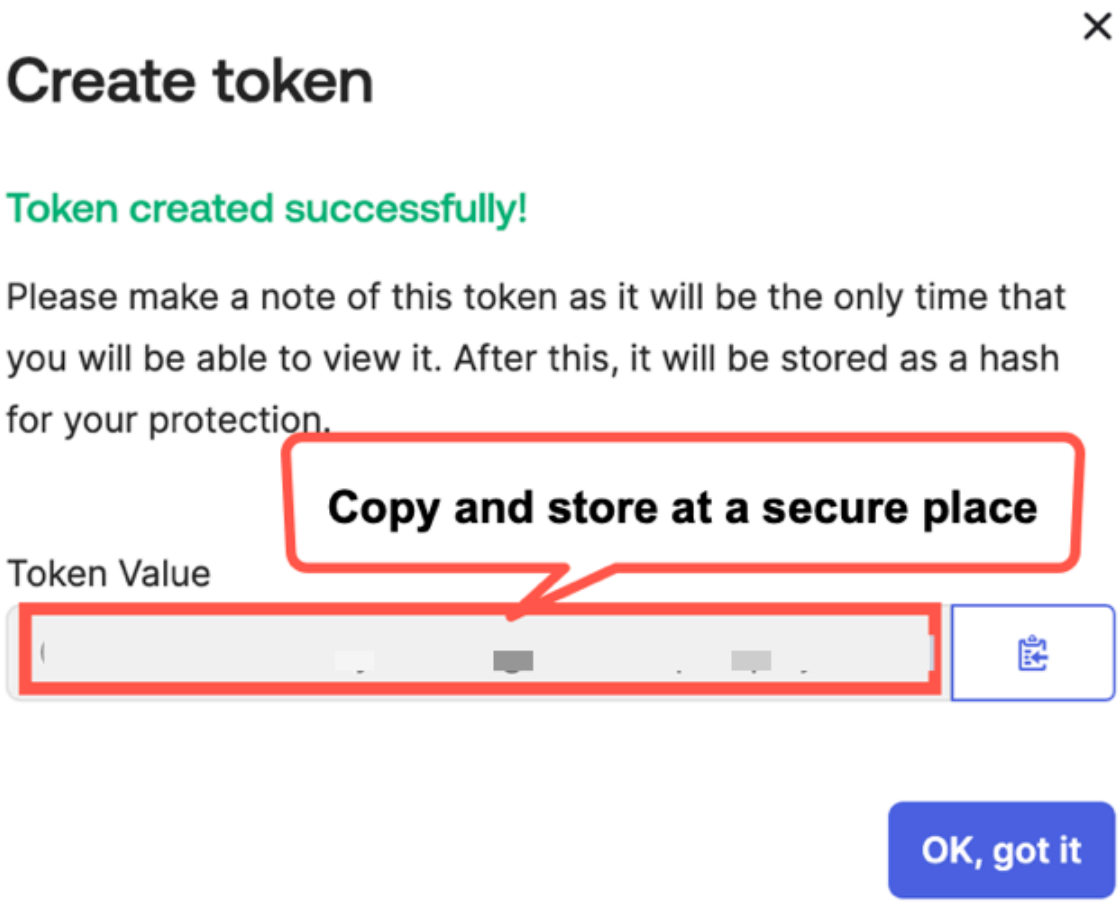
The API key enables the Okta organization or developer account to authenticate an access request from your ServiceNow instance.

Procedure

1. Log in to https://developer.okta.com/login/.
2. On the left panel, navigate to **Security** > **API**.
3. On the API page, select Tokens.



4. Select **Create token**.
5. In the Create token window, enter a name for the token.
6. Select **Create token**.
   The token is created.



7. Copy the API token and store at a secured place.

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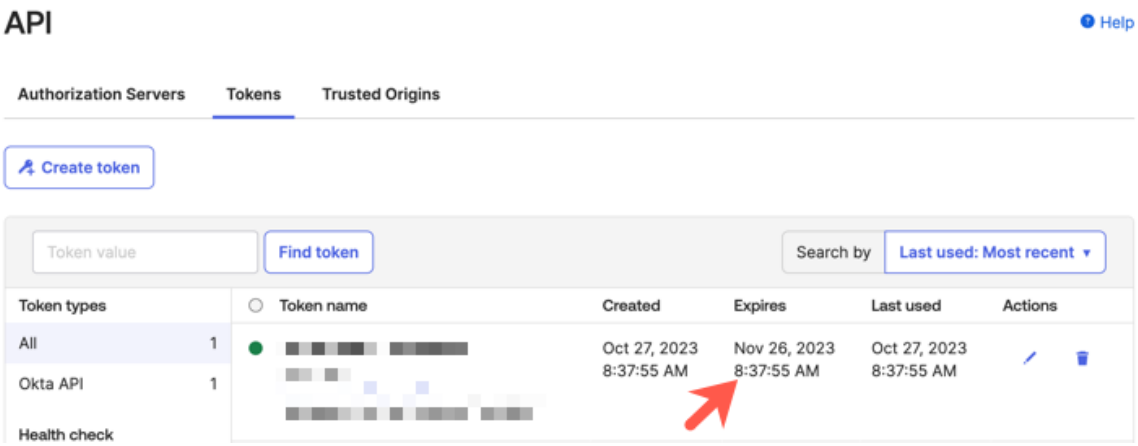
Note the expiry date of the token.



Create an API Key credential record for the Okta spoke

Create Credential records to the Okta application that you created. The Okta spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select **New**.
3. Select **API Key Credentials**.
4. Fill the form.

Field	Value required
Name	A custom name that uniquely identifies the record. For example, `Okta Credentials`.
Active	Activates the credential record so that it's used to connect to the Okta account.
API Key	API token that you had generated in your Okta account in the format SSWS `<API token>`. Replace `<API token>` with the API token. To learn how to generate an API token, see Generate an API key to request authentication.
Applies to	MID Server that can use this credential. For example, select **All MID Servers**.
Order	Order (sequence) in which this credential is used as it attempts to access the Okta API. The smaller the number, the higher in the list this credential appears. Establish credential order when using large numbers of credentials or when security locks out users after three failed login attempts. If all the credentials have the same order number (or none), the instance tries the credentials in a random order. For example, enter `100`.
Credential alias	The credential alias for Okta spoke that resolves in runtime when connecting to the Okta API.

5. Select **Submit**.

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Create a connection record for the Okta spoke

Create a Connection record to the Okta API. The Okta spoke connection and credential alias uses these connections to perform actions in Okta.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Okta**.
3. From the **Connections** tab, select **New**.
4. Fill the form.

Field	Value required
Name	Enter any name to uniquely identify the connection record. For example, enter `Okta Connection`.
Credential	Select the Credential record that you created for Okta. For example, select **Okta Credentials**.
Connection URL	Enter your Okta organization URL. For example, `https://dev-418994.oktapreview.com`.

5. Select **Submit**.

Set up Okta using OAuth credentials

Integrate the ServiceNow instance and your Okta account by creating a custom OAuth application in Okta to authenticate the ServiceNow requests.

Before you begin

- Access to the Okta Developer Console
- Role required: admin

Create an OAuth application in Okta

Create a custom OAuth application in your Okta developer's account to enable OAuth 2.0 authentication of the requests from your ServiceNow instance.

Before you begin

Role required: admin
Administrator access to Okta Developer's or Organization account

Procedure

1. Log in to https://developer.okta.com/login/ .
2. On the left panel, select **Applications** > **Applications** > **.**
3. On the Applications page, select **Create App Integration**.

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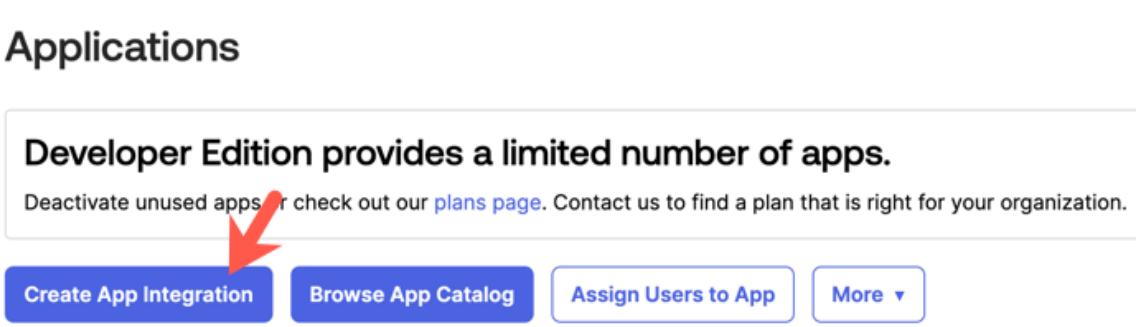
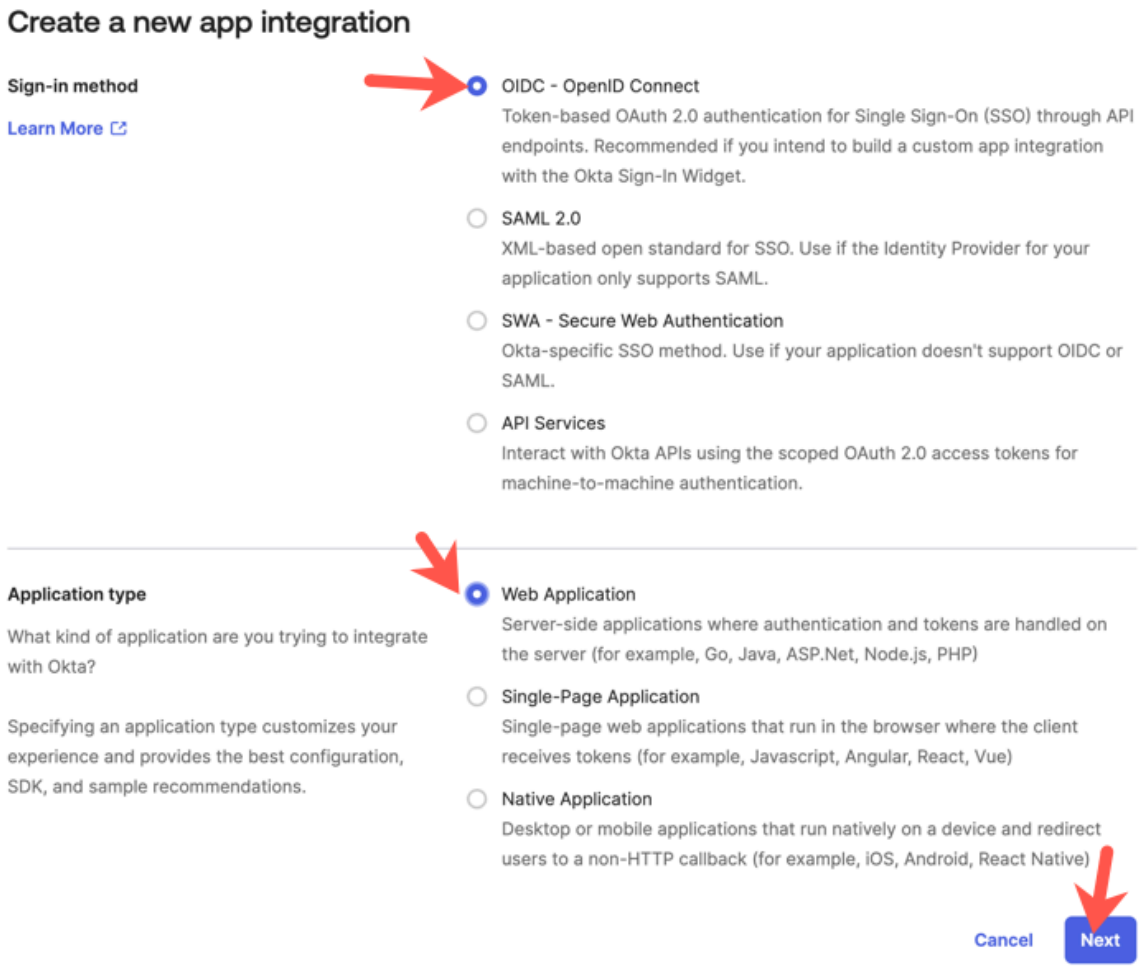


4. On the Create a new app integration window, select OIDC - OpenID Connect.
5. Select
   - OIDC - OpenID Connect
   - Web Application
6. Select



Next.

7. Fill the form.

New Web App Integration

Field	Description
App integration name	Custom name of the OAuth application.
Logo	Logo of the OAuth application. Uploading a logo is optional.

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Field	Description
Grant type	The type of OAuth 2.0 flow to use depending on the type of application you're building. To learn how to select the appropriate option, see https://developer.okta.com/docs/concepts/oauth-openid/#openid-connect. Select the options: ○ Authorization Code ○ Refresh Token ○ Implicit (Hybrid) ▪ Allow ID Token with implicit grant type ▪ Allow access token with implicit grant type
Sign-in redirect URIs	The URI that receives the authentication response and ID token from Okta. Enter your ServiceNow instance URL in the format `https://<instance-name>.service-now.com/oauth_redirect.do`.
Sign-out redirect URIs	The URI that contacts Okta to close a user session. Enter your ServiceNow instance URL in the format `https://<instance-name>.service-now.com/oauth_redirect.do`
Base URIs	URI of the self-hosted Okta widget. Providing the base URI is optional.
Controlled access	Option to assign access to Okta integration in your organization. To assign access: ○ To assign access to everyone in the organization, select **Allow everyone in your organization to access**. ○ To assign access to selected groups, select **Limit access to selected groups** and enter the group names in the Selected group(s) field. ○ To assign access after integration, select **Skip group assignment for now**.

8. Select **Save**.

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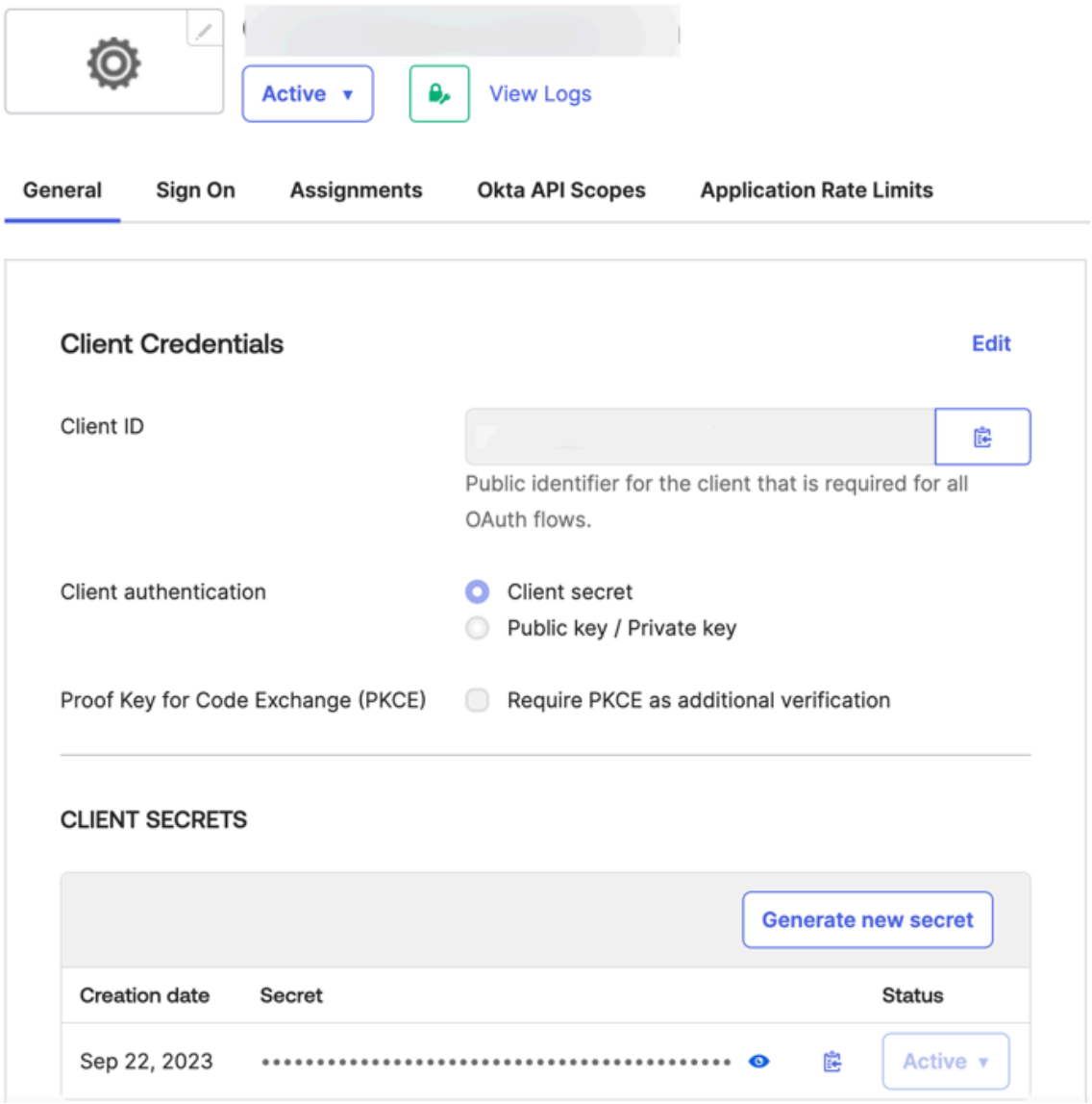
The OAuth application is



created.

9. Grant permissions to access Okta APIs.

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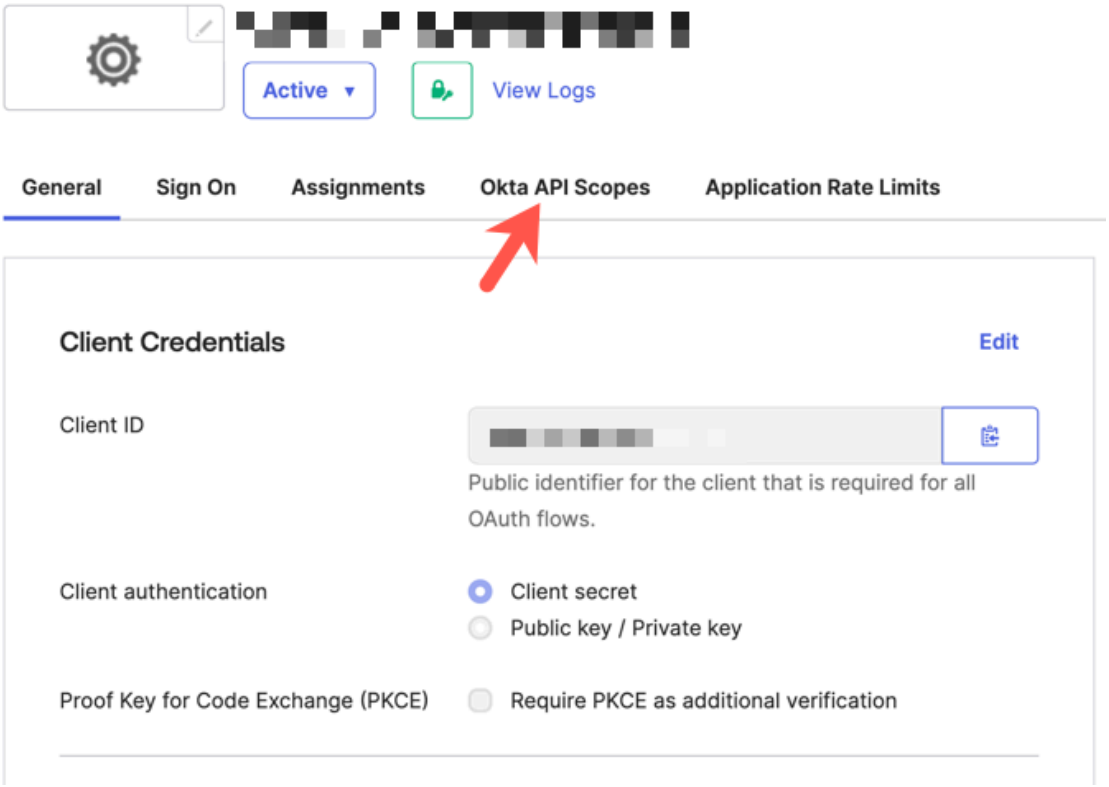
a. Select **Okta API Scopes**.



b. Under **Actions**, select **Grant for the APIs**.

> **Note:** These are all the OAuth scopes required for all the spoke actions to work. If you are only using a subset of the available spoke actions, you can select only the scopes required, based on your own security requirements.

- okta.users.manage
- okta.apps.manage
- okta.logs.read
- okta.groups.read
- okta.groups.manage
- okta.users.read
- okta.apps.read
- okta.eventHooks.read
- okta.eventHooks.manage

For more information about the API scopes, see Define allowed scopes in Okta Developer Documentation.

Create a connection record for Okta Spoke

Create a connection record that contains the information to connect to the Okta server. Your ServiceNow instance uses this form to send authentication requests to the OAuth application.

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Before you begin

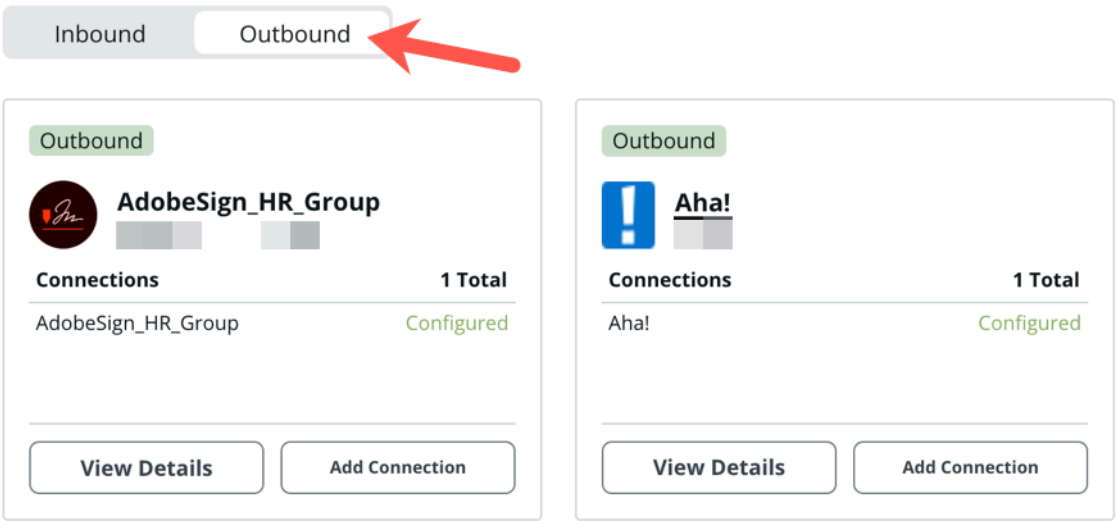
Important: If you have configured different OAuth scopes as mentioned in step 9 of Create an OAuth application in Okta, do not perform this procedure. Instead, perform the steps outlined in Connect to a third-party OAuth provider and add the corresponding OAuth scopes that align with your Okta Web Application that are granted in step 9 of Create an OAuth application in Okta.

Role required: admin.

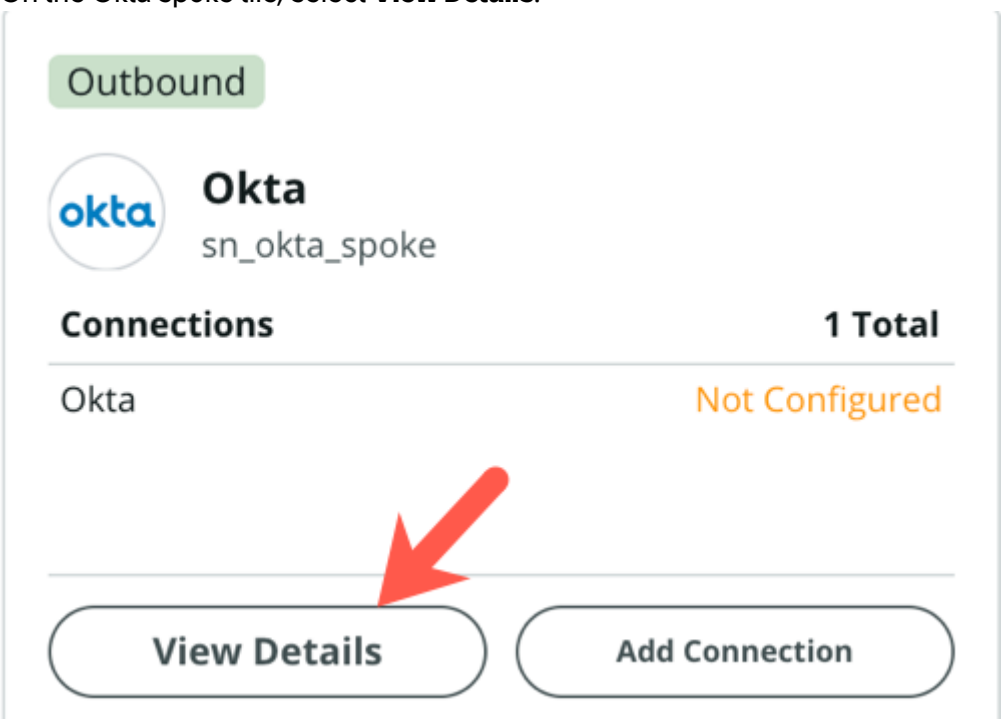
Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. In the Search all connections field, enter `Okta`.

Note: The Outbound tab is enabled by default. Confirm that it's enabled.



4. On the Okta spoke tile, select **View Details**.



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5. Select **Configure**.
6. On the form, fill these values.

Configure Connection

Field	Description
Name	Name of the connection established with the Okta instance. The first connection's default name is automatically assigned to match the name specified in the Connections and Credentials form on the Connection & Credential Aliases page. To provide your custom name, create a connection record by selecting **Add Connection**.
Connection URL	The URL to connect to the Okta server. The URL format is https://[yourOktaDomain].com.
API Version	The version of the Okta APIs.
Authorization URL	The URL that the OAuth application at Okta provides to seek authorization to access the Okta resource server. The format is `https://{youroktadomain}.com/oauth2/{API version}/authorize`.
Token URL	The URL to obtain the access token. The format is `https://{youroktadomain}.com/oauth2/{API version}/token`.
Token Revocation URL	The URL provided by the OAuth authorization server that enables a client application to request the revocation or cancellation of access tokens and refresh tokens that were previously issued. The format is `https://{youroktadomain}.com/oauth2/{API version}/revoke`.
OAuth Client ID	The client ID generated in the Okta developer's account.
OAuth Client Secret	The client secret generated in the Okta developer's account.
OAuth Redirect URL	Redirect the URL to your ServiceNow instance. The format is `https://{instance-name}.service-now.com/oauth_redirect.do`.

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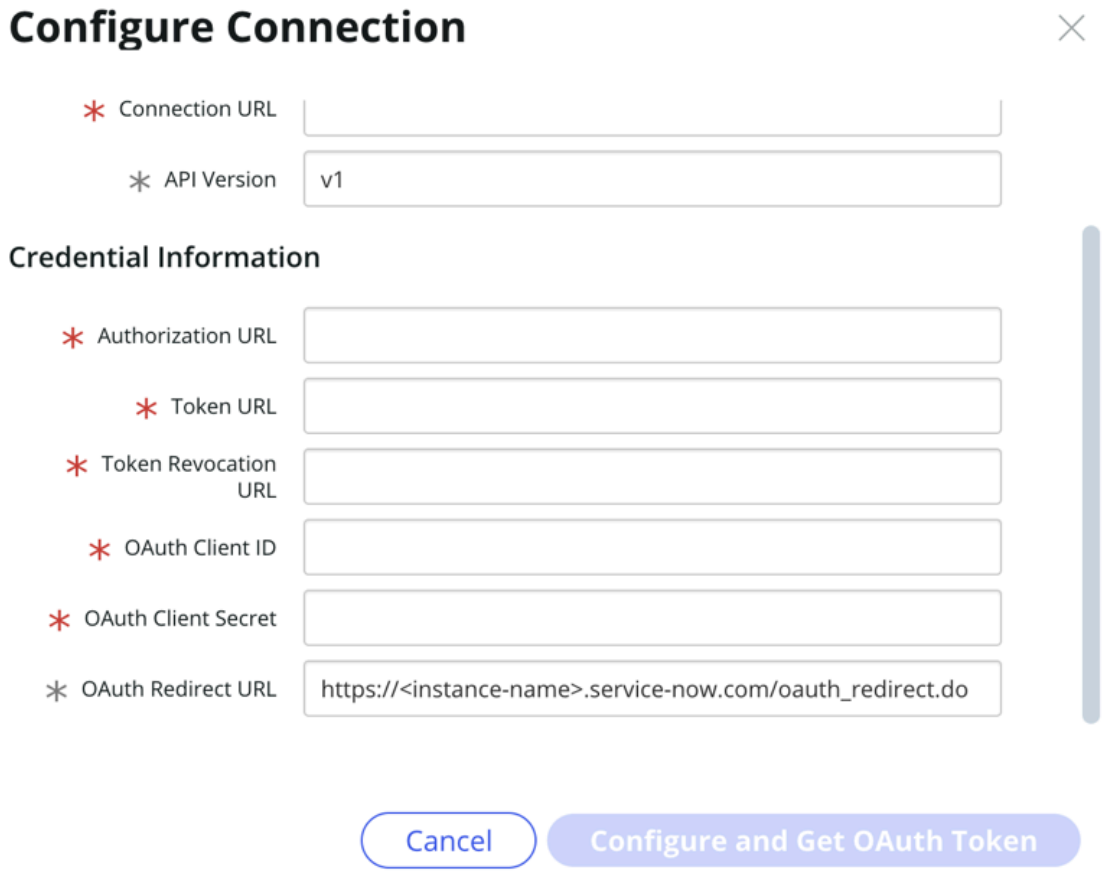

7. Select **Configure and Get OAuth Token**.
   The OAuth Access token is generated for the Okta spoke.

Note: You must log in to Okta before the OAuth access token is granted.

Fetch Okta groups

Fetch Okta groups into your instance so that you can assign them to different users. You can fetch the groups on an as-needed or scheduled basis.

Before you begin

Role required: okta.admin

Procedure

1. To fetch Okta groups on an as-needed basis.

   a. Navigate to **Okta spoke** > **Okta groups**.

   b. Select **Fetch Okta groups**.
   The Get Groups subflow is triggered.

   c. From the Okta groups list, you can review the following:

Column	Description
Name	Name of the Okta group.

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Column	Description
Description	Description of the Okta group.
Group ID	Group ID of the Okta group.
Type	Type of the Okta group.
Group creation date	Date when Okta group was created.
Group last updated date	Date when Okta group was last updated.
Created	Date when Okta group was first synchronized with your ServiceNow instance.
Updated	Date when Okta group was last synchronized with your ServiceNow instance.

2. Fetch Okta groups on a scheduled basis.

   a. Navigate to **System Defintion** > **Scheduled Jobs**.

   b. Open the **Fetch Okta Groups** record.

   c. Update the fields, as needed.

   Note:

   - Make sure that the **Active** option is selected so that the scheduled job is activated for use.
   - The Updated column on your ServiceNow instance displays the time when the Okta group details was updated.

   d. Click **Update**.

Set up a bi-directional webhook for Okta spoke

Configure a webhook to subscribe to Okta with a ServiceNow callback URL.

Before you begin

- Request an Integration Hub subscription
- Install or activate the Okta spoke plugin
- Role required: admin

Register Okta webhook

Register an Okta webhook in your ServiceNow instance to notify the ServiceNow app when certain events occur in Okta.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Okta Spoke** > **Okta Webhook Registry**.
2. Select **New**.

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3. On the form, fill in these fields.

Field	Description
Name	A unique name to identify the webhook registry. **Note:** The name must be only `Okta Webhook Authentication`.
Description	Short description of the webhook registry.
Authentication Key	Authentication key used for connecting to Okta webhook.
Authentication Value	Authentication value used for connecting to Okta webhook.

4. Select **Submit**.

OneLogin Spoke

Manage users, passwords, roles, and groups in the OneLogin account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

OneLogin v1.0.2 is the latest version. For version history of the spoke, see OneLogin spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke actions

The OneLogin spoke provides actions to to manage users, passwords, roles, and groups. Available actions include:

Category	Action	Description
Group Management	Look up Groups	Retrieves the list of groups available in the OneLogin account.
Password Management	Get Lock Status	Retrieves the lock status of the user in OneLogin.
	Lock User	Locks the specified user account in OneLogin.
	Unlock User	Unlocks user in OneLogin.
	Update Password	Updates the user's password in OneLogin.
User Management	Create User	Creates a user in OneLogin.
	Get User Details	Retrieves details of the required user in OneLogin.
	Look up Users	Retrieves details of the required users.
	Update User	Updates the attributes of a user in OneLogin.
User Role Management	Assign Role	Assigns role to user in the OneLogin account.
	Get Roles by User	Retrieves the role IDs assigned to the user in the OneLogin account.
	Look up Roles	Retrieves details of the roles.
	Remove Role	Removes the specified role assigned to a user in OneLogin account.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the OneLogin spoke.

MID Server requirements

These actions use REST calls, which can run on an instance or MID Server. Use the connection record associated with the alias to configure where actions run as well as set MID Server selection attributes. For more information about running actions on the MID Server, see Integration steps

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the OneLogin spoke

Integrate the ServiceNow instance and OneLogin account using the OAuth credentials to authenticate ServiceNow requests.

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Create an API credential in the OneLogin portal

Create an API credential in the OneLogin portal to enable OAuth 2.0 authentication and obtain the values of client ID and client secret.

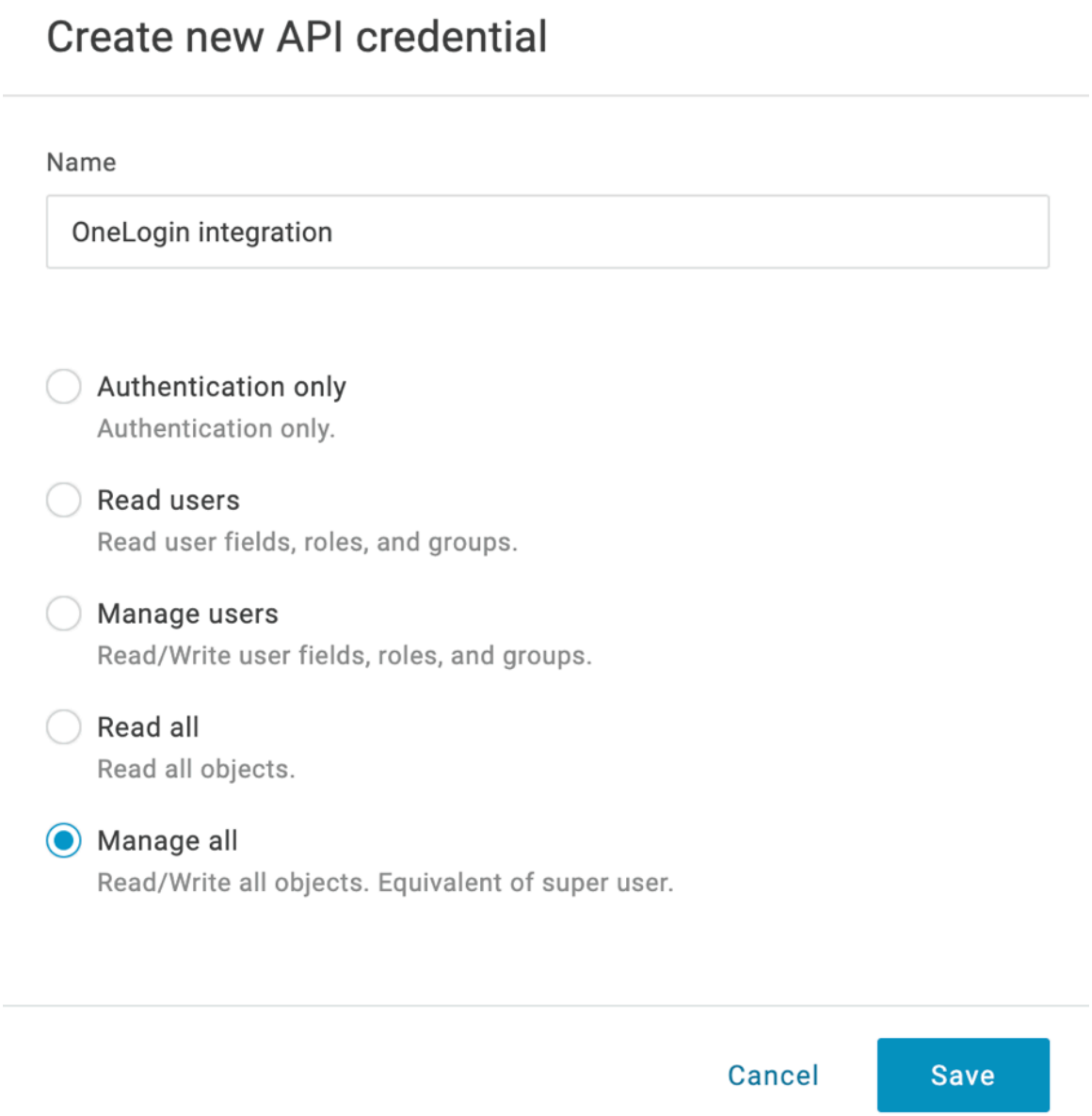
Before you begin

Role required: admin or account owner.

Procedure

1. Log in to your OneLogin account as an account owner or administrator.
2. Navigate to **Developers** > **API Credentials**.
3. In the API Access page, click **New Credential**.
4. On the form, enter the credential name and select scope for the credential.
   For more information, see Working with API Credentials.

Note: Ensure that you select either **Manage users** or **Manage all** permission.



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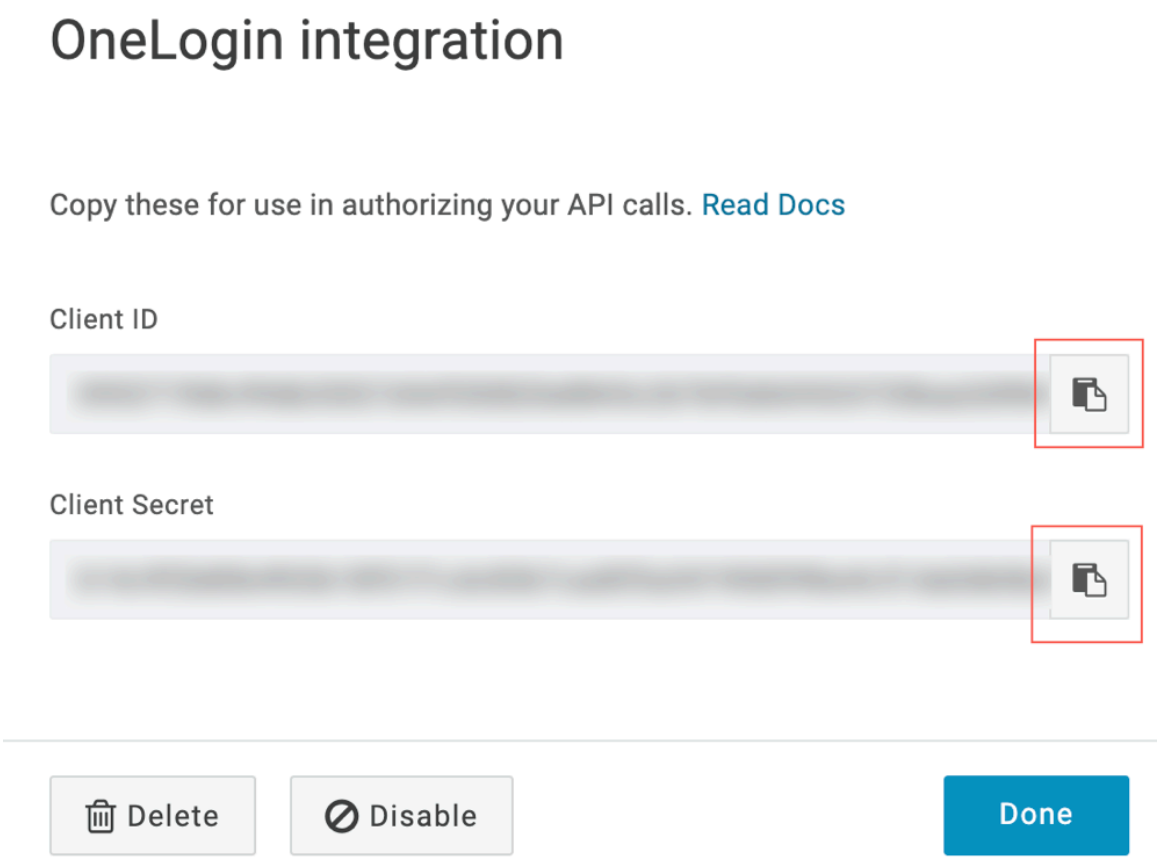
5. Click **Save**.
   The values of client ID and client secret are displayed.



6. Copy and record the values of client ID and client secret for later use.

Configure the OneLogin connection and credential alias record

Configure the default connection and credential alias to integrate the ServiceNow instance and OneLogin account to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the OneLogin spoke.
- Role required: admin.

Procedure

1. Navigate to **Connection & Credentials** > **Connection & Credential Aliases**.
2. Open the record, **OneLogin**.
3. Click the **Create New Connection & Credential** related link.
4. On the form, fill these values.

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Field	Description
Connection Name	Name to identify the connection record.
Connection URL	Connection URL in this format: `https://api.<region>.onelogin.com`. Replace `<region>` with the region of your OneLogin account.
Credential Name	Name to identify the credential record.
OAuth Entity Name	Name to identify the OAuth record.
OAuth Client ID	Client ID of the credential created in the OneLogin portal.
OAuth Client Secret	Client secret of the credential created in the OneLogin portal.
OAuth Token URL	Token URL in this format: `https://api.<region>.onelogin.com/auth/oauth2/v2/token`. Replace `<region>` with the region of your OneLogin account.

5. Click **Create and Get OAuth Token**.
   ServiceNow instance is integrated with the OneLogin account.

Oracle Autonomous DB Spoke

Manage the Oracle Autonomous Database operations from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle Autonomous DB spoke v1.0.6 is the latest version. For version history of the spoke, see Oracle Autonomous DB spoke release notes.

Supported versions

This spoke was built for Oracle Autonomous DB 20160918, but may be compatible with later versions.

Spoke requirements

Oracle Autonomous DB account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

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- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- Oracle Cloud IAM spoke(com.sn.oci.iam.spoke)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Oracle Autonomous DB spoke provides actions to automate Oracle Autonomous DB tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Database Backup Management	Create Database Backup	Creates an Autonomous Database backup for the specified database based on the specified request parameters.
	Get Database Backup	Retrieves the details of the specified Autonomous Database backup.
	Look up Database Backups	Retrieves a list of Autonomous Database backups based on the specified database ID or compartment ID.
Database Management	Create Database	Creates an Autonomous Database.
	Create Database by Cloning	Creates a clone of the existing Autonomous Database.
	Delete Database	Deletes the specified Autonomous Database.
	Deregister Database Data Safe	Deregisters the specified Autonomous Database asynchronously with data safe.
	Failover Database	Initiates a failover database of the specified Autonomous Database to a standby.
	Get Database	Retrieves details of the specified Autonomous Database.
	Look up Databases	Retrieves a list of Autonomous Databases.
	Register Database Data Safe	Registers the specified Autonomous Database asynchronously with data safe.
	Restart Database	Restarts the specified Autonomous Database.
	Start Database	Starts the specified Autonomous Database.
	Stop Database	Stops the specified Autonomous Database.
	Update Database	Updates the specified Autonomous Database.

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Category	Action	Description
Database Version	Look up Database Versions	Retrieves the list of supported Autonomous Database versions.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Oracle Autonomous DB spoke.

Set up the Oracle Autonomous DB spoke

Integrate the ServiceNow instance and Oracle Autonomous DB by using the credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate and set up the Oracle Cloud IAM Spoke.
- Activate the Oracle Autonomous DB spoke.
- Role required: admin.

Create a credential record for the Oracle Cloud IAM spoke

Create a credential record for the Oracle Cloud IAM account. The Oracle Cloud IAM spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Use the public key from the Java Keystore (JKS) file and generate a fingerprint from your Oracle Cloud account. For more information about fingerprint, see Required Keys and OCIDs.

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **OCI SHA256WithRSA Signature**.
4. On the form, fill these values.

OCI SHA256WithRSA Signature Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, Oracle IAM Cloud Cred.
Certificate Sys ID	Sys ID of the OCI Signing Certificate.

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Field	Description
Alias	Alias of the KeyStore.
Alias Password	Alias password of the KeyStore.
Key ID	Key ID helps identify which key is used when multiple keys are used to sign tokens. The Key ID must be slash (/) separated values of Tenancy OCID, User OCID, and Fingerprint in this format: `ocid1.tenancy.oc1..<unique_ID>/ocid1.user.oc1..<unique_ID>/<key_fingerprint>`.
Applies to	Option to specify if the credential applies to all MID Servers in the network.
Active	Option to actively use the credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select `OCI SHA256RSA Signing Algorithm`

5. Right-click the form header and click **Submit**.

Create a connection record for the Oracle Cloud IAM spoke

Create a connection record for your Oracle Cloud IAM account. The Oracle Cloud IAM spoke connection and credential aliases use these connections to perform actions in Oracle Cloud IAM.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for **OracleIAM_credentialANDconnecton**.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle IAM conn`.
Credential	Credential record created for Oracle Autonomous DB spoke. For example, `Oracle IAM Cred`.
Connection alias	Alias record associated with this connection. Search and select `sn_oci_iam_spoke.OracleIAM_credentialAN`
Host	Fully qualified domain name of the target host where the **Oracle Cloud IAM** server is hosted. For example, `database.ap-mumbai-1.oraclecloud.com`.
Connection URL	Base URL to connect to **Oracle Cloud IAM**. For example, `https://database.ap-mumbai-1.oraclecloud.com`.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

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Field	Description
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use a MID Servers for this connection. If the check box is selected, define the fields in the Advanced MID Server Configuration related list.

5. Click **Submit**.

Create a credential record for the Oracle Autonomous DB spoke

Create a credential record for the Oracle Autonomous DB account. The Oracle Autonomous DB spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **OCI SHA256WithRSA Signature**.
4. On the form, fill these values.

OCI SHA256WithRSA Signature Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, Oracle IAM Cloud Cred.
Certificate Sys ID	Sys ID of the OCI Signing Certificate.
Alias	Alias of the KeyStore.
Alias Password	Alias password of the KeyStore.
Key ID	Key ID (kid) helps identify which key is used when multiple keys are used to sign tokens. The Key ID must be slash (/) separated values of Tenancy OCID, User OCID, and Fingerprint in this format: ocid1.tenancy.oc1..<unique_ID>/ ocid1.user.oc1..<unique_ID>/<key_fingerprint>.
Applies to	Option to specify if the credential applies to all MID Servers in the network.
Active	Option to actively use the credential record.
Credential alias	Associated credential record. If you have already created a credential alias, search and select the record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select `OCI SHA256RSA Signing Algorithm`

5. Right-click the form header and click **Submit**.

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Create a connection record for the Oracle Autonomous DB spoke

Create a connection record for your Oracle Autonomous DB account. The Oracle Autonomous DB spoke connection and credential aliases use these connections to perform actions in Oracle Autonomous DB.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for **Oracle Autonomous Database**.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle Auto DB Connection`.
Credential	Credential record created for Oracle Autonomous DB spoke. For example, `Oracle ADB Creds`.
Connection alias	Alias record associated with this connection. Search and select `sn_oci_adb_spoke.Oracle_Autonomous_Database`
Host	Fully qualified domain name of the target host where the **Oracle Autonomous DB** server is hosted. For example, `database.ap-mumbai-1.oraclecloud.com`.
Connection URL	Base URL to connect to **Oracle Autonomous DB**. For example, `https://database.ap-mumbai-1.oraclecloud.com`.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use a MID Servers for this connection. If the check box is selected, define the fields in the Advanced MID Server Configuration related list.

5. Click **Submit**.

Oracle Block Storage Spoke

Manage block storage and volumes in the Oracle Block Storage account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle Block Storage spoke v1.0.4 is the latest version. For version history of the spoke, see Oracle Block Storage Spoke release notes.

Supported versions

This spoke was built for Oracle Block Storage API version 20160918, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Oracle Cloud IAM Spoke
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Oracle Block Storage spoke provides actions to automate Oracle Block Storage tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Volume Backup Management	Change Volume Backup Compartment	Moves a volume backup into a different compartment within the same tenancy.
	Create Volume Backup	Creates a new backup of the specified volume.
	Delete Volume Backup	Deletes a volume backup.
	Get Volume Backup	Retrieves information about the specified volume backup.
	Look up Volume Backups	Retrieves list of the volume backups in the specified compartment.
	Update Volume Backup	Updates the specified volume backup.
Volume Backup Policy Management	Create Volume Backup Policy	Creates a user defined backup policy.
	Delete Volume Backup Policy	Deletes a user defined backup policy.
	Get Volume Backup Policy	Retrieves details of the specified volume backup policy.

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Category	Action	Description
	Look up Volume Backup Policies	Retrieves list of the volume backup policies in the specified compartment.
	Update Volume Backup Policy	Updates a user defined backup policy.
Volume Group Backup Management	Change Volume Group Backup Compartment	Moves a volume group backup into a different compartment within the same tenancy.
	Create Volume Group Backup	Creates a new backup volume group of the specified volume group.
	Delete Volume Group Backup	Deletes the specified volume group backup.
	Get Volume Group Backup	Retrieves details of the specified volume group backup.
	Look up Volume Group Backups	Retrieves list of the volume group backups in the specified compartment.
	Update Volume Group Backup	Updates the specified volume group backup.
Volume Group Management	Change Volume Group Compartment	Moves a volume group into a different compartment within the same tenancy.
	Create Volume Group	Creates a new volume group in the specified compartment.
	Delete Volume Group	Deletes the specified volume group.
	Get Volume Group	Retrieves details of the specified volume group.
	Look up Volume Groups	Retrieves list of the volume groups in the specified compartment.
	Update Volume Group	Updates the specified volume group.
Volume Management	Attach Volume	Attaches the specified storage volume to the specified instance.
	Change Volume Compartment	Moves a volume into a different compartment within the same tenancy.
	Create Volume	Creates a new volume in the specified compartment.
	Delete Volume	Deletes the specified volume.
	Detach Volume	Detaches a storage volume from an instance.
	Get Volume	Retrieves details of the specified volume.
	Get Volume Attachment	Retrieves information about the specified volume attachment.
	Look up Volume Attachments	Retrieves list of the volume attachments in the specified compartment.
	Look up Volumes	Retrieves list of the volume in the specified compartment.

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Category	Action	Description
	Update Volume	Updates the specified volume in the specified compartment.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Oracle Block Storage spoke.

Set up the Oracle Block Storage spoke

Integrate the ServiceNow instance and Oracle Block Storage account by using the OCI SHA256WithRSA Signature credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate and set up the Oracle Cloud IAM Spoke.
- Activate the Oracle Block Storage spoke.
- Role required: admin.

Procedure

1. **Optional:** Create a JKS certificate.
   You can create a JKS certificate for the Oracle Block Storage spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating the JKS Certificate, see Create a Java KeyStore (JKS) certificate.
2. **Optional:** Create X.509 certificate.
   You can create a X.509 certificate for the Oracle Block Storage spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating a X.509 certificate, see Create X.509 certificate for the Oracle Cloud IAM spoke.
3. Create a child alias in the Oracle Cloud IAM spoke connection and credential alias.
   a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.
   b. Click **New**.
   c. On the form, fill these values:

Connection & Credential Aliases form

Field	Description
Name	Name to identify the alias record. For example, `Oracle Block Storage Alias`.

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Field	Description
Parent Alias	Connection and credential alias record of the Oracle Cloud IAM spoke. For example, **sn_oci_iam_spoke.OracleIAM_credentialANDconnecton**.

d. Right-click the form header and click **Save**.

4. Create credential record for the Oracle Block Storage spoke.

a. Navigate to **Connections & Credentials** > **Credentials**.

b. Click **New**.
The system displays this message: `What type of Credentials would you like to create?`

c. Select **OCI SHA256WithRSA Signature**.

d. On the form, fill in the fields.

Note: You can specify details of the certificates you created specifically for the Oracle Block Storage spoke or specify details of the existing certificates you had created for the Oracle Cloud IAM spoke.

OCI SHA256WithRSA Signature Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle Block Storage Cred`.
Certificate Sys ID	Sys ID of the Signing Certificate.
Alias	Alias of the KeyStore.
Alias Password	Alias password of the KeyStore.
Key ID	Key ID helps identify which key is used when multiple keys are used to sign tokens. The Key ID must be slash (/) separated values of Tenancy OCID, User OCID, and Fingerprint in this format: `ocid1.tenancy.oc1..<unique_ID>/ocid1.user.oc1..<unique_ID>/<key_fingerprint>`.
Applies to	Option to specify if the credential applies to all MID Servers in the network.
Active	Option to actively use the credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select `OCI SHA256RSA Signing Algorithm`

e. Right-click the form header and click **Submit**.

5. Create connection record for the Oracle Block Storage spoke.

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a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the child alias record you had created, for example, **Oracle Obj Storage Alias**.

c. From the **Connections** tab, click **New**.

d. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle Block Storage conn`.
Credential	Credential record created for Oracle Block Storage spoke. For example, `Oracle Block Storage Cred`.
Connection alias	Alias record associated with this connection.
Connection URL	Base URL to connect to Oracle Block Storage. For example, `https://iaas.ap-mumbai-1.oraclecloud.com`.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

e. Click **Submit**.

The ServiceNow instance and Oracle Block Storage account are integrated. You can use the spoke actions to build flows and automate tasks as required.

Oracle Boot Volume Spoke

Manage boot volumes, backups, and KMS keys in Oracle Boot Volume account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle Boot Volume v1.0.6 is the latest version. For version history of the spoke, see Oracle Boot Volume spoke release notes.

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Supported versions

This spoke was built for Oracle Boot Volume API version 20160918, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Oracle Cloud IAM Spoke
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Oracle Boot Volume spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Boot Volume Backup Management	Change Boot Volume Backup Compartment	Moves a boot volume backup to a different compartment within the same tenancy.
	Copy Boot Volume Backup	Creates a boot volume backup copy in specified region.
	Create Boot Volume Backup	Creates a boot volume backup of the specified boot volume.
	Delete Boot Volume Backup	Deletes a boot volume backup.
	Get Boot Volume Backup	Gets information for the specified boot volume backup.
	Look up Boot Volume Backups	Lists the boot volumes backup in the specified compartment.
	Update Boot Volume Backup	Updates specified boot volume backup.
Boot Volume KMS Key Management	Delete Boot Volume KMS Key	Removes the specified boot volume's assigned Key Management encryption key.
	Get Boot Volume KMS Key	Gets the Key Management encryption key assigned to the specified boot volume.
	Update Boot Volume KMS Key	Updates the specified volume with a new Key Management encryption key.
Boot Volume Management	Attach Boot Volume	Attaches the specified boot volume to the specified instance.

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Category	Action	Description
	Change Boot Volume Compartment	Moves a boot volume to a different compartment within the same tenancy.
	Create Boot Volume	Creates a boot volume in the specified compartment.
	Delete Boot Volume	Deletes the specified boot volume.
	Detach Boot Volume	Detaches a boot volume from an instance.
	Get Boot Volume	Gets information for the specified boot volume.
	Get Boot Volume Attachment	Gets information about the specified boot volume attachment.
	Look up Boot Volume Attachments	Lists the boot volume attachments in the specified compartment.
	Look up Boot Volumes	Lists the boot volumes in the specified compartment.
	Update Boot Volume	Updates the specified boot volume.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Oracle Boot Volume spoke.

Set up the Oracle Boot Volume spoke

Integrate the ServiceNow instance and Oracle Boot Volume account by using the OCI SHA256WithRSA Signature credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate and set up the Oracle Cloud IAM Spoke.
- Activate the Oracle Boot Volume spoke.
- Role required: admin.

Procedure

1. **Optional:** Create a JKS certificate.
   You can create a JKS certificate for the Oracle Boot Volume spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating the JKS Certificate, see Create a Java KeyStore (JKS) certificate.
2. **Optional:** Create X.509 certificate.
   You can create a X.509 certificate for the Oracle Boot Volume spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating a X.509 certificate, see Create X.509 certificate for the Oracle Cloud IAM spoke.
3. Create credential record for the Oracle Boot Volume spoke.

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a. Navigate to **Connections & Credentials** > **Credentials**.

b. Click **New**.
The system displays this message: `What type of Credentials would you like to create?`

c. Select **OCI SHA256WithRSA Signature**.

d. On the form, fill in the fields.

Note: You can specify details of the certificates you created specifically for the Oracle Boot Volume spoke or specify details of the existing certificates you had created for the Oracle Cloud IAM spoke.

OCI SHA256WithRSA Signature Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle Boot Vol Cred`.
Certificate Sys ID	Sys ID of the Signing Certificate.
Alias	Alias of the KeyStore.
Alias Password	Alias password of the KeyStore.
Key ID	Key ID helps identify which key is used when multiple keys are used to sign tokens. The Key ID must be slash (/) separated values of Tenancy OCID, User OCID, and Fingerprint in this format: `ocid1.tenancy.oc1..<unique_ID>/ocid1.user.oc1..<unique_ID>/<key_fingerprint>`.
Applies to	Option to specify if the credential applies to all MID Servers in the network.
Active	Option to actively use the credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select `OCI SHA256RSA Signing Algorithm`

e. Right-click the form header and click **Submit**.

4. Create connection record for the Oracle Boot Volume spoke.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the alias record of the Oracle Boot Volume spoke, for example, **Oracle_Boot_Volume_Connection**.

c. From the **Connections** tab, click **New**.

d. On the form, fill these fields.

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Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle Boot Volume Conn`.
Credential	Credential record created for Oracle Boot Volume spoke. For example, `Oracle Boot Vol Cred`.
Connection alias	Alias record associated with this connection.
Connection URL	Base URL to connect to Oracle Boot Volume. For example, `https://iaas.ap-mumbai-1.oraclecloud.com`.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

e. Click **Submit**.

The ServiceNow instance and Oracle Boot Volume account are integrated. You can use the spoke actions to build flows and automate tasks as required.

Oracle Cloud IAM Spoke

Manage user identities and user access in Oracle Infrastructure Identity and Access Management (IAM) from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle Cloud IAM spoke v1.1.4 is the latest version. For version history of the spoke, see Oracle Cloud IAM spoke release notes.

Supported versions

This spoke was built for Oracle Cloud IAM 20160918, but may be compatible with later versions.

Spoke requirements

Oracle Cloud account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Oracle Cloud IAM spoke provides actions to automate Oracle Cloud IAM tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Compartment Management	Bulk Delete Resources	Deletes multiple resources from the specified compartment in a batch.
	Bulk Move Resources	Moves multiple resources from one compartment to another compartment in a batch.
	Create Compartment	Creates a child compartment in the specified parent compartment.
	Get Compartment	Retrieves details of the specified compartment.
	Look up Compartments	Retrieves a list of compartments in the specified tenancy.
	Move Compartment	Moves the specified child compartment to a different parent compartment in the same tenancy.
	Recover Compartment	Recovers a deleted compartment and changes its state to active.
	Update Compartment	Updates the specified compartment.
Group Management	Create Group	Creates a group in the specified tenancy.
	Delete Group	Deletes the specified group.
	Get Group	Retrieves information about the specified group.
	Look up Groups	Retrieves a list of groups in the specified tenancy.
	Update Group	Updates the specified group.
OCI Metadata	Get Tenancy	Retrieves information about the specified tenancy.
	Look up Available Domains	Retrieves a list of availability domains in the specified tenancy.
	Look up Regions	Retrieves a list of all the regions offered by Oracle Cloud Infrastructure.
Policy Management	Create Policy	Create a policy in the specified compartment.
	Delete Policy	Deletes the specified policy.
	Get Policy	Retrieves information of the specified policy.

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Category	Action	Description
	Look up Policies	Retrieves a list of policies in the specified compartment.
	Update Policy	Updates the specified policy.
User Management	Add User to Group	Adds the specified user to the specified group.
	Create User	Creates a user.
	Delete User	Deletes the specified user.
	Get User	Retrieves the details of the specified user.
	Look up User Group Membership	Retrieves a list of the user group memberships in the specified tenancy.
	Look up Users	Retrieves a list of the users in the specified tenancy.
	Remove User from Group	Removes a user from a group by deleting the corresponding user group membership.
	Update User	Updates details of the specified user.
	Update User Capabilities	Updates capabilities of the specified user.
	Update User State	Unblocks the specified user.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Oracle Cloud IAM spoke.

Set up the Oracle Cloud IAM spoke

Integrate the ServiceNow instance and Oracle Cloud IAM by using the OCI SHA256WithRSA Signature credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Oracle Cloud IAM spoke.
- Role required: admin

Create a Java KeyStore (JKS) certificate

Use the keytool utility to generate, import, and export certificates.

Before you begin

- Make sure that the keytool utility is installed on your computer.
- Role required: admin

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Procedure

1. Change to the directory where the certificate is to be saved.
   By default, keytool creates a keystore file in the directory where the keystore commands are run.
2. Enter the following keytool command to generate the certificate in the keystore file, keystore.jks:
   ```
   keytool -genkeypair -alias <mycertificate> -keyalg RSA
   -keysize 2048 -validity 365 -keystore keystore.jks -storepass
   your_keystore_password -keypass your_key_password
   ```

   Note: Replace the placeholders <mycertificate>, <your_keystore_password>, and <your_key_password> with your certificate name, keystore password, and key password in all the sample commands.

3. Enter your first name and last name, organization, and other details in the keytool prompt. These details are required for generating the certificate.
4. Enter the following commands in the following sequence.

   ```
   keytool -export -alias sample -storepass <storepassword> -file
    server.cer -keystore keystore.jks
   keytool -import -v -trustcacerts -alias sample -file server.cer
    -keystore cacerts.jks -keypass <keypassword> -storepass
    <storepassword>
   keytool -export -alias sample -keystore keystore.jks -rfc -file
    public.cert
   keytool -export -alias sample -keystore keystore.jks -rfc -file
    certificate.pem
   keytool -list -rfc -keystore keystore.jks -alias sample
    -storepass <storepassword>
   keytool -importkeystore -srckeystore keystore.jks -destkeystore
    keystore.p12 -deststoretype PKCS12 -srcalias <alias>
    -deststorepass <storepassword> -destkeypass <keypassword>
   openssl pkcs12 -in keystore.p12 -nokeys -out cert.pem
   openssl pkcs12 -in keystore.p12 -nodes -nocerts -out
    PrivateKey.pem
   openssl rsa -in key.pem -pubout -out PublicKey.pem
   keytool -list -v -keystore keystore.p12 -storetype PKCS12
    -storepass <storepassword>
   ```

   Verify the generated keystore.jks file in the target directory.
5. Enter the following command to extract public key from the Java Keystore file.
   ```
   openssl x509 -pubkey -noout -in cert.pem > publickey.pem
   ```

Create X.509 certificate for the Oracle Cloud IAM spoke

You must create a X.509 certificate and attach the Java Keystore file to it. This certificate is used for connecting to Oracle Cloud IAM.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System Definition** > **Certificates**.
2. Click **New**.

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3. In the form, fill in these fields.

X.509 Certificate form

Field	Description
Name	Unique name to identify the certificate. For example, `OCI IAM certificate`
Type	Type of the certificate. Select **Java Key Store**.
Notify on expiration	List of persons who are to be notified when a ceritificate is about to expire.
Keystore password	Password of the keystore.
Warn in days to expire	Number of days when a warning is sent to the user before the certificate expires.
Active	Option to make the certificate active.
Short description	Short description for the keystore.

4. Click the attachments icon and upload the keystore.jks file.
5. Click **Validate Stores/Certificates**.

Create a credential record for the Oracle Cloud IAM spoke

Create a credential record for the Oracle Cloud IAM account. The Oracle Cloud IAM spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Use the public key from the Java Keystore (JKS) file and generate a fingerprint from your Oracle Cloud account. For more information about fingerprint, see Required Keys and OCIDs.

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`

3. Select **OCI SHA256WithRSA Signature**.
4. On the form, fill these values.

OCI SHA256WithRSA Signature Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, Oracle IAM Cloud Cred.
Certificate Sys ID	Sys ID of the OCI Signing Certificate.
Alias	Alias of the KeyStore.

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Field	Description
Alias Password	Alias password of the KeyStore.
Key ID	Key ID helps identify which key is used when multiple keys are used to sign tokens. The Key ID must be slash (/) separated values of Tenancy OCID, User OCID, and Fingerprint in this format: `ocid1.tenancy.oc1..<unique_ID>/ocid1.user.oc1..<unique_ID>/<key_fingerprint>`.
Applies to	Option to specify if the credential applies to all MID Servers in the network.
Active	Option to actively use the credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select `OCI SHA256RSA Signing Algorithm`

5. Right-click the form header and click **Submit**.

Create a connection record for the Oracle Cloud IAM spoke

Create a connection record for your Oracle Cloud IAM account. The Oracle Cloud IAM spoke connection and credential aliases use these connections to perform actions in Oracle Cloud IAM.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for **OracleIAM_credentialANDconnecton**.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle IAM conn`.
Credential	Credential record created for Oracle Autonomous DB spoke. For example, `Oracle IAM Cred`.
Connection alias	Alias record associated with this connection. Search and select `sn_oci_iam_spoke.OracleIAM_credentialAN`
Connection URL	Base URL to connect to **Oracle Cloud IAM**. For example, `https://database.ap-mumbai-1.oraclecloud.com`.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

5. Click **Submit**.

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Oracle Compute Engine Spoke

Manage images and instance in the Oracle Compute Engine account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle Compute Engine v1.0.4 is the latest version. For version history of the spoke, see Oracle Compute Engine spoke release notes.

Supported versions

This spoke was built for Oracle Compute Engine API version 20160918, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Oracle Cloud IAM Spoke
- Oracle Object Storage Management Spoke
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Oracle Compute Engine spoke provides actions to automate Oracle Compute Engine tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Custom Image Management	Change Image Compartment	Moves an Image into a different compartment within the same tenancy.
	Create Image	Creates a custom image in the specified compartment.
	Delete Image	Deletes the specified custom image.

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Category	Action	Description
	Export Image	Exports the specified image to the Oracle Cloud Infrastructure Object Storage service.
	Get Image	Retrieves a specified custom image.
	Look up Images	Retrieves a list of available images in the specified compartment.
	Update Image	Updates details of the specified custom image.
Image Shape Compatibility Management	Add Image Shape Compatibility	Adds a shape to the compatible shapes list for the image.
	Delete Image Shape Compatibility	Deletes an image shape compatibility entry.
	Get Image Shape Compatibility	Retrieves a specified image shape compatibility entry.
	Look up Image Shape Compatibilities	Retrieves a list of all the compatible shapes for the specified image.
Instance Configuration Management	Change Instance Configuration Compartment	Moves an Instance Configuration into a different compartment within the same tenancy.
	Create Instance Configuration	Creates an instance configuration.
	Delete Instance Configuration	Deletes the specified instance configuration.
	Get Instance Configuration	Gets the specified instance configuration.
	Look up Instance Configurations	Retrieves a list of instance configurations in the specified compartment.
	Update Instance Configuration	Updates details of the specified instance configuration.
Instance Management	Change Instance Compartment	Moves an Instance into a different compartment within the same tenancy.
	Create Instance	Creates an instance.
	Delete Instance	Deletes a specified instance.
	Get Instance	Retrieves information about the specified instance.
	Instance Action	Performs a specified power action on an instance.
	Look up Instances	Retrieves a list of instances in the specified compartment.
	Update Instance	Updates details of the specified instance.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Oracle Compute Engine spoke.

Set up the Oracle Compute Engine spoke

Integrate the ServiceNow instance and Oracle Compute Engine account by using the OCI SHA256WithRSA Signature credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate and set up the Oracle Cloud IAM Spoke.
- Activate and set up the Oracle Object Storage Management Spoke.
- Activate the Oracle Compute Engine spoke.
- Role required: admin.

Procedure

1. **Optional:** Create a JKS certificate.
   You can create a JKS certificate for the Oracle Compute Engine spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating the JKS Certificate, see Create a Java KeyStore (JKS) certificate.
2. **Optional:** Create X.509 certificate.
   You can create a X.509 certificate for the Oracle Compute Engine spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating a X.509 certificate, see Create X.509 certificate for the Oracle Cloud IAM spoke.
3. Create credential record for the Oracle Compute Engine spoke.

   a. Navigate to **Connections & Credentials** > **Credentials**.

   b. Click **New**.
   The system displays this message: `What type of Credentials would you like to create?`

   c. Select **OCI SHA256WithRSA Signature**.

   d. On the form, fill these values.

   Note: You can specify details of the certificates you created specifically for the Oracle Compute Engine spoke or specify details of the existing certificates you had created for the Oracle Cloud IAM spoke.

OCI SHA256WithRSA Signature Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle CE Cred`.

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Field	Description
Certificate Sys ID	Sys ID of the Signing Certificate.
Alias	Alias of the KeyStore.
Alias Password	Alias password of the KeyStore.
Key ID	Key ID helps identify which key is used when multiple keys are used to sign tokens. The Key ID must be slash (/) separated values of Tenancy OCID, User OCID, and Fingerprint in this format: `ocid1.tenancy.oc1..<unique_ID>/ocid1.user.oc1..<unique_ID>/<key_fingerprint>`.
Applies to	Option to specify if the credential applies to all MID Servers in the network.
Active	Option to actively use the credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select `OCI SHA256RSA Signing Algorithm`

e. Right-click the form header and click **Submit**.

4. Create connection record for the Oracle Compute Engine spoke.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the alias record of the Oracle Boot Volume spoke, for example, **Oracle_Compute_Engine**.

c. From the **Connections** tab, click **New**.

d. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle CE Conn`.
Credential	Credential record created for Oracle Boot Volume spoke. For example, `Oracle CE Cred`.
Connection alias	Alias record associated with this connection.
Connection URL	Base URL to connect to Oracle Compute Engine. For example, `https://iaas.ap-mumbai-1.oraclecloud.com`.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

e. Click **Submit**.

The ServiceNow instance and Oracle Compute Engine account are integrated. You can use the spoke actions to build flows and automate tasks as required.

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Oracle EBS Spoke

Manage sales orders, procurement, finance, customers, ledgers, and so on, in the Oracle EBS instance from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Note: The packages should be redeployed when you are upgrading to the Oracle EBS spoke v1.1 from Oracle EBS spoke v1. For more information, see Set up the Oracle EBS spoke.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle EBS spoke v1.15.0 is the latest version. For version history of the spoke, see Oracle EBS spoke release notes.

Supported versions

This spoke was built for these versions, but may be compatible with later versions.

- Operating system version: Red Hat Enterprise Linux release 8.9 (Ootpa)
- Oracle database version: 12.1.0.2.0
- Oracle E-Business Suite application tier version: 12.2.12
- Oracle WebLogic Server version: 10.3.6.0.171017 PSU
- Oracle WebTier version: 11.1.1.9
- Oracle Forms and Reports: 10.1.2.3

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke flows

The Oracle EBS spoke provides a sample flow, Look up Daily Rates to demonstrate automating tasks. The flow runs daily and retrieves the Daily Currency Exchange Rates from Oracle EBS for the current date and saves the details in your ServiceNow instance.

Spoke subflows

The Oracle EBS spoke provides sample subflows to demonstrate automating tasks. To customize a sample subflow, copy it to the required application scope. Available sample subflows include:

Subflow	Description
AP Invoices - Create Interface Entries	Creates interface entries of AP Invoices in Oracle EBS.
AP Invoices - Get Processing Details	Retrieves the concurrent program status and other details from Oracle EBS.
Fetch AP invoice details	Retrieves the AP invoice details from Oracle EBS.
Fixed Assets - Create Interface Entries	Creates interface entries of fixed assets in Oracle EBS.
Fixed Assets - Get Processing Details	Retrieves the concurrent program status and other details from Oracle EBS.
Get Journal Posted Status	Retrieves the current status of a GL journal header.
Goods Receipts - Create Interface Entries	Creates interface entries of Goods Receipts in Oracle EBS.
Goods Receipts - Get Processing Details	Retrieves the concurrent program status and other details from Oracle EBS.
Purchase Orders - Create Interface Entries	Creates interface entries of purchase orders in Oracle EBS.
Purchase Orders - Get Processing Details	Retrieves the concurrent program status and other details from Oracle EBS.

Spoke actions

The Oracle EBS spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Approval Management	Approve or Reject Approval Request	Approves or rejects the specified approval request in Oracle EBS.
	Cancel Approval	Cancels the specified approval request in Oracle EBS.
Finance	Create AP Invoice - Run Concurrent Program	Runs the concurrent program that imports invoice data from the interface table to the base table of Oracle EBS.
	Get AP Invoice	Retrieves details of the required AP invoice.

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Category	Action	Description
	Get Fixed Asset	Retrieves details of the required fixed asset.
	Get Vendor	Retrieves details of the required vendor.
	Get Vendor Site	Retrieves details of the required vendor site.
	Import Fixed Asset - Run Concurrent Program	Runs the concurrent program that imports the fixed asset data from the interface table to base table of Oracle EBS.
	Look up AR Invoices	Retrieves details of the AR invoices.
	Look up Daily Rate	Retrieves details of the specified daily rate based on the input criteria.
	Look up Legal Entity	Retrieves details of a the required legal entity.
	Look up Ship To Locations	Retrieves details of the required shipped locations based on the input criteria.
Inventory Management	Submit Inventory - Run Concurrent Program	Submits an inventory item CC program.
	Update Inventory Items	Updates details of the inventory items.
Purchase Requisition Management	Create Purchase Requisition	Creates purchase requisition in Oracle EBS.
	Submit Purchase Requisition - Run Concurrent Program	Retrieves the concurrent status of a purchase requisition.
	Look up Purchase Requisitions	Retrieves Purchase Requisition Details from Oracle EBS.
Invoice Management	Authorize Payment - Apply Hold	Applies hold on the specified authorized payment invoices in Oracle EBS.
	Authorize Payment - Release Hold	Releases hold on the specified authorized payment invoices in Oracle EBS.
	Cancel Invoice	Cancels an invoice in Oracle EBS.
	Create AP Invoice	Creates an Accounts Payable (AP) invoice in Oracle EBS. **Note:** The internal name of the latest version of the action is create_ap_invoice_v3. To use it, you must install the latest version of the spoke from the ServiceNow store.

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Category	Action	Description
	Look up AP Invoices	Retrieves an Accounts Payable (AP) invoice details from Oracle EBS.
	Look up Invoice Payment Status	Retrieves the invoice payment status from Oracle EBS.
	Submit Invoice - Run Concurrent Program	Submits an invoice - run concurrent program in Oracle EBS.
Journal Ledger	Create Journals	Creates a journal.
	Get GL Journal Batch	Retrieves details of the required GL journal batch.
	Get GL Journal Header	Retrieves details of the required GL journal header.
	Get GL Ledger	Retrieves details of the required GL ledger.
	Get GL Subledger Account	Retrieves details of the required GL subledger account.
	Import Journals - Run Concurrent Program	Runs the concurrent program that imports journals data from the interface table to the base table of Oracle EBS.
	Look up GL Balance	Retrieves details of the required GL balance based on the input criteria.
	Look up GL Balances	Retrieves details of the required GL balance based on the input query.
	Look up GL Code Combinations	Retrieves details of the required GL code combinations based on the input query.
	Look up GL Journals	Retrieves details of the required GL journals based on the input criteria.
	Look up GL Ledgers	Retrieves details of the required GL ledgers based on the input criteria.
	Look up GL Subledger Accounts	Retrieves details of the required GL subledger accounts based on the input criteria.
	Post Journals - Run Concurrent Program	Runs the concurrent program that posts the unposted journals.
	Reverse Journals - Run Concurrent Program	Runs the concurrent program that reverses the posted journals.
Master	Create Item	Creates an item.
	Look up Cost Center	Retrieves details about the required cost center.
	Look up Item	Retrieves details about the required item.

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Category	Action	Description
	Look up Item Category	Retrieves details about the required item category.
Utility Actions	Generate Input Payload With Crossreference	Generates array type input payload for Create Actions from subflow input payload while assigning configured cross-reference field with the ServiceNow ID(s).
	Get Additional EBS Fields	Retrieves list of fields which can be further used as a dynamic template or dynamic object, based on an input string, Action Internal Name.
	Get Records	Retrieves data from any Oracle EBS module using an SQL query.
	Look up Common Object Details	Retrieves the common details of the object specified.
	Look up Concurrent Program Status	Retrieves the status of a concurrent request.
	Parse OEBS Record Details	Converts the JSON output of 'Get Records' Action into structured Object format.
	Wait for Request Completion	Waits until the status of the request completes.
Transfer Order Management	Create Transfer Order	Creates a transfer order with the specified details.
	Look up Transfer Orders	Retrieves details of the required transfer orders.
Procurement	Create Goods Receipts	Creates a goods receipt.
	Get Advance Shipment Notice	Retrieves details of the required advance shipment notice.
	Look up Advance Shipment Notices	Retrieves details of multiple advance shipment notices based on the input query.
Asset Management	Create Asset	Creates an asset with the specified details.
	Look up Asset Categories Stream	Retrieves the details of the look up asset categories.
	Submit Asset - Run Concurrent Program	Returns the concurrent status of the specified asset in Oracle EBS.
Bills and Payments	Look up Bill Details	Retrieves details of the required bills.
	Look up Outstanding Balances	Retrieves details of the required outstanding balances.

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Category	Action	Description
	Look up Payment Details	Retrieves details of the required payments.
	Look up Payment Status	Retrieves status of the required payments.
Customer	Create Customer Account	Creates a customer account.
	Create Customer Account Role	Creates a customer account role.
	Create Customer Contact	Creates a customer account contact.
	Create Customer Relation	Creates a customer relation record.
	Create Person	Creates a person record.
	Look up Customer Accounts	Retrieves details of the required customer accounts.
	Look up Customer Contacts	Retrieves the required customer contacts.
	Update Customer Account	Updates details of the required customer account.
	Update Customer Contact	Updates details of the required customer contact.
Sales Order	Look up Sales Order Status Stream	Retrieves status details of the required sales orders.
	Look up Sales Order Stream	Retrieves details of the required sales orders.
Contract Management	Create Contract	Creates a contract in Oracle EBS.
	Create Contract - Run Concurrent Program	Retrieves the concurrent status of contract in Oracle EBS.
Purchase Order Management	Cancel Purchase Order	Cancels the purchase order.
	Create Blanket Release	Creates blanket release in Oracle EBS.

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Category	Action	Description
		Note: The internal name of the latest version of the action is create_blanket_release_v2. To use it, you must install the latest version of the spoke from the ServiceNow store.
	Create Blanket Release - Run Concurrent Program	Retrieves the concurrent status of blanket release in Oracle EBS.
	Create Blanket Purchase Agreement	Creates a blanket purchase agreement. **Note:** The internal name of the latest version of the action is create_blanket_purchase_agreement_v2. To use it, you must install the latest version of the spoke from the ServiceNow store.
	Create Purchase Order	Creates purchase orders in Oracle EBS. **Note:** The internal name of the latest version of the action is create_purchase_order_v3. To use it, you must install the latest version of the spoke from the ServiceNow store.
	Create Purchase Order - Run Concurrent Program	Runs the concurrent program that imports the purchase order data from the interface table to the base table of Oracle EBS.
	Update Blanket Purchase Agreement	Updates the details of the specified blanket purchase agreement. **Note:** The internal name of the latest version of the action is update_blanket_purchase_agreement_v2. To use it, you must install the latest version of the spoke from the ServiceNow store.
	Update Purchase Order	Updates the purchase order in Oracle EBS. **Note:** The internal name of the latest version of the action is update_purchase_order_v3. To use it, you must install the latest version of the spoke from the ServiceNow store.
Receipt Management	Cancel PO Goods Receipt	Cancels the purchase order (PO) goods receipt. **Note:** The internal name of the latest version of the action is create_po_goods_receipt_v2. To use it, you must install the latest version of the spoke from the ServiceNow store.
	Create Goods Receipt - Run	Creates a good receipt in concurrent program mode.

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Category	Action	Description
	Concurrent Program	
	Create PO Goods Receipt	Creates a Purchase Order (PO) goods receipt in Oracle EBS.
	Look up PO Receipts	Retrieves purchase order (PO) receipts from Oracle EBS.
	Update PO Goods Receipt	Updates a Purchase Order (PO) goods receipt in Oracle EBS.
Supplier Management	Create Bank Account	Creates a bank account.
	Create Supplier	Creates a supplier in Oracle EBS.
	Create Supplier Site	Creates a supplier site in Oracle EBS.
	Deactivate Supplier	Deactivates the specified supplier in Oracle EBS.
	Deactivate Supplier Site	Deactivates the specified supplier site in Oracle EBS.
	Look up Bank Accounts Stream	Retrieves the supplier bank account details.
	Look up Supplier Sites Stream	Retrieves the supplier site details from Oracle EBS.
	Look up Suppliers Stream	Retrieves the supplier details from Oracle EBS.
	Update Bank Account	Updates the specified bank account in Oracle EBS.
	Update Supplier	Updates the specified supplier details in Oracle EBS.
	Update Supplier Site	Updates the specified supplier site details in Oracle EBS.
	Void Supplier Bank Account	Makes the supplier bank account as void.
Primary Data Management	Look up Attachments	Retrieves the file attachments related to purchase order, supplier, and other specified details from Oracle EBS.
	Look up Currencies	Retrieves currency details from Oracle EBS.
	Look up GL Accounts Stream	Retrieves GL account details from Oracle EBS.
	Look up GL Cost Centers Stream	Retrieves the cost center details from Oracle EBS.
	Look up GL Daily Rates	Retrieves GL Daily Rate details from Oracle EBS.

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Category	Action	Description
	Look up GL Ledgers	Retrieves Ledger details from Oracle EBS.
	Look up GL Legal Entities	Retrieves GL Legal Entity details from Oracle EBS.
	Look up HR Locations Stream	Retrieves the details of HR locations from Oracle EBS.
	Look up Inventory Items Stream	Retrieves the inventory item details from Oracle EBS.
	Look up Item Categories Stream	Retrieves the item category details from Oracle EBS.
	Look up Operating Units	Retrieves Operating Unit details from Oracle EBS.
	Look up Payment Terms	Retrieves payment term details.
	Look up Purchase Groups	Retrieves Purchasing Group details from Oracle EBS.
	Look up Purchasing Organizations	Retrieves Purchasing Organization details from Oracle EBS.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Oracle EBS spoke.

MID Server requirements

These actions use REST calls, which can run on an instance or MID Server. Use the connection record associated with the Oracle EBS alias to configure where actions run as well as set MID Server selection attributes. For more information about running actions on the MID Server, see Integration steps.

Note: If your Oracle EBS instance is only accessible on a private network, you must use MID Server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Oracle EBS spoke

Integrate the ServiceNow instance and your Oracle EBS instance using a basic authentication to authenticate the ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Oracle EBS spoke.
- Admin access to the Oracle EBS account.
- Role required: admin.

Set up for Oracle Database 12C and later versions

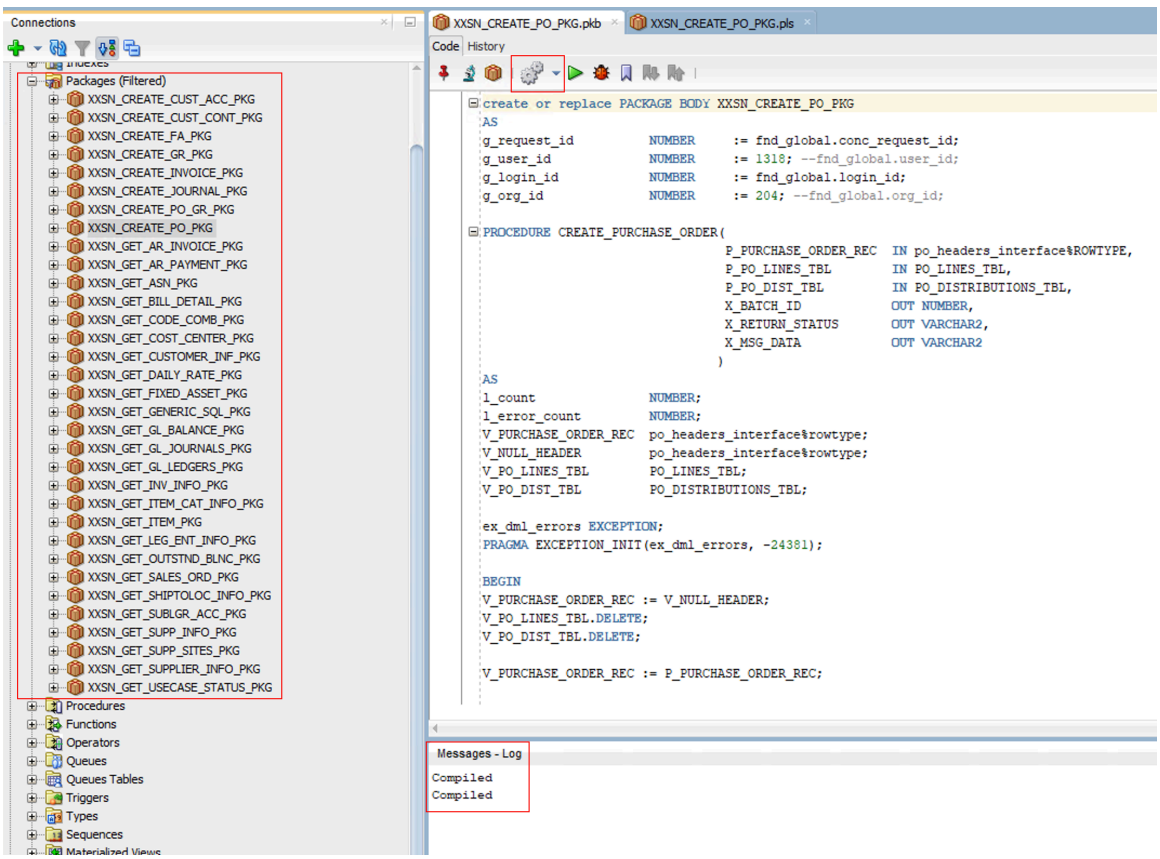
Configure Oracle Database 12C and later versions to work with the Oracle E-Business Suite spoke by deploying REST APIs and setting up ServiceNow connections.

Before you begin

Role required: admin

Procedure

1. From the ServiceNow® Store Oracle E-Business Suite Spoke Dependencies for Oracle Database 12c and 18c download the project file, Oracle_e-business_suite spoke_dependencies.zip and save it in the required local folder.
2. Unzip the contents of the Oracle_e-business_suite spoke_dependencies.zip file.
3. In SQL Developer or an SQL client, compile all the PKB and PLS files in the APPS schema.



4. In Oracle EBS server, deploy the Oracle EBS REST API.

   For the steps to enable the REST API per extension, see Deploying REST Web Services.

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You must perform these steps for every PLS file. While deploying each PLS file, you must provide the relevant values. Here, the procedure is outlined using *XXSN_CREATE_PO_PKG.pls* as an example.

a. Copy and upload the compiled package .pls files to these respective directories:

- `$PO_TOP/patch/115/sql/tmp/`
- `$PO_TOP/patch/115/sql/`

Note: Ensure that you replace the $PO_TOP with the module the package belongs to such as, $AP_TOP, $PO_TOP, and so on.

b. Log in to PuTTY of your Oracle EBS server and execute the Integration Repository Parser.

i. To generate an iLDT (*.ildt) file, execute the Integration Repository Parser using this syntax:

```
$IAS_ORACLE_HOME/perl/bin/perl $FND_TOP/bin/irep_parser.pl
 -g -v -username=sysadmin
 po:patch/115/sql:XXSN_CREATE_PO_PKG.pls:12.0=$PO_TOP/patch/
115/sql/tmp/XXSN_CREATE_PO_PKG.pls
```

ii. If you aren't generating .ildt file for the XXSN_CREATE_PO_PKG.pls file, replace `po` and `$PO_TOP` with required `Top`.

iii. If you aren't generating .ildt file for the XXSN_CREATE_PO_PKG.pls file, replace `XXSN_CREATE_PO_PKG.pls` with the required package name.

```
# Interface Repository Annotation Processor, 12.0.0

#
# Generating annotation output.
# Processing file 'XXSN_CREATE_PO_PKG.pls'.
# Using YAPP-based parser.
#  Found a package-level annotation for 'XXSN_CREATE_PO_PKG'.
#  Found a detail-level annotation...
# Found a procedure named 'CREATE_PURCHASE_ORDER'.
#  Found a detail-level annotation...
# Found a procedure named 'SUBMIT_PURCHASE_ORDER_CC'.
#  Found a detail-level annotation...
# Found a procedure named 'CANCEL_PO'.
# Done all files.
```

c. Upload the generated iLDT file to Integration repository by executing this command:

```
$FND_TOP/bin/FNDLOAD apps/apps 0 Y UPLOAD
 $FND_TOP/patch/115/import/wfirep.lct
 XXSN_CREATE_PO_PKG_pls.ildt
```

Note: Replace `XXSN_CREATE_PO_PKG_` with the required package name.

```
bash-4.2$ $FND_TOP/bin/FNDLOAD apps/apps 0 Y UPLOAD $FND_TOP/patch/115/import/wfirep.lct XXSN_CREATE_PO_PKG_pls.ildt
Log filename : L7734829.log


Report filename : O7734829.out
```

d. Log in to your Oracle E-Business Suite instance as system administrator.

e. Switch to the **Integrated SOA Gateway** responsibility and select **Integration Repository**.

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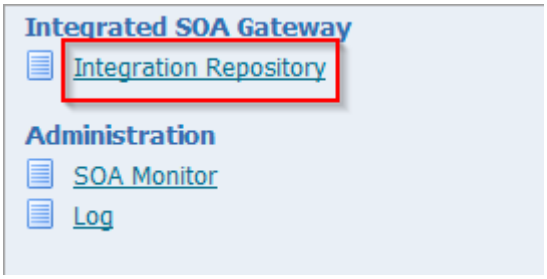
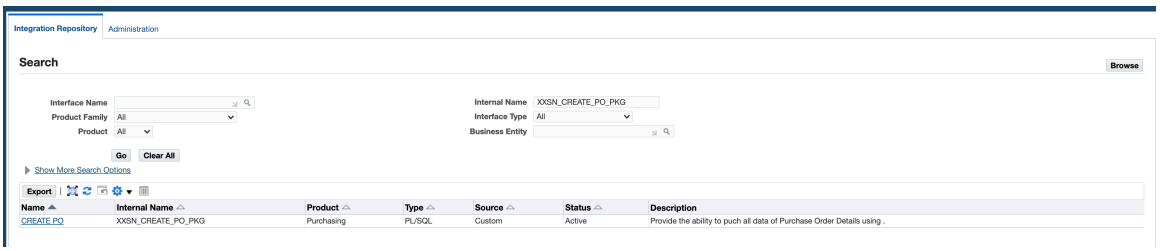
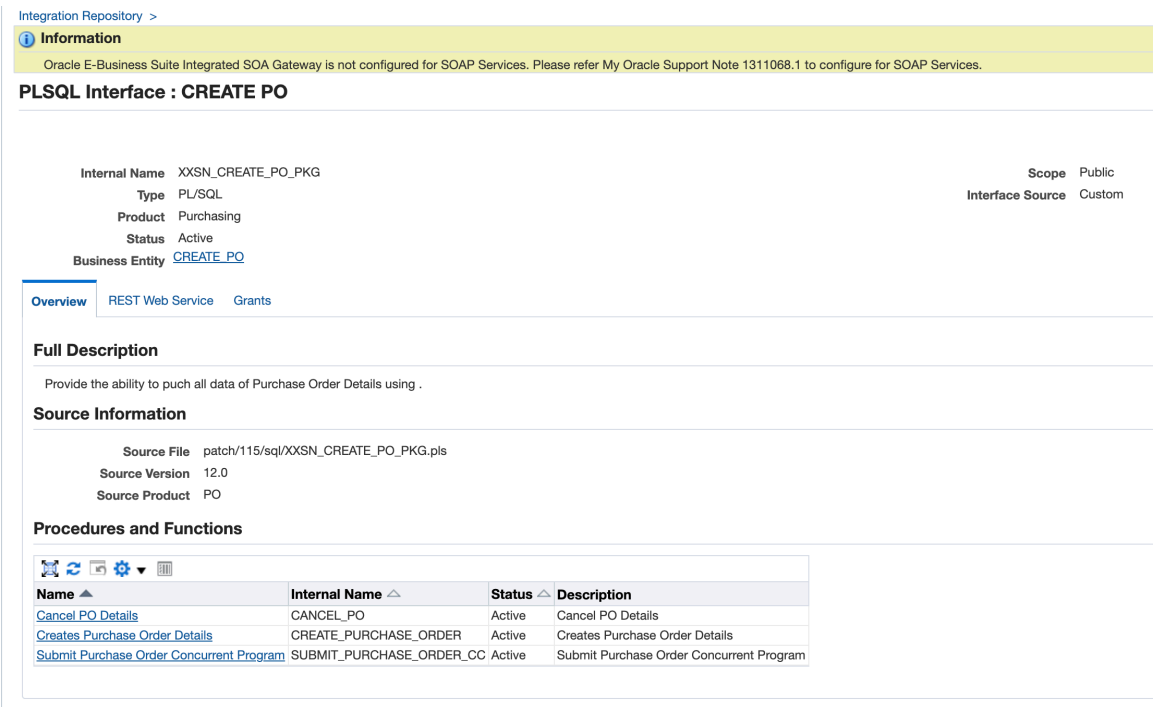


f. Search for the web service with the internal name, `XXSN_CREATE_PO_PKG`.



g. Click the link in the search result to access the list of available metods in the interface package.



Note: In the PL/SQL interface type, both SOAP and REST web services are available. However, this procedure focuses on the REST web service.

h. Click the **REST Web Service** tab.

i. Set an alias for this service. For exmaple, `hr`.

ii. Click **Deploy**.

i. View the Create PO method by clicking the **REST Web Service** tab.

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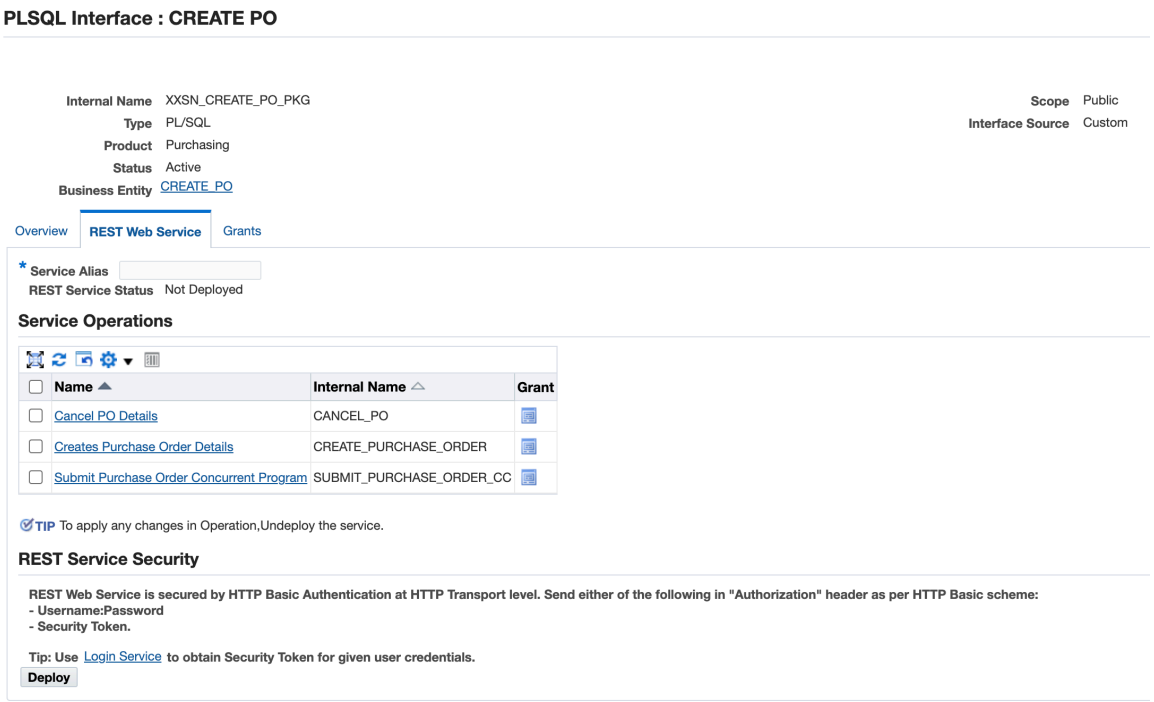

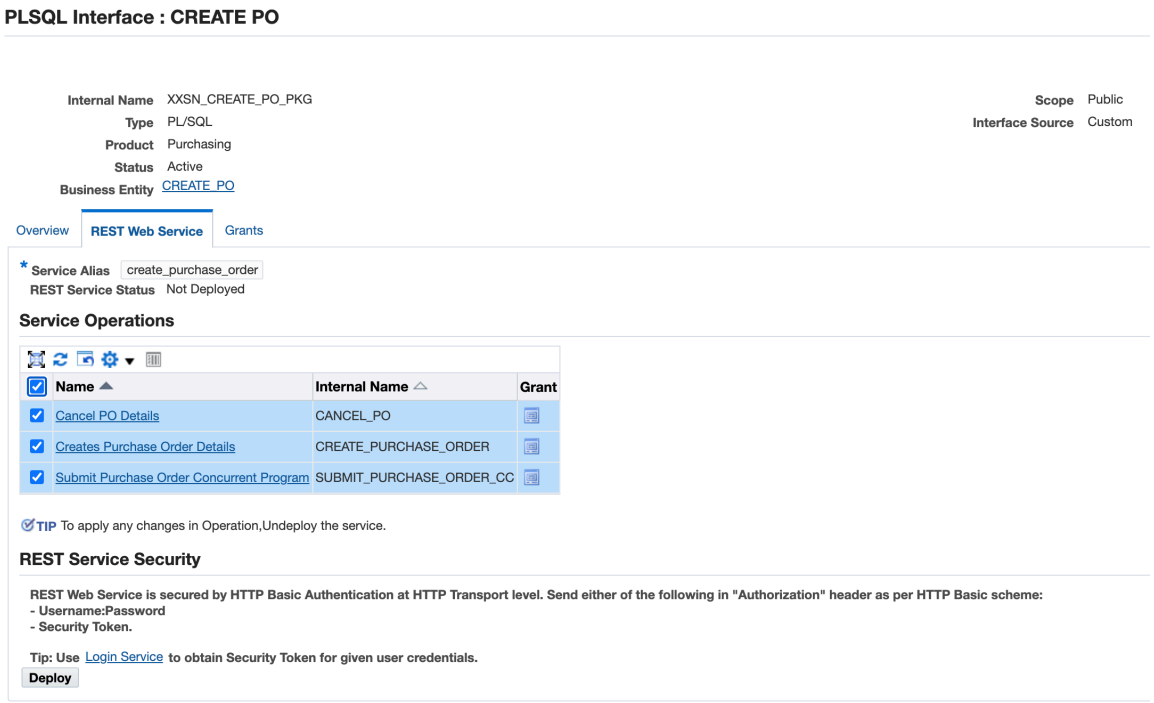

j. Enter the unique service alias name, select the **Create PO** method, and click **Deploy**.

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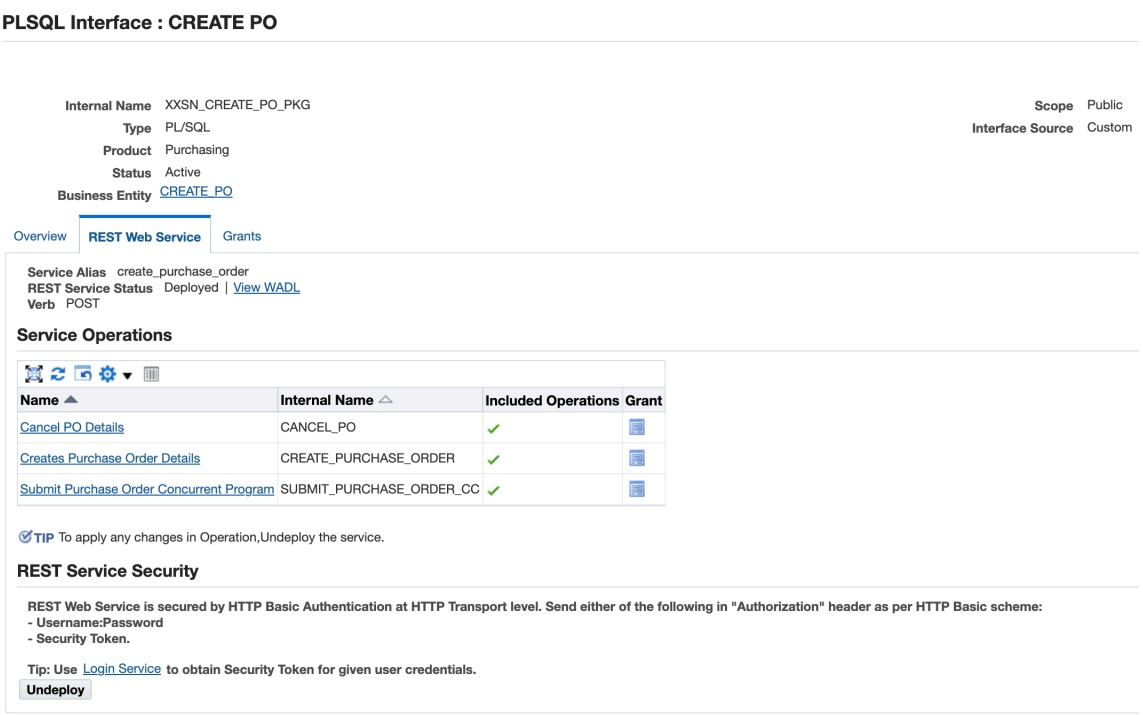
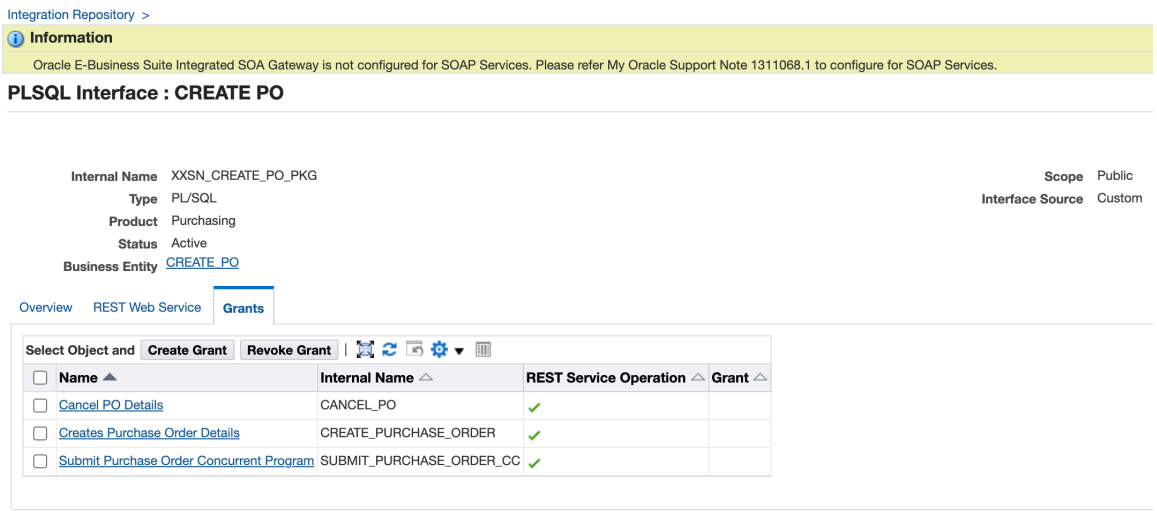


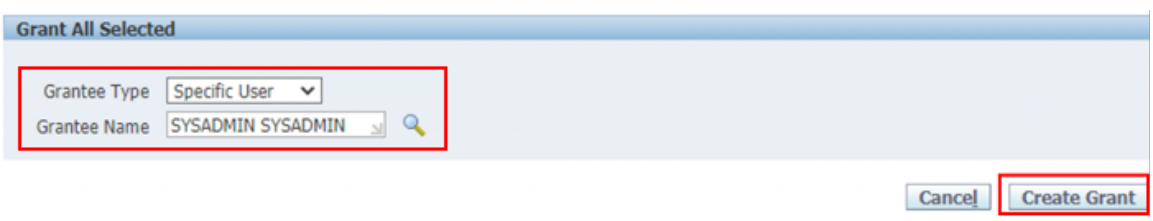
A confirmation message is displayed that the service is successfully deployed.

k. Click **View WADL** to access the physical location of the service endpoint where the service is hosted.

l. Open the **Grants** tab, select **Create PO**, and click **Create Grant**.



m. Select a grantee type, enter the user name to whom you want to give the grant access to use the web service, and click **Create Grant**.



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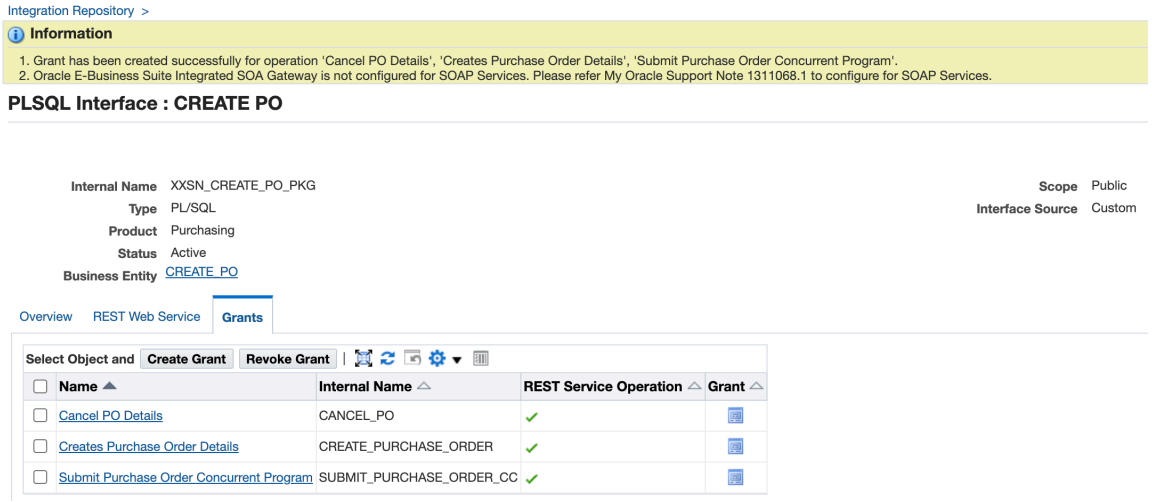
A confirmation message is displayed mentioning that the grant has been successfully created.



Note: To revoke grant, click **Revoke Grants** in the **Grants** tab and select the required users.

n. Perform the above steps for all the required actions and ensure that you use the same names (associated with the respective action) as mentioned in the Resource Path column of the following table:

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Action Name	Category	Resource Path
Cancel Purchase Order	Procurement	webservices/rest/create_purchase_order/cancel_po/
Create AP Invoice	Finance	webservices/rest/create_ap_invoice/create_ap_invoice/
Create AP Invoice - Run Concurrent Program	Finance	webservices/rest/create_ap_invoice/submit_ap_invoice_cc/
Create Customer Account	Customer	webservices/rest/create_customer_acc/create_cust_accounts/
Create Customer Account Role	Customer	webservices/rest/create_customer_contact/create_cust_acct_role/
Create Customer Contact	Customer	webservices/rest/create_customer_contact/create_contact_points/
Create Customer Relation	Customer	webservices/rest/create_customer_contact/create_cust_relation/
Create Fixed Assets	Finance	webservices/rest/create_fa_mass/create_fa_entries/
Create Goods Receipt- Run Concurrent Program	Procurement	webservices/rest/create_po_gr/submit_rcv_trans_cc/
Create Goods Receipts	Procurement	webservices/rest/create_gr/create_goods_rec/
Create Item	Master	webservices/rest/item/process_item/
Create Journals	Journal Ledger	webservices/rest/create_gl_journal/create_journal_entries/
Create Person	Customer	webservices/rest/create_customer_contact/create_person/
Create Purchase Order	Procurement	webservices/rest/create_purchase_order/create_purchase_order/
Create Purchase Order - Run Concurrent Program	Procurement	webservices/rest/create_purchase_order/submit_purchase_order_cc/
Create Vendor	Finance	webservices/rest/supplier/create_vendor/
Create Vendor Site	Finance	webservices/rest/supplier/create_vendor_site/
Generate Input Payload With Crossreference	Utility Actions	N/A
Get Additional EBS Fields	Utility Actions	N/A
Get Advance Shipment Notice	Procurement	webservices/rest/get_adv_ship_notice_info/get_asn_info/
Get AP Invoice	Finance	webservices/rest/get_ap_inv_info/get_inv_info/
Get Fixed Asset	Finance	webservices/rest/get_fa_inf/get_fixed_asset_info/
Get GL Journal Batch	Journal Ledger	webservices/rest/get_je_journals/get_gl_journals_info/
Get GL Journal Header	Journal Ledger	webservices/rest/get_je_journals/get_gl_je_info/
Get GL Ledger	Journal Ledger	webservices/rest/get_gl_ldgr/get_gl_ledgers_info/
Get GL Subledger Account	Journal Ledger	webservices/rest/get_gl_sub_ledger_acc/get_gl_subldgr_acc_info/
Get OEBS Processed Records	Utility Actions	webservices/rest/get_usecase_status/get_usecase_sql_proc/
Get Records	Utility Actions	webservices/rest/get_generic_sql/get_generic_sql_proc/
Get Ship To Location	Finance	webservices/rest/get_shipto_loc_info/get_shipto_loc_info/
Get Vendor	Finance	webservices/rest/get_ap_supplier_info/get_ap_supp_info/
Get Vendor Site	Finance	webservices/rest/get_supp_sites/get_supp_sites_info/
Import Fixed Asset - Run Concurrent Program	Finance	webservices/rest/create_fixed_asset/post_mass_additions_cc/
Import Journals - Run Concurrent Program	Journal Ledger	webservices/rest/create_gl_journal/submit_journal_import_cc/
Look up Advance Shipment Notices	Procurement	webservices/rest/get_adv_ship_notice_info/get_asn_info/
Look up AP Invoices	Finance	webservices/rest/get_ap_inv_info/get_invoice_tree_info/
Look up AR Invoices	Finance	webservices/rest/get_ar_invs_info/get_ar_invoice/
Look up Bill Details	Bills and Payment	webservices/rest/get_bill_detail_info/get_bill_detail_info/
Look up Cost Center	Master	webservices/rest/get_cost_center_info/get_cc_info/
Look up Cost Centers	Master	webservices/rest/get_cost_center_info/get_cc_info/
Look up Customer Accounts	Customer	webservices/rest/get_cust_inf/get_customer_acc/
Look up Customer Contacts	Customer	webservices/rest/get_cust_inf/get_customer_contact/
Look up Daily Rate	Finance	webservices/rest/get_daily_rate/get_gl_daily_rates_info/
Look up Daily Rates	Finance	webservices/rest/get_daily_rate/get_gl_daily_rates_info/
Look up Fixed Assets	Finance	webservices/rest/get_fa_inf/get_fixed_asset_info/
Look up GL Balance	Journal Ledger	webservices/rest/get_gl_balances/get_gl_balances_info/
Look up GL Balances	Journal Ledger	webservices/rest/get_gl_balances/get_gl_balances_info/
Look up GL Code Combinations	Journal Ledger	webservices/rest/get_code_combination/get_code_comb_info/
Look up GL Journals	Journal Ledger	webservices/rest/get_je_journals/get_gl_je_tree_info/
Look up GL Ledgers	Journal Ledger	webservices/rest/get_gl_ldgr/get_gl_ledgers_info/
Look up GL Subledger Accounts	Journal Ledger	webservices/rest/get_gl_sub_ledger_acc/get_gl_subldgr_acc_info/
Look up Item	Master	webservices/rest/get_items_info/get_item_master/
Look up Item Categories	Master	webservices/rest/get_item_categories/get_item_category/
Look up Item Category	Master	webservices/rest/get_item_categories/get_item_category/
Look up Items	Master	webservices/rest/get_items_info/get_item_master/
Look up Legal Entities	Finance	webservices/rest/get_legal_entity_info/get_le_info/
Look up Legal Entity	Finance	webservices/rest/get_legal_entity_info/get_le_info/
Look up Outstanding Balances	Bills and Payment	webservices/rest/get_outstnd_blnc_info/get_ar_outstnd_blnc_info/
Look up Payment Details	Bills and Payment	webservices/rest/get_ar_payment_info/get_ar_payment_details_info/
Look up Payment Status	Bills and Payment	webservices/rest/get_ar_payment_info/get_ar_payment_status_info/
Look up Sales Order Status	Sales Order	webservices/rest/get_sales_ords_info/get_order_status_info/
Look up Sales Orders	Sales Order	webservices/rest/get_sales_ords_info/get_so_info/
Look up Ship To Locations	Finance	webservices/rest/get_shipto_loc_info/get_shipto_loc_info/
Look up Vendor Sites	Finance	webservices/rest/get_supp_sites/get_supp_sites_info/
Look up Vendors	Finance	webservices/rest/get_ap_supplier_info/get_ap_supp_info/
Parse OEBS Record Details	Utility Actions	N/A
Post Journals - Run Concurrent Program	Journal Ledger	webservices/rest/create_gl_journal/post_journal_batches_cc/
Reverse Journals - Run Concurrent Program	Journal Ledger	webservices/rest/create_gl_journal/reverse_journal_batches_cc/
Update Customer Account	Customer	webservices/rest/create_customer_acc/update_cust_accounts/
Update Customer Contact	Customer	webservices/rest/create_customer_contact/update_contact_points/
Update Purchase Order	Procurement	webservices/rest/update_purchase_order/update_po/

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o. Restart the server and using PuTTY, perform these steps up on logging in to the Oracle EBS server.

i. Execute the commands: *cd $ADMIN_SCRIPTS_HOME* and *./adadminsrvctl.sh stop*.

ii. Enter the WebLogic password and EBS password.

iii. Execute the command, *./adadminsrvctl.sh start*.

iv. Enter the WebLogic password and EBS password.

v. To check the status, execute the command, *./adadminsrvctl.sh status*.

5. Create a credential record for the Oracle EBS spoke.

a. Navigate to **Connections & Credentials** > **Credentials**.

b. Click **New**.
The system displays the message `What type of Credentials would you like to create?`.

c. Select **Basic Auth Credentials**.

d. On the form, fill these values.

Field	Description
Name	Name to uniquely identify the credential record. For example, `OEBS Cred`.
User name	User name to log in to the Oracle EBS instance.
Password	Password to log in to the Oracle EBS instance.
Active	Option to actively use the credential record.

e. Click **Submit**.

6. Create a connection record for the Oracle EBS spoke.

a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

b. Open the record for the Oracle EBS spoke.

c. From the **Connections** tab, click **New**.

d. On the form, fill these values.

Field	Description
Name	Name to uniquely identify the connection record. For example, `OEBS Conn`.

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Field	Description
Credential	Credential record you created for the Oracle EBS spoke.
Connection URL	Connection URL to connect to your Oracle EBS instance.

e. Click **Submit**.

Set up for Oracle Database 19C and later versions

Configure Oracle Database 19C and later versions to work with the Oracle E-Business Suite spoke by deploying REST APIs and setting up ServiceNow connections.

Before you begin

Role required: admin

Procedure

1. From the ServiceNow® Store Oracle EBS Spoke Dependencies for Oracle Database 19c or later download the project file, Oracle_e-business_suite spoke_dependencies.zip and save it in the required local folder.
2. Unzip the contents of the Oracle_e-business_suite spoke_dependencies.zip file.
3. In SQL Developer or an SQL client, compile all the PKB and PLS files in the APPS schema.
4. Review the module package reference to identify the correct values for your deployment.

   The following table lists the .pls filename, $TOP variable, product short-code, and service alias required for each Oracle EBS module. Use the values in this table wherever the steps below reference a module-specific path, product code, or alias.

Module	Package (.pls filename)	$TOP variable	Product code	Service alias
General Ledger	xxsn_gl_integration_pkg.pls	$GL_TOP	gl	xxsn_gl_integration_pkg
AP — Supplier	xxsn_supplier_integration_pkg.pls	$AP_TOP	ap	xxsn_supplier_integration_pk
Purchasing	xxsn_po_integration_pkg.pls	$PO_TOP	po	xxsn_po_integration_pkg
Accounts Payable	xxsn_ap_integration_pkg.pls	$AP_TOP	ap	xxsn_ap_integration_pkg
Fixed Assets	xxsn_fa_integration_pkg.pls	$FA_TOP	fa	xxsn_fa_integration_pkg
Sourcing	xxsn_pon_integration_pkg.pls	$PON_TOP	pon	xxsn_pon_integration_pkg
Inventory	xxsn_inv_integration_pkg.pls	$INV_TOP	inv	xxsn_inv_integration_pkg
Common	xxsn_common_integration_pkg	$FND_TOP	fnds	xxsn_common_integration_pkg
Receivables	xxsn_ar_integration_pkg.pls	$AR_TOP	ap	xxsn_ar_integrations_pkg
Order Management	xxsn_om_integration_pkg.pls	$ONT_TOP	ont	xxsn_om_integration_pkg

5. In Oracle EBS server, deploy the Oracle EBS REST API.

   For the steps to enable the REST API per extension, see Deploying REST Web Services.

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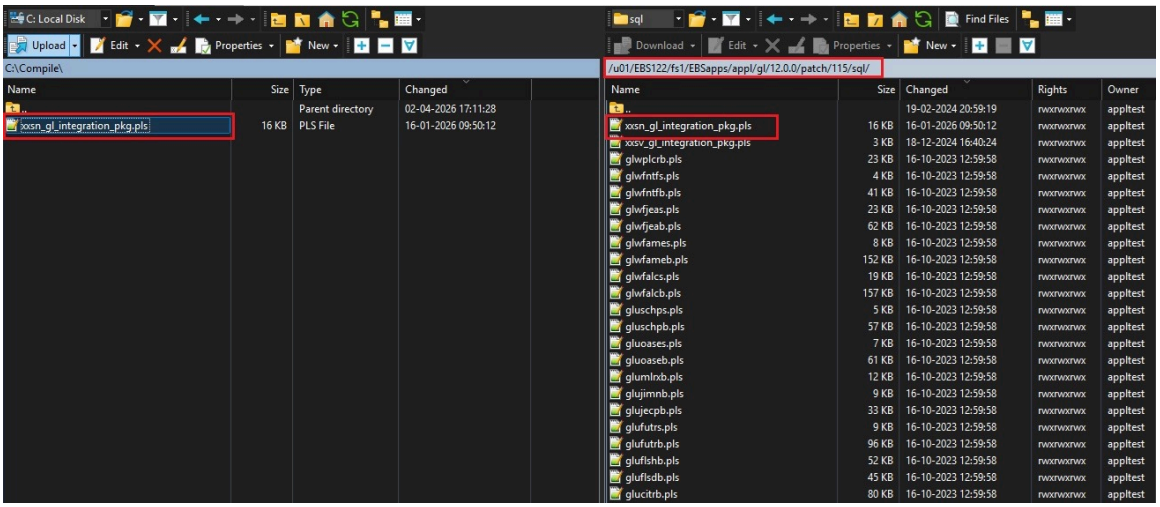
You must perform these steps for every PLS file. While deploying each PLS file, you must provide the relevant values. Here, the procedure is outlined using *`xxsn_gl_integration_pkg.pls`* as an example.

a. Copy and upload the compiled package .pls files to these respective directories:

- `$GL_TOP/patch/115/sql/tmp/`
- `$GL_TOP/patch/115/sql/`

> **Note:** Ensure that you replace the $GL_TOP with the $TOP variable for the module the package belongs to. For the correct $TOP variable per module, see the module package reference table in the previous step.



b. Grant `777` permissions to the uploaded `.pls` file.

In your SFTP client, right-click the `.pls` file, click **Properties**, and set the **Octal** permission value to `0777`.

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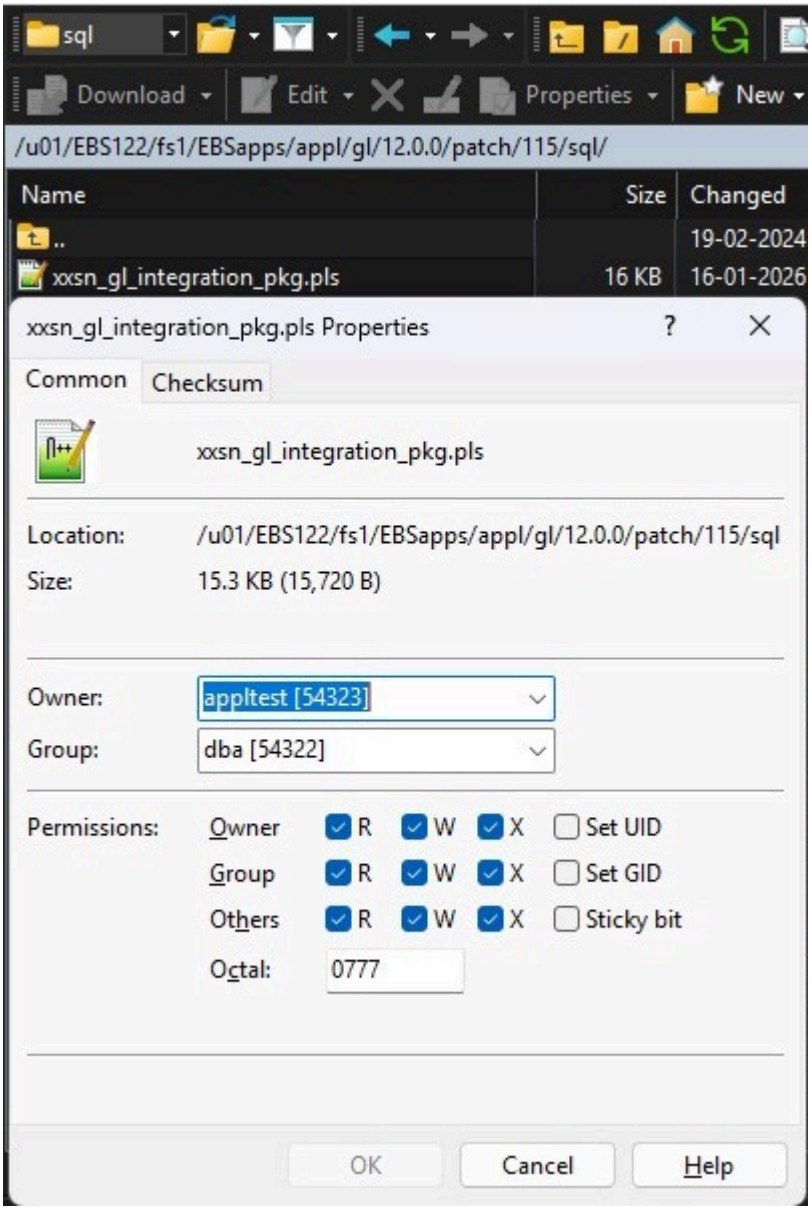

Note: 777 permissions are required for the Integration Repository parser to process the file. Without this step, the command in the next substep fails.

c. Log in to PuTTY of your Oracle EBS server and execute the Integration Repository Parser.

i. To generate an iLDT (*.ildt) file, execute the Integration Repository Parser using this syntax:

```
$IAS_ORACLE_HOME/perl/bin/perl $FND_TOP/bin/irep_parser.pl
 -g -v -username=sysadmin
 gl:patch/115/sql:xxsn_gl_integration_pkg.pls:12.0=$GL_TOP/p
atch/115/sql/xxsn_gl_integration_pkg.pls
```

ii. If you aren't generating the .ildt file for the `xxsn_gl_integration_pkg.pls` file, replace `gl` and `$GL_TOP` with the product code and `$TOP` variable for the required module. For the correct values per module, see the module package reference table in the previous step.

iii. If you aren't generating the .ildt file for the `xxsn_gl_integration_pkg.pls` file, replace `xxsn_gl_integration_pkg.pls` with the required package name.

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```
[appltest@tdcvm27s28 ~]$ $IAS_ORACLE_HOME/perl/bin/perl $FND_TOP/bin/irep_parser.pl -g -v -username=sysadmin ap:patch/115/sql:xxsn_gl_integration_pkg.pls:12.0=$GL_TOP/p
atch/115/sql/xxsn_gl_integration_pkg.pls
# Interface Repository Annotation Processor, 12.0.0

#
# Generating annotation output.
# Processing file '/u01/EBS122/fs2/EBSapps/appl/gl/12.0.0/patch/115/sql/xxsn_gl_integration_pkg.pls'.
# Using YAPP-based parser.
#  Found a package-level annotation for 'XXSN_GL_INTEGRATION_PKG'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_LEGAL_ENTITY_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_LEDGER_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_OPERATING_UNIT_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_GL_DAILY_RATES_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_GL_ACCOUNT_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_GL_COST_CENTER_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_GL_JOURNAL_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'CREATE_JOURNAL_ENTRIES'.
#  Found a detail-level annotation...
# Found a procedure named 'SUBMIT_JOURNAL_IMPORT_CC'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_CURRENCY_DETAILS'.
# Done all files.
```

d. Upload the generated iLDT file to Integration repository by executing this command:

```
$FND_TOP/bin/FNDLOAD apps/apps 0 Y UPLOAD
 $FND_TOP/patch/115/import/wfirep.lct
 xxsn_gl_integration_pkg_pls.ildt
```

Note: Replace `xxsn_gl_integration_pkg_` with the required package name.

```
[appltest@tdcvm27s28 ~]$ $IAS_ORACLE_HOME/perl/bin/perl $FND_TOP/bin/irep_parser.pl -g -v -username=sysadmin ap:patch/115/sql:xxsn_gl_integration_pkg.pls:12.0=$GL_TOP/p
atch/115/sql/xxsn_gl_integration_pkg.pls
# Interface Repository Annotation Processor, 12.0.0

#
# Generating annotation output.
# Processing file '/u01/EBS122/fs2/EBSapps/appl/gl/12.0.0/patch/115/sql/xxsn_gl_integration_pkg.pls'.
# Using YAPP-based parser.
#  Found a package-level annotation for 'XXSN_GL_INTEGRATION_PKG'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_LEGAL_ENTITY_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_LEDGER_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_OPERATING_UNIT_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_GL_DAILY_RATES_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_GL_ACCOUNT_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_GL_COST_CENTER_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_GL_JOURNAL_DETAILS'.
#  Found a detail-level annotation...
# Found a procedure named 'CREATE_JOURNAL_ENTRIES'.
#  Found a detail-level annotation...
# Found a procedure named 'SUBMIT_JOURNAL_IMPORT_CC'.
#  Found a detail-level annotation...
# Found a procedure named 'GET_CURRENCY_DETAILS'.
# Done all files.
[appltest@tdcvm27s28 ~]$ $FND_TOP/bin/FNDLOAD apps/apps 0 Y UPLOAD $FND_TOP/patch/115/import/wfirep.lct xxsn_gl_integration_pkg_pls.ildt
Log filename : L744422.log

Report filename : O744422.out
```

e. Log in to your Oracle E-Business Suite instance as system administrator.

f. Switch to the **Integrated SOA Gateway** responsibility and select **Integration Repository**.



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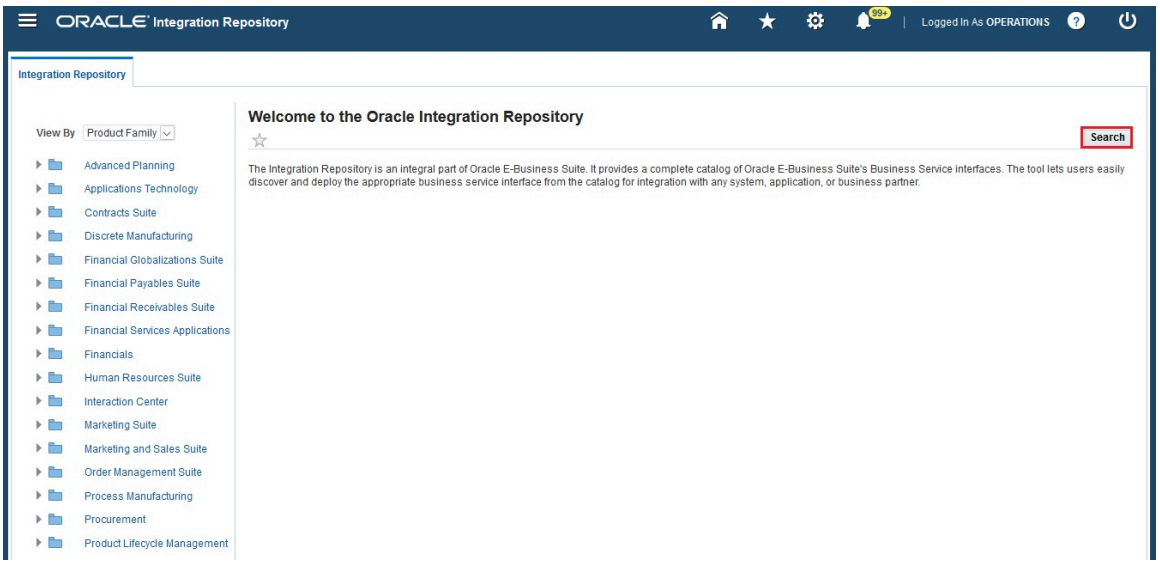
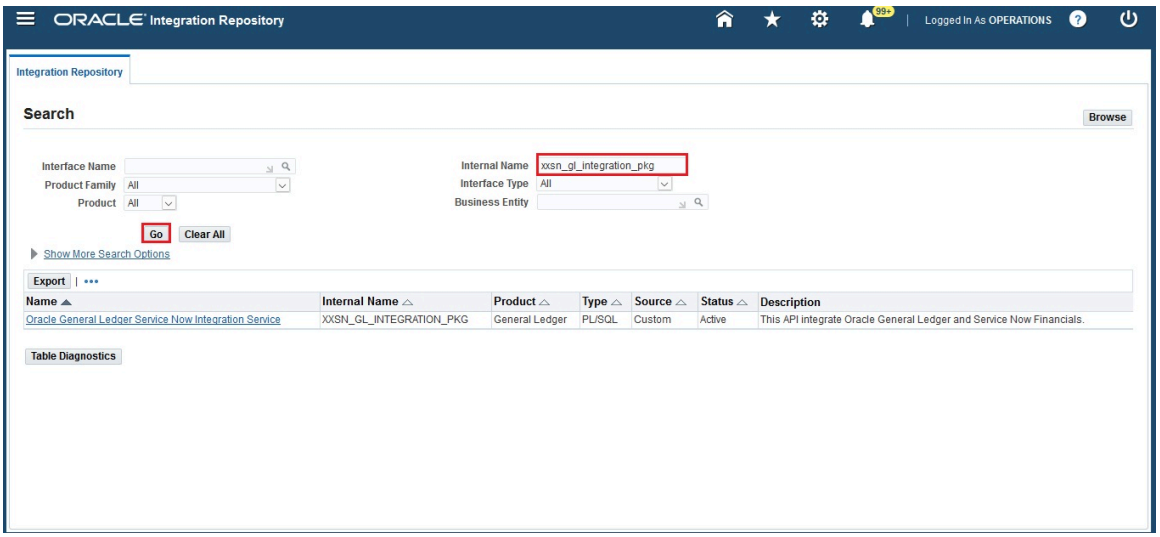
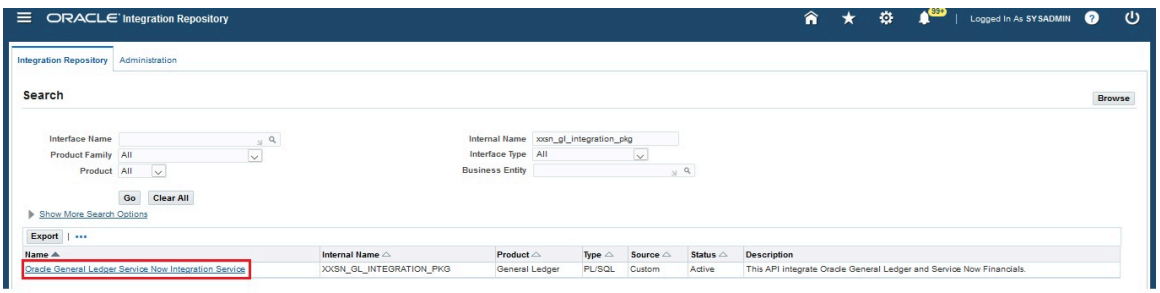


g. Search for the web service with the internal name, `xxsn_gl_integration_pkg`.





h. Click the link in the search result to access the list of available methods in the interface package.

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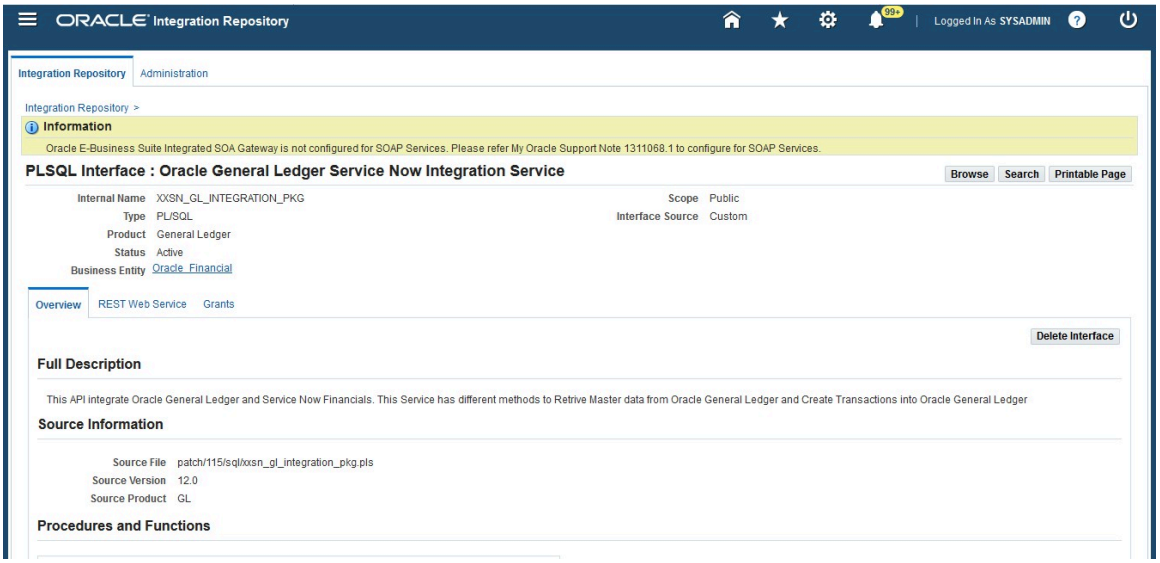


Note: In the PL/SQL interface type, both SOAP and REST web services are available. However, this procedure focuses on the REST web service.

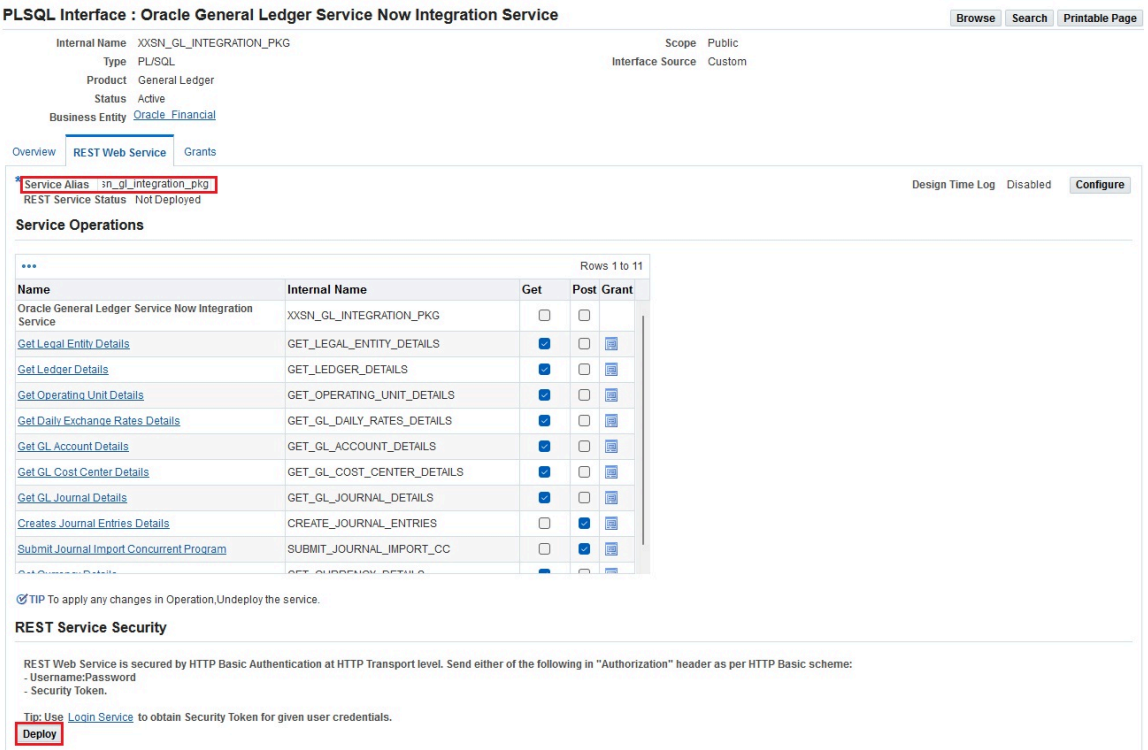
i. Click the **REST Web Service** tab.

i. In the **Service Alias** field, enter the service alias for your module. For the correct alias value per module, see the module package reference table in the previous step.

Note: The service alias must exactly match the value in the **Service Alias** column of the module package reference table. Aliases are case-sensitive.

ii. Click **Deploy**.

j. View the General Ledger Integration service method by clicking the **REST Web Service** tab.



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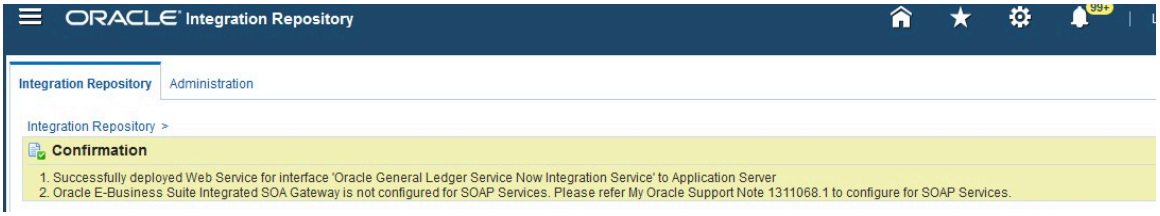
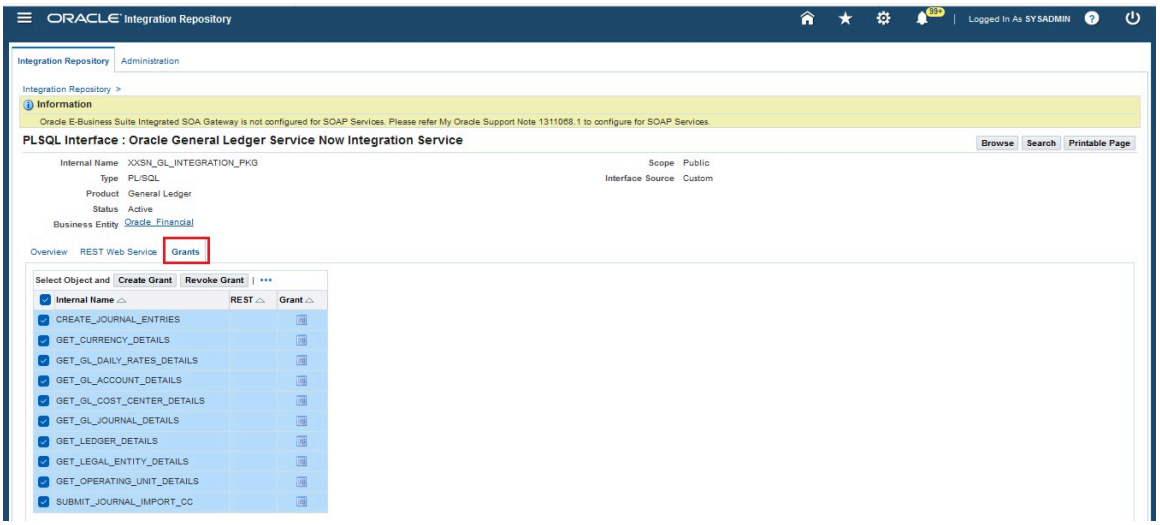
k. Enter the unique service alias name, select the required method, and click **Deploy**.

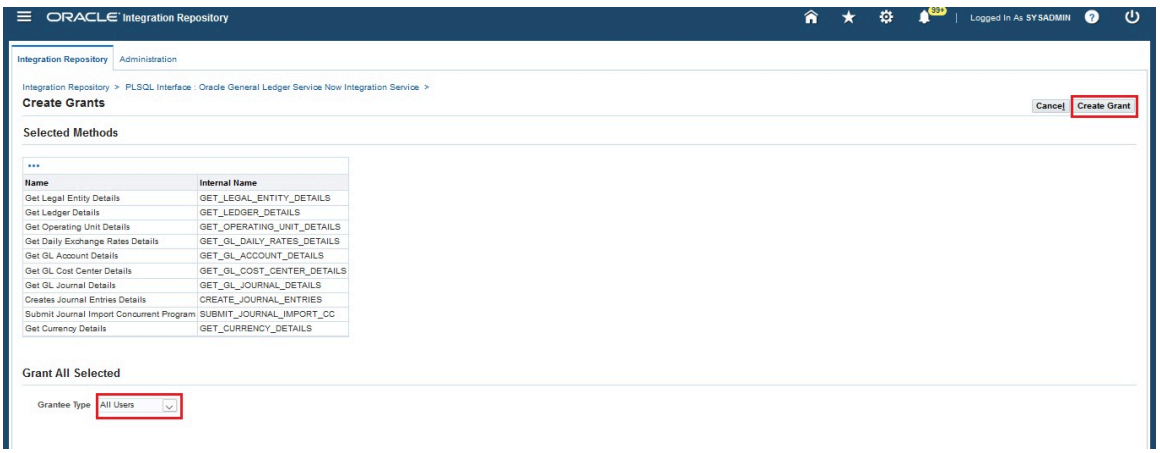


A confirmation message is displayed that the service is successfully deployed.

l. Click **View WADL** to access the physical location of the service endpoint where the service is hosted.

m. Open the **Grants** tab, select the required method, and click **Create Grant**.





n. Select a grantee type, enter the user name to whom you want to give the grant access to use the web service, and click **Create Grant**.

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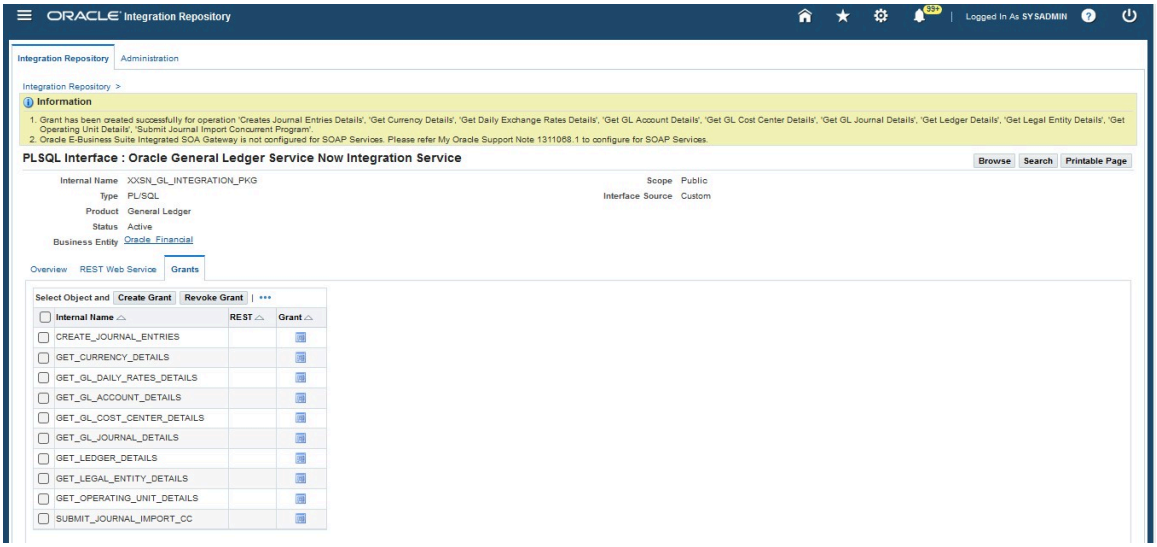


A confirmation message is displayed mentioning that the grant has been successfully created.

Note: To revoke grant, click **Revoke Grants** in the **Grants** tab and select the required users.

o. Perform the above steps for all the required actions and ensure that you use the same names (associated with the respective action) as mentioned in the Resource Path column of the following table:

p. Restart the server and using PuTTY, perform these steps up on logging in to the Oracle EBS server.

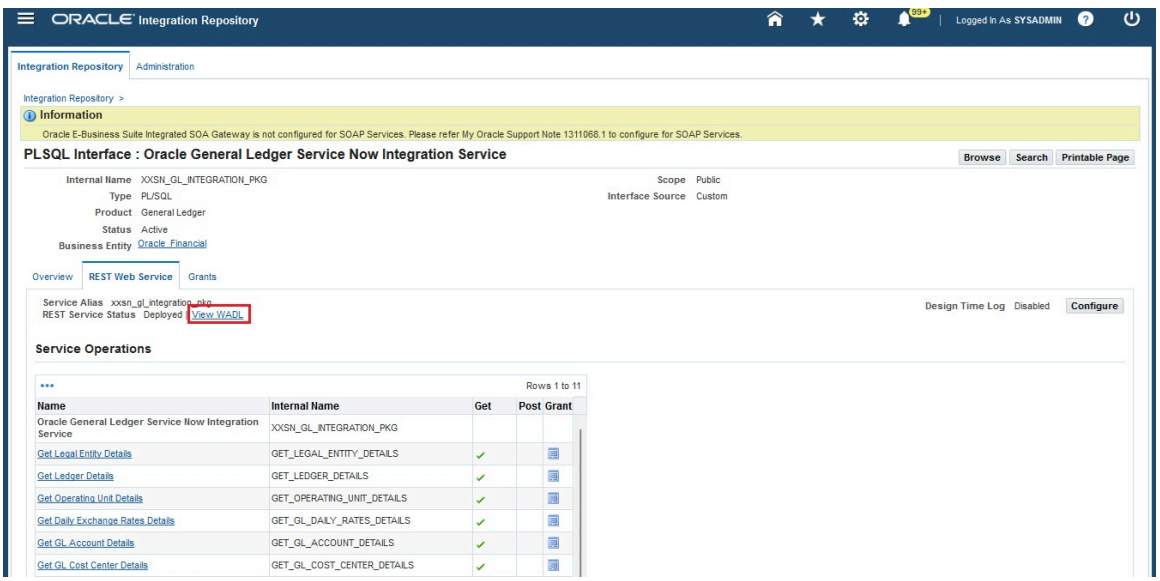
i. Execute the commands: *`cd $ADMIN_SCRIPTS_HOME`* and *`./adadminsrvctl.sh stop`*.

ii. Enter the WebLogic password and EBS password.

iii. Execute the command, *`./adadminsrvctl.sh start`*.

iv. Enter the WebLogic password and EBS password.

v. To check the status, execute the command, *`./adadminsrvctl.sh status`*.



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```
[appltest@tdcvm27s28 ~]$ cd $ADMIN_SCRIPTS_HOME
[appltest@tdcvm27s28 scripts]$ ./adadminsrvctl.sh stop

You are running adadminsrvctl.sh version 120.10.12020000.11

Enter the WebLogic Admin password:
Enter the APPS Schema password:
Stopping WLS Admin Server...
.Refer /u01/EBS122/fs2/inst/apps/TEST_tdcvm27s28/logs/appl/admin/log/adadminsrvctl.txt for details

AdminServer logs are located at /u01/EBS122/fs2/FMW_Home/user_projects/domains/EBS_domain/servers/AdminServer/logs

adadminsrvctl.sh: exiting with status 0

adadminsrvctl.sh: check the logfile /u01/EBS122/fs2/inst/apps/TEST_tdcvm27s28/logs/appl/admin/log/adadminsrvctl.txt for more information ...
```

```
[appltest@tdcvm27s28 scripts]$ ./adadminsrvctl.sh start

You are running adadminsrvctl.sh version 120.10.12020000.11

Enter the WebLogic Admin password:
Enter the APPS Schema password:

 The AdminServer is already running

AdminServer logs are located at /u01/EBS122/fs2/FMW_Home/user_projects/domains/EBS_domain/servers/AdminServer/logs

adadminsrvctl.sh: exiting with status 2

adadminsrvctl.sh: check the logfile /u01/EBS122/fs2/inst/apps/TEST_tdcvm27s28/logs/appl/admin/log/adadminsrvctl.txt for more information ...
```

6. Create a credential record for the Oracle EBS spoke.

   a. Navigate to **Connections & Credentials** > **Credentials**.

   b. Click **New**.
   The system displays the message `What type of Credentials would you like to create?`.

   c. Select **Basic Auth Credentials**.

   d. On the form, fill these values.

Field	Description
Name	Name to uniquely identify the credential record. For example, `OEBS Cred`.
User name	User name to log in to the Oracle EBS instance.
Password	Password to log in to the Oracle EBS instance.
Active	Option to actively use the credential record.

   e. Click **Submit**.

7. Create a connection record for the Oracle EBS spoke.

   a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

   b. Open the record for the Oracle EBS spoke.

   c. From the **Connections** tab, click **New**.

   d. On the form, fill these values.

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Field	Description
Name	Name to uniquely identify the connection record. For example, `OEBS Conn`.
Credential	Credential record you created for the Oracle EBS spoke.
Connection URL	Connection URL to connect to your Oracle EBS instance.

e. Click **Submit**.

Oracle Financial Cloud Spoke

Manage invoices, ledger, and records in an Oracle Financial Cloud instance from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle Financial Cloud spoke v1.7.1 is the latest version. For version history of the spoke, see Oracle Financial Cloud spoke release notes.

Supported versions

This spoke was built for Oracle Financial Cloud API version 11.13.18.05.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Utility Actions Spoke
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke flows

The Oracle Financial Cloud spoke provides sample flows to demonstrate automating the Oracle Financial Cloud tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Get Accounted AP Invoices	Retrieves information about the accounted AP invoices. This flow triggers the Get Accounted AP Invoice subflow and includes the Look up Record Details action.
Import Journals	Imports the journal records from your ServiceNow instance to Oracle Financial Cloud system. To import the journal records, you must create the required records in the GL Interface module.
Import AP Invoices	Imports accounts payable invoice line and accounts payable invoice records from your ServiceNow instance to Oracle Financial Cloud system. To import the accounts payable invoice line and accounts payable invoice records, you must create the required records in the AP Invoices Interface and AP Invoices Lines Interface modules respectively.

Note: The success message displayed after flow executions during the data imports from ServiceNow instance to Oracle Financial Cloud system, only indicates that data has been successfully pushed to Oracle Financial Cloud system. You must verify that the data import is successfully completed by accessing the Oracle Financial Cloud system.

Spoke subflows

The Oracle Financial Cloud spoke provides sample subflow, Get Accounted AP Invoice, to demonstrate automating Oracle Financial Cloud tasks. The subflow retrieves the accounted AP invoice records and is used in the Get Accounted AP Invoices flow. To customize the sample subflow, copy it to a new application scope.

Spoke actions

The Oracle Financial Cloud spoke provides actions to automate Oracle Financial Cloud tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
All Record Management	Create Record	Creates a record related to the specified object in Oracle Financial Cloud.
	Delete Record	Deletes a record related to the specified object in Oracle Financial Cloud.
	Look up Record Details	Retrieves record details in an object.

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Category	Action	Description
	Look up Record Details By ID	Retrieves details of the specified record in an object.
	Look up Records Stream	Retrieves a list of records related to the specified record or object from Oracle Financial Cloud.
	Update Record	Updates the record related to the specified object in Oracle Financial Cloud.
AP Invoice Management	Import AP Invoices	Imports the actionable payment invoices.
	Look up AP Invoice Lines	Retrieves information about the accounts payable invoice lines.
	Look up AP Invoices	Retrieves information about the actionable payment invoices.
Currency Conversion	Look up Currency Rates	Retrieves information about the currency rates.
General Ledger	Get Code Combinations Details	Retrieves information about the code combinations.
	Get Subledger Balances	Retrieves information about the subledger balances.
	Import Journals	Imports details about the journals.
	Look up Chart of Accounts	Retrieves the chart of accounts structure, including segment definitions and value set details, for the specified ledger.Create chart of accounts data model in Oracle Financial Cloud,before using this action.
	Look up Ledger Balance	Retrieves information about the ledger balances.
Invoice Management	Look up Invoice Payments Status	Retrieves the status of invoice payment for the specified invoice ID from Oracle Financial Cloud.
	Update Invoice Payment Status	Updates the status of an existing invoice payment in Oracle Financial Cloud.
Metadata Retrieval	Get Object Data for Oracle Cloud Financials	Retrieves the object metadata for the specified object from Oracle Financials Cloud.
	Get Objects (Metadata)	Retrieves the list of all records or objects from Oracle Financial Cloud.

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Category	Action	Description
	Get Object Schema (Metadata)	Retrieves all schema or fields related data from Oracle Financial Cloud for the specified object.
	Get Dynamic Response Schema (Metadata)	Retrieves all output schema or fields related data from Oracle Financial Cloud for the specified object.
Primary Data Management	Look up HR Locations Stream	Retrieve the list of all locations with the object name "locations".
	Look up Cost Centers Stream	Retrieves the details of the Cost Centers from the Oracle Financial Cloud.
Purchase Order Management	Create Purchase Order and PO Lines	Creates a purchase order and adds associated purchase order lines in Oracle Financial Cloud.
	Update Purchase Order and PO Lines	Updates an existing purchase order and its associated purchase order lines in Oracle Financial Cloud.
Supplier Record Management	Look up Suppliers	Retrieves information about the suppliers.

Spoke modules

The Oracle Financial Cloud spoke adds the Oracle Financial Cloud application to your instance and includes these modules:

Module	Description
Accounted AP Invoices	Displays information about the accounted AP invoices. This information is retrieved when the Get Accounted AP Invoices flow is triggered.
AP Invoices Interface	Displays the accounts payable invoice records. Admin must create these records in the ServiceNow instance in this module. The Import AP Invoices flow imports these invoices from your ServiceNow instance to Oracle Financial Cloud system.
AP Invoices Lines Interface	Displays the accounts payable invoice line records. Admin must create these records in the ServiceNow instance in this module. The Import AP Invoices flow imports these invoices from your ServiceNow instance to Oracle Financial Cloud system.

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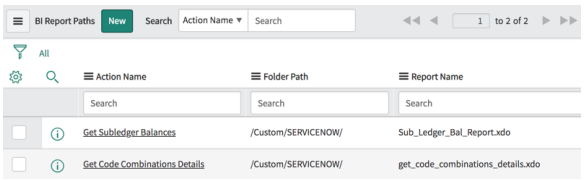
Module	Description
BI Report Paths	Displays information about the folder path where the required report is saved. The Get Subledger Balances and Get Code Combinations Details actions retrieve the subledger balances from these folder paths. Admin must create two records for the two actions and specify the folder path in this module. 
Get Currency Rates	Displays information about the currency rates. The currency rates are retrieved from the remote table, Get Currency Rates [sn_ofc_spoke_st_get_currency_rates]. You can use the remote table as reference and create another remote table for currency rates as per your requirement.
GL Interface	Displays the journal records. The Import Journals flow imports these records from your ServiceNow instance to Oracle Financial Cloud system. Admin must create the required journal records in this module.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Two connection and credential records are available along with the spoke. You must configure these alias record to use the spoke. See Set up the Oracle Financial Cloud spoke for more information.

Note: Depending on the Oracle Financial Cloud policies and account settings, you may have to change or refresh the credentials in your credential record periodically.

For information about setting up the spoke, see Set up the Oracle Financial Cloud spoke.

Set up the Oracle Financial Cloud spoke

Integrate the ServiceNow instance and Oracle Financial Cloud instance by using the basic auth credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Oracle Financial Cloud spoke.
- Role required: admin.

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Configure a connection for the Oracle Financial Cloud spoke

Configure a connection to authenticate ServiceNow requests in an Oracle Financial Cloud spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select the **Connections** tab.
3. Configure an **OracleCloudFinancials** connection.

   a. Search for the **OracleCloudFinancials** connection alias.
   There are two options.

Option	Description
View Details	To configure the default connection and credential alias record shipped with the spoke.
Add Connection	To manage more than one spoke connection records. For more information, see Supporting multiple connections

   b. Select **View Details**.

   c. Configure, edit, or add a connection.

   - Select **Configure** or **Edit** to set up an existing connection.
   - Select **Add Connection** to create and configure a new connection.

   d. On the configuration form, fill in the fields.

Field	Value
Connection Name	`OracleCloudFinancials`.
Connection URL	The instance URL in this format:`<provider-domain-name>.fa.ocs.oraclecloud.com/`.
User name	The Oracle account user name.

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Field	Value
Password	The Oracle admin account password.

e. Confirm your configuration.

For an existing connection, select **Edit Connection**. For a new connection, select **Create Connection**.

4. Repeat step 3 to configure **OrancleCloudFinancialsReport** with the following information:

Field	Value
Connection Name	`OracleCloudFinancialsReport`.
Connection URL	The instance URL in this format: `<provider-domain-name>.fa.ocs.oraclecloud.com/xmlpserver/services/v2/ReportService`.
User name	The Oracle account user name.
Password	The Oracle admin account password.

What to do next

Create the necessary records in the following relevant spoke modules, or use the available spoke actions directly:

- AP Invoices Interface
- AP Invoices Lines Interface
- BI Report Paths
- GL Interface

Create the data model for the Oracle Financial Cloud spoke

Configure a chart of accounts structure data model in Oracle Financial Cloud so the **Look up chart of accounts** action in the Oracle Financial Cloud spoke can retrieve chart of accounts data.

Before you begin

- Oracle Financial Cloud must be accessible, and BI Publisher must be enabled for the instance.
- The chart of accounts structures to be extracted must already be defined in General Ledger.
- Role required: an Oracle Financial Cloud role with access to Reports and Analytics and permission to create BI Publisher data models.

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About this task

The **Look up chart of accounts** action retrieves chart of accounts structure data through a BI Publisher data model rather than a direct table query. Create the data model once per environment. The data model returns the chart of accounts structure code, segment definitions, and value set details for each ledger, filtered by an optional `P_LEDGER_NAME` parameter.

Procedure

1. Log in to Oracle Financial Cloud.
2. Navigate to **Tools** > **Reports and Analytics** > **Browse Catalog**.
3. Create the folder structure in this hierarchy: `Custom > ServiceNow > Data Model`.
4. Click **New**, and select **Data Model**.
5. From the **Data Model** page, select **SQL Query**.
6. Enter a name for the query, and in the **Type of SQL** list, select **Standard SQL**.
7. Paste the following SQL query, click **Validate SQL**, and click **OK**.

```
SELECT   ta.structure_code coa_structure_code,
 ts.structure_instance_number coa_structure_id,
        gl.ledger_id, gl.NAME legder_name, gl.currency_code
 ledger_currency,
        b.segment_code, b.segment_identifier,
        b.sequence_number, b.NAME segment_name, b.column_name,
        vs.value_set_code, vs.value_data_type,
 vs.maximum_length, td.NAME segment_label
   FROM fnd_vs_value_sets vs, fnd_kf_segments_vl b,
 fnd_kf_structures_tl ta, fnd_kf_structures_b tb,
        fnd_kf_labeled_segments tc, fnd_kf_segment_labels_tl
 td, fnd_kf_str_instances_vl ts, gl_ledgers gl WHERE 1 = 1
    AND ta.application_id = 101   -- Application Id 101 is for
 General Ledger
    AND ta.structure_code = tb.structure_code AND
 tb.structure_id = tc.structure_id(+)
    AND tc.segment_label_code = td.segment_label_code(+) AND
 ta.LANGUAGE = 'US' AND td.LANGUAGE(+) = 'US'
    AND b.structure_id = tb.structure_id AND b.segment_code =
 tc.segment_code(+)
    AND b.default_value_set_id = vs.value_set_id AND gl.NAME =
 NVL (:p_ledger_name, gl.NAME)
    AND tb.structure_id = ts.structure_id AND
 ts.structure_instance_number = gl.chart_of_accounts_id
ORDER BY gl.NAME, b.sequence_number
```

8. On the **Add Parameter** page, confirm that the bind parameter `P_LEDGER_NAME` is detected.
9. Select the checkbox to include the parameter, and click **OK**.
10. From the **Data Model** page, go to **Properties** > **Data Sets**, and select the query to confirm the columns display as expected.
11. Select **Properties**, edit the group name if needed, and click **OK**.
12. Click the **Data** tab, enter a sample value for the `P_LEDGER_NAME` parameter, and view the sample data in tree or table format.
13. Click **Save as Sample Data**.
14. From the **Data Model** menu, go to **Parameters**, and select **Row Placement Order**.

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15. Confirm that the row order matches `gl.NAME, b.sequence_number`, as defined in the SQL query's ORDER BY clause, and click **Save**.

    Note: This order must match the row order used later in the report definition.

16. When prompted for a save location, save the data model to `Custom > ServiceNow > Data Model`.
17. Name the data model `ServiceNow_COA_Structure_Extract_DM`.

Result

The data model is saved to the BI Publisher catalog and is available as the data source for the **Look up chart of accounts** action's report extract.

Create the BI Publisher report for the data model

Create a BI Publisher report from the chart of accounts data model so the **Look up chart of accounts** action has a runnable report to call for chart of accounts structure data.

Before you begin

- The `ServiceNow_COA_Structure_Extract_DM` data model must already be created and saved to `Custom > ServiceNow > Data Model` in Oracle Financial Cloud.
- Role required: an Oracle Financial Cloud role with access to Reports and Analytics and permission to create BI Publisher.

Procedure

1. In BI Publisher, select **New**, and under **Published Reporting**, select **Report**.
2. On the **Create Report** page, click **Use Data Model**.
3. From **Create a report using an existing Data Model**, select `ServiceNow_COA_Structure_Extract_DM`, and click **Next**.
4. On the following page, leave the default values, and click **Next**.
5. Clear the **Show Grand Totals Row** checkbox at the bottom of the page.
6. Drag and drop all required columns from the Data Source pane on the left into the layout area on the right, including every column needed for the extract.
7. Click **Finish**.
8. Save the report to `Custom > ServiceNow`, and name it `ServiceNow_Charts_of_Accounts_Structure_Extract_Report`.
9. Run the report to confirm the data displays correctly, and enter a sample value for the bind parameter `P_LEDGER_NAME` if prompted.
10. Edit the report, go to the row placement settings, and confirm that the row order matches the order defined in the data model.
11. While editing the report, click **View as List**, and from **Output Formats**, select **Data (XML)** as the output format for the report, and set it as the default format.

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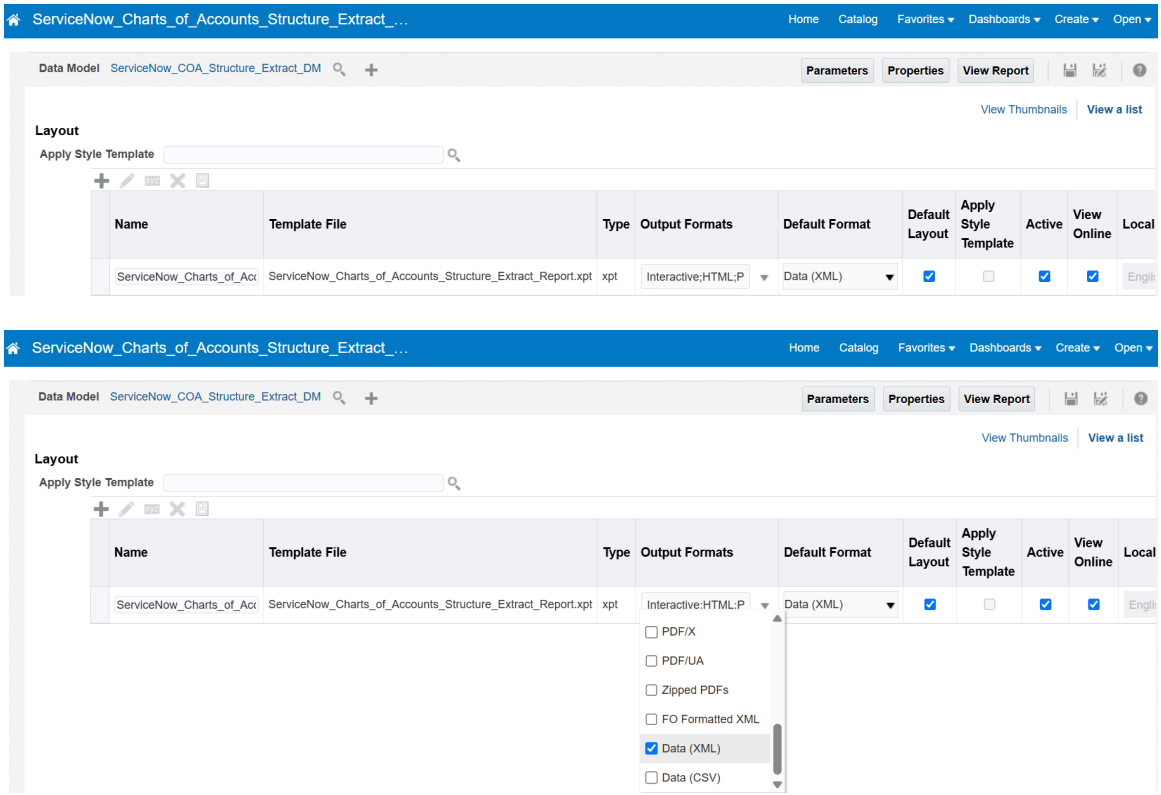

12. Save the report.

Result

The report is saved to the BI Publisher catalog and produces chart of accounts structure output in the required format, ready for the **Look up chart of accounts** action to consume.

Oracle HCM Cloud Spoke

Manage work structures and human capital in Oracle HCM Cloud instance from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle HCM Cloud spoke v4.5.0 is the latest version. For version history of the spoke, see Oracle HCM Cloud spoke release notes.

Supported versions

This spoke was built for Oracle HCM Cloud API version 11.13.18.05, but may be compatible with later versions.

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Spoke requirements

Oracle HCM Cloud subscription.

Spoke dependencies

If you're having trouble installing the app, verify that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- ServiceNow IntegrationHub Action Step - SOAP (com.glide.hub.action_step.soap)
- Large JSON and XML Payload Builder API (com.glide.streaming_builder)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke subflows

The Oracle HCM Cloud spoke provides sample subflows to demonstrate automating Oracle HCM Cloud tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Get Active Department	Retrieves the active department information by calling the **Look up Departments** action.

Spoke actions

The Oracle HCM Cloud spoke provides actions to automate tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
All Record Management	Look up Record Details	Retrieves all record details.
	Look up Time Record Details	Retrieves the employee's time sheet for the specified time.
Absence Management	Look up Time Off Balance	Retrieves the time-off details of an employee.
	Look up Absence Type	Retrieves the absence type for the specified employee.
	Look up Absence Type Reason	Retrieves absence type reasons for all the available absence types.
	Request Time Off	Request time off for the specified employee.

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Category	Action	Description
Employee Information Management	Update Personal Details	Updates the employee details, such as the email address, phone number, date of birth, or blood type.
Employee Document Management	Get Employee Documents by Employee ID	Retrieves the documents of an employee by the employee ID.
	Get Employee Documents Attachments	Retrieves the attachments of an employee's document.
Benefits Management	Look up Benefit Enrollments	Retrieves the benefit enrollment details of an employee.
Compensation Management	Get Total Rewards	Retrieves the total rewards details of an employee.
	Look up Individual Compensation	Retrieves the individual compensation details of an employee.
Employee Atom Feeds	Look up Atom Feeds Employees Assignments Stream	Retrieves the changes made in employee assignments.
	Look up Atom Feeds Employees New hire Stream	Retrieves information about the employees who were recently hired.
	Look up Atom Feeds Employees Termination Stream	Retrieves information about the terminated employees.
	Look up Atom Feeds Employees Update Stream	Retrieves information about the employee updates.
Feedback Management	Look up Feedback	Retrieves the feedback received for the employees.
Goals Management	Look up Goals	Retrieves the goals of an employee.
Human Capital Management	Look up Departments Stream	Retrieves information about the departments.
	Look up Employee Assignments	Retrieves information about the employees assignments.
	Look up Employees Stream	Retrieves information about the employees.
	Get User Holiday Calendar	Retrieves information about the holidays for the specified year in the specified country.
	Look up Jobs Stream	Retrieves information about the jobs.
	Look up Locations Stream	Retrieves information about the locations.
	Look up Organizations Stream	Retrieves a list of organizations from Oracle HCM.
	Look up Positions Stream	Retrieves information about the positions.

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Category	Action	Description
	Look up Workers Stream	Retrieves information about the workers.
	Look up Active and Inactive Workers Stream	Retrieves information about the active and inactive workers.
Job Management	Look up Job Application Attachment	Retrieves the job application attachments.
	Look up Job Applications Stream	Retrieves a list of job applications fromOracle HCM.
	Look up Recruiting Candidates	Retrieves the details of a recruiting candidate.
	Look up Recruiting Job Requisitions Stream	Retrieves a list of recruiting job requisitions.
Metadata Retrieval	Get Oracle Cloud HCM Array.Object Schema	Retrieves information about the Oracle Cloud HCM array object schema.
	Get Oracle Cloud HCM Object Metadata	Retrieves information about the Oracle Cloud HCM object metadata.
	Get Oracle Cloud HCM Objects	Retrieves information from Oracle Cloud HCM Objects.
Payroll Management	Look up External Bank Accounts	Retrieves external bank account information for employees.
	Look up Payroll	Retrieves payroll information of an employee.
	Look up Legislative Data Group	Retrieves legislative data group details for an employee.
	Look up Payslip	Retrieves payslip details for an employee.
	Look up Payroll Elements	Retrieves payroll element information of employees.
Workstructures Atom Feeds	Look up Atom Feeds Jobs Stream	Retrieves the changes made in jobs.
	Look up Atom Feeds Locations Stream	Retrieves the changes made in locations.
	Look up Atom Feeds Organizations Stream	Retrieves the changes made in organizations.
	Look up Atom Feeds Positions Stream	Retrieves the changes made in positions.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

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You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Oracle HCM Cloud feedback management AI agent	Retrieves and manages feedback that the employees received.
Oracle HCM Cloud goals management AI agent	Retrieves goals and provide relevant actionable information to enable users manage and track their objectives.
Oracle HCM Cloud human capital management AI agent	Retrieves employee data, organizational structures, and other HR-related tasks by leveraging predefined actions.
Oracle HCM Cloud jobs management AI agent	Retrieves and manages data related to recruiting, job applications, and candidate information.
Oracle HCM Cloud payroll management AI agent	Retrieves, processes, and manages payroll-related data.
Oracle HCM Cloud compensation management AI agent	Retrieves and manages compensation-related data. Also, provides access to critical information and insights.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Available sample agentic workflows

Install Now Assist for Integration Hub and start using the available sample agentic workflows and AI agents. For more information, see Now Assist for Integration Hub.

In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. Use the available sample agentic workflow in AI Agent Studio so that AI agents can coordinate to solve complex problems. To modify the available sample agentic workflow as per your requirement, see Modify an agentic workflow.

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Sample agentic workflow	Description	AI agents used	Always ON by default?
Fetch Individual Compensation and Payslip and Total Rewards	Retrieves and consolidates an employee's compensation data from Oracle HCM, including payslips, salary details, and total rewards information. It orchestrates multiple Oracle HCM actions and presents the results as a clear, HR#friendly summary that supports payroll review, employee inquiries, and compensation analysis.	• Oracle HCM Cloud payroll management AI agent • Oracle HCM Cloud compensation management AI agent	Yes
Fetch Goals and Performance Feedback	Retrieves employee goals and performance feedback from Oracle HCM and presents the information as a consolidated goals and performance summary. It helps HR teams and managers quickly review progress, feedback, and performance context in a clear format.	• Oracle HCM Cloud goals management AI agent • Oracle HCM Cloud feedback management AI agent	Yes

Spoke module

The Oracle HCM Cloud spoke adds the Oracle HCM Cloud application to your instance and includes the modules in the following table.

Module	Description
BI Report Paths	Lists the BI report paths for the actions.
Look up Holiday Calendars	Lists the holiday calendars.
New Positions	Lists the available new positions.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when

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using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Configure the Oracle HCM Cloud spoke connection record.

Set up the Oracle HCM Cloud spoke

Set up the Oracle HCM spoke to integrate your ServiceNow instance with the Oracle REST APIs.

Before you begin

- Request an Integration Hub subscription.
- Activate the Oracle HCM Cloud spoke.
- Access to the Oracle HCM tenant site.
- Ensure that OpenSSL is installed on your machine.
- Role required: admin.

About this task

Oracle REST APIs mandate a JWT authentication of requests that your ServiceNow instance makes. To set up your Oracle HCM Cloud spoke, you must enable your ServiceNow instance to handle JWT authentication, configure the connection record, and add the roles necessary to execute the Oracle HCM Cloud spoke actions.

Generate the X.509 key pair and fingerprints on your Mac machine

Generate the X.509 key pair and its fingerprint on your Mac machine that you upload to the Oracle HCM tenant.

Before you begin

Role required: admin

Ensure that OpenSSL is installed. To verify that OpenSSL is installed, execute the command `openssl version` on the terminal.

Procedure

1. Open the terminal.
2. To generate the private key, run the command `openssl genrsa -out private.key 2048`.
   The private key is generated.
   ```
   Generating RSA private key, 2048 bit long modulus
   .....+++++
   ..........+++++
   e is 65537 (0x10001)
   ```
3. To generate the public key, run the command `openssl req -new -x509 -key private.key -out publickey.cer -days 365`.
4. Enter the information.

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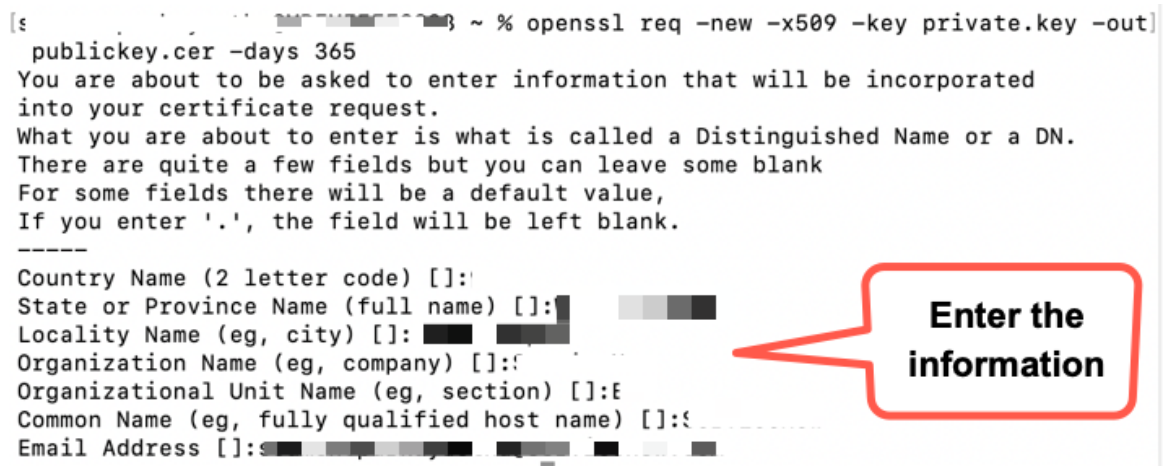

The public key is generated.

5. To generate the fingerprint, execute the command `openssl x509 -sha1 -in publickey.cer -noout -fingerprint`.
   The fingerprint is generated in the form of a hexadecimal value.
6. Convert the hexadecimal value to a Base64 value.
7. Copy the Base64 value and store in a secure place.
   You need the Base64 value when you configure the connections and credential record on your ServiceNow instance.

Generate X.509 key pair and fingerprints on your Windows machine

Generate the X.509 key pair and its fingerprint on your Windows machine that you upload to the Oracle HCM tenant.

Before you begin

Role required: admin

Ensure that OpenSSL is installed.

Procedure

1. On your Windows machine, copy the path to the `bin` folder under the `OpenSSL-Win<bit>` folder.
2. Run the Command Prompt as an administrator.
3. On the prompt, use the `cd` command to change the current directory to the `bin` folder.
4. To generate the private key, run the command `openssl genrsa -out private.key 2048`.
   The private is generated under the bin folder.
5. To generate the public key, run the command `openssl req -new -x509 -key private.key -out publickey.cer -days 365`.
6. Enter the information.

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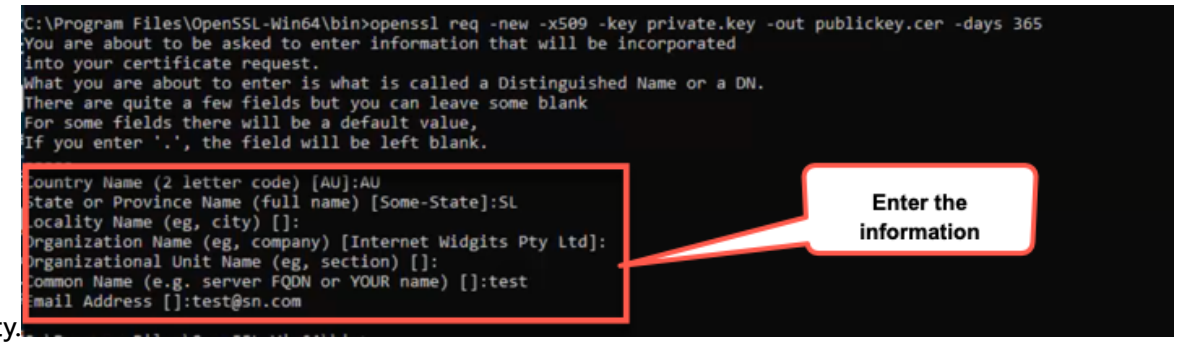
You can choose to leave one or more fields empty.



The public key is generated in the bin folder.

7. To generate the fingerprint, run the command `openssl x509 -sha1 -in publickey.cer -noout -fingerprint`.
   The fingerprint is generated in the form of a hexadecimal value.
8. Convert the hexadecimal value to a Base64 value.
9. Copy the Base64 value and store in a secure place.
   You need the Base64 value when you configure the connections and credential records on your ServiceNow instance.

Create a trusted issuer

Create a trusted issuer on the Oracle HCM tenant site that certifies the authenticity of the public certificate that you had generated on your Mac or Windows machine.

Before you begin

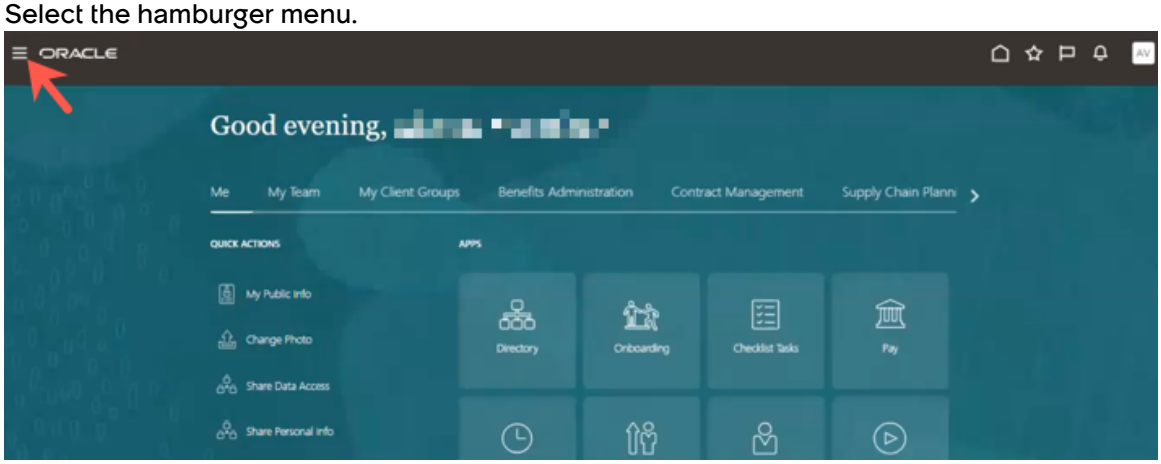
Role required: admin

You've generated the private and public certificates.

Access to the Oracle HCM tenant site.

Procedure

1. Log in to the Oracle HCM tenant site.
2. Select the hamburger menu.



3. Navigate to **Tools** > **Security Console**.
4. On the left panel, select API Authentication.
5. Select **Create Oracle API Authentication Provider**.
6. Select **Edit**.

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7. In the Trusted Issuer field, enter a custom name for the trusted issuer.

   Tip: Copy and save the name of the trusted issuer at a secured place.

8. In the Token Type field, select **JWT**.
9. Select **Save and Close**.
10. On the left panel, select **Inbound API Authentication Public Certificates**.
11. Select **Add New Certificate**.
12. In the Certificate Alias field, enter the name of the trusted issuer that you had created.
13. In the Import Public Certificate field, select **Choose File** to select and upload the public certificate you had generated.
14. Select **Save**.

Generate a Java KeyStore file

Convert the public certificate that you had generated to a Java KeyStore file on your machine because your ServiceNow instance supports a Java KeyStore file. After generating, you must upload the file to your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Open the command prompt on your machine.
2. Use the `cd` command to change the directory to the location where you had generated the public certificate.
3. On the command prompt, execute the command `openssl pkcs12 -export -in publickey.cer -inkey private.key -out <your-file-name>.p12 -name "<your-custom-name>”`.
4. In the Enter Export Password prompt, create an export password.
5. In the Verifying - Enter Export Password prompt, reenter the export password you had created. The P12 file is created.
6. Copy the P12 file to the respective JDK/bin folder of your machine.

   Note: Depending on the OS of your machine, the location of the JDK/bin folder might vary.

7. Copy the path to the JDK/bin folder.
8. In the command prompt, use the `cd` command to change the current directory to the JDK/bin folder.
9. To convert the P12 file to a Java KeyStore file, execute the command `keytool -importkeystore -srckeystore <P12-file-name>.p12 -srcstoretype pkcs12 -destkeystore <Java-KeyStore-filename>.jks`.
10. In the Enter destination keystore password prompt, create a password.
11. In the Re-enter new password prompt, reenter the destination keystore password you had created.

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12. In the Enter source keystore password prompt, enter the same password that you had created to generate the P12 file.
The Java KeyStore file is created in the JDK/bin location.

Upload Java KeyStore certificate to ServiceNow instance

Upload the Java KeyStore certificate to your ServiceNow instance to enable the creation of connections and credentials.

Before you begin
Role required: admin

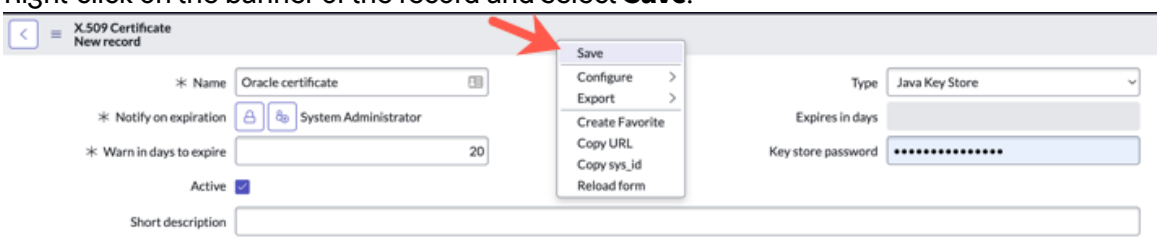
Procedure

1. On your ServiceNow instance, navigate to the X.509 certificate list by entering `sys_certificate.LIST` in the navigation filter.
2. Select **New**.
3. Fill the form.

New record

Field	Description
Name	Custom name of the certificate.
Type	Type of certificate. Select Java Key Store.
Notify on expiration	The role that should be notified when the certificate expires.
Expires in days	The validity of the certificate.
Warn in days to expire	The number of days before which the role receives a warning of expiry.
Key store password	Key store password that you had created.
Active	Indicates that the Java Key Store certificate is active.
Short description	Short description of the record.

4. Right-click on the banner of the record and select **Save**.



5. Select the **Manage Attachments** icon ( ) to attach the Java KeyStore file.

Trouble?
If your instance displays an error of the type "<file-name>.jks File type not permitted or mime type does not match the file content", complete the steps.

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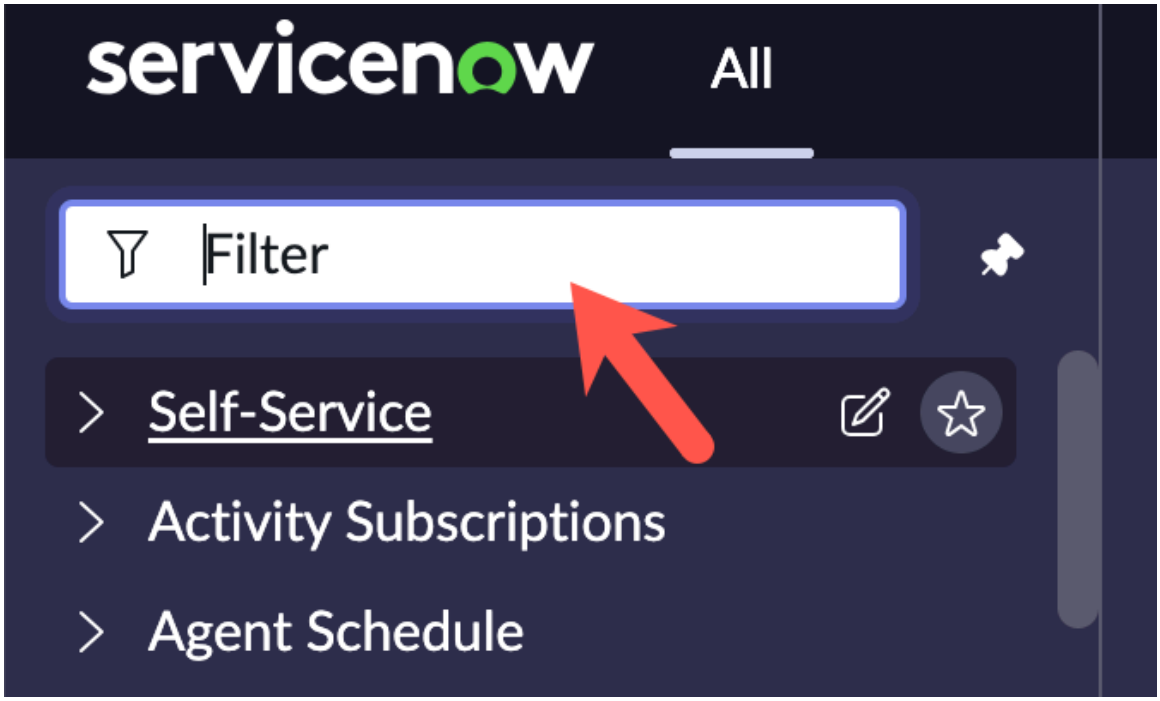
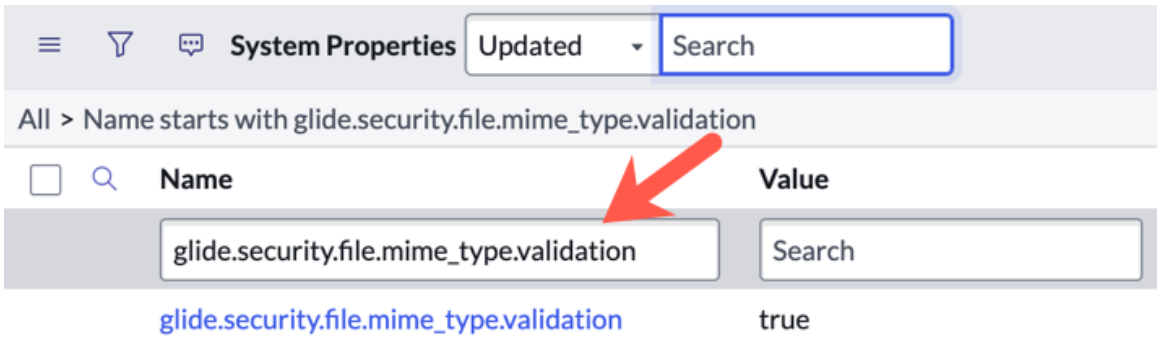
a. In the filter field of your instance, enter `sys_properties.LIST` and press **Enter**.



b. In the Name field of the System Properties page, enter `glide.security.file.mime_type.validation` and press **Enter**.



c. Select the system property glide.security.file.mime_type.validation.

d. In the Value field, update the value to `False`.

e. Right-click on the banner of the form and select **Save**.

6. Select **Save**.

7. To validate the certificate, select the Validate Stores/Certificates link.
You've uploaded the Java Key Store certificate to your ServiceNow instance.

Configure the Oracle HCM Cloud spoke connection record

Set up an outbound integration between the ServiceNow instance and the Oracle HCM instances by creating connection and credential records.

Before you begin

- Request an Integration Hub subscription.
- Activate the Oracle HCM Cloud spoke spoke plugin on the ServiceNow instance.
- Role required: admin

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Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Set the connection and credential for the Oracle Cloud HCM instance.
   a. Select Connections.
   b. Turn on the Outbound tab.
   c. In the Search all connections field, enter `Oracle HCM`.
   d. On the OracleCloudHCM tile, select **View Details**.
   e. Select **Configure**.
   f. Fill the form.

Oracle HCM Cloud connection and credential configuration form

Field	Description
Name	Name of the connection. **Note:** For the first connection, the default name is OracleCloudHCM that is read-only. However, for all the connection records you set up after the first record, you can provide a custom name.
Connection URL	URL to connect to the Oracle HCM tenant.
Version	Version of the Oracle API.
JWT Provider Name	Name of the JWT provider.
JWT Keys Name	Name of the JWT key.
Signing Keystore	Name of the key store that you had created. To learn how to create a key store, see Upload Java KeyStore certificate to ServiceNow instance.
Signing Key Password	Password that you had created while creating the Java KeyStore file.
Issuer (iss) Claim value	The value that you had configured while creating a trusted issuer. For more information, see Create a trusted issuer.
Subject (sub) Claim value	User name that has access to the REST API endpoint.
Fingerprint/x5t value	Base 64 value that you had obtained while generating the fingerprint.

   g. Select **Configure Connection**.

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Note: To update the default expiry time of a token, do the steps.

a. In the filter field of your instance, enter `sys_properties.LIST` and press **Enter**.

b. In the Name field of the System Properties page, enter `jwt.provider.expiry.interval.limit` and press **Enter**.

c. On the jwt.provider.expiry.interval.limit page, update the value in the Value field.

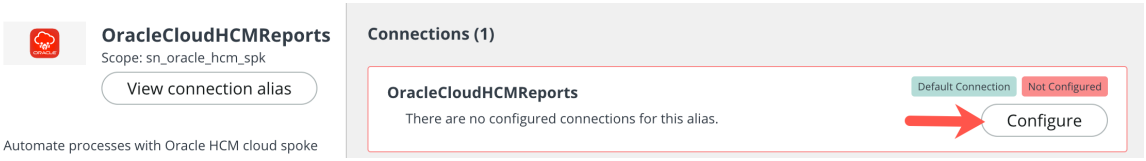
d. Navigate to **All** > **JWT Providers**.

e. Set the same expiry value in seconds in the field Expiry Interval (sec).

3. Set the connection and credential for the Oracle Cloud HCM Reports instance.

a. On the OracleCloudHCMReports tile, select **View Details**.

b. Select **Configure**.



c. In the form, fill the details.

Oracle Cloud HCM Reports Connection record form

Field	Description
Connection Name	Name of the connection. **Note:** For the first connection, the default name is OracleCloudHCMReports that is read-only. However, for all the connection records you set up after the first record, you can provide a custom name.
Connection URL	URL to connect to the Oracle HCM Cloud Reports instance. The format is `https://<provider-domain-name>.com`
User name	User name to log in to your target host on which Oracle Cloud HCM Reports is installed.
Password	Password to authenticate and log in to your target host on which Oracle Cloud HCM Reports is installed.

d. Select **Configure Connection**.

Create roles in the Oracle HCM Cloud

Create roles to execute all actions in the Oracle HCM spoke.

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Before you begin

Role required: admin

Access to the Oracle HCM Cloud tenant with the IT Security Manager role.

About this task

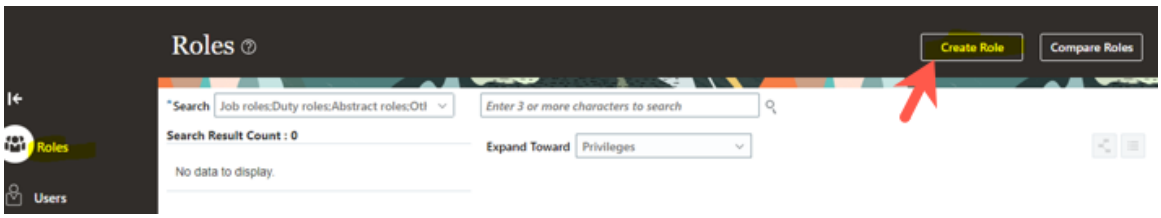
You need both seeded and custom roles in the Oracle HCM Cloud. The table provides the roles that you need.

Oracle HCM Cloud roles

Role Name	Role Code
Application Administrator	ORA_FND_APPLICATION_ADMINISTRATOR_JOB
Application Implementation Administrator	ORA_ASM_APPLICATION_IMPLEMENTATION_ADMIN_ABSTRA
Application Implementation Consultant	ORA_ASM_APPLICATION_IMPLEMENTATION_CONSULTANT_J
Application Implementation Manager	ORA_ASM_APPLICATION_IMPLEMENTATION_MANAGER_JOB
Employee_SN	PER_EMPLOYEE_ABSTRACT_SN
Human Capital Management Integration Specialist_SN	HUMAN_CAPITAL_MANAGEMENT_INTEGRATION_SPECIALIST
Human Resource Analyst_ViewAll	PER_HUMAN_RESOURCE_ANALYST_JOB_VIEWALL
Human Resource Manager_ViewAll	PER_HUMAN_RESOURCE_MANAGER_JOB_VIEWALL
Human Resource Specialist_ViewAll	PER_HUMAN_RESOURCE_SPECIALIST_JOB_VIEWALL
Line Manager_SN	PER_LINE_MANAGER_ABSTRACT_CUSTOM
Product Management VP	ORA_ACE_PRODUCT_MANAGEMENT_VP_JOB
Product Manager	ORA_EGP_PRODUCT_MANAGER_JOB
Recruiter	ORA_IRC_RECRUITER_JOB
Recruiting Administrator	ORA_PER_RECRUITING_ADMINISTRATOR_JOB
Recruiting Agent	ORA_IRC_RECRUITING_AGENT_JOB
Recruiting Manager	ORA_IRC_RECRUITING_MANAGER_JOB
SN_Access Opportunity Marketplace	SN_Access_Opportunity_Marketplace

Procedure

1. Log in to the Oracle HCM Cloud.
2. On the left panel, navigate to **Tools** > **Security Console**.
3. Select Roles.
4. Select **Create Role**.



5. In the Search field, enter the role name and press **Enter**.
   The search results display the role name as one of the results.

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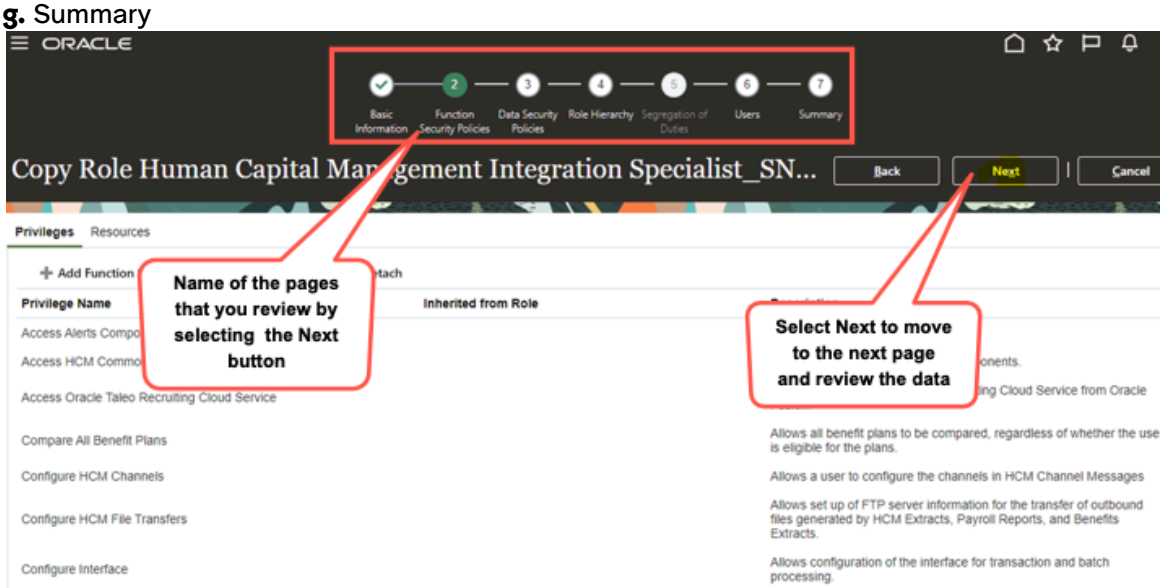
6. Select the Actions button and select **Copy Role**.



7. In the Copy Options window, select **Copy Role**.
8. In the Role Name field, enter the role name and select **Next**.
9. To move to the next pages and review the information shown, select **Next** on the subsequent pages.
   Page information
   a. Basic information
   b. Function Security Policies
   c. Data Security Policies
   d. Role Hierarchy
   e. Segregation of Duties
   f. Users
   g. Summary



10. Select **Submit and Close**.
11. Select your profile icon and then select Settings and Actions.

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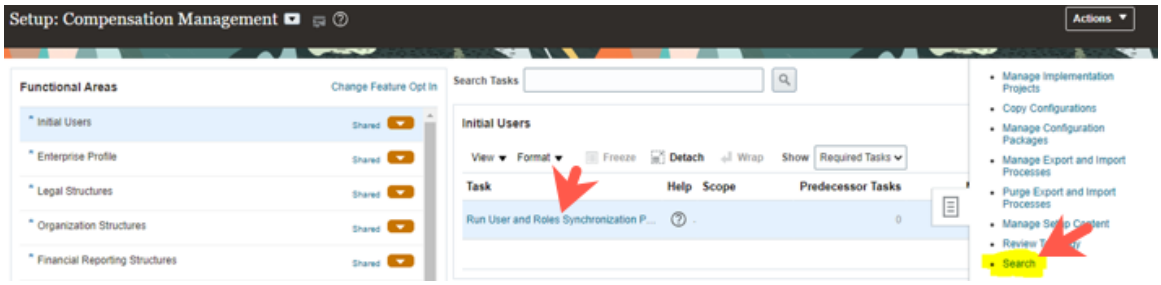
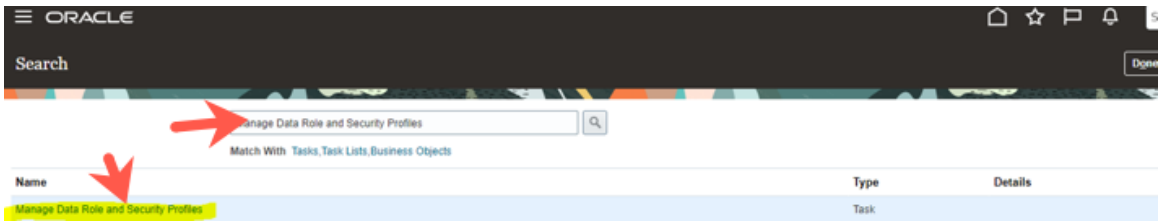
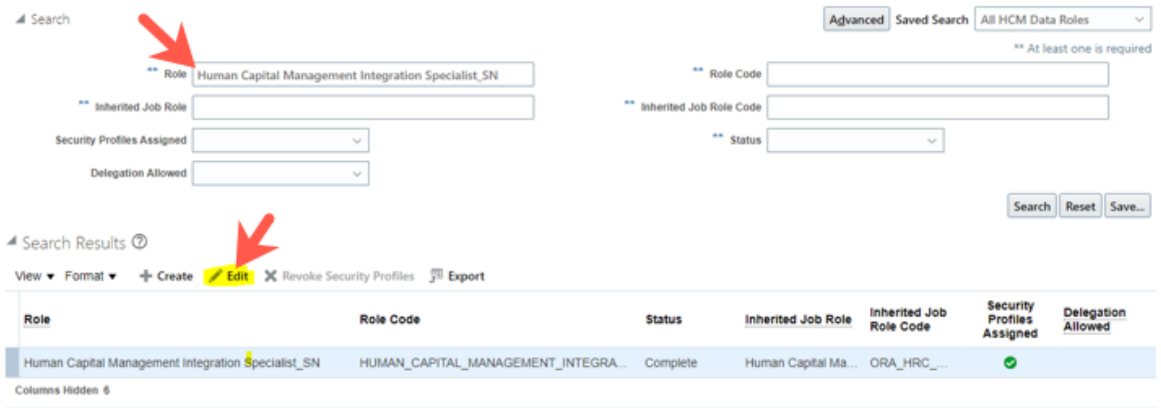
12. Select **Setup and Maintenance**.
13. Select the task and then select Search.



14. In the Search field, enter `Manage Data Role and Security Profiles` and press **Enter**.



15. In the Role field, enter the role name and select **Edit**.



16. Select **Next**.
17. Provide inputs for the required fields and select **Next**.

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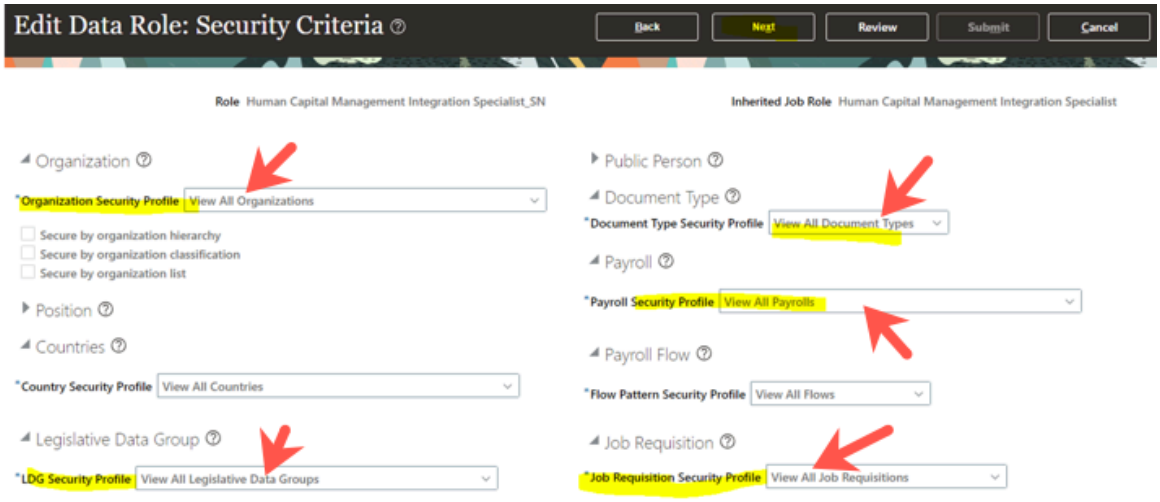
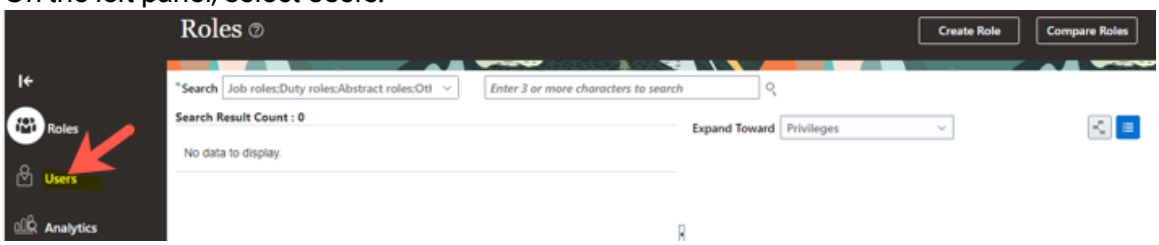


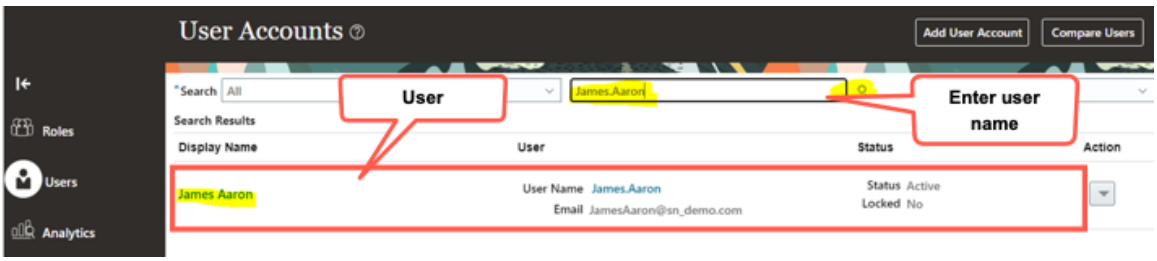
18. To navigate through the next few pages, select **Next** on the subsequent pages.
19. Select **Submit**.
20. Assign the role to the user.

    a. On the left panel, navigate to **Tools** > **Security Console**.

    b. On the left panel, select Users.



    c. In the User Name field, enter a user name and select the search icon.
    The user name and its details are displayed.



    d. Select the user name link.

    e. On the Edit User Account page, select **Edit**.

    f. On the Edit User Account page, select **Add Role**.

    g. In the Search field, ensure that the Roles option is selected and then enter the role name.

    h. Select **Add Role Membership**.

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i. Select **Done**.

j. Select **Save and Close**.

Create BI report paths for Oracle HCM Cloud spoke

Create BI reports paths to specify the folder paths where the reports are saved.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Oracle HCM Cloud** > **BI Report Paths**.
2. Click **New**.
3. On the form, fill in the fields:

Field	Description
Report Name	Name of the BI report.
Action Name	Name of the action.
Folder Path	Folder path of Oracle HCM Cloud.

Sample BI Report Paths

Report Name	Action Name	Folder Path
Holiday Calendar Report.xdo	Look up Holiday Calendar	/Custom/Human Capital Management/
Legislativedatagroup Report.xdo	Get Legislative Group ID	/Custom/Human Capital Management/
USOnlinePayslip.xdo	Look up Payroll	/Human Capital Management/Payroll/ Payment Distribution/US/
Element Screen Entry Values.xdo	Look up Payroll Elements	/Custom/Human Capital Management/
Individual Compensation Report.xdo	Look up Individual Compensation	/Custom/Human Capital Management/

Note: Report Name and Folder Path may vary based on the Oracle HCM Cloud instance.

Oracle NetSuite Spoke

Automate create, read, update, and delete (CRUD) record management operations in Oracle NetSuite from your ServiceNow instance by using the Oracle NetSuite spoke. It provides preconfigured actions, subflows, connection and credential aliases, and scripted REST APIs to do these operations.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle NetSuite spoke v1.2.0 is the latest version. For version history of the spoke, see Oracle Netsuite Spoke release notes.

Supported versions

This spoke was built for Oracle NetSuite API version 1.0, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.object)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Step - SOAP (com.glide.hub.action_step.soap)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke subflows

The Oracle NetSuite spoke provides sample subflows to demonstrate automating Oracle NetSuite tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Get Record Details (Inbound)	Triggers the 'Look up Record Details' action. The output of the action is logged for reference. You can replace the logging step with custom logic, such as creating records in a desired table, depending on the requirement to store record details.
Create Purchase Order (Outbound)	Triggers the 'Create Record' action of the Oracle NetSuite Spoke. Required data is provided through subflow inputs, and all fields are structured exactly as per the API requirements. All subflow inputs are passed directly to the action, except for one: the input of type Array of Objects is converted to a string using

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Subflow	Description
	the OracleNetsuiteUtils.stringifyArray(array) method before being passed. This method should be used for all Array of Object type inputs.

Spoke actions

The Oracle NetSuite spoke provides actions to automate Oracle NetSuite tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Record Management	Create Record	Creates a record corresponding to an object in Oracle NetSuite. For example, create a new record for the object: “purchaseOrder”.
	Delete Record	Delete a record corresponding to an object in Oracle NetSuite. For example, delete a record for the object: “account”.
	Look up Record Details	Retrieves any type of record details from Oracle NetSuite.
	Update Record	Updates a record corresponding to an object in Oracle NetSuite. For example, update a record for the object: "purchaseOrder".
	Look up Record List Stream	Retrieves the list for a given record or object from Oracle NetSuite. For example, retrieve the list of all purchaseOrder(s).
Metadata Retrieval	Get Objects (Metadata)	Retrieves the list of all records or objects from Oracle NetSuite.
	Get Object Schema (Metadata)	Retrieves all schema or fields related data from Oracle NetSuite for a given object.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Oracle NetSuite Spoke.

Set up Oracle NetSuite Spoke

Set up your ServiceNow instance and Oracle NetSuite application so that they are integrated.

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Before you begin

- Request an Integration Hub subscription.
- Activate Oracle NetSuite Spoke.
- Role required: admin

Configure OAuth 2.0 in Oracle NetSuite

Configure an OAuth 2.0 profile on Oracle NetSuite that enables integration between it and the ServiceNow instance through the OAuth 2.0 framework.

Before you begin

Role required: admin

Procedure

1. Log in to Oracle NetSuite.
2. Navigate to **Setup** > **Integration** > **Manage Integrations**.
3. Select **New**.
4. Fill the form.

OAuth 2.0 form

Field	Description
Name	Option to enter a unique name for the OAuth integration profile.
Description	Option to enter a description of the OAuth integration profile.
Authorization Code Grant	Option to indicate the flow that the ServiceNow instance will use to access Oracle NetSuite.
Redirect URI	Option to enter the redirect URI of ServiceNow instance in the format: `https://<instancename>.service-now.com/oauth_rediect.do`.
REST Web Services	Option to indicate the scope.

5. Select **Save**.
   The client ID and client secret are generated.
6. Copy and store the client ID and client secret at a secure place.
   You will need the client ID and client secret when you configure the connection and credential alias on your ServiceNow instance.

Upload Update Set

Upload and commit the Update Set to your ServiceNow instance to deploy a script include called OAuthCustomOracleNetsuitGlobal to the ServiceNow instance.

Before you begin

Role required: admin

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About this task

The OAuthCustomOracleNetsuitGlobal script in the Update Set contains methods for Oracle OAuth connections, designed specifically for Oracle NetSuite integration. You can upload and commit the Update Set across ServiceNow instances and enable them to handle Oracle NetSuite integration.

Procedure

1. From the Oracle NetSuite spoke page on ServiceNow Store, download the `OAuthCustomOracleNetsuitGlobal` Update Set from to your local disk.
2. Navigate to **System Update Sets** > **Retrieved Update Sets**.
3. Under Related Links, select Import Update Set from XML.
4. Select **Choose File** and then navigate to the location of the `OAuthCustomOracleNetsuitGlobal` Update Set.
5. Select **Upload**.
6. Select **Commit Update Set**.
   The OAuthCustomOracleNetsuitGlobal script is deployed into the ServiceNow instance.

Configure a connection record for Oracle NetSuite

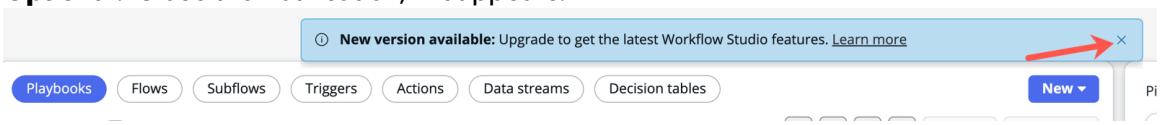
Configure a connection record between your ServiceNow instance and Oracle NetSuite. The record centrally stores credentials, OAuth tokens, client ID, and client secret, and is a reusable connection across flows.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. **Optional:** Close the notification, if it appears.



3. Select **Integrations**.
4. Select the **Connections** tab.
5. In the Search all connections field, enter `Oracle NetSuite`.
   If the **Outbound** tab is selected by default, you can do this step. If it isn't selected, confirm that you have selected it.
6. On the Oracle NetSuite card, select **View Details**.

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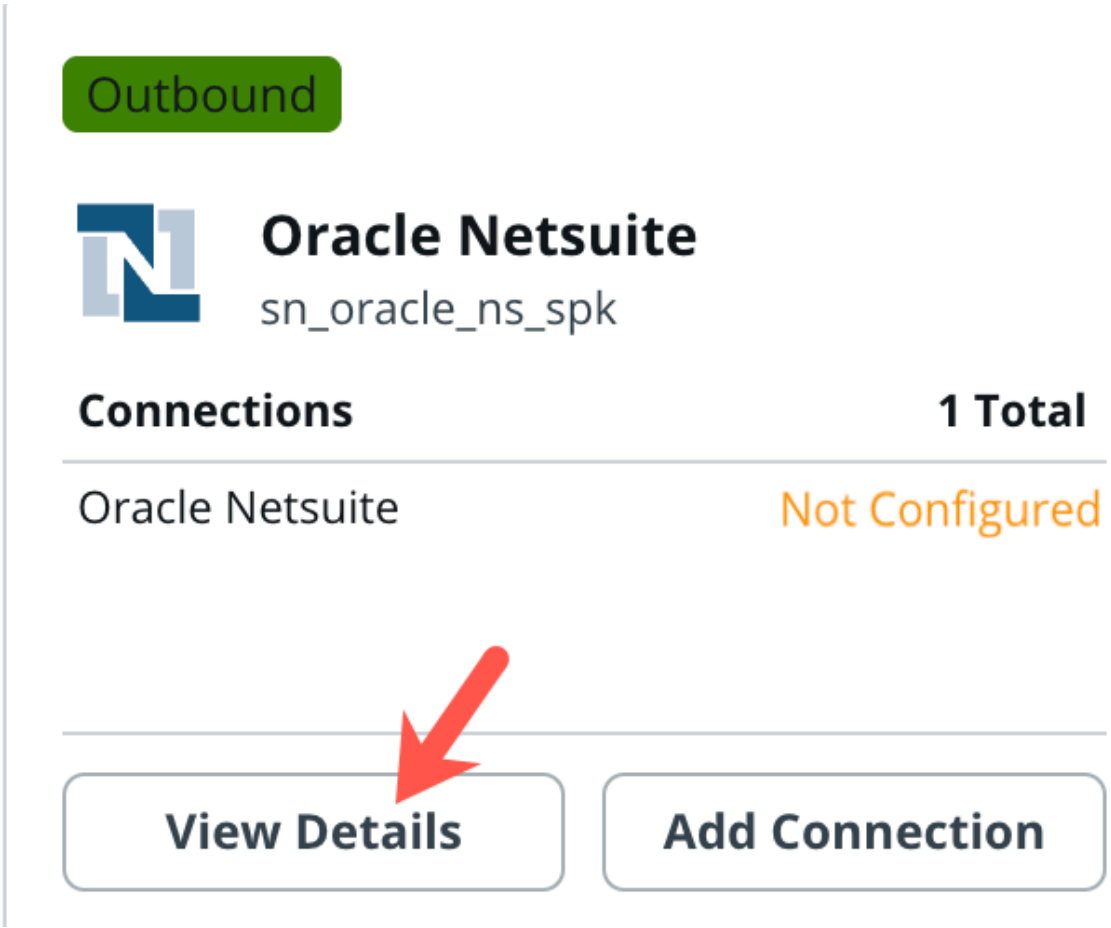
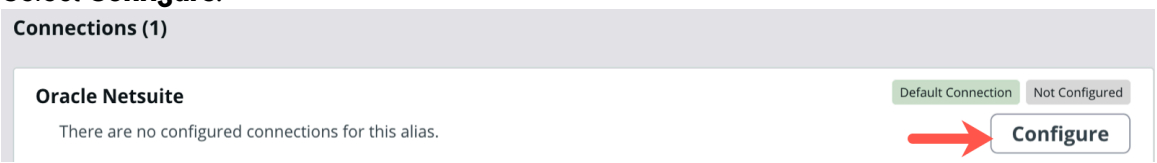


7. Select **Configure**.



8. Fill the form.

Configure Connection form

Field	Description
Connection Name	Option to provide a unique name to the connection record.
Connection URL	Option to provide the base API URL of the third-party application your ServiceNow instance connects to.
OAuth Entity Name	Option to provide the name of the OAuth Entity Configuration record in ServiceNow.
OAuth Client ID	Option to provide the OAuth client ID that you had generated earlier.
OAuth Client Secret	Option to provide the OAuth client secret that you had generated earlier.
OAuth API Script	Option to provide an optional Script Include in ServiceNow that can customize the OAuth flow. You must select

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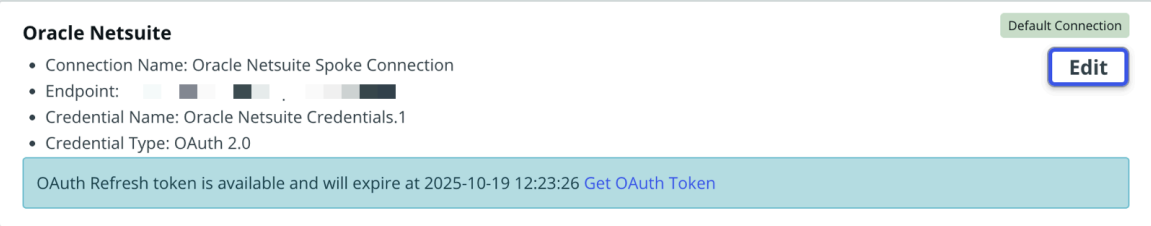
Field	Description
	`OAuthCustomOracleNetsuitGlobal` script that you had downloaded.
OAuth Redirect URL	Option to enter the redirect URI of ServiceNow instance in the format: `https://<instancename>.service-now.com/oauth_rediect.do`.
OAuth Authorization URL	Option to provide the URL of Oracle NetSuite's authorization server.
OAuth Token URL	Option to provide the endpoint that issues access tokens after authorization.

9. Select **Configure and Get OAuth Token**.
   The OAuth Access token is generated for the Oracle NetSuite spoke.

Note: You must log in to Oracle NetSuite before the OAuth access token is granted.



Generate webhook authentication token

Generate an authentication token that enables the Oracle NetSuite requests to your ServiceNow instance to get authenticated. The requests contain events occurring in the Oracle NetSuite real-time. For example, Oracle NetSuite sends a notification when a customer record is created.

Before you begin

Role required: admin

About this task

Important: Skip this procedure if you don't need to initiate an inbound call from Oracle NetSuite to ServiceNow.

Oracle NetSuite Webhook, a preconfigured sample scripted REST API, is available on your ServiceNow instance. It listens to events occurring on the Oracle NetSuite real-time, and logs the status of the events as success or failure in your ServiceNow instance. To enable the authentication of the events that Oracle NetSuite sends to the scripted REST API, you must generate an authentication token in the Oracle NetSuite webhook registry. The token is included in the webhook that Oracle NetSuite sends.

To access the webhook, navigate to **All>System Web Services> Scripted Web Services> Scripted REST APIs**, in the Name field, enter `Oracle NetSuite Webhook`, and press **Enter**.

Procedure

1. Navigate to **All** > **Oracle Netsuite Spoke** > **Webhook Registry**.
2. Select **New**.
3. Fill the form.

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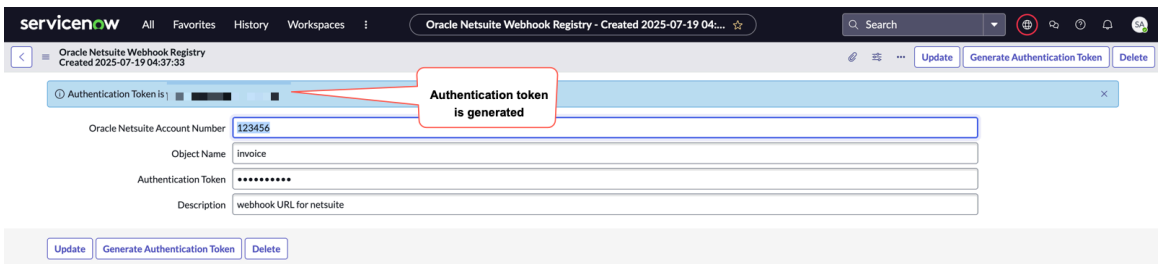
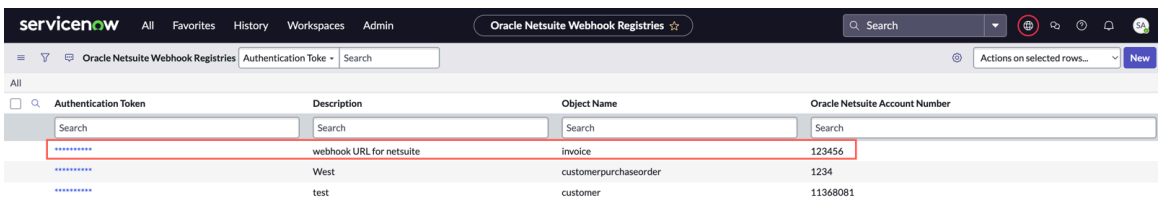
Oracle Netsuite Webhook Registry

Field	Description
Oracle Netsuite Account Number	Option to enter the account number that the Oracle NetSuite provides.
Object Name	Option to provide the type of the object in Oracle NetSuite that it includes in the webhook. For example, customer.
Authentication Token	Option to generate the authentication token that Oracle NetSuite uses to have its requests authenticated on your ServiceNow instance. The token is generated after you select **Generate Authentication Token**.
Description	Option to enter a description of the webhook.

4. Select **Generate Authentication Token**.
   The authentication token is generated.



5. Copy and store the authentication token at a secure place.
6. Select **Update**.
   The webhook is recorded in the webhook registry.



Deploy SuiteScript in Oracle NetSuite

Deploy a SuiteScript that enables the Oracle NetSuite to send real-time event details to the scripted API in your ServiceNow instance using the webhook.

Before you begin

Role required: admin

About this task

Important: Skip this procedure if you don't need to initiate an inbound call from Oracle NetSuite to ServiceNow.

ServiceNow provides a preconfigured sample SuiteScript that you can update and enable the Oracle NetSuite to send real-time events to the scripted API in your ServiceNow instance. You update the SuiteScript by providing the authentication token you had generated, ServiceNow

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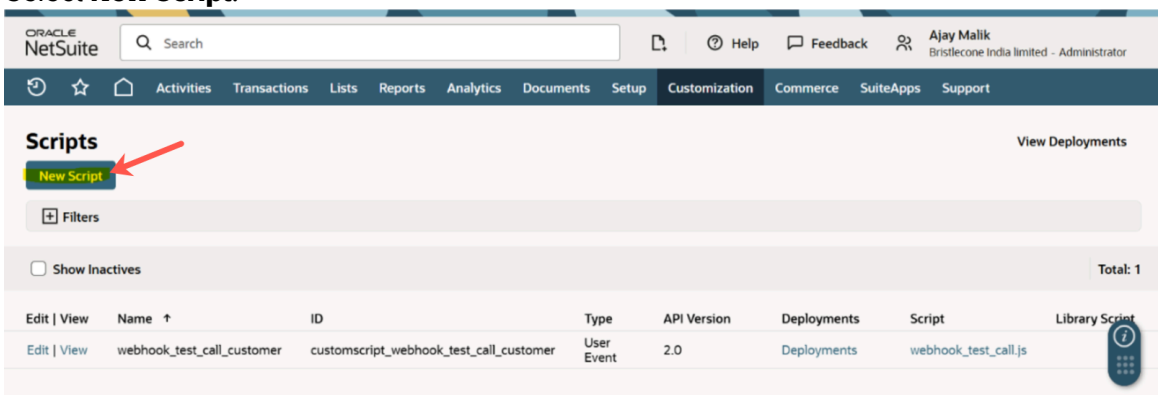
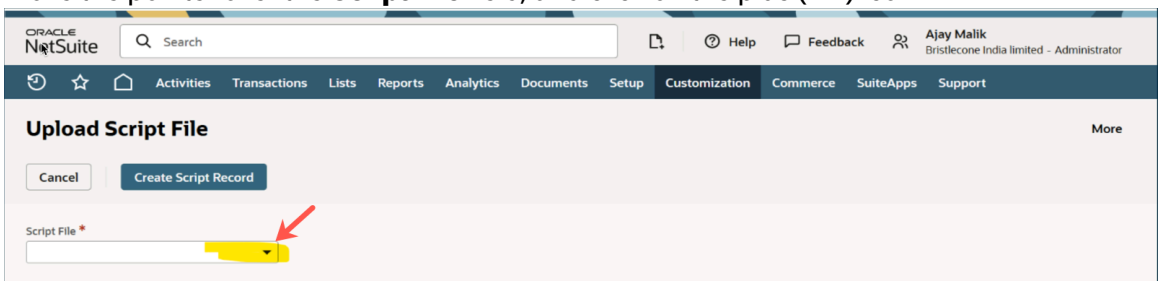
Webhook URL, object, and the Oracle NetSuite account number at appropriate places in the NetSuite script. After configuring the sample NetSuite script, you must deploy it on the Oracle NetSuite application so it can send events to the scripted API in your ServiceNow instance.

Procedure

1. From the Oracle NetSuite spoke page on ServiceNow Store, download the `servicenow_webhook_call.js` file to your local disk.
2. Log in to Oracle NetSuite.
3. Navigate to **Customization** > **Scripting** > **Scripts** > **New**.
4. Select **New Script**.



5. Move the pointer over the **Script File** field, and click on the plus (“+”) icon



6. Fill the form.

File table

Field	Description
Attach From	Option to indicate the location from which you will attach the SuiteScript.
File Name	Option to provide the name of the SuiteScript file. **Important:** You must provide the extension (.js) of the SuiteScript file with its name.
Folder	Option to provide the name of the folder that contains the SuiteScript file.
Select File	Option to select the SuiteScript file.

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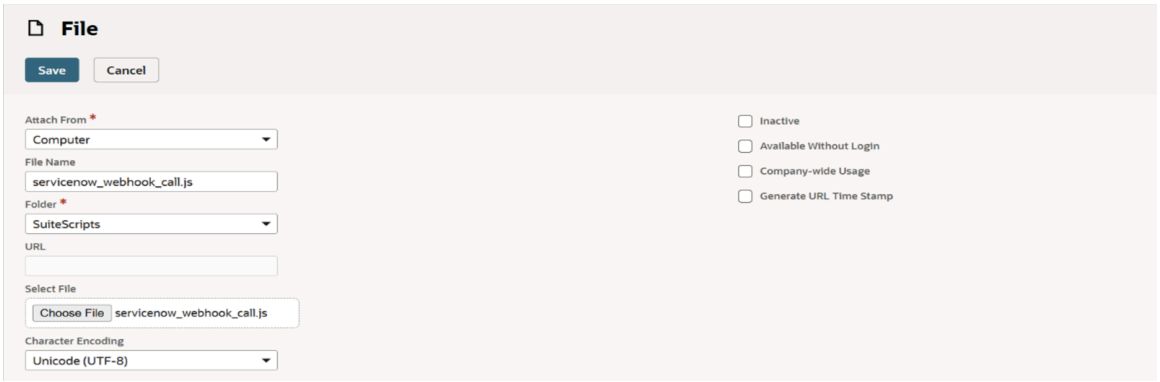
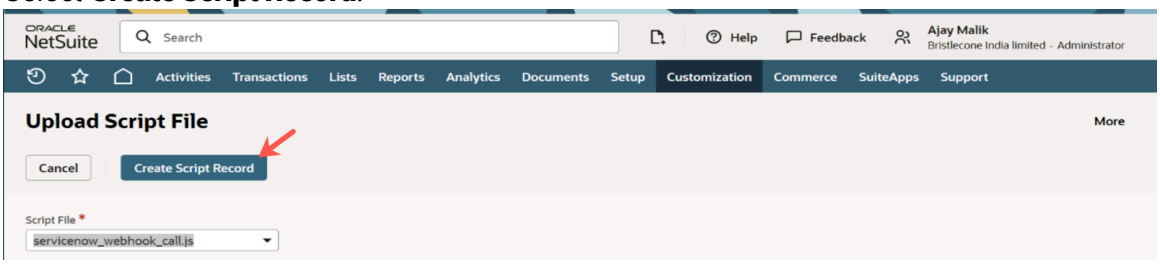
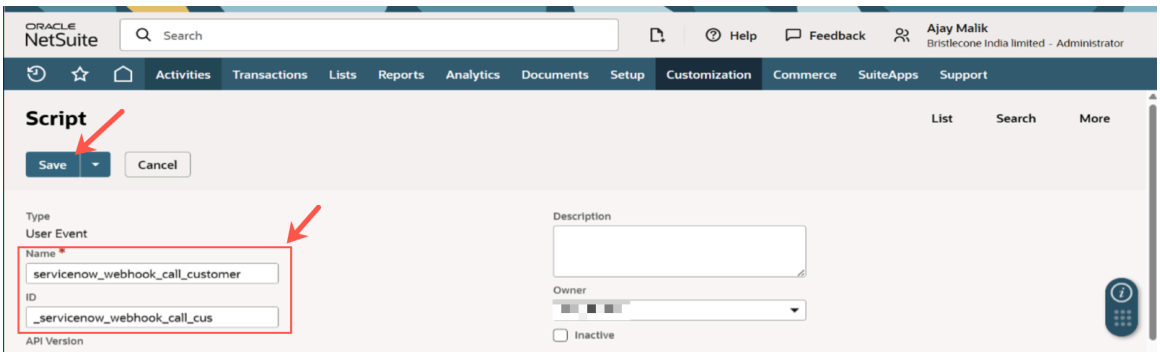


7. Select **Save**.
8. Select **Create Script Record**.

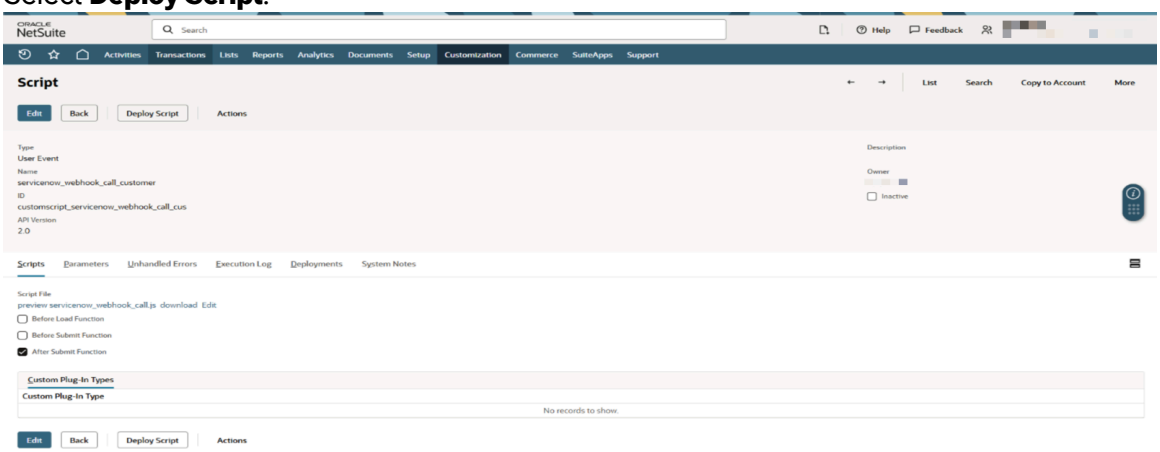


9. In the Name field, enter a unique name.
   For example, `servicenow_webhook_call_customer`.
10. Provide an ID format with underscores.
    For example, `_servicenow_webhook_call_cus`
11. Select **Save**.



The script record screen appears.

12. Select **Deploy Script**.



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13. In the Script Deployment page, enter the name of the object in the Applies to field.
    Example of an object: Customer.
14. Enter the ID that you have already created earlier in the procedure.
15. Enter information in the other fields, as required.
16. Select **Save**.
    The NetSuite script is deployed.

Oracle Object Storage Management Spoke

Manage objects, buckets, and namespace in the Oracle Object Storage Management account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle Object Storage Management spoke v1.0.3 is the latest version. For version history of the spoke, see Oracle Object Storage Management spoke release notes.

Supported versions

This spoke was built for Oracle Object Storage Management API version 20160918, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Oracle Cloud IAM Spoke
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Oracle Object Storage Management spoke provides actions to automate Oracle Object Storage Management tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
Bucket Management	Create Bucket	Creates a bucket in the specified Oracle Cloud Namespace.
	Delete Bucket	Deletes the specified bucket.
	Get Bucket	Retrieves details of the specified bucket.
	Look up Buckets	Retrieves a list of buckets in the specified compartment.
	Re-encrypt Bucket	Re-encrypts the specified bucket.
	Update Bucket	Updates details of the specified bucket.
Namespace Metadata	Get Namespace	Retrieves the name of the Object Storage namespace for the user.
Object Management	Copy Object	Creates a request to copy an object within a region or to another region.
	Create or Update Object	Creates a new object or overwrites an existing object with the same name
	Delete Object	Deletes the specified object.
	Get Object	Retrieves the specified object.
	Look up Objects	Retrieves a list of objects in the specified bucket.
	Re-encrypt Object	Re-encrypts the specified object.
	Rename Object	Renames the specified object.
	Restore Object	Restores the specified object.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Oracle Object Storage Management spoke.

Set up the Oracle Object Storage Management spoke

Integrate the ServiceNow instance and Oracle Object Storage Management account by using the OCI SHA256WithRSA Signature credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate and set up the Oracle Cloud IAM Spoke.
- Activate the Oracle Object Storage Management spoke.
- Role required: admin.

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Procedure

1. **Optional:** Create a JKS certificate.
   You can create a JKS certificate for the Oracle Object Storage Management spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating the JKS Certificate, see Create a Java KeyStore (JKS) certificate.
2. **Optional:** Create X.509 certificate.
   You can create a X.509 certificate for the Oracle Object Storage Management spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating a X.509 certificate, see Create X.509 certificate for the Oracle Cloud IAM spoke.
3. Create a child alias in the Oracle Cloud IAM spoke connection and credential alias.
   a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.
   b. Click **New**.
   c. On the form, fill these values:

Connection & Credential Aliases form

Field	Description
Name	Name to identify the alias record. For example, `Oracle Obj Storage Alias`.
Parent Alias	Connection and credential alias record of the Oracle Cloud IAM spoke. For example, **sn_oci_iam_spoke.OracleIAM_credentialANDconnecton**.

   d. Right-click the form header and click **Save**.
4. Create credential record for the Oracle Object Storage Management spoke.
   a. Navigate to **Connections & Credentials** > **Credentials**.
   b. Click **New**.
   The system displays this message: `What type of Credentials would you like to create?`
   c. Select **OCI SHA256WithRSA Signature**.
   d. On the form, fill these values.

> **Note:** You can specify details of the certificates you created specifically for the Oracle Object Storage Management spoke or specify details of the existing certificates you had created for the Oracle Cloud IAM spoke.

OCI SHA256WithRSA Signature Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `OCI Obj Cred`.

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Field	Description
Certificate Sys ID	Sys ID of the Signing Certificate.
Alias	Alias of the KeyStore.
Alias Password	Alias password of the KeyStore.
Key ID	Key ID helps identify which key is used when multiple keys are used to sign tokens. The Key ID must be slash (/) separated values of Tenancy OCID, User OCID, and Fingerprint in this format: `ocid1.tenancy.oc1..<unique_ID>/ocid1.user.oc1..<unique_ID>/<key_fingerprint>`.
Applies to	Option to specify if the credential applies to all MID Servers in the network.
Active	Option to actively use the credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select `OCI SHA256RSA Signing Algorithm`

e. Right-click the form header and click **Submit**.

5. Create connection record for the Oracle Object Storage Management spoke.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the child alias record you had created. For example, **Oracle Obj Storage Alias**.

c. From the **Connections** tab, click **New**.

d. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle Obj Storage conn`.
Credential	Credential record created for Oracle Object Storage Management spoke. For example, `OCI Obj Cred`.
Connection alias	Alias record associated with this connection.
Connection URL	Base URL to connect to Oracle Object Storage Management. For example, `https://objectstorage.ap-mumbai-1.oraclecloud.com`.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

e. Click **Submit**.

The ServiceNow instance and Oracle Object Storage Management account are integrated. You can use the spoke actions to build flows and automate tasks as required.

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Oracle Peoplesoft Financial Spoke

Manage finances and procurement in the Oracle Peoplesoft Financial instance from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle Peoplesoft Financial spoke v1.2.1 is the latest version. For version history of the spoke, see Oracle Peoplesoft Financial spoke release notes.

Supported versions

- PeopleSoft FSCM 9.2 Update Image 37
- PeopleTools 8.58.05
- Oracle Database 19.3.0.0
- Elasticsearch 7.0.0
- Kibana 7.0.0
- Oracle Linux 7.8x
- Oracle Database version above 12.2.0.0
- PeopleTools above 8.56

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Remote Tables (com.glide.script.vtable)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- ServiceNow IntegrationHub Action Step - SOAP (com.glide.hub.action_step.soap)
- ServiceNow IntegrationHub Action Step - XML Parser (com.glide.hub.action_step.xmlparser)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke flows

The Oracle Peoplesoft Financial spoke provides a sample flow, Create PO, to demonstrate automating the PO creation. To customize the sample flow, copy it to the required application scope.

Spoke subflows

The Oracle Peoplesoft Financial spoke provides sample subflows to demonstrate automating tasks. To customize a sample subflow, copy it to the required application scope. Available sample subflows include:

Subflow	Description
BU and Vendor Validation	Validates if a vendor or business unit exists in Oracle Peoplesoft Financial.
Create PO After BU Validation	Validates a business unit before creating a purchase order using that business unit.
Polling Suppliers	Retrieves details of the daily suppliers based on the mentioned polling frequency and creates or updates records in PSFT data table based on Vendor ID.

Spoke actions

The Oracle Peoplesoft Financial spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Finance	Create Bulk Journals	Creates bulk journals.
	Create Invoice	Creates an invoice in Oracle Peoplesoft Financial.
	Get Business Unit By Business Unit ID	Retrieves details of the specified business unit.
	Get Department By Department ID	Retrieves the department cost center details of the specified department.
	Get GI Account Details	Retrieves details of the specified GI account.
	Get Item Details	Retrieves details of the items, based on the input criteria.
	Lookup AP Invoice Line	Retrieves the AP invoice line details of the specified voucher.
	Lookup AP Invoice Header	Retrieves details of the AP invoice headers, based on the input criteria.
	Lookup Business Units	Retrieves details of the business units, based on the input criteria.
	Lookup Currency Rate	Retrieves details of the currency market rate, based on the input criteria.

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Category	Action	Description
	Lookup Departments	Retrieves details of the departments, based on the input criteria.
	Lookup GI Balance	Retrieves details of the GI balance, based on the input criteria.
	Lookup Invoice Payment Status	Retrieves the list of invoice statuses, based on the input criteria.
Procurement	Cancel PO	Cancels the specified PO.
	Create Bid Event	Creates a bid event in the specified business unit.
	Create Bulk Assets	Creates assets with the provided details.
	Create Bulk Goods Receipts	Creates good receipts with the provided details.
	Create PO	Creates a PO with the provided details.
	Create Vendor	Creates a vendor with the provided details.
	Get Ship To Location By Ship To ID	Retrieves all the ship to locations details, based on the input Ship to ID.
	Get Supplier By Vendor ID	Retrieves the supplier details based on the input Vendor ID.
	Lookup Fixed Assets	Retrieves details of all the fixed assets, based on the input criteria.
	Lookup Advance Shipment Receipts	Retrieves details of the advance shipment receipts, based on the input criteria.
	Lookup Bid Event	Retrieves details of all the bid events, based on the input criteria.
	Lookup PO Header	Retrieves details of the PO header, based on the input criteria.
	Lookup PO Line	Retrieves details of the PO line, based on the input criteria.
	Lookup Ship To Locations	Retrieves list of all the ship to locations, based on the input criteria.
	Lookup Suppliers	Retrieves details of all the suppliers, based on the input criteria.
	Update PO	Updates details of the PO.
Utility		
	Process Trigger	Triggers the specified process.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Oracle Peoplesoft Financial spoke.

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MID Server requirements

To use these actions, your instance must have a MID Server set up and configured to use SOAP. For more information about running actions on the MID Server, see Integration steps. For more information about the MID Server, see MID Server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Oracle Peoplesoft Financial spoke

Integrate the Oracle Peoplesoft Financial and ServiceNow instances, and authenticate the requests using the basic authentication.

Before you begin

- Request an Integration Hub subscription.
- Activate the Oracle Peoplesoft Financial spoke.
- Ensure that you have access to Oracle Peoplesoft Application Designer.
- Roles required: ServiceNow admin and Oracle Peoplesoft Financial System Admin.

Procedure

1. In the Application Designer, import the Oracle Peoplesoft Financial project.

   a. From the ServiceNow® Store download the project file, SN_PS_FSCM_INTEGRATION.zip and save it in the required local folder.

   b. Import the Oracle Peoplesoft Financial project to the target environment that is, Oracle Peoplesoft Application Designer.

   c. Navigate to **Copy Project** > **From File** and select the project file.

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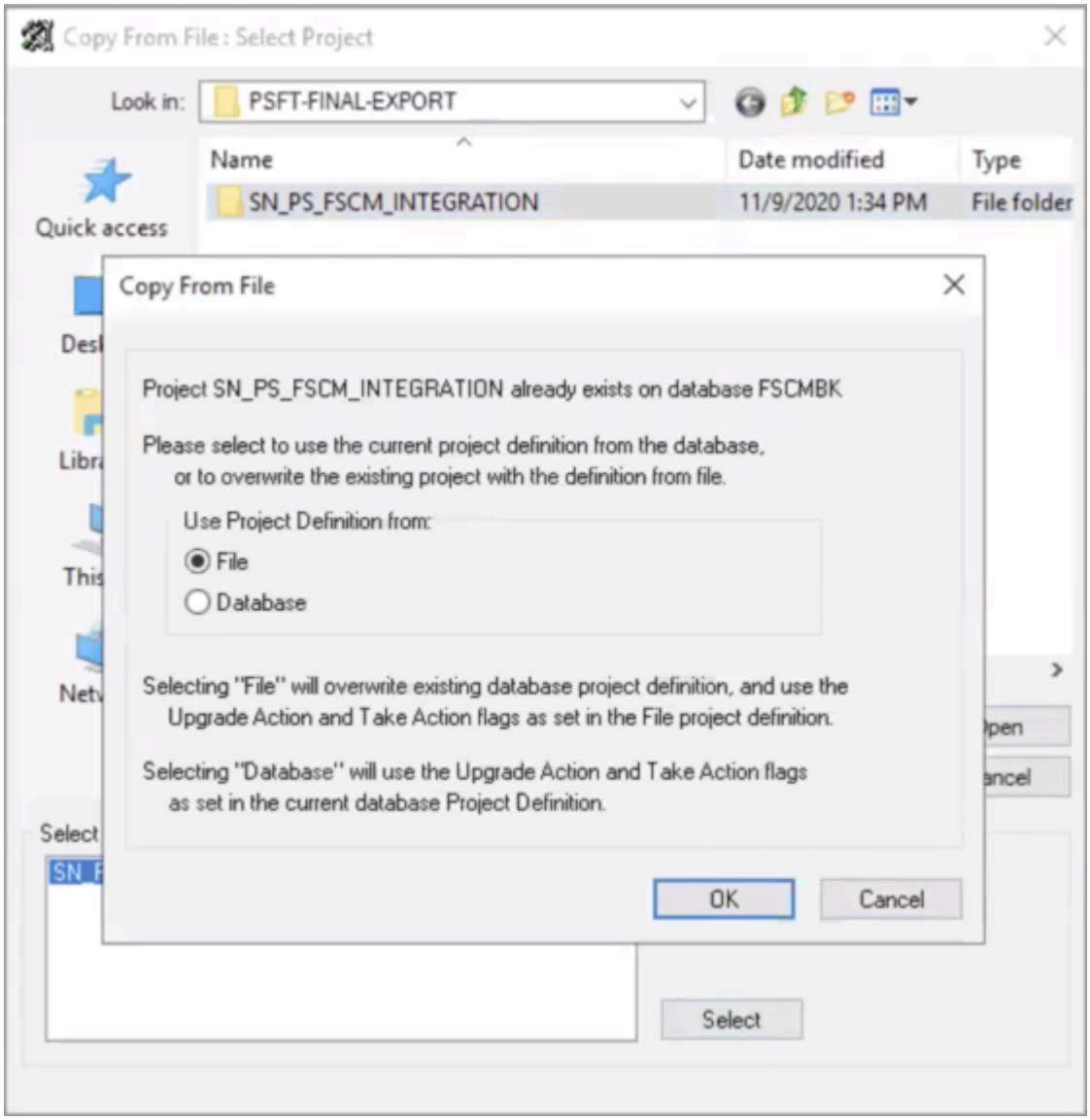
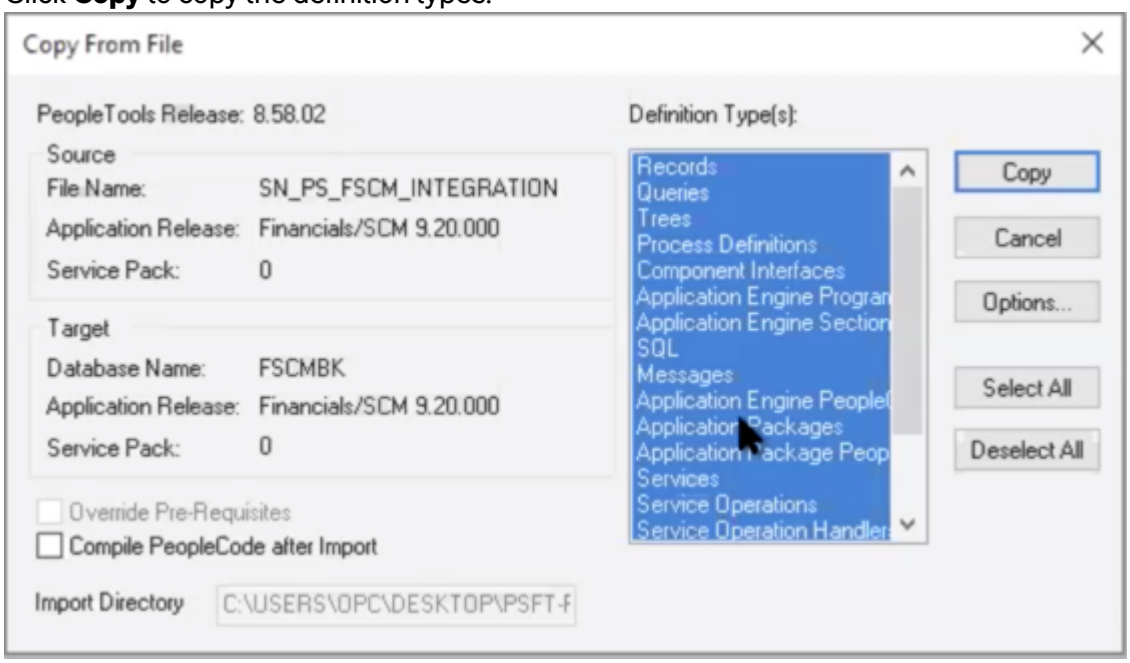


d. Click **Copy** to copy the definition types.



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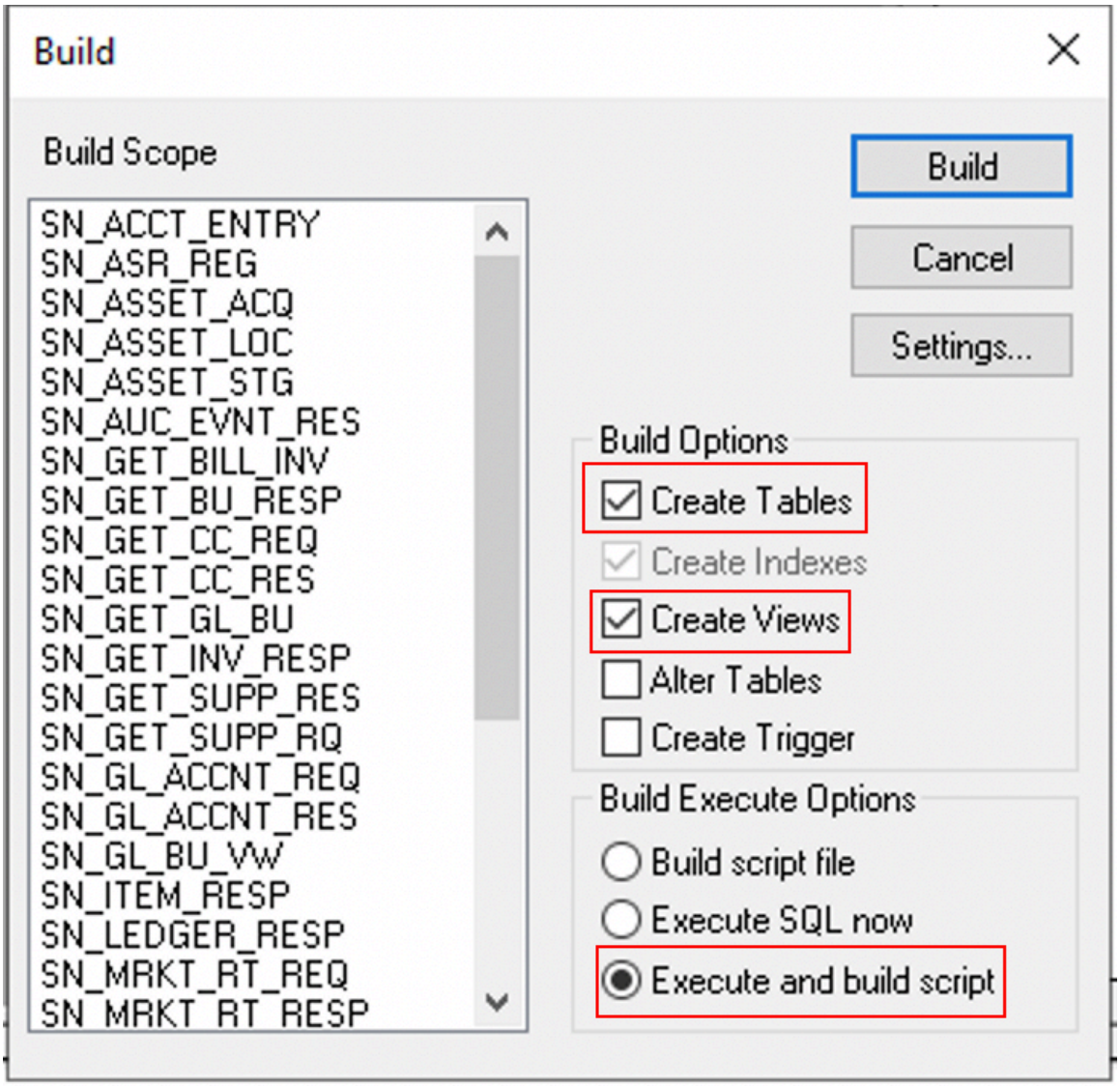
e. Verify that the project has all the objects; Application packages, Records, Services, and Service Operations.

f. Build the project by navigating to **Build** > **Project**.

g. Select **Create Tables**, **Create Views**, and **Execute and build script** options.



The required tables are created in the target Oracle Peoplesoft Financial database.

2. Enable the required web services on your Oracle Peoplesoft Financial instance.

a. Log in to your Oracle Peoplesoft Financial instance as an System Admin.

b. Navigate to **Navigator** > **People Tools** > **Integration Broker** > **Web Services** > **Provide Web Service**.

c. In the Search Criteria, specify `sn_` for **Service Name** and click **Search**.

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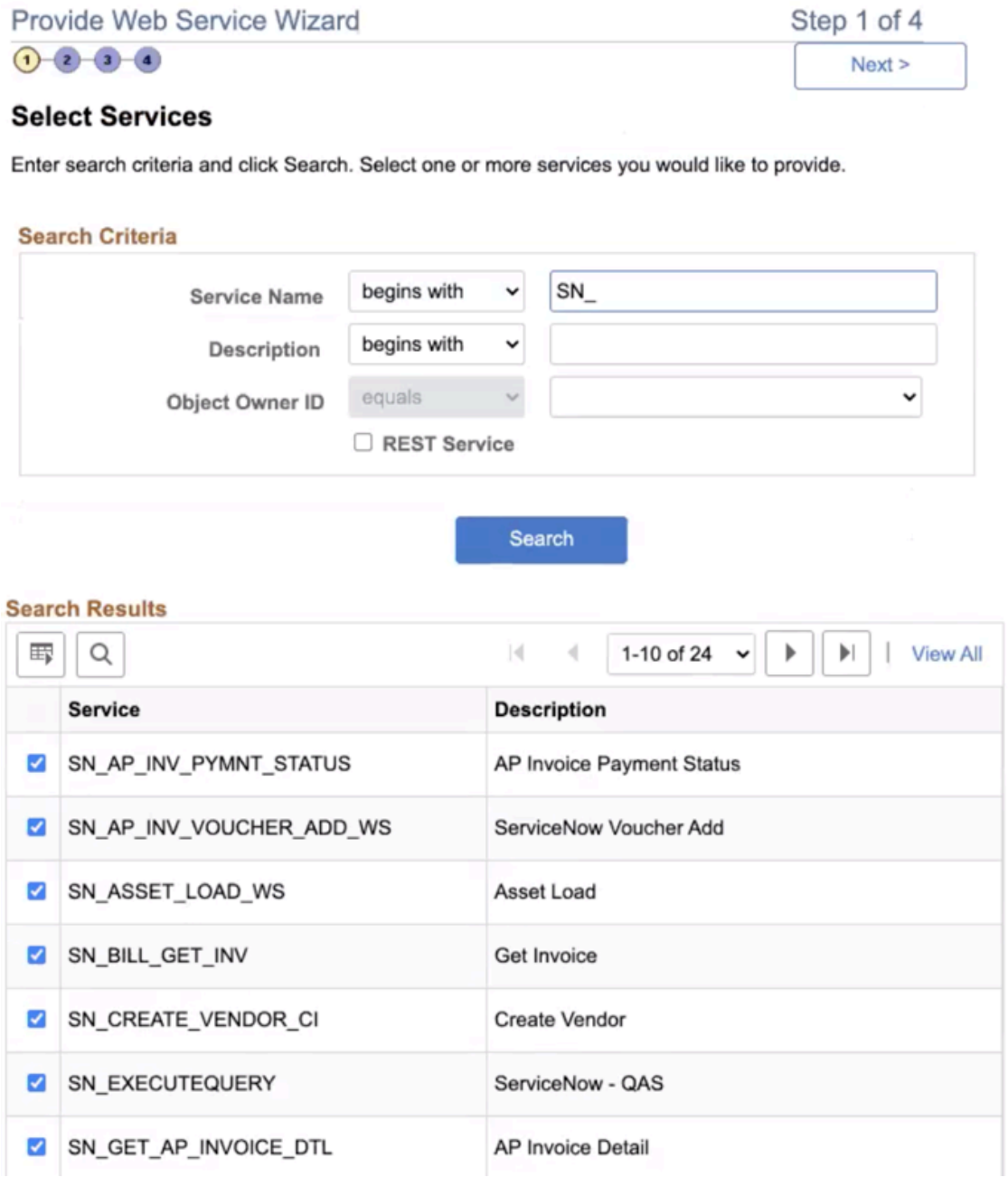

d. Select the check box against the required web services and click **Next**.

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Note: Ensure that you select 24 ServiceNow web services.

Service	Description
SN_AP_INV_PYMNT_STATUS	AP Invoice Payment Status
SN_AP_INV_VOUCHER_ADD_WS	ServiceNow Voucher Add
SN_ASSET_LOAD_WS	Asset Load
SN_BILL_GET_INV	Get Invoice
SN_CREATE_VENDOR_CI	Create Vendor
SN_EXECUTEQUERY	ServiceNow - QAS
SN_GET_AP_INVOICE_DTL	AP Invoice Detail
SN_GET_ASR	Advance Shipment Receipt
SN_GET_ASSET	SN_GET_ASSET
SN_GET_BID_EVENT	ServiceNow Bid Event
SN_GET_CC	Get Const centres
SN_GET_CURRENCY_RATES	Get Currency Rates
SN_GET_GL_ACCOUNT	Get GI Accounts
SN_GET_GL_BALANCE	Ledger Data
SN_GET_GL_BU	Get GL BU
SN_GET_ITEM_MASTER	Item Master
SN_GET_POHDR	PO Header
SN_GET_POLN	Get PO Line
SN_GET_SHIPTO_LOCATIONS	Get Ship to Locations
SN_GET_SUPPLIERS	Get Suppliers/Vendors
SN_JOURNAL_LOAD	ServiceNow Journal Load
SN_MANAGE_PROCESSES	ServiceNow Process webservice
SN_PO_CANCEL	SN PO CANCEL
SN_RECPT_LOAD	Receipt frm SN

e. Under **Operations**, select the check box against the required web service and click **Next**.

f. Click **View WSDL** to view the WSDL file and click **Next**.

g. In **Specify Publishing Options**, click **Finish**.
Generated WSDL URL is displayed in this format: `<Base-URL>/<webservice-endpoint>.wsdl`

h. Navigate to **Navigator** > **People Tools** > **Integration Broker** > **Web Services** > **CI-Based Services**.

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i. Perform the same steps that you had earlier performed for the webservices.

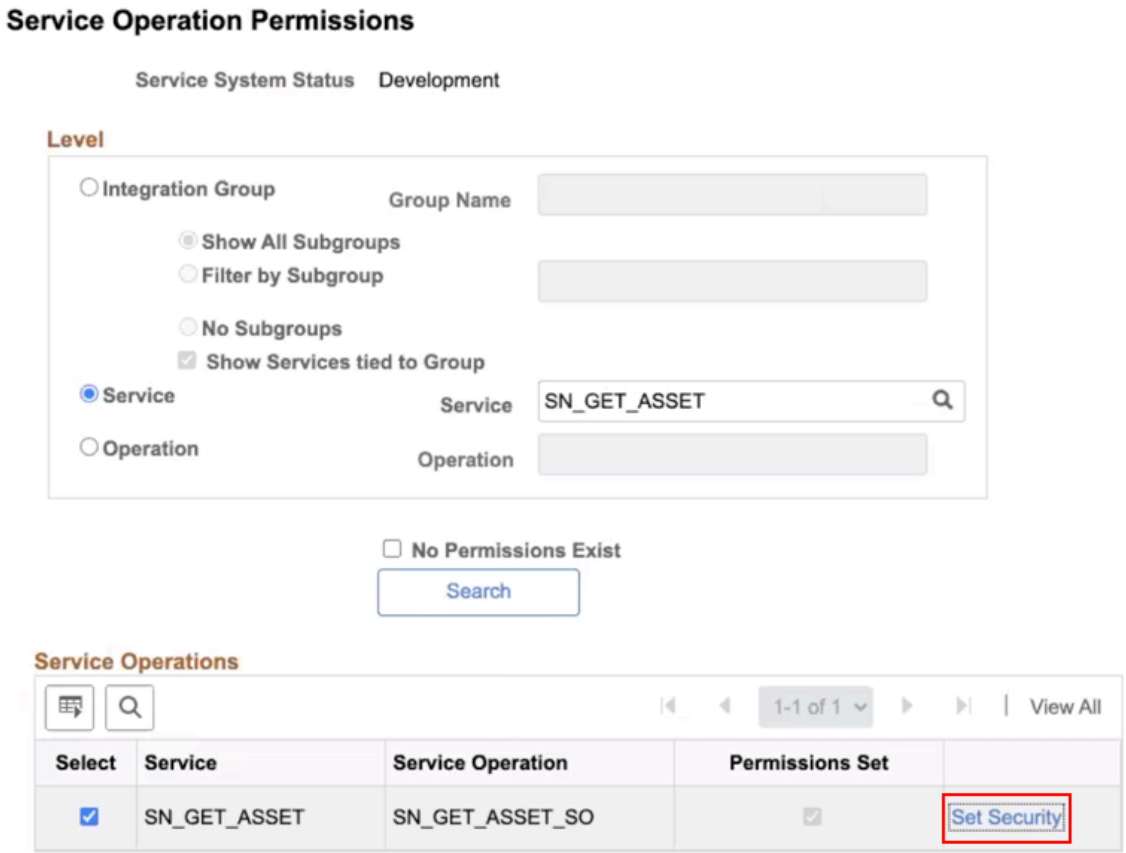
Note: Configure the webservices as per your requirement.

3. Provide the required permissions to the web services.

a. Log in to your Oracle Peoplesoft Financial instance as a System Admin.

b. Navigate to **Navigator** > **People Tools** > **Integration Broker** > **Web Services** > **Service Utilities** > **Service Operation Permissions**.

c. Select **Service** option, specify the service name in **Service**, and click **Search**.



d. Select the check box against the required web service and click **Set Security**.

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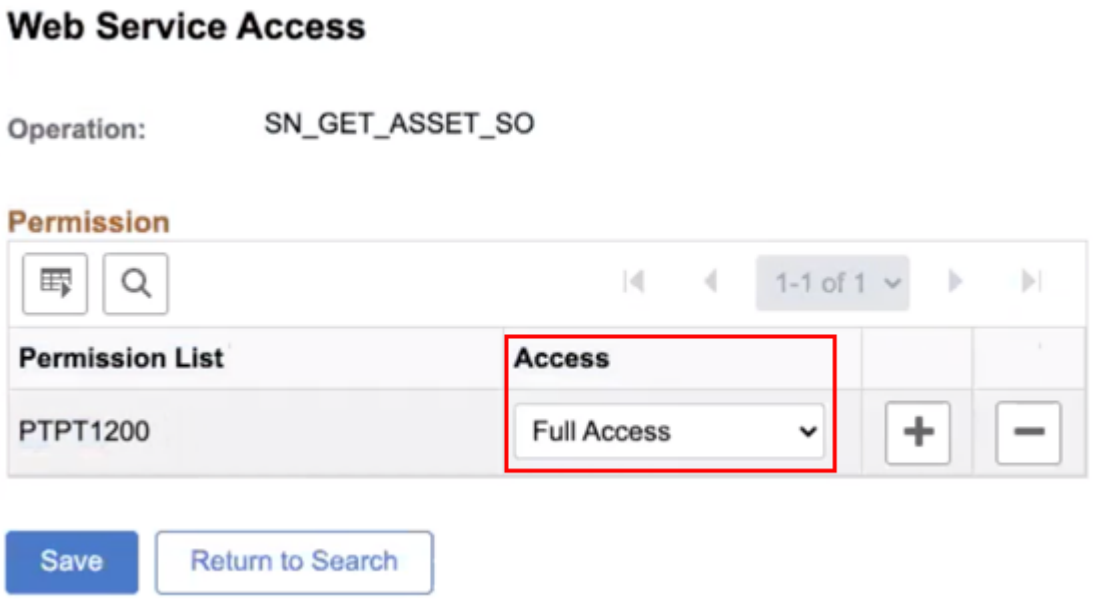
e. In **Web Service Access**, provide access as per your requirement and click **Save**.



4. Using SQL Developer or Data Mover in Oracle Peoplesoft Application Designer, connect to the database and run these scripts to ensure that the journal entry, SN_ACCT_ENTRY is built.

```
SET DEFINE OFF;

Insert into PS_SOURCE_TBL
 (SETID,SOURCE,EFFDT,EFF_STATUS,DESCR,JRNL_BALANCE_OPTN,JRNL_ED
IT_ERR_OPTN,JRNL_AMT_ERR_OPTN,JRNL_DT_ERR_OPTN,JRNL_DT_ERR_OPTN
2,CONTROL_TOTAL_OPTN,CURRENCY_BAL_OPTN,EXCHANGE_RATE_OPTN,BASE_
CUR_ADJ_OPTN,JRNL_FOREIGN_OPTN,POST_ZERO_SW,JRNL_APPRVL_OPTN,BD
_JRNL_APPR_OPTN,BUSPROCNAME,APPR_RULE_SET,BUSPROCNAME_BD,APPR_R
ULE_SET_BD,PHYSICAL_NATURE,DOC_TYPE_OPTN,DOC_TYPE) values
 ('SHARE','SN',to_date('01-JAN-00','DD-MON-RR'),'A','ServiceNow
','R','R','R','D','D','R','D','D','D','D','N','D','D',' ',' ','
 ',' ',' ',' ','D',' ');
```

```
Insert into PS_JRNLGEN_DEFN
 (SETID,ACCTG_DEF_NAME,DESCR,RECNAME,RECNAME_UPDATE,RECNAME_REF
REC_KEY,FIELDNAME_ACCTDATE,FIELDNAME_MON_AMT,FIELDNAME_FRN_AMT,
FIELDNAME_STAT_AMT,FIELDNAME_DESCR,FIELDNAME_JRNL_REF,FIELDNAME
_OPEN_KEY,FIELDNAME_STLMT_DT,FIELDNAME_DT_STAMP,SYSTEM_SOURCE,B
UDGET_AMT_TYPE,PNLNAME,DRILL_DOWN_OPTN,KK_SKIP,JGEN_KK_OPTN,KK_
AMOUNT_TYPE,APPL_JRNL_ID_DFLT) values
 ('SHARE','SNOW_PSFT','ServiceNow Accounting
 Entries','SN_ACCT_ENTRY','SN_ACCT_ENTRY','
 ','ACCOUNTING_DT','MONETARY_AMOUNT','FOREIGN_AMOUNT','STATISTI
C_AMOUNT','LINE_DESCR','
 ','JRNL_LN_REF','ACCOUNTING_DT','DTTM_STAMP','GOT','OT','JGEN_
ACCTG_DRILL','Y','1','V','1',' ');
```

```
Insert into PS_JRNLGEN_DEFNV
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,CHARTFIELD,CF_S
UMMARIZE_OPT) values
 ('SHARE','SNOW_PSFT',1,'ACCOUNT','ACCOUNT','Y');
```

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```
Insert into PS_JRNLGEN_DEFNV
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,CHARTFIELD,CF_S
UMMARIZE_OPT) values
 ('SHARE','SNOW_PSFT',2,'ALTACCT','ALTACCT','Y');
Insert into PS_JRNLGEN_DEFNV
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,CHARTFIELD,CF_S
UMMARIZE_OPT) values
 ('SHARE','SNOW_PSFT',3,'OPERATING_UNIT','OPERATING_UNIT','Y');
Insert into PS_JRNLGEN_DEFNV
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,CHARTFIELD,CF_S
UMMARIZE_OPT) values
 ('SHARE','SNOW_PSFT',4,'DEPTID','DEPTID','Y');
Insert into PS_JRNLGEN_DEFNV
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,CHARTFIELD,CF_S
UMMARIZE_OPT) values
 ('SHARE','SNOW_PSFT',5,'PRODUCT','PRODUCT','Y');
Insert into PS_JRNLGEN_DEFNV
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,CHARTFIELD,CF_S
UMMARIZE_OPT) values
 ('SHARE','SNOW_PSFT',6,'PROJECT_ID','PROJECT_ID','Y');
Insert into PS_JRNLGEN_DEFNV
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,CHARTFIELD,CF_S
UMMARIZE_OPT) values
 ('SHARE','SNOW_PSFT',7,'AFFILIATE','AFFILIATE','Y');
Insert into PS_JRNLGEN_DEFNV
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,CHARTFIELD,CF_S
UMMARIZE_OPT) values
 ('SHARE','SNOW_PSFT',8,'STATISTICS_CODE','STATISTICS_CODE','Y
');
```

```
Insert into PS_JRNLGEN_DEFMB
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME) values
 ('SHARE','SNOW_PSFT',1,'BUSINESS_UNIT');
Insert into PS_JRNLGEN_DEFMB
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME) values
 ('SHARE','SNOW_PSFT',2,'TRANSACTION_ID');
Insert into PS_JRNLGEN_DEFMB
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME) values
 ('SHARE','SNOW_PSFT',3,'LEDGER_GROUP');
Insert into PS_JRNLGEN_TGRP
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,FIELD_VALUE1)
 values ('SHARE','SNOW_PSFT',1,'BUSINESS_UNIT',' ');
Insert into PS_JRNLGEN_TGRP
 (SETID,ACCTG_DEF_NAME,FIELD_SEQUENCE,FIELDNAME,FIELD_VALUE1)
 values ('SHARE','SNOW_PSFT',2,'TRANSACTION_ID',' ');
Insert into PS_JRNLGEN_APPL_ID
 (SETID,APPL_JRNL_ID,EFFDT,EFF_STATUS,DESCR,JOURNAL_ID_MASK,JRN
L_DT_OPTN,JRNL_DT_ALT_OPTN,JOURNAL_DATE,STAY_IN_PERIOD,SOURCE,C
URR_EFFDT_FLG,JRNL_DESCR,LINE_DESCR,TRANS_REF_NUM,JRNL_LN_REF,H
OW_SPECIFY,ACCOUNT_SPECIFY,DEFAULT_SPECIFY,TREE_NAME,TREE_LEVEL
,REVERSAL_CD,ENTRY_SYNC,BUS_UNIT_OPTN,DOC_TYPE) values
 ('SHARE','SNOW_PSFT',to_date('01-JAN-00','DD-MON-RR'),'A','Ser
viceNow Journal
 Template','SN','A','BF',null,'N','SN','J','ServiceNow External
 Journals','ServiceNow Journal Template',' ',' ','D','1','D','
 ',' ','N','Y','A','GN-JG');
```

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```
Insert into
 PS_JRNLGEN_REQUEST(OPRID,RUN_CNTL_ID,REQUEST_NBR,PROCESS_FREQU
ENCY,PROCESS_STATUS,PROCESS_INSTANCE,PROCESS_ORIG,DTTM_STAMP_SE
C,SETID,FROM_DT_OPTN,FROM_DT,TO_DT_OPTN,TO_DT,APPL_JRNL_ID,LEDG
ER_GROUP,BUSINESS_UNIT,ACCTG_DEF_NAME,JRNL_EDIT_OPTN,JRNL_BGTCH
K_OPTN,JRNL_POST_OPTN,RTM_PRCS_FLG) values
 ('VP1','SN-PSFT',1,'A','C',200255,'P',to_timestamp('16-JUL-20
 02.03.43.204000000 PM','DD-MON-RR HH.MI.SSXFF
 AM'),'SHARE','N',null,'C',null,'SNOW_PSFT','RECORDING','
 ','SNOW_PSFT','Y','N','N',' ');
```

```
Insert into PS_PRCSRUNCNTL
 (OPRID,RUN_CNTL_ID,LANGUAGE_CD,LANGUAGE_OPTION) values
 ('VP1','SN-PSFT','ENG','O');
Insert into PS_PRCSRUNCNTL
 (OPRID,RUN_CNTL_ID,LANGUAGE_CD,LANGUAGE_OPTION) values
 ('VP1','SN_LOAD_1','ENG','O');
Insert into PS_PRCSRUNCNTL
 (OPRID,RUN_CNTL_ID,LANGUAGE_CD,LANGUAGE_OPTION) values
 ('VP1','SN_PSFT_AP_VOUCHER_BUILD','ENG','O');
```

5. Configure a connection record for the Oracle Peoplesoft Financial spoke.

   a. Log in to the ServiceNow instance as an admin.

   b. Navigate to **All** > **Process Automation** > **Flow Designer**

   c. Select the **Connections** tab.

   d. Locate the **Oracle_PeopleSoft** alias and click **View Details**.

      Note: Don't click **Add Connection**.

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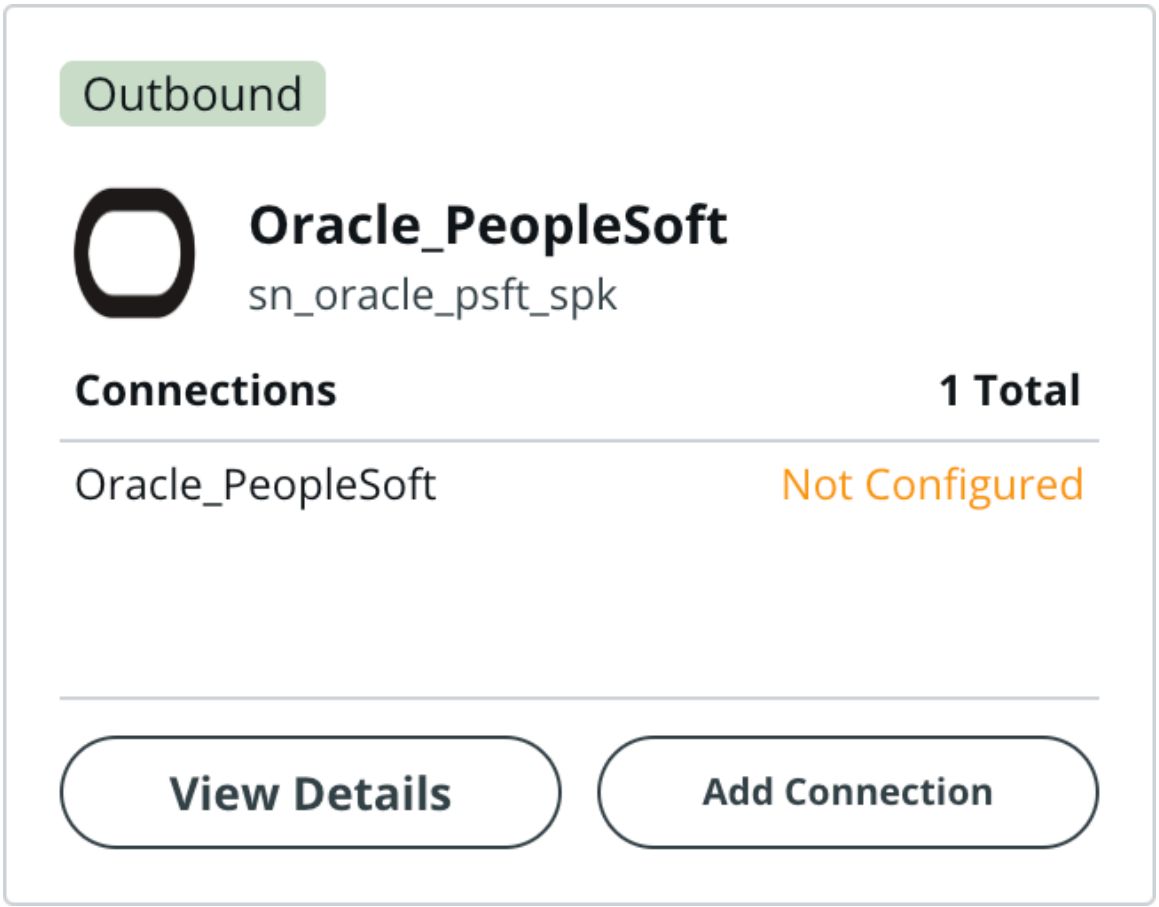

e. Click **Configure**.



f. On the **Configure Connection**, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection.
Connection URL	Base URL obtained from the generated WSDL URL. **Note:** Remove the `<webservice-endpoint>.wsdl` part of the WSDL URL while specifying the Connection URL.
User name	User name of your Oracle Peoplesoft Financial account.
Password	Password of your Oracle Peoplesoft Financial account.

g. Click **Configure Connection**.

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6. Provide Oracle Peoplesoft Financial credentials to use the Process Trigger action.
   a. Log in to the ServiceNow instance as an admin.
   b. Navigate to **Oracle Peoplesoft Credentials** > **Oracle Peoplesoft Credentials**.
   c. Click **New**.
   d. On the form, enter the username and password of user with the required permissions.
   e. Click **Submit**.
7. Retrieve details of the daily suppliers up to the required date.
   a. Log in to the ServiceNow instance as an admin.
   b. Navigate to **PSFT Flow Execution** > **PSFT Flow Executions**.
   c. Click **New**.
   d. Select the date up to which you want to retrieve the daily suppliers data in **Last Successfull Execution**.
   e. Click **Submit**.
   Based on the trigger you have configured in the Polling Suppliers subflow, data is retrieved periodically. To view the data, navigate to **PSFT** > **PSFT Data**.

Oracle Virtual Cloud Network Spoke

Manage networks, route tables, security lists, and subnets in Oracle Virtual Cloud Network account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Oracle Virtual Cloud Network spoke v1.0.4 is the latest version. For version history of the spoke, see Oracle Virtual Cloud Network spoke release notes.

Supported versions

This spoke was built for Oracle Virtual Cloud Network API version 20160918, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Oracle Cloud IAM Spoke
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

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- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Oracle Virtual Cloud Network spoke provides actions to automate Oracle Virtual Cloud Network tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Network Management	Change Network Compartment	Moves the specified VCN to a different compartment within the same tenancy.
	Create Network	Creates a virtual cloud network.
	Delete Network	Delete the specified VCN.
	Get Network	Retrieves details of the required VCN.
	Look up Networks	Lists the VCNs in the specified compartment.
	Update Network	Updates details of the specified VCN.
Route Table Management	Change Route Table Compartment	Moves a route table to different compartment within the same tenancy.
	Create Route Table	Creates a route table for the specified VCN.
	Delete Route Table	Delete the specified route table.
	Get Route Table	Retrieves the specified route table details.
	Look up Route Tables	Lists the route table in the specified compartment.
	Update Route Table	Updates details of the specified route table.
Security List Management	Change Security List Compartment	Moves the specified security list to different compartment within the same tenancy.
	Create Security List	Creates a security list for the specified VCN.
	Delete Security List	Deletes the specified security list.
	Get Security List	Retrieves specified security list's information.
	Look up Security Lists	Lists the security lists in the specified compartment.
	Update Security List	Updates display name or rules of the specified security list.
Subnet Management	Change Subnet Compartment	Moves the specified subnet to a different compartment within the same tenancy.
	Create Subnet	Creates a subnet in the specified VCN.
	Delete Subnet	Deletes the specified subnet.
	Get Subnet	Retrieves details of the specified subnet.
	Look up Subnets	Lists the subnets in the specified compartment.
	Update Subnet	Updates subnet in the specified VCN.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Oracle Virtual Cloud Network spoke.

Set up the Oracle Virtual Cloud Network spoke

Integrate the ServiceNow instance and Oracle Virtual Cloud Network account by using the OCI SHA256WithRSA Signature credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate and set up the Oracle Cloud IAM Spoke.
- Activate the Oracle Virtual Cloud Network spoke.
- Role required: admin.

Procedure

1. **Optional:** Create a JKS certificate.
   You can create a JKS certificate for the Oracle Virtual Cloud Network spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating the JKS Certificate, see Create a Java KeyStore (JKS) certificate.
2. **Optional:** Create X.509 certificate.
   You can create a X.509 certificate for the Oracle Virtual Cloud Network spoke or use the certificate created for the Oracle Cloud IAM spoke. For information about creating a X.509 certificate, see Create X.509 certificate for the Oracle Cloud IAM spoke.
3. Create credential record for the Oracle Virtual Cloud Network spoke.

   a. Navigate to **Connections & Credentials** > **Credentials**.

   b. Click **New**.
   The system displays this message: `What type of Credentials would you like to create?`

   c. Select **OCI SHA256WithRSA Signature**.

   d. On the form, fill these values.

   Note: You can specify details of the certificates you created specifically for the Oracle Virtual Cloud Network spoke or specify details of the existing certificates you had created for the Oracle Cloud IAM spoke.

OCI SHA256WithRSA Signature Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle Virtual Cloud Network Cred`.

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Field	Description
Certificate Sys ID	Sys ID of the Signing Certificate.
Alias	Alias of the KeyStore.
Alias Password	Alias password of the KeyStore.
Key ID	Key ID helps identify which key is used when multiple keys are used to sign tokens. The Key ID must be slash (/) separated values of Tenancy OCID, User OCID, and Fingerprint in this format: `ocid1.tenancy.oc1..<unique_ID>/ocid1.user.oc1..<unique_ID>/<key_fingerprint>`.
Applies to	Option to specify if the credential applies to all MID Servers in the network.
Active	Option to actively use the credential record.
Authentication Algorithm	Custom authentication algorithm for outbound signing requests. Select `OCI SHA256RSA Signing Algorithm`

e. Right-click the form header and click **Submit**.

4. Create connection record for the Oracle Virtual Cloud Network spoke.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the alias record of the Oracle Virtual Cloud Network spoke, for example, **Oracle_VCN_Connection**.

c. From the **Connections** tab, click **New**.

d. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Oracle_VCN_Conn`.
Credential	Credential record created for Oracle Virtual Cloud Network spoke. For example, `Oracle Virtual Cloud Network Cred`.
Connection alias	Alias record associated with this connection.
Connection URL	Base URL to connect to Oracle Virtual Cloud Network. For example, `https://iaas.ap-mumbai-1.oraclecloud.com`.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.

e. Click **Submit**.

The ServiceNow instance and Oracle Virtual Cloud Network account are integrated. You can use the spoke actions to build flows and automate tasks as required.

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PagerDuty Spoke

The PagerDuty spoke provides actions to view and analyze meaningful usage data for PagerDuty software subscriptions. Analyze on-call users to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

PagerDuty spoke v1.6.0 is the latest version. For version history of the spoke, see PagerDuty spoke release notes.

Supported versions

This spoke was built for PagerDuty v1.5.1, but may be compatible with later versions.

Spoke requirements

PagerDuty global admin account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke subflows

The PagerDuty spoke provides sample subflows to demonstrate automating PagerDuty tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
PagerDuty Download Subscriptions	Downloads user subscriptions from the PagerDuty portal. To use this subflow, perform the steps outlined in Integrating with PagerDuty.

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Subflow	Description
PagerDuty Reclaim Subscription	Deactivates user accounts in PagerDuty. To use this subflow, perform the steps outlined in Integrating with PagerDuty.
PagerDuty Update User Activity	Retrieves the activity of users who are on an on-call schedule. To use this subflow, perform the steps outlined in Integrating with PagerDuty.

Spoke actions

The PagerDuty spoke provides actions to automate PagerDuty tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Audit Management	Look up Audit Record Stream	Retrieves information about the list of audits.
Business Service Management	Create Business Service	Creates business service by passing the Number field.
	Create Business Service Subscribers	Creates a business service subscriber.
	Delete Business Service	Deletes a business service.
	Look up Business Service by ID	Retrieves information about the specified business service.
	Look up Business Service Dependencies by Business Service ID	Retrieves the Business Service Dependencies by Business Service ID.
	Look up Business Service Subscribers by Business Service ID	Retrieves Business Service Subscribers by Business Service ID.
	Look up Business Services Stream	Retrieves a Business Services Stream.
	Remove Business Service Subscribers	Removes the specified business service subscriber.
	Update Business Service	Updates a business service.
Escalation Policy Management	Delete Escalation Policy	Deletes the specified escalation policy.
	Look up Escalation Policies Stream	Retrieves information about the list of escalation policies.
	Look up Escalation Policy by ID	Retrieves Escalation Policy by ID.
	Update Escalation Policy	Updates an escalation policy.
	Create Escalation Policy	Creates an escalation policy
Extension Management	Create Extension	Creates an extension.

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Category	Action	Description
	Look up Extension by ID	Retrieves information about the specified extension.
	Look up Extensions Stream	Retrieves information about the list of extensions.
	Update Extension	Updates an extension.
Incident Management	Create Incident	Creates an incident with the specified details.
	Look up Incident by ID	Retrieves information about an incident by its ID.
	Look up Incidents Stream	Retrieves information about the list of incidents.
	Update Incident	Updates an incident with the specified details.
Notifications Management	Look Up Notification Stream	Retrieves the list of notifications.
Schedule Management	Create Schedule	Creates a schedule.
	Look up Schedule by ID	Retrieves information about a schedule ID.
	Look up Schedules Stream	Retrieves information about the list of schedules.
	Update Schedule	Updates a schedule with the specified information.
Service Management	Create Service	Creates a service
	Look up Service by ID	Retrieves the details of a service by its ID.
	Look up Services Stream	Retrieves information about the list of services.
	Update Service	Updates a service with the specified information.
Tag Management	Create Tag	Creates a tag.
	Delete Tag	Deletes the specified tag.
	Look up Tag by ID	Retrieves information about the specific tag.
	Look up Tags Stream	Retrieves information about the required tags.
	Assign Tags	Assigns tags to the required entity.
Team Management	Add Escalation Policy to Team	Adds the escalation policy to a team with the specified details.
	Add User to Team	Adds users to the specified team.
	Create Team	Creates a team.
	Create Team Subscriptions	Creates a team subscription.
	Delete Team	Deletes the specified team.

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Category	Action	Description
	Look up Subscriptions in Team	Retrieves information about the specified subscription in a team.
	Look up Team by ID	Retrieves the specific team by ID.
	Look up Teams Stream	Retrieves the information about the list of teams.
	Look up Users in Team	Retrieves information about the specified users from a team.
	Remove Escalation Policy from Team	Removes the specified escalation policy from the specified team.
	Remove Team Subscriptions	Removes the specified team subscription.
	Remove User from Team	Removes the specified user from the specified team.
	Update Team	Updates the details of a team.
Webhook Management	Create Webhook Subscription	Creates a webhook subscription.
	Delete Webhook	Deletes a webhook.
	Look up Webhook Subscription by ID	Retrieves information about the specified webhook subscription ID.
	Look up Webhook Subscription Stream	Retrieves information about the list of webhook subscriptions.
	Update Webhook Subscription	Updates the specified webhook subscription.
User Management	Look Up Users	Retrieves all PagerDuty user subscriptions.
	Look Up On Call Users	Retrieves information about the last time that a user was on an on-call schedule.
	Remove User	Deactivates a user account in PagerDuty.
	Look up Users Stream	Retrieves information about the list of users.
	Create User	Creates a user.
	Update User	Updates the details of the specified user.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

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- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
PagerDuty team management AI agent	Creates teams, updates team details, manages users and escalation policies, and retrieves information about teams and their subscriptions.
PagerDuty business service management AI agent	Creates, updates, and deletes business services, manages subscribers, and retrieves dependencies.
PagerDuty schedule management AI agent	Retrieves schedule streams and details of the required schedule.
PagerDuty extension management AI agent	Retrieevs details of the required extensions, creates new extensions, retrieves a stream of extensions, and updates existing extensions.
PagerDuty user management AI agent	Retrieves details of the on-call users, updates user details, creates new users, removes the required users and retrieves the user streams.
PagerDuty incident management AI agent	Creates new incidents, updates existing ones, and retrieves details of the required incident.
PagerDuty notification management AI agent	Retrieves details of notifications.
PagerDuty service management AI agent	Creates new services, updates details of existing services, and retrieves details of the required service.
PagerDuty audit management AI agent	Retrieves the audit records and integrates the PagerDuty functionalities into broader operational flow.
PagerDuty escalation policy management AI agent	Creates, updates, deletes, and retrieves escalation policies, as well as stream policy data for integration into workflows
PagerDuty tag management AI agent	Creates tags, retrieves details of the required tag, retrieves tag streams, deletes tags, and assigns tags.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

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Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Set up PagerDuty spoke

Set up an outbound integration between your ServiceNow instance and the PagerDuty server with a connection and credential record.

Before you begin

- Request an Integration Hub subscription.
- Activate the PagerDuty spoke.
- Access to the PagerDuty application so you can set up the OAuth 2.0 app.
- Role required: admin.

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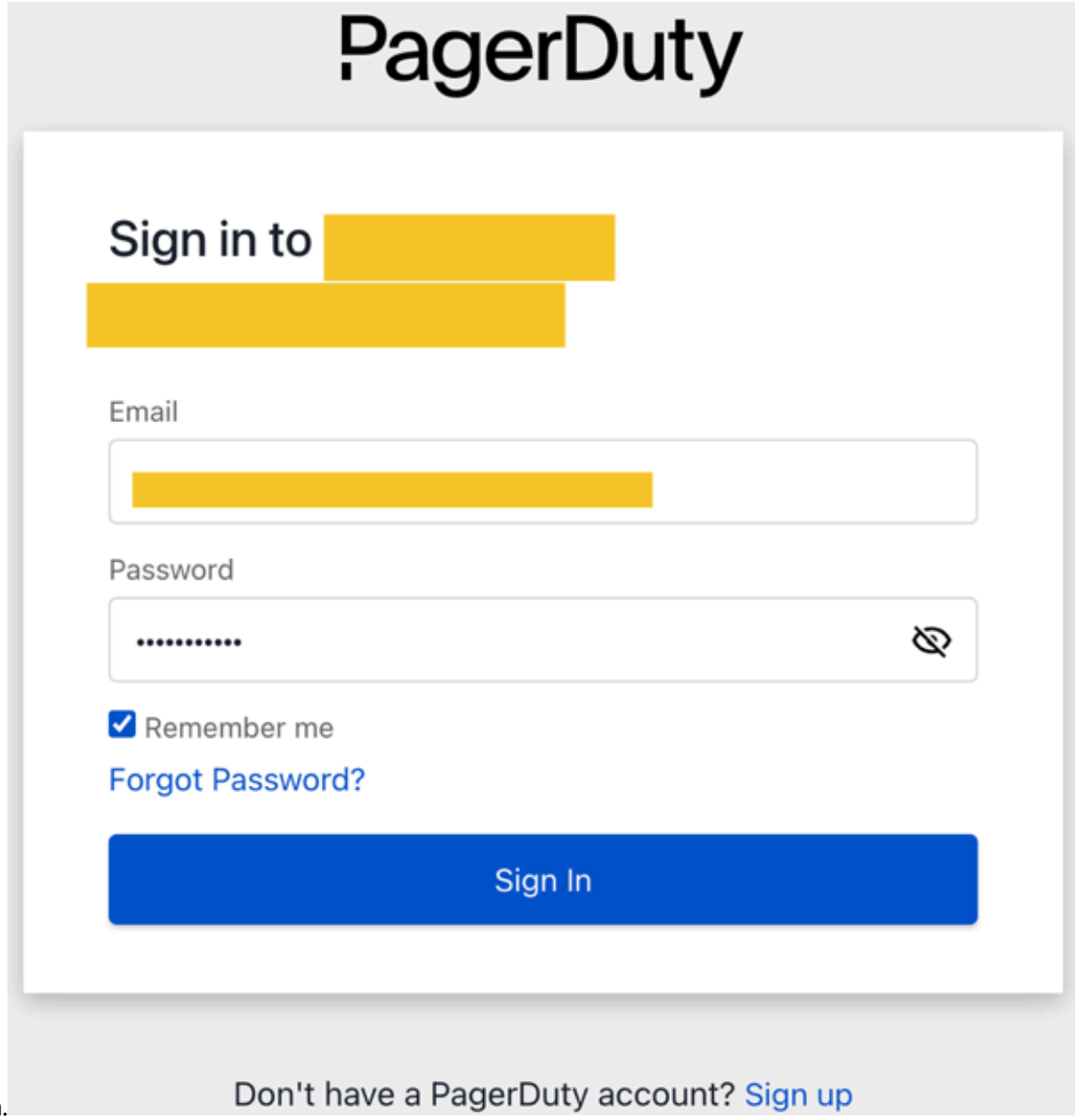
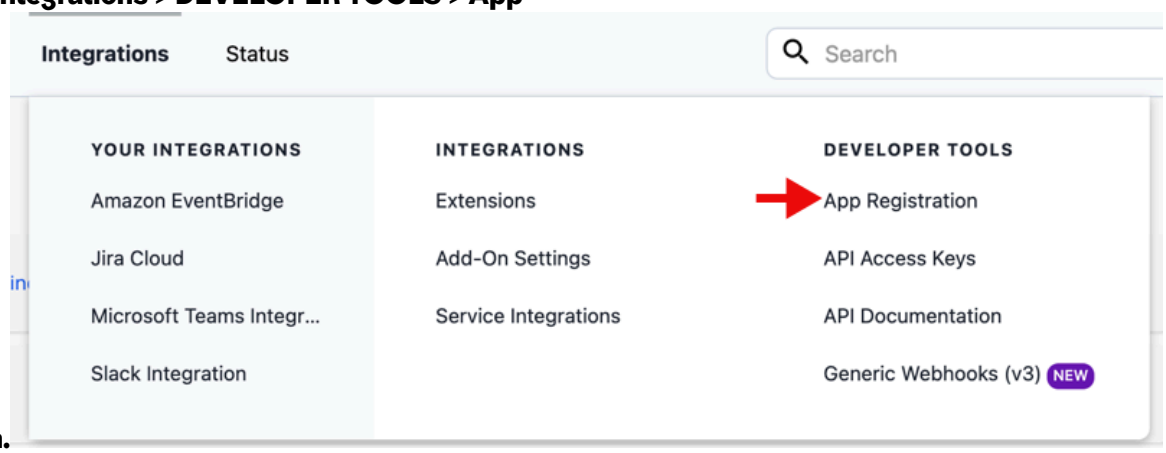
Procedure

1. Set up PagerDuty as the OAuth provider.

a. Log in to the PagerDuty application.



b. Navigate to **Integrations** > **DEVELOPER TOOLS** > **App Registration**.



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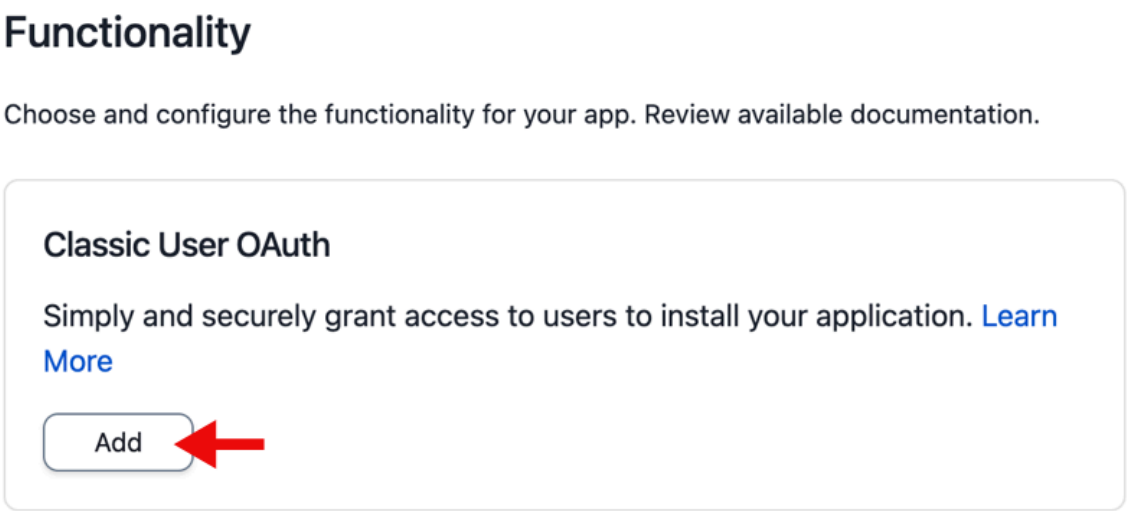
c. Select **Create New App**.

d. In the App Name field, enter a unique name for the OAuth app.

e. In the Brief Description field, enter a brief description of the OAuth app.

f. Select **Save**.

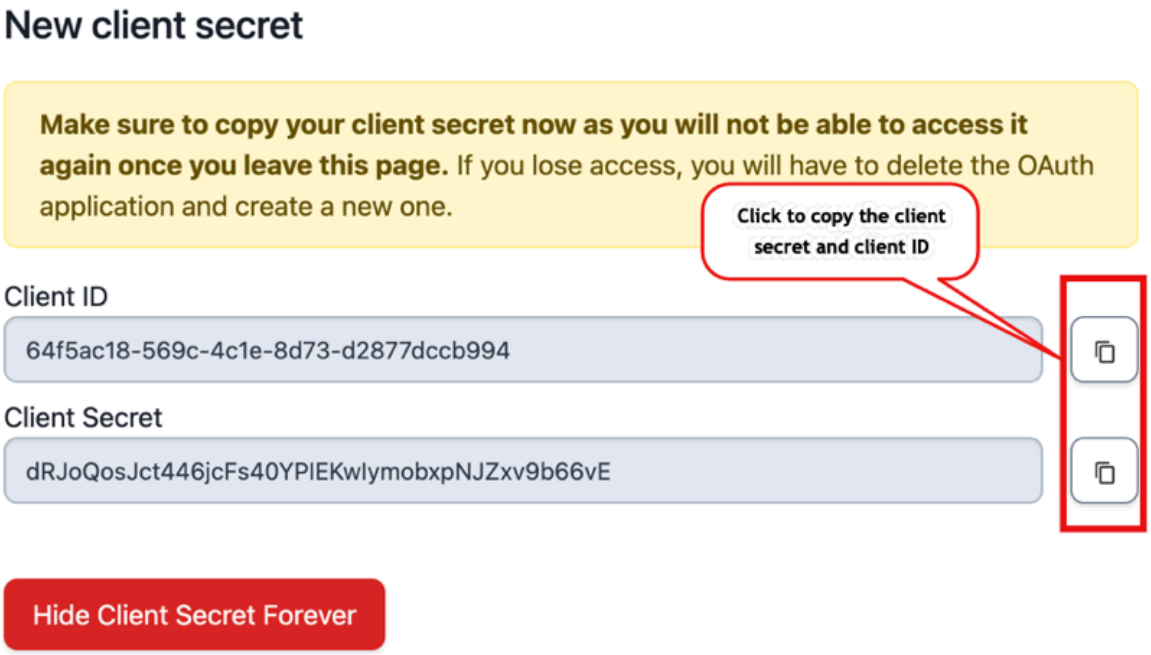
g. Under the Classic User OAuth heading, select



Add.

h. In the Redirect URL field, enter your ServiceNow instance URL.

i. Select **Save**.
PagerDuty generates the client ID and client



secret.

j. Copy and store the client ID and secret.

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You need the client ID and secret when you set up the connection and credential record.
You have set the PagerDuty OAuth app.

2. Set up the connection and credential record.

   a. Log in to your ServiceNow instance.

   b. Navigate to **All** > **Process Automation** > **Flow Designer.**

   c. Select Connections.

   d. In the Search all connections field, enter `PagerDuty`.

   e. On the PagerDuty tile, select **View Details**.

   f. Select **Configure**.

   g. Fill the Create Connection form.

Create Connection

Field	Description
Connection Name	Name of the connection. **Note:** The default and read-only name of the first connection is PagerDuty. To provide a custom name for the connection, select **Add Connection**.
Name	Name of the credential. **Note:** The default and read-only name of the first credential is PagerDuty. To provide a custom name for the credential, select **Add Connection**.
OAuth Client ID	OAuth client ID that you generated when you set up the OAuth app.
OAuth Client Secret	OAuth client secret that you generated when you set up the OAuth app.
OAuth Redirect URL	The redirect URL that you had provided when you set up the OAuth app.

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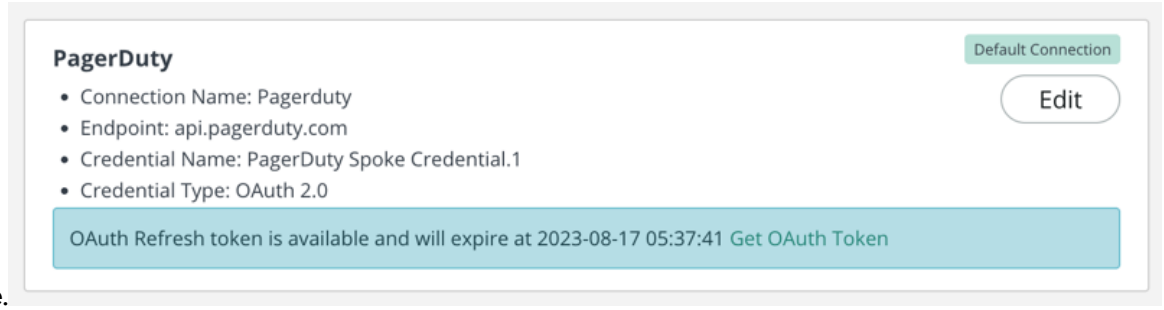
h. Select **Create and Get OAuth Token**.
The OAuth token becomes available.



Plivo Spoke

Enable communications with your customers using the Plivo platform from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Plivo spoke v1.3.0 is the latest version. For version history of the spoke, see Plivo spoke release notes.

Supported versions

This spoke was built for Plivo API version v1, but may be compatible with later versions.

Spoke requirements

- Admin access to the Plivo console.
- **AUTH ID** and **AUTH TOKEN**. You can find these vales in the dashboard of your Plivo account. For more information, see Authentication in the Plivo documentation.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

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Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke subflows

The Plivo spoke provides sample subflows to demonstrate automating the Plivo tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Plivo Call Handler	Manages calls associated with the Plivo account.
Plivo SMS Handler	Manages SMS associated with the Plivo account.

While customizing subflows, you must ensure that the subflows are configured to avoid infinite loops.

Note:

- You must configure webhooks to use the spoke subflow. See Set up a bi-directional webhook for the Plivo spoke for information regarding setting up and configuring the webhook.
- The sample subflow runs as a user by default. The subflow can be configured to run as system.

Spoke actions

The Plivo spoke provides actions to automate the Plivo tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Application Management	Create Application	Creates an application.
	Delete Application	Deletes an application.
	Get Application	Retrieves details of an application.
	Look up Applications	Retrieves list of all application IDs.
	Update Application	Updates details of an application.
Call Management	Get Call	Retrieves Call Detail Record(CDR) of the call.
	Hang Up Call	Ends an ongoing call or cancel a queued outbound call.
	Look up Call	Retrieves details of the specified call.
	Make Call	Initiates an outbound call.
	Start Recording Call	Starts recording an ongoing outbound call.

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Category	Action	Description
	Stop Recording Call	Stops all the ongoing recordings for the specified call UUID.
Conference Management	Get Conference	Gets details of a conference.
	Hang Up Conference	Hangs up all ongoing conferences in your account.
	Hang Up Member	Hangs up a member in a conference.
	Kick Member	Disconnects a member in a conference.
	Look up Conferences	Retrieves a list of all conferences that are ongoing on your account.
	Mute Member	Mutes members in a conference.
	Unmute Member	Unmutes members in a conference.
SMS Management	Get Message	Retrieves the details of the specified message.
	Look up Message	Retrieves the details of the messages.
	Send Bulk SMS	Sends SMS to the multiple numbers.
	Send SMS	Sends the SMS to the specified number.

Spoke module

Webhooks can be set up to be notified about the required events. Routing policy defines conditions that must be met to notify the ServiceNow instance. These conditions are based on the events in Plivo that you want to be notified about. When the conditions are met, routing policy triggers the associated subflow, which in turn automates the Plivo tasks.

Webhooks require separate setup and can be used independently without using the spoke actions. The Plivo spoke adds the Plivo Spoke application to your instance and includes these modules:

Module	Description
Plivo Webhook Registries	Create and view the Plivo webhooks in ServiceNow.
Plivo Webhook Routing Policy	Create and view the routing policies for the Plivo webhooks in ServiceNow. You can also customise the conditions in the routing policies as per your requirement.

Use the Plivo Webhook Registries module to register a Plivo webhook. You must generate a Callback URL and provide this URL in your Plivo account.

Routing policies and subflows support these Plivo fields:

- Keywords
- Call Event
- Caller Name

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- Event Type
- SMS Text
- To Number
- Show Related Fields

Create routing policy in the Plivo WebHook Routing Policies module and specify conditions as per your requirement. See Set up a bi-directional webhook for the Plivo spoke for information regarding setting up and configuring the webhooks.

Spoke user roles

The Plivo spoke provides a Plivo Admin (sn_plivo_spoke.Plivo_Admin) role.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Plivo spoke.

Set up the Plivo spoke

Integrate the ServiceNow instance and Plivo account by using the basic authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Plivo spoke.
- Role required: admin.

Configure a connection for the Plivo spoke

Add and configure a Plivo connection to authenticate ServiceNow requests in Plivo spoke.

Before you begin

- Values of **AUTH ID** and **AUTH TOKEN**. You can find these vales in the dashboard of your Plivo account. For more information, see Authentication in the Plivo documentation.
- Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Plivo** and click **View Details**.

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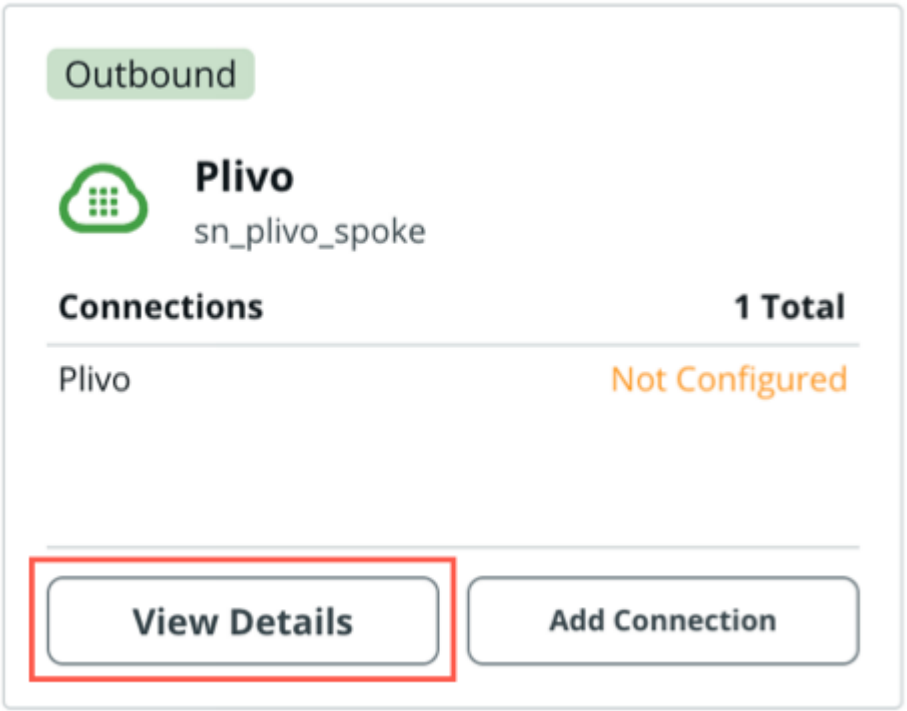
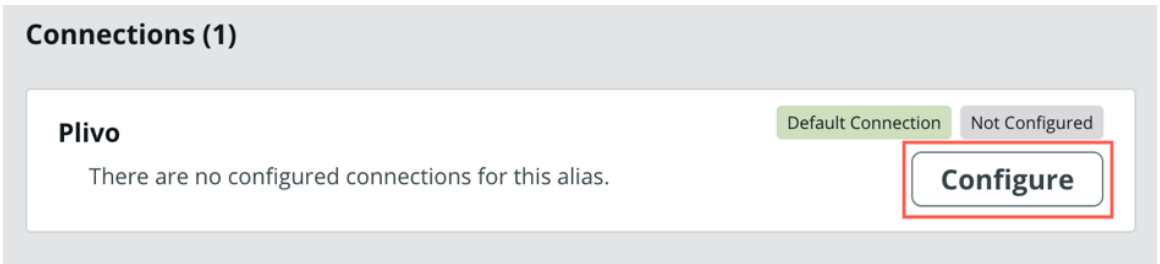
- To configure the default connection and credential alias record that is shipped along with the Plivo spoke, click **View Details**.



- To manage more than one Plivo spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the **Configure Connection** form, fill in the fields:

Configuration form

Field	Description
Connection Name	Name to uniquely identify the connection record.
Connection URL	Base URL to connect to Plivo. Enter `https://api.plivo.com`.
Auth ID	Auth ID of your Plivo account.
API Version	API version of your Plivo account. Enter `v1`.
User name	Auth ID of your Plivo account.

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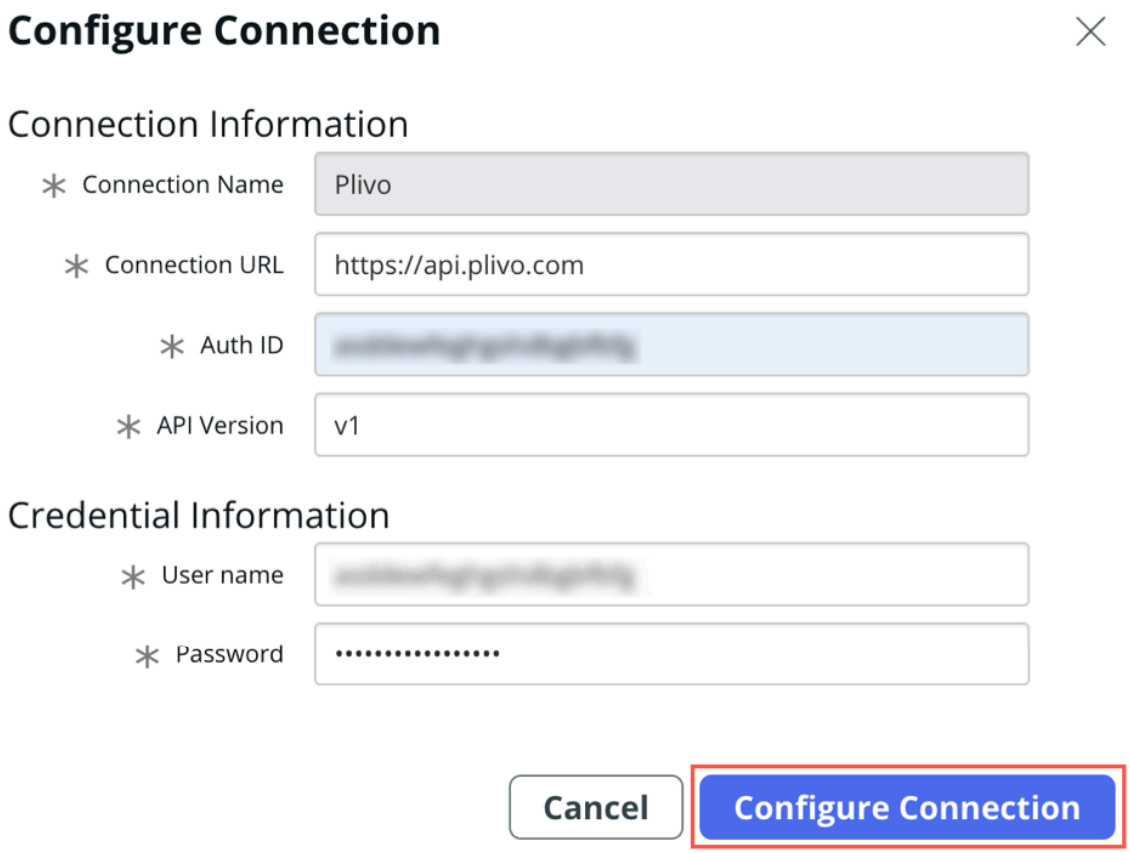
Field	Description
Password	Auth token of your Plivo account.



6. Click **Configure Connection**.

Result
The spoke connection is configured and ready to be used.

Set up a bi-directional webhook for the Plivo spoke

Configure a webhook to subscribe to your Plivo account with a ServiceNow callback URL.

Before you begin

- Request Integration Hub subscription.
- Activate the Plivo spoke.
- Set up the Plivo spoke
- Role required: sn_plivo_spoke.Plivo_Admin and decision_table_admin.

Register a Plivo webhook in ServiceNow

Register a Plivo webhook in your ServiceNow instance to notify the ServiceNow app when certain events occur in Plivo.

Before you begin
Role required: sn_plivo_spoke.Plivo_Admin and decision_table_admin

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Procedure

1. Navigate to **All** > **Plivo Spoke** > **Plivo Webhook Registries**.
2. Click **New**.
3. On the form, fill in the fields.

Plivo Webhook Registry form

Field	Description
Name	Unique name to identify the record. For example, `Plivo webhook`.
Description	Description of the record.
Path	Plivo webhook path. By default, this path is set to `api/sn_plivo_spoke/plivo_webhook_handler/wh_entry`.

4. Right-click the form header and click **Save**.
5. Click **Callback URL**.
   The system displays the webhook callback URL.
6. Copy and record the webhook callback URL.

Result
The Plivo webhook is registered in your ServiceNow instance.

Add a callback URL in Plivo

Provide a webhook callback URL in your Plivo account to create a webhook.

Before you begin
Role required: sn_plivo_spoke.Plivo_Admin and decision_table_admin

Procedure

1. Log in to your Plivo console.
2. Create an application in the Plivo console as per your requirement.
   For more information about creating an application in the Plivo console, see the Create an Application section in the Make your first Outbound Call page of the Plivo documentation. You can also refer to the Plivo Application documentation for more information about creating and updating an application using Plivo APIs.
3. Enter the webhook callback URL in **MESSAGE URL** and **ANSWER URL**, and configure the application as per your requirement.

Result
The callback URL is added in your Plivo account. You can create routing policies and subflows as per your requirement. See Create routing policy and customize webhook for information regarding the creation of new routing policies and subflows.

Create routing policy and customize webhook

Create a webhook routing policy and subflow as per your requirement.

Before you begin
Role required: sn_plivo_spoke.Plivo_Admin and decision_table_admin

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About this task

Routing policy in the Plivo WebHook Routing Policy module triggers the subflows and notifies the ServiceNow instance when certain events occur in your Plivo account. See Plivo Spoke for information about the fields that the routing policy and subflows support.

Procedure

1. Navigate to **All** > **Flow Designer** > **Designer**.
2. Click **Subflows**.
3. Create a copy of the default subflow.
   Two subflows are available along with Plivo spoke; Plivo Call Handler and Plivo SMS Handler. You can create a copy of either of these subflows as per your requirement.
4. Customize the subflow as per your requirement and publish it.
   See Building subflows for more information about creating and using subflows, and Plivo Spoke for information about the supported fields.
5. Navigate to **Plivo Spoke** > **Plivo WebHook Routing Policy**.
6. Click **New**.
7. On the form, fill in the fields.

Decision form

Field	Description
Label	Unique label to identify the routing policy.
Default answer	Option to specify if this is the default answer. The default answer is applicable when the conditions are not met. **a.** Click the lookup icon ( ). **b.** Select the required subflow from the Document list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow]`.
Condition	Conditions to be met when the required events occur in Plivo.
Answer	Subflow that must be triggered when the specified conditions are met.

Routing policies and subflows support these Plivo fields:

- Keywords
- Call Event
- Caller Name
- Event Type
- SMS Text
- To Number
- Show Related Fields

8. Click **Submit**.

Note: These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

Result

The routing policy and subflow are created.

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Pluralsight Spoke

Manage users, learning, courses, and so on in the Pluralsight Skills account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Pluralsight spoke v1.2.0 is the latest version. For version history of the spoke, see Pluralsight spoke release notes.

Supported versions

This spoke was built for Pluralsight GraphQL API version v1, but may be compatible with other future API versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Pluralsight spoke provides actions to automate Pluralsight tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Course Management	Look up Courses	Retrieves details of the specified Pluralsight courses.
Learning Management	Look up Learning Status for Course	Retrieves the learning status of the specified Pluralsight course.
	Look up Learning Status for User	Retrieves the learning status for the specified Pluralsight user.

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Category	Action	Description
	Look up Learning Status Data Stream	Retrieves the learning status of the specified course in Pluralsight.
Skill Management	Look up Skill Assessment Results	Retrieves the skill assessment results in Pluralsight. **Note:** • Pluralsight Enterprise Plan is required to use this action. • The action output, **Attempt Number** starts with **0** and this value is synchronised with value from Pluralsight.
	Look up Skill Assessments	Retrieves the list of all available skill assessments in Pluralsight that can be taken by a user.
	Look up Skill IQ Summary	Retrieves the skill IQ summary in Pluralsight.
User Management	Create User	Creates a user in Pluralsight. **Note:** API key must have the write permission to perform this action.
	Deactivate User	Removes a user's license from plan in Pluralsight. **Note:** API key must have the write permission to perform this action.
	Invite User	Invites the specified user to a plan in Pluralsight. **Note:** API key must have the write permission to perform this action.
	Look up Users	Retrieves details of the users in Pluralsight.

See Set up the Pluralsight spoke for information about setting up the Pluralsight spoke.

Set up the Pluralsight spoke

Integrate the ServiceNow instance and your Pluralsight Skills account using an API key to have the ServiceNow instance requests authenticated by the Pluralsight host.

Before you begin

- Request an Integration Hub subscription.
- Activate the Pluralsight spoke.
- Admin access to the Pluralsight Skills account.
- Role required: admin.

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About this task

This task enables you to integrate your ServiceNow instance with the Pluralsight host. See the flow, as given in the image below.

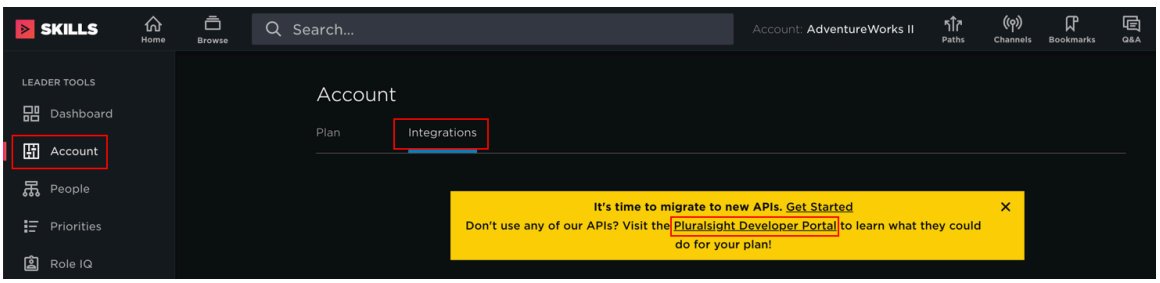
Procedure

1. Create an API key in your Pluralsight Skills account.

   a. Log in to your Pluralsight Skill account as an admin.

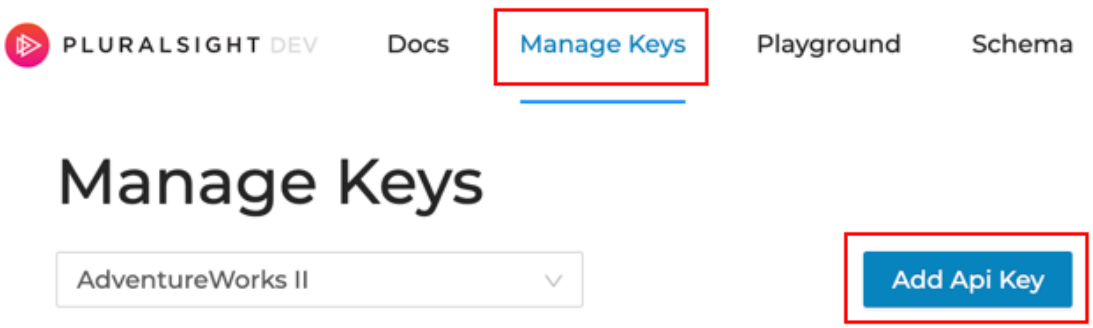
   b. Navigate to **Account** and click the **Integrations** tab.

   c. Click the Pluralsight Developer Portal link.



   d. In the Pluralsight Developer Portal, click the **Manage Keys** tab.

   e. Click **Add Api Key**.



   f. On the form, fill the fields and provide write permissions to the API Key.

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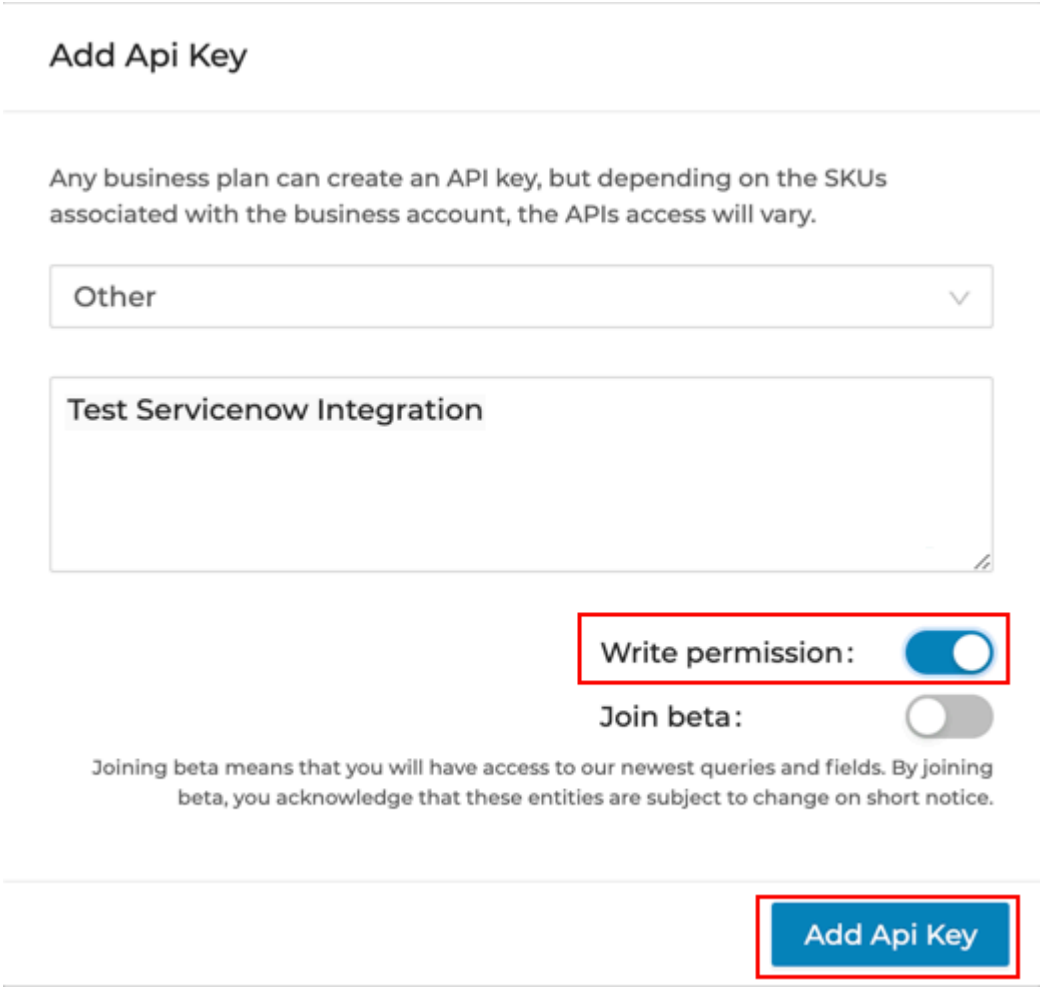
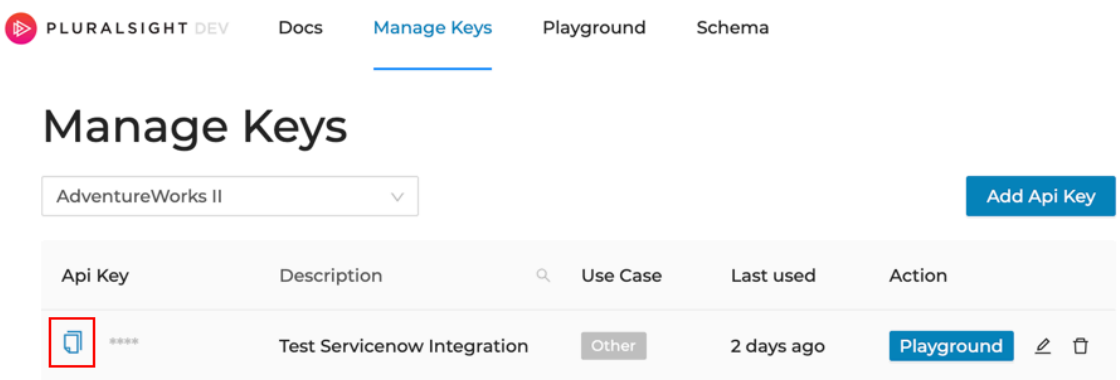


g. Copy the API Key for later use.



2. Log in to your ServiceNow instance.

3. Navigate to **All** > **Process Automation** > **Workflow Studio**.

4. Click the **Integrations** tab.

5. Under **Connections**, toggle and enable the **Outbound** connections.

6. Locate the alias for **Pluralsight** and click **View Details**.

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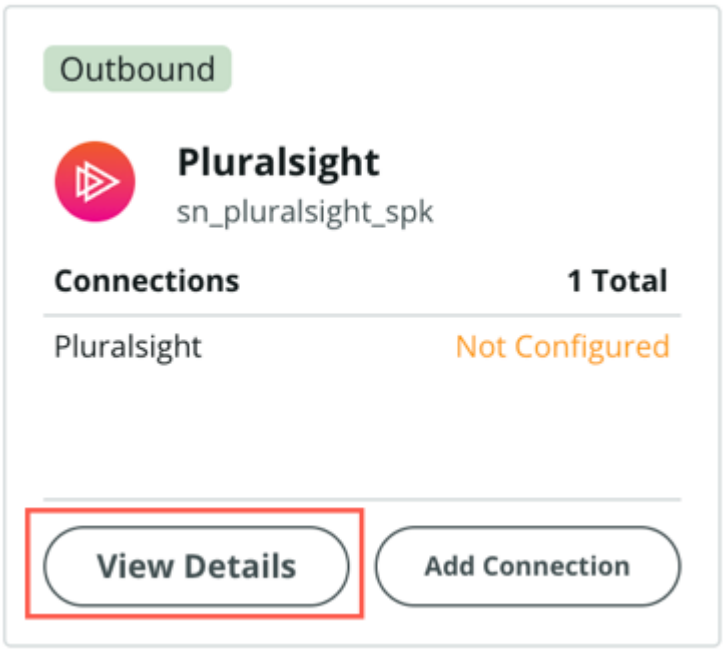
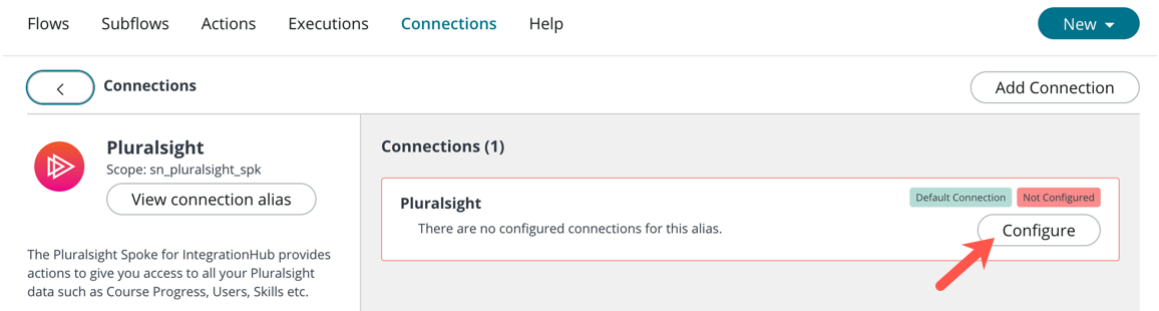
- To configure the default connection and credential alias record that is shipped along with the Pluralsight spoke, click **View Details**.



- To manage more than one Pluralsight spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



7. On the Configure Connection form, fill the values,

Configure Connection form

Connection Name	Name of the connection between the ServiceNow instance and the Pluralsight host. The connection name is read-only.
Connection URL	The URL to the Pluralsight skills account. Enter `https://paas-api.pluralsight.com/`
API Key	API key generated earlier from the Pluralsight developers portal.

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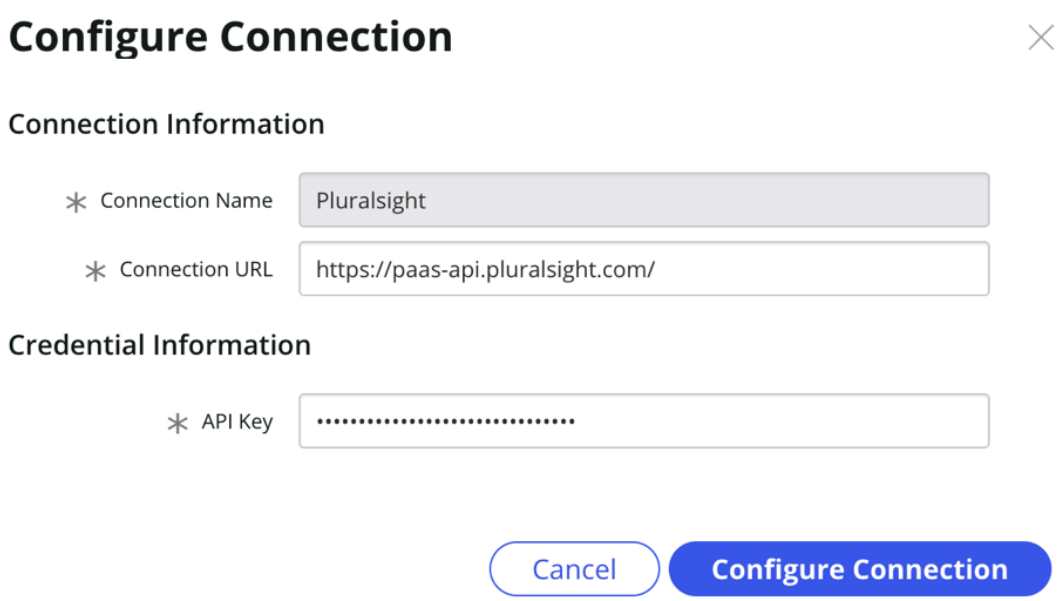

8. Click **Configure Connection**.
   The connection and credentials connection record is created.

Qualtrics Spoke

Integrate ServiceNow instance with Qualtrics. Manage web-based survey distribution in Qualtrics from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Qualtrics spoke v1.4.2 is the latest version. For version history of the spoke, see Qualtrics spoke release notes.

Supported versions

This spoke was built for Qualtrics v3, but may be compatible with later versions.

Spoke requirements

Qualtrics account.

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Qualtrics spoke provides sample flows to demonstrate automating the Qualtrics tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Create distribution when incident is closed	Creates a distribution for a survey and sends the survey to the incident caller, when an incident is closed.
Look up Contact by Email	Retrieves details of the customer and the customer score. That is, customer value and customer satisfaction, which can be high or low based on the configured decision policy.
Upsert Contact or Consumer to Qualtrics	Updates details of the existing consumer records or creates consumer record in Qualtrics. This flow is triggered when a record in created or updated in the Contacts and Consumers module of your ServiceNow instance. When a record is created the Contacts and Consumers module of your ServiceNow instance, the Upsert Contact or Consumer to Qualtrics flow is triggered and creates the record in Qualtrics. Also, Reference ID that is generated in Qualtrics, is updated in the Contacts and Consumers module of your ServiceNow instance.

Spoke subflows

The Qualtrics spoke provides sample subflows to demonstrate automating Qualtrics tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Look up Contact in Mailing List	Retrieves the look up ID of the specified contact.
Look up Mailing List by Name	Retrieves ID of the mailing list for the specified name.

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Subflow	Description
Look up Message by Name	Retrieves ID of the message for the specified name.
Look up Survey by Name	Retrieves ID of the survey with the specified name.

Spoke actions

The Qualtrics spoke provides actions to automate Qualtrics tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Contact Management	Create Contact	Creates a contact in the specified directory.
	Look up Contact by Email	Retrieves contacts in a directory of the required email address.
	Look up Contact Distribution Email History Stream	Retrieves the distribution email history for the specified contact in a directory.
	Look up Contact Distribution Response Histories Stream	Retrieves a list of distribution response history for a specified contact in a directory.
	Look up Contacts Stream	Retrieves a list of contacts from a directory.
	Update Contact	Updates the specified contact details in the specified directory.
Distribution Management	Create Distribution	Creates a distribution for a survey.
	Look up Distribution Links Stream	Retrieves a list of distribution links for an existing distribution of the specified survey.
	Look up Distributions Stream	Retrieves a list of distributions for a survey.
Library Management	Look up Library Messages Stream	Retrieves a list of messages in a library.
Mailing List Management	Create Contact in Mailing List	Creates a directory contact in a specified mailing list.
	Look up Contact in Mailing Lists Stream	Retrieves a contact from a mailing list in the specified directory.
	Look up Mailing Lists	Retrieves a list of mailing lists in a directory.
	Remove Contact from Mailing List	Removes a contact from the specified mailing list.
Metadata Retrieval	Look up Directories Metadata	Retrieves the metadata of a list of directories within a brand. **Note:** Ensure that this action is always used along with relevant actions that use dynamic inputs.
	Look up Libraries Metadata	Retrieves a list of libraries.

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Category	Action	Description
		Note: Ensure that this action is always used along with relevant actions that use dynamic inputs.
Survey Management	Look up Surveys	Retrieves a list of surveys available to the user.
Event Subscription Management	Create Subscription	Creates an event subscription.
	Look up Subscription by Subscription ID	Retrieves all event subscriptions.
	Look up Subscriptions Stream	Retrieves all event subscriptions.

Spoke modules

The Qualtrics spoke provides these modules.

Module	Description
Contacts and Consumers	Create, view, and modify the contact and consumer records. When a record is created or updated here, the Upsert Contact or Consumer to Qualtrics flow is triggered.
Qualtrics Score Mapping Answers	View the score mapping answers.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Qualtrics spoke.

Set up the Qualtrics spoke

Integrate the ServiceNow instance and Qualtrics by registering Qualtrics as an OAuth provider to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Qualtrics spoke.
- Role required: admin.

Obtain required details from Qualtrics account

Copy and record the values of token, Organization ID, Client ID, and Client secret from your Qualtrics account for authentication.

Before you begin

Role required: admin

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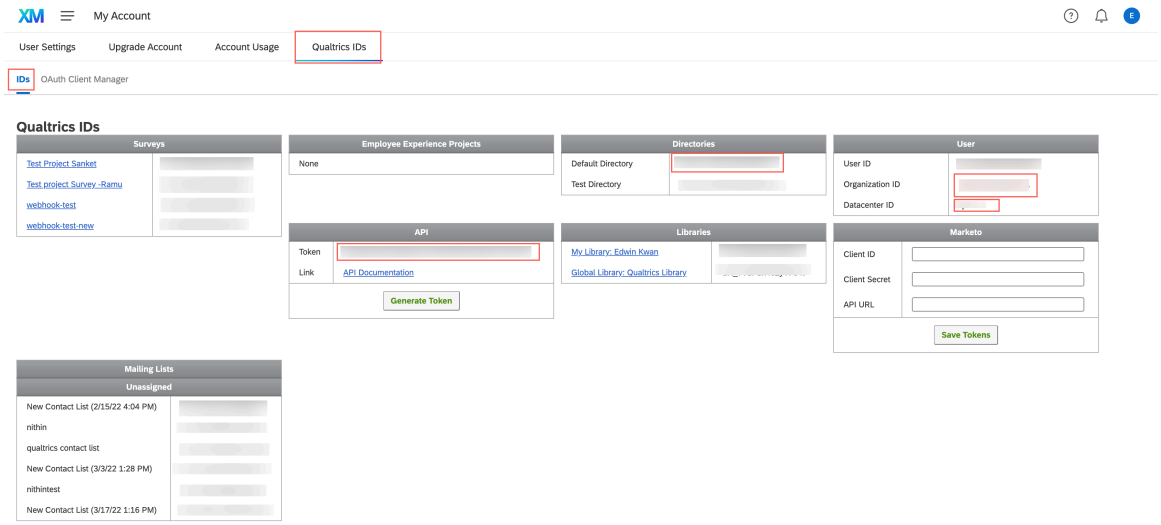
Procedure

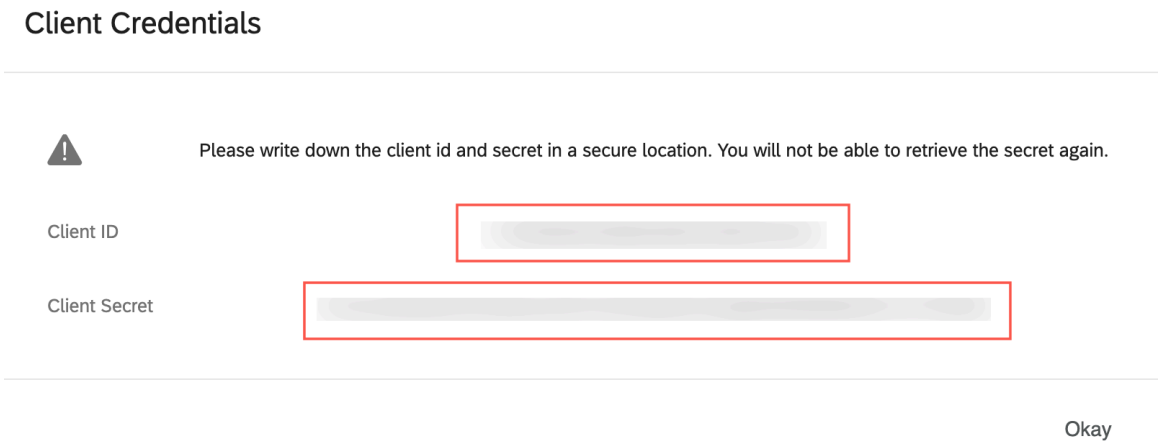
1. Log in to your Qualtrics account as an admin.
2. Navigate to **Account Settings** > **Qualtrics IDs**.
3. Under **User**, copy and record the values of **Organization ID** and **Datacenter ID**.
4. Under **Directories**, copy and record the value of **Default Directory**.
5. Under **API**, copy and record the value of **Token**.



6. Click the **OAuth Client Manager** tab.
7. Click **Create Client**.
8. On the form, fill the values.

Field	Description
Name	Name to identify the client record.
Scopes	Select `manage:all`.
Grant Type	Select `Client Credentials`.

9. Click **Create Client**.



The values of Client ID and Client Secret are displayed. Copy and record these values for later use.

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Configure a connection

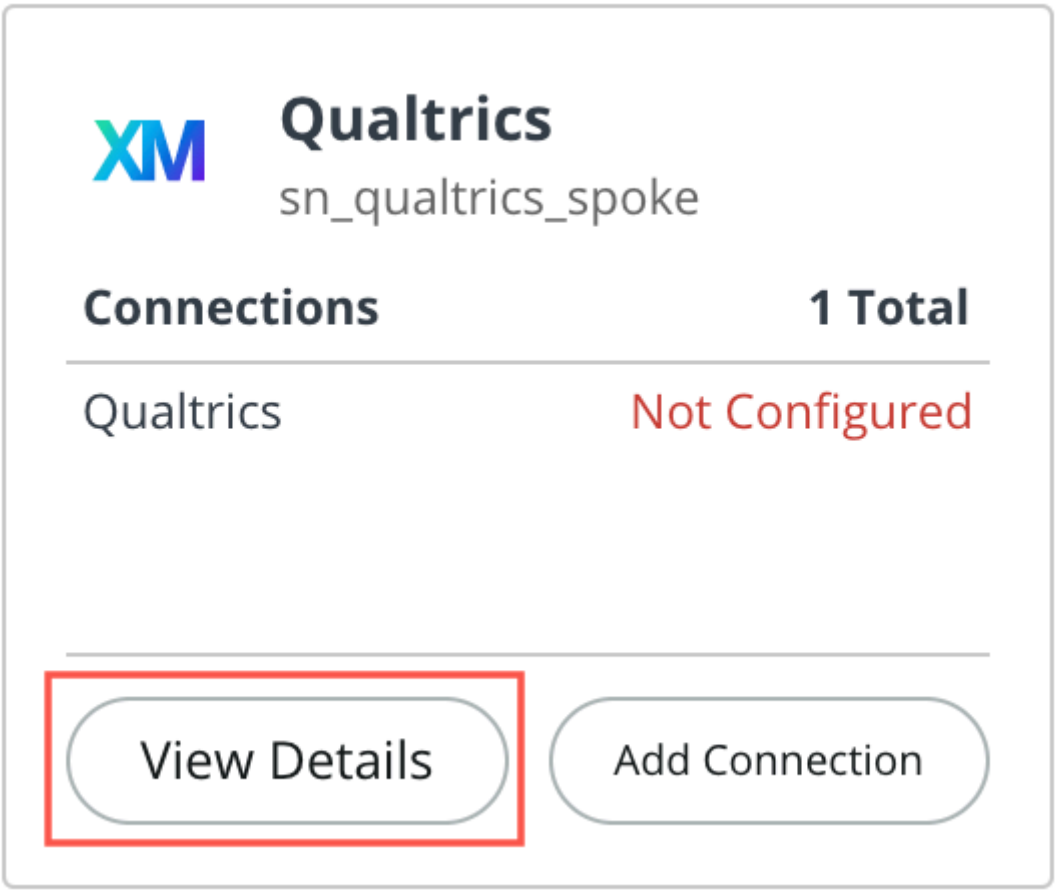
Add and configure a Qualtrics connection to authenticate ServiceNow requests.

Before you begin
Role required: admin

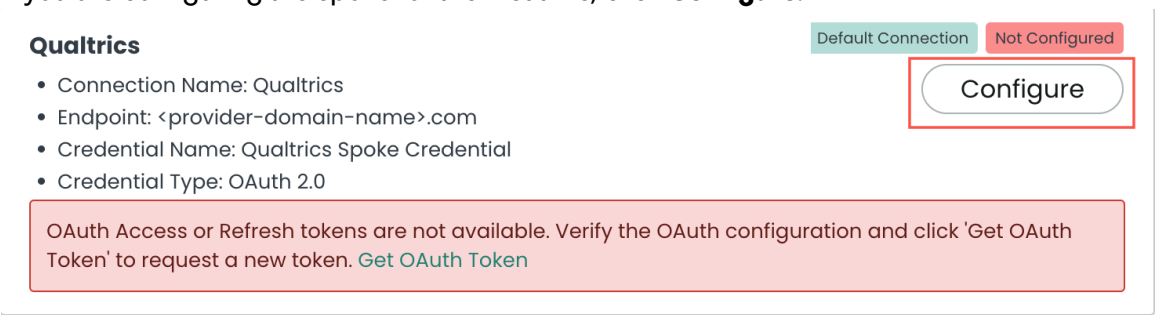
Procedure

1. Navigate to **Process Automation** > **Flow Designer**.
2. Click the **Connections** tab.
3. Locate the alias for **Qualtrics** and click **View Details**.

> **Note:** Don't click **Add Connection**.



4. If you are configuring the spoke for the first time, click **Configure**.



5. On the Configure Connection form, fill in the fields.

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Field	Description
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to **Qualtrics**. Enter: `https:<Organization-ID>.qualtrics.com/API/v3`
X-API-TOKEN	Unique token you had copied from the Qualtrics account settings.
OAuth Name	Name to identify the application registry record.
OAuth Client ID	Client ID you had copied when you created a client in your Qualtrics account.
OAuth Client Secret	Client Secret you had copied when you created a client in your Qualtrics account.
Token URL	OAuth server token endpoint. Enter: `https://<Data-Center-ID>.qualtrics.com/oauth2/token`. **Note:** Select the Qualtrics data center based on your geographic location.

6. Click **Configure and Get OAuth Token**.

Result
The spoke is configured and ready to be used.

Configure system parameter

Configure the system parameter *sn_qualtrics_spoke.qualtrics_directory* and specify the Qualtrics Directory ID that can be used in the flows.

Before you begin
Role required: admin.

Procedure

1. In the filter navigator, enter `sys_properties.list`.
2. Search and open the record with **Name** as **sn_qualtrics_spoke.qualtrics_directory**.
3. In **Value**, specify the Qualtrics Directory ID.
4. Click **Update**.

Rally Spoke

Manage subscriptions for Rally by analyzing usage based on last login and activity time to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Rally spoke v1.0.3 is the latest version. For version history of the spoke, see Rally spoke release notes.

Spoke requirements

Rally account with an admin role.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream Inputs (com.glide.hub.action_type.datastream)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses when used outside the spoke implementation.

Spoke actions

The Rally spoke provides actions to automate Rally tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Subscription Management	Look up Subscriptions Stream	Retrieves all subscriptions.
User Management	Look up Users Stream	Retrieves all users in an account.
	Update User	Modifies the specified user's details.
	Delete User	Deletes the specified user and associated records from the account.
	User Inputs - Dynamic	Retrieves the list of fields to be used as dynamic input.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Rally spoke.

Set up the Rally spoke

Integrate the ServiceNow instance and Rally by using Rally credentials to authenticate ServiceNow requests.

Register a Rally OAuth application

Register the Rally OAuth application to access the Rally API 2.0 and to receive a Client ID and Client secret.

Before you begin

- Request an Integration Hub subscription.
- Activate the Rally spoke.
- Role required: admin.

Procedure

1. Log in to CA Agile Central by using your admin credentials.
2. Select **OAUTH CLIENTS** > **Create New Client**.
3. In the Create Oauth Client dialog box, fill in the fields.

Field	Value
Application Name	Provide a name for the application.
Callback URL	Callback URL of the ServiceNow instance to which the application is to be integrated. For example, `https://<instance_url>/oauth_redirect.do`.

4. Select **Next**.
5. Copy the Client ID and Client secret for later use.

Redox Electronic Health Record Spoke

Enable communications with your customers using the Redox platform from your ServiceNow instance.

Important:

Starting with the Yokohama release, Redox Electronic Health Record Spoke is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

For details, see the Deprecation Process [KB0867184] article in the Now Support knowledge base.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Redox Electronic Health Record Spoke v1.0.3 is the current version. For version history of the spoke, see Redox Electronic Health Record Spoke release notes.

Key features

The Redox Electronic Health Record Spoke enables a hospital, payer (insurance), or life sciences company to:

- Enable interoperability with an electronic medical record (EMR) or another healthcare system by leveraging the ServiceNow Healthcare and Life Sciences data model that is based on the Health Insurance Portability and Accountability Act (HIPAA) and the Health Level Seven International (HL7) industry standards. For more information, see Healthcare and Life Sciences data model.
- Improve patient care and reduce cost by reducing data duplicity and entry.
- Connect to the healthcare ecosystem by enabling patient-centric workflows.

Spoke requirements

- Administrator access to the Redox Dashboard.
- **API Key** and **Source Secret**. You can find these values in the dashboard of your Redox account. For more information, see Authenticate an API key in the Redox documentation.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Redox Electronic Health Record Spoke provides actions to automate Redox tasks when events occur in your ServiceNow instance. Available actions include:

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Category	Action	Description
Scheduling	Create Appointment	Creates a new appointment.
	Reschedule Appointment	Reschedules an existing appointment.
	Modify Appointment	Modifies an existing appointment.
	Cancel Appointment	Cancels an existing appointment.
	Look up Booked Appointments	Queries and returns booked appointments within a given time range.
	Look up Available Slots	Queries and returns times available for booking an appointment within a given time range.
Clinical Summary	Look up Latest Clinical Summary	Queries and returns the most recent clinical summary for a given patient at the specified health system.
	Look Up Visit Summary	Queries and returns visit summaries for a given patient at the specified health system within the specified time frame.
	Send Visit Information	Sends a visit summary to another application or to an EHR.
Media	Create Media Document	Adds a new media document to the patient's chart.
	Replace Media Document	Replaces a media document that was previously added to the patient's chart.
	Delete Media Document	Deletes a media document that was previously added to the patient's chart.
	Look Up Media Documents	Queries and returns media documents based on the specified filter criteria.
Notes	Create Note Document	Adds a new note document to the patient's chart.
	Replace Note Document	Replaces a note document that was previously added to the patient's chart.

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Category	Action	Description
	Delete Note Document	Deletes a note document that was previously added to the patient's chart.
	Look Up Note Documents	Queries and returns note documents based on the specified filter criteria.
Patient Education	Send Patient Education	Adds education assignments to a patient's chart.
	Send Patient Update	Updates education assignments in a patient's chart.
	Send Patient Education Delete	Removes education assignments from a patient's chart.
Patient Admin	Look up Patient Demographics and Visit Information	Queries and returns patient demographics and visit information.
	Look up Admitted Patients	Queries and returns all currently admitted patients from a facility.
Referral	Update Referral	Modifies a referral.
Result	Look up Results	Queries and returns results of diagnostic tests including labs, radiology, and imaging.
	Pull Diagnostic Info	Displays a diagnostic result message.
Vaccination	Look up Patient Vaccinations	Queries and returns patient's vaccinations based on demographic data.
	Look Up Vaccine Administration	Queries and returns vaccine administration information.
Patient Search	Look Up Patient	Queries and returns an existing patent record.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

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For information about setting up the spoke, see Set up the Redox Electronic Health Record Spoke.

Set up the Redox Electronic Health Record Spoke

Integrate your ServiceNow instance and the Redox engine with both inbound and outbound configuration.

Before you begin

Important:

Starting with the Yokohama release, Redox Electronic Health Record Spoke is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

For details, see the Deprecation Process [KB0867184] article in the Now Support knowledge base.

- Request an Integration Hub subscription.
- Ensure you have the admin access to the Redox engine dashboard https://dashboard.redoxengine.com/#/login.
- Activate the Redox Electronic Health Record Spoke.
- Role required: admin.

About this task

This task gives the procedure to set up both the inbound and outbound transactions between your ServiceNow instance and the Redox engine. After you configure the inbound transactions, the Redox engine can make calls to the ServiceNow REST Application Programming Interface (API). The outbound setup enables the ServiceNow instance to get authenticated and connect with the Redox engine.

Procedure

1. Create a Redox Electronic Health Record Spoke connection and credential record.
   This procedure enables the outbound transactions.
2. Configure the external Redox healthcare system as a source system for the Redox Electronic Health Record Spoke.
   This procedure enables the inbound transactions.

Create a Redox Electronic Health Record Spoke connection and credential record

Enable your ServiceNow instance to connect with the Redox engine by setting up a connection and credential record.

Before you begin

Important:

Starting with the Yokohama release, Redox Electronic Health Record Spoke is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

For details, see the Deprecation Process [KB0867184] article in the Now Support knowledge base.

Role required: admin

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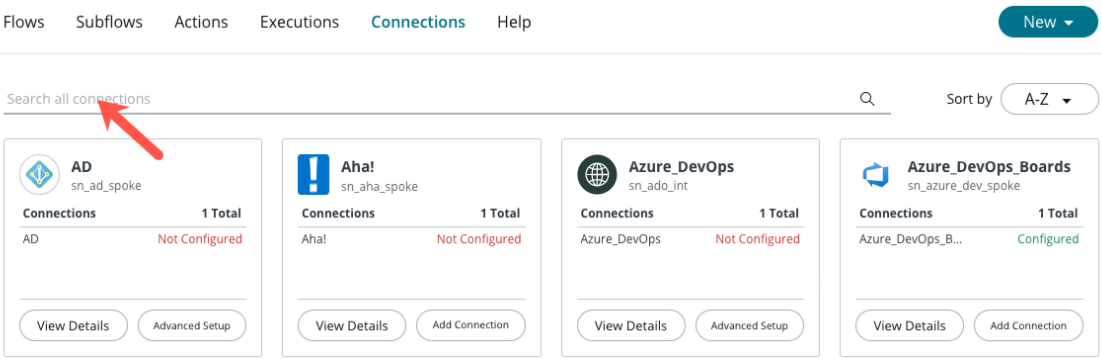
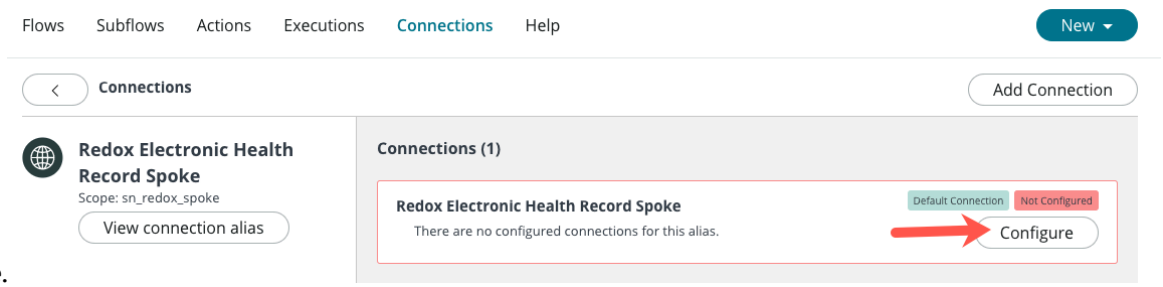
Procedure

1. Log in to your ServiceNow instance.
2. Navigate to **All** > **Process Automation** > **Flow Designer**.
3. On the Flow Designer page, select Connections.
4. In the Search all connections field, enter *Redox*.



5. On the Redox Electronic Health Record Spoke card, click **View Details**.
6. Click **Configure**.



7. In the Configure Connection form, fill details.

Configure Connection form

Field	Description
Connection Name	Name of the connection. **Note:** If you're creating the first record, then Redox Electronic Health Record Spoke is the default name and it's read-only. If you create any record after that, you can provide custom connection name.
Connection URL	The URL to connect to the Redox engine. Enter https://api.redoxengine.com/.
Name	Name of the Redox Electronic Health Record Spoke credential. The default name is Redox credential but you can update it.
API Key	The API key to access the Redox engine dashboard. You must generate the key on the Redox engine dashboard https://dashboard.redoxengine.com/#/login. **Tip:** To learn how to generate the API key, see the Redox developer documentation.

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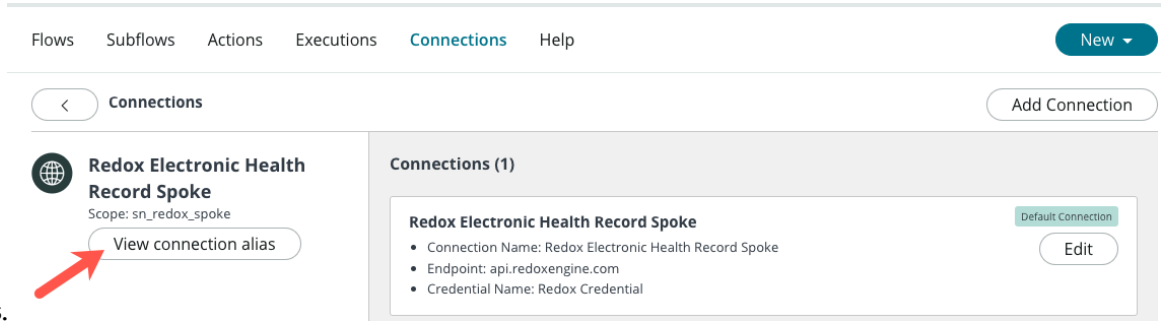
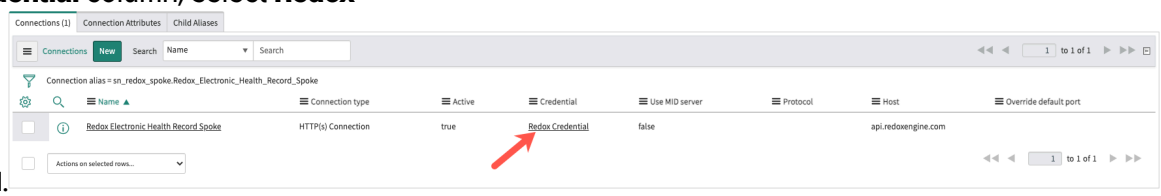
Field	Description
Secret	The source secret to access the Redox engine dashboard. You must generate the secret on the Redox engine dashboard https://dashboard.redoxengine.com/#/login. **Tip:** To learn how to generate the secret, see the Redox developer documentation.

8. Click **Configure Connection**.
   The connection and credential record is created.
9. Click **View connection alias**.



10. In the **Credential** column, select **Redox Credential**.



11. On the Redox credential page, click **Get Token** to generate a token for raising authenticated requests from the spoke actions.

Configure the external Redox healthcare system as a source system for the Redox Electronic Health Record Spoke

Enable the Redox Electronic Health Record Spoke to send data to the external Redox healthcare system by configuring the source and destination IDs of the system in your ServiceNow instance.

Before you begin

Important:

Starting with the Yokohama release, Redox Electronic Health Record Spoke is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

For details, see the Deprecation Process [KB0867184] article in the Now Support knowledge base.

Role required: admin

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Procedure

- Configure the Source system [sn_hcls_source_system] table to send data to an external Redox healthcare system by using the Redox Inbound Integration application.
  For more information, see Configure an external Redox healthcare system as a source system for a custom integration.
- Specify the destination ID used in the Source system [sn_hcls_source_system] table for each spoke action in your flow.

Roadmunk Spoke

The Roadmunk spoke provides actions to view and analyze meaningful usage data for Roadmunk software subscriptions. Analyze usage for your Roadmunk account to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Roadmunk spoke v1.7.1 is the latest version. For version history of the spoke, see Roadmunk spoke release notes.

Supported versions

This spoke was built for the Roadmunk June 2021 release version, but may be compatible with later versions.

Spoke requirements

Roadmunk account with an Account Admin user role.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Roadmunk spoke provides actions to automate Roadmunk tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
Account Management	Look up Account	Retrieves information about a Roadmunk account.
Feedback Management	Look up Feedback Stream	Retrieves a list of all feedback.
Idea Management	Look up Ideas Stream	Retrieves a list of all ideas.
Roadmap Management	Look up Roadmaps Stream	Retrieves a list of all roadmaps.
User Management	Look up Users Stream	Retrieves a list of all users within an account.
	Look up Users Using File	Retrieves a list of users from a file that is attached to a record.
	Deactivate User	Deactivates a Roadmunk user.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Roadmunk spoke.

Set up the Roadmunk spoke

Integrate the ServiceNow instance and Roadmunk by using an API access token to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Roadmunk spoke.
- Roadmunk role required: Account Admin.
- Role required: admin.

Generate a Roadmunk API access token

Generate an API access token that authorizes access to the Roadmunk GraphQL API.

Before you begin

Role required: Roadmunk Account Admin

Procedure

1. From a web browser, open Roadmunk.
2. Log in using your account admin credentials.
   The Roadmunk dashboard opens.

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3. On the left navigation menu of the Roadmunk dashboard, click your profile icon and then select **Account Settings**.
   Your account settings open.
4. On the page header of your account settings, select the **Integrations** tab.
5. Under Existing Integrations, click **Add an integration**.
6. When prompted to select an integration to configure, select **API Tokens**.
   The Roadmunk API Tokens form opens.
7. Enter a name for your API access token in the **Application Name** field.
8. Click **Create API Token**.
   The API access token generates and then the API Token Created dialog box opens.
9. On the dialog box, copy your API access token by clicking **Copy To Clipboard**.
   Save it in a secure location for later use.

Create a Roadmunk connection

Create a connection between your Roadmunk applications and your ServiceNow instance so that your instance can retrieve user data from your applications.

Before you begin

Role required: admin

Procedure

1. From your ServiceNow instance, navigate to **Process Automation** > **Flow Designer**.
   The Flow Designer launches in a new tab.
2. Select the **Connections** tab.
3. Locate your Roadmunk connection and then click **Add Connection**.
   The Create Connection dialog box opens.
4. On the dialog box, fill in the fields.

Create Connection dialog box

Field	Description
Connection Information	
Connection Name	Name of the Roadmunk connection. This field populates automatically.
Connection URL	URL for the connection. This field is automatically set to **https://app-gateway.roadmunk.com**, where **app** is the default geographic region (North America) in which the connection is being created. If you are creating the connection outside of the default **app** (North America) region, you can change the value of the region to either **eu** (Europe) or **apac** (Asia-Pacific Region).
Credential Information	
API Token	API access token that authorizes access to the Roadmunk GraphQL API. Enter the same API access token that you generated in Generate a Roadmunk API access token.

5. Click **Create Connection**.

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Saba Spoke

The Saba spoke enables you to pull learning courses, course activity and users from a Saba instance into a ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Saba spoke v1.1.0 is the latest version. For version history of the spoke, see Saba spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - JSON Parser [com.glide.hub.action_step.jsonparser]
- IntegrationHub Standard Spokes [com.glide.hub.action_step.xmlparser]

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke flows

The Saba spoke provides a flow to pull tokens on a scheduled basis. Enable the flow to ensure that the spoke actions work properly.

Flow	Description
Get Saba Token	Retrieves access token for Saba and generates a new refresh token after every six days.

Spoke actions

The Saba spoke provides actions to automate Saba tasks when events occur in the ServiceNow instance. Available actions include:

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Action	Description
Get Authorization Code	Retrieves the authorization code that is required to get the access token in the Saba system.
Get Access Token	Retrieves the access token for Saba based on username, password, authorization code, connection alias, and application registry.
Get Refresh Token	Retrieves the refresh token for Saba.
Get Saba System Timezone Difference	Compares the time zones of the Saba system and ServiceNow platform and retrieves the difference.
Look up Courses Stream	Retrieves the main view to get course data. This is based on filters such as count per page, and start page.
Look up User Course Activity Stream	Retrieves user progress on course items.
Look up Users Stream	Retrieves data of employees from the the Saba system.
Save Assignment	Creates or updates a standard assignment.

Spoke module

The Saba spoke adds a Saba application to your ServiceNow instance. The Saba application has the following module:

Module	Description
Credentials	Details required to pull tokens from the Saba system.

Saba spoke account requirements

The Saba spoke requires registering an OAuth 2.0 application in your Saba account to generate OAuth 2.0 tokens for the Saba spoke. Record the generated Client ID, Client Secret, Application key, Integration user name, and password for later use.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up Saba spoke.

Set up Saba spoke

Integrate your Saba application with your ServiceNow instance. Register an OAuth application in Saba and authenticate requests from a ServiceNow instance.

Before you begin

- Request Integration Hub subscription.
- Activate the Saba spoke.

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- Saba integration user or admin credentials.
- Role required: admin.

Note: Make sure that the application registry, connections, and credentials are within the application scope.

Register Saba as an OAuth provider

Use the information generated during the Saba application creation and configuration to register Saba as an OAuth provider and allow the instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin.

Procedure

1. Navigate to **System OAuth** > **Application Registry**.
2. Open the record for the Saba spoke.
3. On the form, fill in the fields.

Application Registries

Field	Value required
Name	Name to uniquely identify the record.
Client ID	Client ID created during the application configuration in Saba.
Client Secret	Client Secret created during the application configuration in Saba.
Default Grant type	Grant type used to establish the token: **Authorization Code**
Application	Application scope that contains this record: **Saba Spoke**
Accessible from	Application scope that this registry is accessible from.
Active	Option to actively use the application registry. Select the option.
Token URL	OAuth server token endpoint.

4. Right-click the form header, and click **Save**.

Create connection record for the Saba spoke

Create connection records to your Saba application. The Saba spoke connection and credential alias uses these connections to perform actions in Saba.

Before you begin

Role required: admin

Procedure

1. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the record for the Saba spoke.
3. From the **Connections** tab, click **New**.
4. On the form, fill these values.

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HTTP(s) Connection form

Field	Value required
Name	Name to uniquely identify the connection record.
Credential	OAuth credential record you created for Saba.
Connection alias	Alias record associated with this connection. For example, enter `sn_saba_spoke.Saba`
URL builder	**Note:** Do not select the check box.
Connection URL	URL of the Saba instance.
Use MID server	This field isn't applicable.
Active	Option to actively use the connection. Select the option.
Domain	Domain that the action or activity runs in.

5. Click **Submit**.

Create credential record for the Saba spoke

Authorize the Saba spoke actions by creating credential records for the application registered in Saba. The Saba spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **Connections & Credentials** > **Credentials**.
2. Click **New**.
3. Select OAuth 2.0 Credentials.
4. On the form, fill in the fields.

Field	Description
Name	Name to uniquely identify the record. For example, Saba.
Active	Option to actively use the credential record. Select the option.
OAuth Entity Profile	Default OAuth entity profile of the Saba spoke.
Order	Order that the credentials are used. For example, enter 100.

5. Right-click the form header and click **Save**.

Create basic Auth credentials for the Saba spoke

Integrate the ServiceNow instance and Saba instance by using the basic Auth credentials to authenticate ServiceNow requests.

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Before you begin
Role required: admin.

Procedure
1. Navigate to **Connections & Credentials** > **Credentials**.
2. Click **New**.
3. Select Basic Auth Credentials.
4. On the form, fill in the fields.

Field	Description
Name	Name to uniquely identify the record. For example, Saba.
User name	User name to be entered as credential.
Password	Password to be entered as credential.
Active	Option to actively use the credential record. Select the option.
Order	Order that the credentials are used. For example, enter 100.

5. Right-click the form header and click **Save**.

Provide Saba user credentials

Create a record to provide details and credentials of the required Saba user. The Saba spoke uses these user credentials to perform actions in Saba.

Before you begin
Role required: admin.

Procedure
1. Navigate to **Saba** > **Credentials**.
2. Click **New**.
3. On the form, fill these values.

Saba Credentials form

Field	Descriptions
Credential	Reference to the Saba integration user credential record.
Connection & Credential Alias	Default alias record associated with the Saba spoke.
Refresh Token Expires	Date and time by when the Saba refresh token expires. Once the Get Saba Token flow is activated, the Saba spoke generates a new token periodically, before the current refresh token expires.

4. Click **Submit**.
5. To generate the Saba token, click the **Get Saba Token** related link.

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Salesforce Marketing Cloud Spoke

The Salesforce Marketing Cloud spoke is built by Bristlecone, Inc. This spoke provides actions to retrieve records from your Salesforce Marketing Cloud data extensions and retrieve and update user information.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Salesforce Marketing Cloud spoke v1.6.2 is the latest version. For version history of the spoke, see Salesforce Marketing Cloud spoke release notes.

Supported versions

This spoke was built for Salesforce Marketing Cloud Corporate Edition.

Spoke requirements

Admin user with privileges to create new users and roles in Salesforce Marketing Cloud.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - SOAP (com.glide.hub.action_step.soap)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Salesforce Marketing Cloud spoke provides actions to automate Salesforce Marketing Cloud tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Data Extension Management	Look up Data Extension Attributes	Retrieves records from data extensions with less than 2500 records.
	Look up Data Extension Attributes for Bulk Records Stream	Retrieves bulk records from data extensions.

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Category	Action	Description
User Management	Look up Users Stream	Retrieves user properties for your Salesforce Marketing Cloud users based on the specified user properties and associated filters.
	Update User by User ID	Updates user properties based on the user ID.

Spoke tables

The Salesforce Marketing Cloud spoke adds the following table:

Table	Description	Fields
Configurations	Displays the list of Salesforce Marketing Cloud configurations, such as data extensions.	• Configuration Type • Configuration Value

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Connection and credential alias requirements

The Salesforce Marketing Cloud spoke uses a Connection & Credential alias for the connection setup and the user profile that is attached to the SOAP security policies for the credential setup. If you are connecting to multiple Salesforce Marketing Cloud environments, you must use the same credential information in each environment.

For information about setting up the spoke, see Set up the Salesforce Marketing Cloud spoke.

Set up the Salesforce Marketing Cloud spoke

Integrate the ServiceNow instance and Salesforce Marketing Cloud by using Salesforce Marketing Cloud credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Salesforce Marketing Cloud spoke.
- Salesforce Marketing Cloud role required: admin user with privileges to create new users and roles.
- Role required: admin.

Procedure

1. **Optional:** Using basic authentication for Salesforce Marketing Cloud spoke
2. **Optional:** Using OAuth 2.0 for Salesforce Marketing Cloud spoke

Using basic authentication for Salesforce Marketing Cloud spoke

You can use basic authentication to validate ServiceNow requests instance with Salesforce Marketing Cloud spoke.

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Create a user for accessing the Salesforce Marketing Cloud SOAP API

Create a user with which you can access the Salesforce Marketing Cloud SOAP API. The SOAP API enables you to retrieve records from your Salesforce Marketing Cloud data extensions and get information about your Salesforce Marketing Cloud users.

Before you begin

Role required: Salesforce admin user with privileges to create new users and roles.

Procedure

1. From a web browser, go to your Salesforce Marketing Cloud instance.
2. Log in using your admin credentials.
3. On the page header of your instance, click your profile icon and then select **Setup**.
   The Setup page opens.
4. Create a Salesforce Marketing Cloud user.

   a. Navigate to **Administration** > **Users** > **Users** and then click **Create**.
   The New User form opens.

   b. In the General Settings form section, fill in the fields.

General Settings

Field	Description
Name	Name of the user.
Reply Email Address	Email address that you want to send and reply to email messages from. Salesforce Marketing Cloud also sends forgotten password requests to this email address. After you enter an email address, click **Verify** to verify the email address.
Add to From Name Dropdown	Option to send the reply email address through a domain verification process before the email address populates in an email.
Notification Email Address	Email address that you want to send Salesforce Marketing Cloud notifications to.
Username	Username for the user.
External Key	Key that uniquely identifies the user during API calls.
Time Zone	Time zone in which the user is located.
Culture Code	Language that is used on the Salesforce Marketing Cloud user interface for this user.
API User	Option indicating whether the user can access the Salesforce Marketing Cloud APIs. Select the check box to enable this option.
Temporary Password	Temporary password with which the user can log in for the first time. The user is prompted to change this password on the first login.

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Field	Description
Verify Password	Field to verify the temporary password.

c. Click **Save**.

5. Create a user role that enables assigned users to access the Salesforce Marketing Cloud SOAP API and also manage users and data extensions.

a. Navigate to **Administration** > **Users** > **Roles** and then click **Create**.
The New Role form opens.

b. In the Properties form section, fill in the fields.

Properties

Field	Description
Name	Name of the user role.
External Key	Key that uniquely identifies the user role.
Description	Description of the user role.

c. In the Permissions form section, expand the **Email** > **Subscribers** > **Data Extension** permission category and then select the **Allow** check box for the View and Manage Data access permissions.

d. Expand the **Email** > **Admin** > **API Access** permission category and then select the **Allow** check box for the WebService API access permission.

e. Expand the **Administration** > **Users** permission category and then select the **Allow** check box for the following access permissions:

- View
- Update
- Disable
- Manage Business Units

f. Click **Save**.

6. Assign the user role to your Salesforce Marketing Cloud user.

a. Navigate to **Administration** > **Users** > **Users**.

b. From the list of available users, select the check box for the user that you created in step 4.

c. Click **Manage Roles**.
The Roles form for the selected user opens.

d. In the Roles form section, click **Edit Roles**.

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e. When the list of available roles appears, select the check box for the user role that you created in step 5.

f. Click **Save**.

Create a connection and credential for Salesforce Marketing Cloud

Create a connection and credential for Salesforce Marketing Cloud so that you can connect your ServiceNow instance with the Salesforce Marketing Cloud SOAP API.

Before you begin

Role required: admin

Procedure

1. From your ServiceNow instance, navigate to **Connections & Credentials** > **Connection & Credential Aliases**.
2. From the list of available connection and credential aliases, select **SalesforceMarketingCloud**.
3. On the Connection & Credential Aliases form, click the **Create New Connection & Credential** related link.
   The Create Connection and Credential dialog box opens.
4. In the dialog box, fill in the fields.

Create Connection and Credential dialog box

Field	Description
Please Enter the Connection Information	
Connection Name	Name of the connection.
SOAP Connection URL	URL of your SOAPConnection endpoint. Enter `https://<subdomain>.soap.marketingcloudapis.com/Service.asmx`, where <*subdomain*> is your Salesforce Marketing Cloud subdomain.
Please Enter the Credential Information	
Username Profile Name	Name of your credentials.
Username	Username of the user that you can access the Salesforce Marketing Cloud SOAP API with. Enter the username of the user that you created in Create a user for accessing the Salesforce Marketing Cloud SOAP API.
Password	Password of the user that you can access the Salesforce Marketing Cloud SOAP API with. Enter the password of the user that you created in Create a user for accessing the Salesforce Marketing Cloud SOAP API.

5. Click **Create**.

Using OAuth 2.0 for Salesforce Marketing Cloud spoke

You can use OAuth 2.0 to validate ServiceNow requests instance with Salesforce Marketing Cloud spoke.

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Create OAuth 2.0 credentials for Salesforce Marketing Cloud spoke

Create Salesforce Marketing Cloud OAuth 2.0 credentials to use Salesforce Marketing Cloud spoke.

Before you begin

Role required: Salesforce Marketing Cloud admin

Procedure

1. Log in to the Salesforce Marketing Cloud tenant.
2. Navigate to **Setup Home** > **Platform Tools** > **Apps** > **Installed Packages**.
3. Select **New** to create a package.
4. Select **Add Component**.
5. Select **API Integration** to integrate Salesforce Marketing Cloud APIs to your application.
6. Select **Next**.
7. Select **Server-to-Server** as the integration type.
8. Select **Next**.
9. Select the required scopes for your integration.
10. Select **Save**.
    Your Client Id and Client Secret gets displayed in your configuration summary. Navigate to the Components section under **SETUP** > **INSTALLED PACKAGES** > **DETAILS** to view the Client Id and Client Secret. Copy the values to use them later.

Create a connection and credential for Salesforce Marketing Cloud spoke

Create a connection and credential for OAuth 2.0 authorization of Salesforce Marketing Cloud spoke.

Before you begin

Role required: admin

- Create OAuth 2.0 credentials for Salesforce Marketing Cloud spoke

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open the **SalesforceMarketingCloudSOAPConnection** record.
3. From the **Related Links** tab, click **Create New Connection & Credential** link.
4. On the Connection & Credential Aliases form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection. For example, `SFMC SOAP Connection`.
SOAP Connection URL	URL of your SOAP Connection endpoint. Enter `https://<subdomain>.soap.marketingcloudapis.com/Service.asmx`, where *<subdomain>* is your Salesforce Marketing Cloud subdomain.

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Field	Description
OAuth Client ID	Client ID created for the Salesforce Marketing Cloud spoke.
OAuth Client Secret	Client secret created for the Salesforce Marketing Cloud spoke.
OAuth Redirect URL	OAuth redirect URL. It must be in the format `https://<instance-name.service-now.com>/oauth_redirect.do`.
Contacts Counts Data Extension	Name of the data extension that you want to retrieve Contacts Counts report data from.

5. Select **Create and Get OAuth Token**.

Salesforce Spoke

The Salesforce spoke is built by Bristlecone, Inc. Access and manage data in the Account, Contact, Case, Lead, Opportunity, Order, and User objects of your Salesforce instance from the ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Salesforce spoke v2.6.1 is the latest version. For version history of the spoke, see Salesforce spoke release notes.

Supported version

This spoke was built for the Salesforce API version v64.0, but may be compatible with later versions.

Spoke requirements

- Salesforce account
- Salesforce admin credentials
- Salesforce connected app configured to integrate with ServiceNow
- Salesforce connected app details such as, consumer key and consumer secret.
- Integration Hub subscription

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Note: For users who have installed Salesforce spoke v1, you can't upgrade from Salesforce spoke v1 to Salesforce spoke v1.2 directly. To upgrade, you must uninstall the Salesforce spoke v1 and then, install the Salesforce spoke v1.2.

You must also note that, Salesforce spoke v1 is certified on New York and Salesforce spoke v1.2 is certified on Orlando and Paris.

Spoke subflows

The Salesforce spoke provides subflows to access and manage data in the Salesforce Account, Case, Contract, and Opportunity objects.

Subflow	Description
Account Subflow	Processes data in the account object when the Salesforce webhook is triggered.
Case Subflow	Processes data in the case object when the Salesforce webhook is triggered.
Contract Subflow	Processes data in the contract object when the Salesforce webhook is triggered.
Opportunity Subflow	Processes data in the opportunity object when the Salesforce webhook is triggered.
Salesforce Subflow	Processes data in any Salesforce object when the Salesforce webhook is triggered.

Spoke actions

The Salesforce spoke provides actions to access and manage data in the Salesforce , Account, Contact, Case, Lead, Opportunity, Order, and User objects.

Category	Action	Description
Account Management	Create Account	Creates an account in Salesforce.
	Look up Accounts	Retrieves all the account details based on the specified SOQL query.
	Look up Records for Account	Retrieves all the records for an account based on the given relationship name.
Record Management	Create Record	Creates a record in Salesforce. **Note:** Ensure that you use relevant actions to create records for Account, Contact, Case, Lead, Opportunity, Order, and User.
	Delete Record	Deletes a record in Salesforce.
	Get Record Details	Retrieves the specific record in Salesforce by Record ID.

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Category	Action	Description
	Look up Attachment from Records	Retrieves an attachment from a record if it was uploaded using the Salesforce Classic view.
	Look up Contracts	Retrieves all the contract details based on the specified SOQL query.
	Look up Related Records	Retrieves all the records for the specified object name associated with their given relationship name.
	Subflow Helper Action	Parses the subflow's JSON input and generates an array of object.
	Update Record	Updates a record in Salesforce.
	Look up Document from Record	Retrieves a document from a record if it was uploaded using the Salesforce Lightning view.
Case Management	Create Case	Creates a case in Salesforce.
Lead Management	Create Lead	Creates a lead in Salesforce.
Metadata Retrieval	Metadata - Check Service Cloud Feature	Checks whether Salesforce Service Cloud is enabled on the target Salesforce instance. To use this action, perform the steps outlined in the Create a Salesforce CRM integration profile section in Integrating with Salesforce CRM.
	Metadata - Get Account Types	Retrieves all the available account types in Salesforce.
	Metadata - Get Creatable Fields	Retrieves a list of creatable fields in a required standard or custom Salesforce table.
	Metadata - Get Creatable Objects	Retrieves a list of creatable objects in Salesforce.
	Metadata - Get Deletable Objects	Retrieves a list of deletable objects in Salesforce.
	Metadata - Get Updatable Fields	Retrieves a list of updatable fields in a required standard or custom Salesforce table.
	Metadata - Get	Retrieves a list of updatable objects in Salesforce.

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Category	Action	Description
	Updatable Objects	
	Metadata - Get Account Fields	Retrieves a list of fields in the Salesforce Account object.
	Metadata - Get Case Origin Values	Retrieves a list of case origins in Salesforce. The value field of the case origin from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Case Priorities	Retrieves a list of case priorities in Salesforce. The value field of the case priority from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Case Reasons	Retrieves a list of case reasons in Salesforce. The value field of the case reason from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Case Status Values	Retrieves a list of case status values in Salesforce. The value field of the case status from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Industries for Accounts	Retrieves all the industries available for accounts in Salesforce.
	Metadata - Get Industries for Lead	Retrieves a list of industries in the Salesforce Lead object. The value field of the industry from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Lead Status	Retrieves a list of lead status values in Salesforce. The value field of the lead status from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Objects	Retrieves all the available object names in Salesforce.
	Metadata - Get Opportunity Stages	Retrieves a list of opportunity stages in Salesforce. The value field of the opportunity stage from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Opportunity Types	Retrieves a list of opportunity types in Salesforce. The value field of the opportunity type from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Order Status Values	Retrieves a list of order status values in Salesforce. The value field of the order status from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Organization Type	Retrieves the organization type of the Salesforce instance. To use this action, perform the steps outlined in the Create a Salesforce integration profile section in Integrating with Salesforce.

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Category	Action	Description
	Metadata - Get Record Fields	Retrieves all the record fields for the specified table name.
	Metadata - Get Relationship Fields	Retrieves all the relationship fields for the specified object name.
	Metadata - Get Relationship Names	Retrieves all the relationship names for the specified object name.
	Metadata - Get User Email Encodings	Retrieves a list of email encodings in the Salesforce User object. The value field of the email encoding from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get User Languages	Retrieves a list of languages in the Salesforce User object. The value field of the user language from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get User Locales	Retrieves a list of locales in the Salesforce User object. The value field of the user locale from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get User Time Zones	Retrieves list of time zones in the Salesforce User object. The value field of the time zone from the Salesforce response body is mapped to the name field in JSON output.
	Metadata - Get Object Schema	Retrieves the schema metadata for a specified Salesforce object, including object details and field definitions.
Opportunity Management	Create Opportunity	Creates an opportunity in Salesforce.
Order Management	Create Order	Creates an order in Salesforce.
License Management	Look up User Licenses Stream	Retrieves user subscription information that is available in Salesforce. To use this action, perform the steps outlined in the Create a Salesforce CRM integration profile section in Integrating with Salesforce CRM.
	Look up Usage Based Entitlements Stream	Retrieves the consumption usage details for the resources. To use this action, perform the steps outlined in the Create a Salesforce CRM integration profile section in Integrating with Salesforce CRM.
User Management	Create User	Creates a user in Salesforce.
	Look up User Profiles	Retrieves a list of user profiles in Salesforce. The name and ID fields of the user profiles from the Salesforce response body are mapped to the label and name fields respectively in the JSON output.

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Category	Action	Description
	Look up User Roles	Retrieves a list of user roles in Salesforce. The name and ID fields of the user profiles from the Salesforce response body are mapped to the label and name fields respectively in the JSON output.
	Look up Users	Retrieves user attributes for Salesforce users. To use this action, perform the steps outlined in the Create a Salesforce CRM integration profile section in Integrating with Salesforce CRM.
	Remove User	Reclaims a user account in Salesforce. To use this action, perform the steps outlined in the Create a Salesforce CRM integration profile section in Integrating with Salesforce CRM.

Salesforce account requirements

The Salesforce spoke requires configuring your Salesforce account to generate an OAuth 2.0 JWT Bearer Grant token.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Salesforce spoke.

MID Server requirements

These actions use REST calls, which can run on an instance or MID Server. Use the connection record associated with the Salesforce alias to configure where actions run as well as set MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the Salesforce spoke

Integrate your Salesforce account with your ServiceNow instance. Create a custom OAuth application in Salesforce and authenticate requests from ServiceNow.

Before you begin

- Request an Integration Hub subscription
- Activate the Salesforce spoke
- Role required: admin.

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Note: Two spoke setup procedures are outlined here. Perform one of the procedures as per your requirement.

- To setup the spoke using OAuth authorization template, see Option 1: Set up the Salesforce spoke using OAuth authorization template.
- To setup the spoke using JWT signing key, see Option 2: Set up the Salesforce spoke using JWT signing key.

Note: Don't delete the default connection alias record. This can result in an unexpected behavior. Configure your connection using the default connection alias.

Configure a connection for Salesforce spoke

Add and configure a Salesforce connection to authenticate ServiceNow requests in Salesforce spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **Process Automation** > **Workflow Studio**.
2. Select **Integrations**.
3. Select the **Connections** tab.
4. Use the search box to find the **Salesforce** connection alias.

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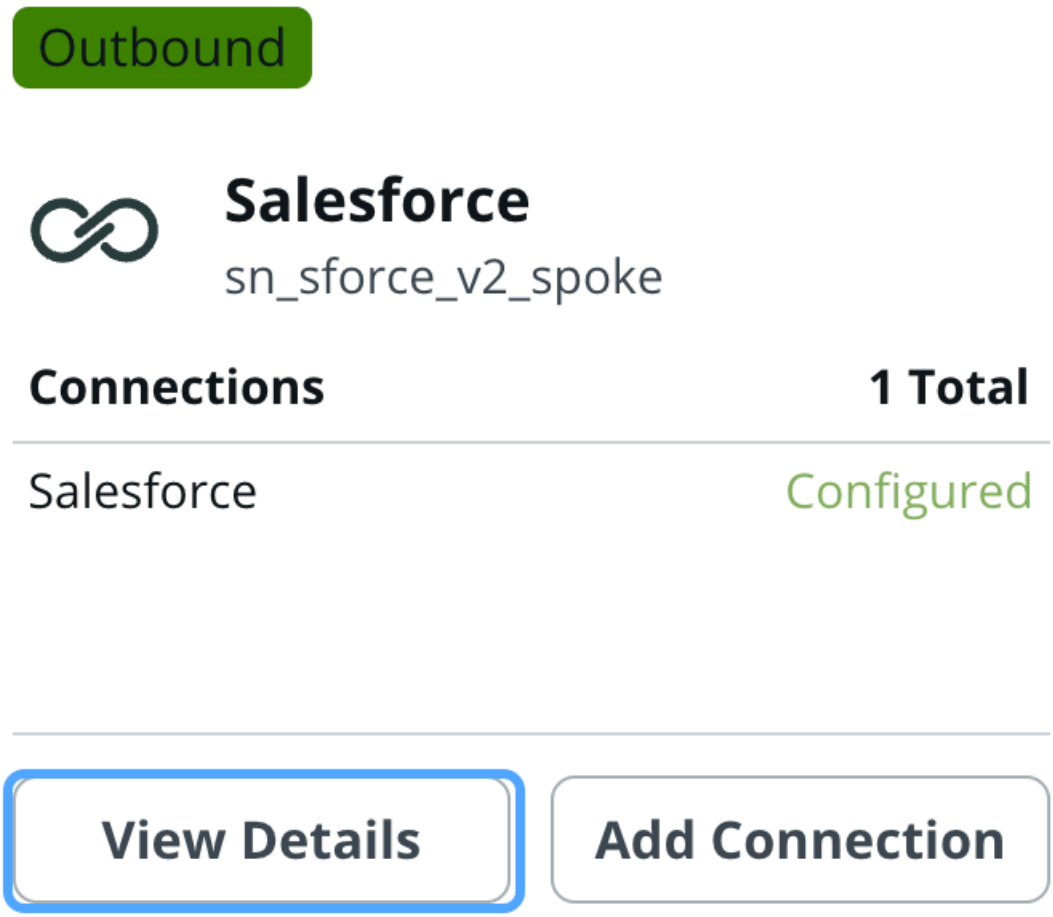
5. Select **View Details**.



6. Configure the Salesforce connection.

   a. Add or edit a connection.

   - To set up an existing connection, select **Configure** or **Edit**.
   - To create and configure a new connection, select **Add Connection**.

   Note: To support multiple connections through a spoke, see Supporting multiple connections.

   b. On the configuration form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection. For example, `Salesforce`.
Connection URL (Instance URL)	URL to make a connection to Salesforce. Use this format: `https://<organization_name>.my.salesforce.com`.
Grant Type	OAuth grant type for authentication. Select one of the following options:

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Field	Description
	▪ **Authorization Code** ▪ **Client Credentials**
OAuth Client ID	Client ID generated in Salesforce for OAuth authentication.
OAuth Client Secret	Client Secret generated in Salesforce for OAuth authentication.
OAuth Redirect URL	URL where Salesforce redirects after successful authentication. Use this format: `https://<instance_name>.service-now.com/oauth_redirect.do`.

c. Select **Save and Get OAuth Token**.

Result
The Salesforce spoke connection is configured and ready to be used.

Create a connected app in Salesforce

Create a connected app in your Salesforce account to enable OAuth 2.0 authentication with the Salesforce spoke.

Before you begin
- Salesforce account
- Role required: Salesforce admin

About this task
Complete these steps from your Salesforce account. See Create a Connected App in Salesforce Trailblazer forum documentation for instructions on creating and configuring connected apps.

Procedure
1. From your Salesforce account, create a connected app.
2. Configure the connected app to enable your Salesforce application to share data with your ServiceNow instance.

   a. Select **Enable OAuth Settings** and configure the authentication settings.

   b. If you want to set up the spoke using JWT signing key, select **Use Digital Signatures** and upload a Java KeyStore (JKS) certificate.

   c. Select the OAuth scopes:

Grant Type	OAuth scopes
Authorization Code	▪ **Access and manage your data (api)** ▪ **Perform requests on your behalf at any time (refresh_token, offline_access)**

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Grant Type	OAuth scopes
Client Credentials	**Access and manage your data (api)**

d. Specify ServiceNow instance URL in Callback URL in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`

e. After creating the connected app, under **OAuth Policies** on the Edit Policies page, set these values:

Field	Value
Permitted Users	Admin approved users are pre-authorized
IP Restrictions	Relax IP Restrictions

f. Configure user provisioning for the connected app as per your requirement.

3. Record the values of **Consumer Key** and **Consumer Secret**.

Note:

- Assign profile and permission set as per your requirement.
- In OAuth app IP restrictions, specify OAuth policies to ensure that the connected app works like a default app.

Result

The connected app is created in Salesforce.

Option 1: Set up the Salesforce spoke using OAuth authorization template

Integrate your Salesforce account with your ServiceNow instance. Create a custom OAuth application in Salesforce and authenticate requests from ServiceNow using OAuth authorization template.

Before you begin

- Create a connected app in Salesforce
- Role required: admin

Procedure

1. Log in to Salesforce.
   You can also switch from the Lightning UI.
2. Select the setup icon and then select **Setup**.
3. Search for and select#**OAuth and OpenID Connect Settings** #in the setup page search bar.
4. Enable **Allow Authorization Code and Credentials Flows**.
5. Search for and select **App Manager** in the setup page search bar.
6. On the App Manager page, select **New External Client App** to create an external client application.
7. On the form, fill in the fields.

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Field	Description
Basic Information	
External Client App Name	Name of your application.
API Name	Name of the API. This field is automatically populated.
Contact Email	The email address that you want to associate with the application.
Distribution State	The scope of distribution of the application. Select **Local** as the distribution state.
Contact Phone	The phone number that you want to associate with the application.
Info URL	The URL of the web page with more information about your application.
Logo URL	The URL of your logo image that is displayed with the connected application.
Icon URL	The URL of the icon for the connected application.
Description	Description of the application.
API (Enable OAuth Settings)	
Enable OAuth	Option to enable OAuth settings. Select this option to enable the OAuth settings.
Callback URL	URL of the OAuth provider that users are redirected to after authentication. Enter `https://instance.service-now.com/oauth_redirect.do`, where <*instance*> is the name of your ServiceNow instance.
OAuth Scopes	OAuth scopes that determine the amount of access that is granted to an access token. When the grant type is **Authorization Code**, use: ○ **Manage user data via APIs (api)** ○ **Perform requests at any time (refresh_token, offline_access)** When the grant type is **Client Credentials**, use **Manage user data via APIs (api)**.
Flow Enablement	

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Field	Description
Enable Client Credentials Flow	Select this option when the grant type is **Client Credentials**.
Security	
Require Secret for Web Server Flow	The option to implement the Require Secret for Web Server Flow in your external client app or connected app settings. ○ If the grant type is **Authorization Code**, select this option. ○ If the grant type is **Client Credentials**, clear this option.
Require Secret for Refresh Token Flow	The option in your external client app or connected app while implementing the refresh token flow using a server-side callback handler. ○ If the grant type is **Authorization Code**, select this option. ○ If the grant type is **Client Credentials**, clear this option.
Require Proof Key for Code Exchange (PKCE) Extension for Supported Authorization Flows	If this field is selected by default, clear the **Require Secret for Web Server Flow** and **Require Secret for Refresh Token Flow** options. **Note:** Enable **Require Proof Key for Code Exchange (PKCE) Extension for Supported Authorization Flows**.

8. Select **Create**.
   The application registration is complete and you're redirected to the Manage External Client Apps page.
9. Verify and edit the policies for the registered application by selecting **Edit**.
10. In the OAuth Policies section, verify that the **Permitted Users** field is set to **Admin approved users are pre-authorized** for the ServiceNow application.

    Note: Admin-approved users who are preauthorized enable any users with the corresponding profile or permission set to access the application without prior authorization. For more information, see Pre-Authorize User App Access Through Connected App Policies.

11. In the App Policies section, select either the profile of the integration user or the profile of the user that you want to use for the integration.
12. If you have selected the **Enable Client Credentials Flow** option, then in the OAuth Flows and External Client App Enhancements section, select **Enable Client Credentials Flow** and enter either the username or email address of the integration user that you want to use for the integration profile.
13. In the App Authorization section, verify that the **Refresh token policy** field is set to **Refresh token is valid until revoked** and the **IP Relaxation** field is set to **Relax IP restrictions**.

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14. Select **Save**.
15. Retrieve OAuth credentials.

    a. Navigate to **Settings** > **OAuth Settings** and then select **Consumer Key and Secret**.
    The Salesforce login page opens in a new window.

    b. Enter your credentials to log in to Salesforce.

    c. Copy the **Consumer Key** and **Consumer Secret** and save them in a secure location for later use.

Option 2: Set up the Salesforce spoke using JWT signing key

Integrate your Salesforce account with your ServiceNow instance. Create a custom OAuth application in Salesforce and authenticate requests from ServiceNow using JWT signing key.

Before you begin

- Create a connected app in Salesforce
- Role required: admin

Attach a Java Key Store certificate to the Salesforce spoke

Enable the JSON Web Token (JWT) Bearer Grant token authentication by attaching a valid Java KeyStore (JKS) certificate to the Salesforce spoke.

Before you begin

- Valid Java KeyStore certificate
- Role required: admin

Procedure

1. Navigate to **All** > **System Definition** > **Certificates**.
2. Click **New**.
3. On the form, fill in the fields.

X.509 Certificate form

Field	Description
Name	Name to uniquely identify the record. For example, `Salesforce Certificate`.
Expiration notification	Option to send a notification when the certificate is about to expire.
Notify on expiration	Users that are notified when the certificate expires.
Warn in days to expire	Number of days to send a notification before the certificate expires.
Active	Option to actively use the certificate.
Format	Certificate format. The instance supports the PEM and DER formats.
Type	Type of certificate. Select **Java Key Store**.

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Field	Description
Valid from	Date from which the certificate is valid.
Expires	Date on which the certificate expires.
Expires in days	Number of days until the certificate expires.
Key store password	Password associated with the certificate.
Short description	Summary about the certificate.
PEM Certificate	Contents of the X509 certificate.

4. Click the attachments icon ( ) and attach a JKS certificate.
5. Click **Validate Stores/Certificates**.

Result
The JKS certificate is created and attached to the Salesforce spoke.

Create a JWT signing key for the Salesforce spoke

Create a JSON Web Token (JWT) signing key to assign to your Java KeyStore certificate.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **System OAuth** > **JWT Keys**.
2. Click **New**.
3. On the form, fill in the fields.

JWT Keys form

Field	Description
Name	Name to uniquely identify the JWT signing key. For example, `Salesforce JWT Keys`.
Signing Keystore	Valid JKS certificate attached in the previous task. For example, `Salesforce Certificate`.
Key Id	Key ID to identify which key is used when multiple keys are used to sign tokens.
Application	Application scope that contains this record. Select Salesforce spoke.
Signing Algorithm	Algorithm to sign with the JWT key.
Signing Key Password	Password associated with the signing key.
Active	Option to actively use the certificate.

4. Click **Submit**.

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Result
The JWT key is created and assigned to the JKS certificate.

Create a JWT provider for the Salesforce spoke

Add a JSON Web Token (JWT) provider to your ServiceNow instance.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **JWT Providers**.
2. Click **New**.
3. On the form, fill in the fields.

JWT Provider form

Field	Description
Name	Name to uniquely identify the JWT provider. For example, `Salesforce JWT Provider`.
Expiry Interval (sec)	Number, in seconds, to set the lifespan of JWT provider tokens.
Signing Configuration	JWT signing key from the previous step. For example, `Salesforce JWT Keys`.

4. Right-click the form header, and click **Save**.
   The Standard Claims and Custom Claims related lists are displayed.
5. In the **Standard Claims** related list, enter values for **iss**, **sub**, and **aud**.
   See OAuth 2.0 JWT Bearer Flow for Server-to-Server Integration in Salesforce Trailblazer forum documentation for instructions.
6. Click **Update**.

Result
The JWT provider is added to your ServiceNow instance.

Register Salesforce as an OAuth Provider

Use the information generated during Salesforce connected app configuration to register Salesforce as an OAuth provider and enable the instance to request OAuth 2.0 tokens.

Before you begin
Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Click **New**.
   The system displays the message `What kind of OAuth application?`
3. Select **Connect to a third party OAuth Provider**.
   The system displays a blank Application Registries form.
4. On the form, fill in the fields.

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Field	Value required
Name	Name to uniquely identify the record. For example, enter `Salesforce OAuth`.
Client ID	Consumer key that you generated during the Salesforce connected app configuration.
Client Secret	Consumer secret that you generated during the Salesforce connected app configuration.
OAuth API Script	Optional script to customize the request and response.
Default Grant type	Grant type used to establish the token. Select **JWT Bearer**.
Refresh Token Lifespan	Time, in seconds, that the refresh token is valid. The default time is 8,640,0000 seconds.
PKCE required	Option to enable public clients to require PKCE for an authorization. **Note:** You can use only **Authorization Code** as the **Default Grant type** when **PKCE** is enabled.
Application	Application scope that contains this record. Select Salesforce.
Accessible from	Application scope that this registry is accessible from.
Active	Option to actively use the application registry.
Authorization URL	This field should be left blank.
Token URL	OAuth server token endpoint. ○ For production instance, enter `https://login.salesforce.com/services/oauth2/token`. ○ For sandbox instance, enter `https://test.salesforce.com/services/oauth2/token`
Token Revocation URL	This field should be left blank.
Redirect URL	This field should be left blank.

5. Right-click the form header, and click **Save**.
   - The system validates the OAuth credentials and populates the **Redirect URL** field.
   - The system populates **OAuth Entity Profile** with **Grant Type** as **JWT Bearer**. For example, **OAuth Entity Profile** is created with default **Name**, **Salesforce JWT provider default_profile** .
6. Copy the value from the **Redirect URL** field.
7. Click **Update**.

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8. Log in to your Salesforce account to edit the configuration of your connected app.
   See the Salesforce Trailblazer forum documentation for instructions.
9. Paste the Redirect URL value into the Callback URL of your Salesforce connected app.
   For example, paste `https://<instance-name>.service-now.com/oauth_redirect.do`.

Result
The instance can request OAuth 2.0 tokens for the Salesforce spoke.

Note: When an OAuth token expires, the spoke automatically regenerates a new token in most cases. If a token expires and is not regenerated, a user with the admin role can regenerate the spoke OAuth token.

Create credential records for the Salesforce spoke

Create Credential records for the Salesforce connected app that you created. The Salesforce spoke connection and credential alias use these credentials to authorize actions.

Before you begin
Role required: admin

Procedure
1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
3. Select **OAuth 2.0 Credentials**.
   The pop-up window displays a blank OAuth 2.0 Credentials form.
4. On the form, fill in the fields.

Field	Value required
Name	Name to uniquely identify the record. For example, enter `Salesforce Credentials`.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile that you created when you registered the Salesforce connected app as an OAuth provider. For example, select **Salesforce OAuth default_profile**.
Applies to	MID Servers that can use this credential. For example, select **All MID Servers**.
Order	Order to apply this credential. For example, enter `100`.

5. Save the record.
6. Click the **Get OAuth Token** related link to generate the OAuth token.

Result
The credential record for the Salesforce spoke is created.

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Create connection records for the Salesforce spoke

Create connection records for your Salesforce account. The Salesforce spoke connection and credential alias use these connections to perform actions in Salesforce.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **Salesforce**.
3. On the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.
4. Enter these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `Salesforce Connection`.
Credential	Credential record you that created for Salesforce. For example, select **Salesforce Credentials**.
Connection alias	Alias record associated with this connection.
URL builder	**Note:** Do not select the check box.
Connection URL	Base URL to connect to your Salesforce instance. For example, `https://<instance-name>.salesforce.com`.
Use MID server	Option to use a MID Server. If you select this check box, define the fields in the Advanced MID Server Configuration related list.
Active	Option to actively use the connection.
Domain	Domain that the action or activity runs in.

5. Right-click the form header and click **Save**.
6. Ensure that **api_version** is set `v48.0` in the Attributes related list.

Result

The Salesforce spoke is set up and integrated with the ServiceNow instance.

Set up a bidirectional webhook

Configure a webhook to subscribe to Salesforce events with a ServiceNow callback URL.

Before you begin

- Role required: admin

Procedure

1. Log in as an administrator to your Salesforce instance.
2. Obtain the Salesforce instance details.

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For more information, see the View instance information for your Salesforce Organization knowledge article in Salesforce Trailblazer forum.

a. If you don't have Salesforce custom domains, obtain the Salesforce instance name from the Company Information page.

b. If you have custom domains, navigate to **Domain Management** > **My Domain** and copy the domain name.
For example, if the complete domain name on the page is **newdomain-customdomain.my.salesforce.com**, copy and record the value `newdomain-customdomain`.

3. Obtain the 18-digit Organization ID of your Salesforce instance.

a. Navigate to the Developer Console in your Salesforce instance and run this query:

```
Select Id from Organization
```

b. Copy and record the value of the 18-digit Organization ID.

4. Log in to your ServiceNow instance.
5. Create a webhook registry.

a. Navigate to **Salesforce Webhook Registry** > **Salesforce Webhook Registries**.

b. Click **New**.

c. On the form, fill these values:

Field	Description
Organization ID	18-digit Organization ID of your Salesforce instance.
Instance Name	Name of the Salesforce instance obtained from the Company Information page or custom domain of the Salesforce instance obtained from **Domain Management** > **My Domain**.

d. Right-click the form header and click **Save**.

6. Obtain the resource path from your ServiceNow instance.

a. Navigate to **System Web Services** > **Scripted Web Services** > **Scripted REST APIs**.

b. Open the record, **Salesforce Webhook Callbacks**.

c. In the **Resources** tab, click the **Default Callback** record.

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d. Copy and record the value of **Resource path**.
The required ServiceNow endpoint URL is: `https://<intance-name>.service-now.com/<resource-path>`

7. Configure the default subflows or create customsubflows.
These subflows are triggered when the required events occur in Salesforce instance. For more information, see Building subflows.

8. Configure the webhook routing policy.

a. Navigate to **System Definition** > **Decision Tables**.

b. Open the record, **Salesforce Decision Webhook Policy**.

c. In the **Decisions** tab, click **New**.

d. On the form, fill these values:

Field	Description
Label	Unique label to identify the routing policy.
Answer	Subflow that must be triggered when the specified conditions are met.
Default Answer	Option to specify if this is the default answer.
Condition	Conditions to be met when the required events occur in Salesforce.

Note: By default, these Salesforce objects are supported in the webhook routing policies:

- Account
- Case
- Contract
- Opportunity

You can configure the default decision table to support other Salesforce objects as per your requirement.

e. Click **Save**.

9. From your Salesforce instance, create outbound message.

For information about creating the outbound message, see Outbound Message Actions in Salesforce Trailblazer forum.

10. In the Endpoint URL, enter the endpoint URL in this format: https://<intance-name>.service-now.com/<resource-path>.

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SAP Ariba Spoke

The SAP Ariba spoke is built by Bristlecone, Inc. Manage the primary and transactional data of buying and sourcing suites in the SAP Ariba instance from your ServiceNow instance. The SAP Ariba system offers a single SaaS offering edition and the SAP Ariba spoke works as-is irrespective of the datacenter chosen.

Important: The SAP Ariba spoke uses the ITK-style service (file upload or file download) REST APIs via MIME multi-part format, and not ITK jar. So, although SAP Ariba announced end of life of ITK jar by Dec 31st, 2023, which resulted in the removal of ITK from the SAP download site and SAP Portal, there is no functionality impact to the existing SAP Ariba spoke.

Request apps on Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Starting on March 1st 2022, all SAP spokes will be available only on the Store.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SAP Ariba spoke v1.15.1 is the latest version. For version history of the spoke, see SAP Ariba spoke release notes.

Supported versions

This spoke was built for SAP Ariba v2.0, but may be compatible with later versions.

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Spoke requirements

- Enable file upload or file download REST services by creating a shared secret. Copy and record the integration password for later use.

  Note: If you want to create two shared secrets, one for sourcing suite and another for buying a suite, you must provide the same shared secret.

  - To create a shared secret for sourcing suite, navigate to **Administration** in your SAP Ariba solution.
  - To create a shared secret for buying a suite, navigate to **Core Administration** in your SAP Ariba solution.

  To create a new shared secret:

  1. Log in to your SAP Ariba solution.
  2. Select **Manage** in the navigation menu.
  3. Select **Core Administration** or **Administration**.
  4. Select the expansion arrow for **Integration Manager**.
  5. Select **Integration Toolkit Security**.
  6. In **Shared Secret Authentication**, enter integration password in **Integration password**.
  7. Select **Save**.

  For more information, see Security Configuration for Master Data Integration in SAP Help Portal.

- Copy and record the realm of your SAP Ariba instance.
- In **Administration**, create an inbound endpoint in **End Point Configuration** under **Integration Manager**. Copy and record the login password that you have provided under **HTTP Authentication**. For information about creating an endpoint, see Configure the SAP Ariba Solution in SAP Help Portal.

  To create an integration end point in your SAP Ariba solution:

  1. Log in to your SAP Ariba solution.
  2. Select **Manage** in the navigation menu.
  3. Select **Administration**.
  4. Select the expansion arrow for **Integration Manager**.
  5. Select **End Point Configuration**.
  6. Select **Create New**.
  7. On the End Point Configuration - Create End Point page, enter a name for the end point in **Name** and select **Inbound** for **Type**.
  8. In the **HTTP Authentication** section, enter a user ID in the **Login** field and a password in the **Password** field.

     You need the user ID and password to authenticate your HTTP calls later.
  9. Select **Save**.

  Enable SOAP service of the Import Sourcing Project task for your inbound endpoint in **Integration Configuration** under **Integration Manager**.

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- Copy and record the URL in the Integration Task **URL** field.
- Open the WSDL file. Copy and record the value of the *targetNamespace* parameter.

For information about Integration Task **URL** and *targetNamespace*, see Configure the SAP Ariba Solution in SAP Help Portal.

To enable an integration task and link it to an existing end point:

1. Log in to your SAP Ariba solution.
2. Select **Manage** in the navigation menu.
3. Select **Administration**.
4. Select the expansion arrow for **Integration Manager**.
5. Select **Integration Configuration**.
6. Locate the task that you want to enable.

   Select **List All** or enter search criteria.
7. Select **Search**.
8. Select **Actions** and select **Edit** for the required task.
9. In the Edit data import/export task page, select **Enabled** for **Status**.
10. For **End point**, select the required end point.
11. Select **Save**.

- In **Core Administration**, create an inbound endpoint in **End Point Configuration** under **Integration Manager**. Copy and record the login password that you have provided under **HTTP Authentication**. For information about creating an endpoint, see Configure the SAP Ariba Solution in SAP Help Portal.

To create an integration end point in your SAP Ariba solution:

1. Log in into your SAP Ariba solution.
2. Select **Manage** in the navigation menu.
3. Select **Core Administration**.
4. Select the expansion arrow for **Integration Manager**.
5. Select **End Point Configuration**.
6. Select **Create New**.
7. On the End Point Configuration - Create End Point page, enter a name for the end point for **Name**.
8. Select **Inbound** for **Type**.
9. In the **HTTP Authentication** section, enter a user ID in the **Login** field and a password in the **Password** field.

   You need the user ID and password to authenticate your HTTP calls later.
10. Select **Save**.

Enable SOAP service of the Import Suppliers task for your inbound endpoint in **Integration Configuration** under **Integration Manager**.

- Copy and record the URL in the Integration Task **URL** field.
- Open the WSDL file. Copy and record the value of the *targetNamespace* parameter.

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To enable an integration task and link it to an existing end point:

1. Log in into your SAP Ariba solution.
2. Select **Manage** in the navigation menu.
3. Select **Core Administration**.
4. Select the expansion arrow for **Integration Manager**.
5. Select **Integration Configuration**.
6. Locate the task that you want to enable.

   Select **List All** or enter search criteria.
7. Select **Search**.
8. Select **Actions** and select **Edit** for the required task.
9. In the Edit data import/export task page, select **Enabled** for **Status**.
10. For **End point**, select the required end point.
11. Select **Save**.

For information about Integration Task **URL** and *targetNamespace*, see Configure the SAP ARiba Solution in SAP Help Portal.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Step - SOAP (com.glide.hub.action_step.soap)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Flow Designer Action Step - Script on MID (com.glide.hub.action_step.script_mid)
- Utility Actions Spoke

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The SAP Ariba spoke provides sample flows to demonstrate automating the SAP Ariba tasks. To customize a sample flow, copy it to the required application scope. Available sample flows include:

Flow	Description
Import Supplier Organizations Buyer	Imports supplier organizations from ServiceNow to the buying suite of your SAP Ariba instance.
Import Supplier Organizations Sourcing	Imports supplier organizations from ServiceNow to the sourcing suite of your SAP Ariba instance.

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Spoke subflows

The SAP Ariba spoke provides sample subflows to demonstrate the sequence of reusable actions in a flow. To customize the sample subflows, copy them to the required application scope.

Spoke subflows

Subflow	Description
Look up Export Task - Subflow v2 (Xanadu and Beyond)	Searches for the export task event ZIP file, copies the ZIP file to an SFTP location. Then the file is unzipped and the unzipped XLS or CSV files are copied to the specified ServiceNow table record.
Update Requisition sample subflow	Updates the requestions specified in the payload.
Create Requisition sample subflow	Creates a requisition record after verifying that a requestion with the specified requisition details does not exist.

Note: The sample subflow requires a server host, port, and working directory.

Spoke actions

The SAP Ariba spoke provides actions to automate SAP Ariba tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Export Management	Copy Ariba File To Data Source	Takes sys ID of the source record and transfers the attachment to the target data source.
Import Management	Execute Ariba Import Task	Triggers the SAP Ariba import task for the specified operation.
	Look up Export Task	Executes an Ariba export task event where a ZIP file is received as response and stored to the selected data source.
Invoice Management	Look up Invoices CXML	Retrieves invoices from SAP business network in cXML format.
	Look up Pending Messages ID CXML	Retrieves the pending messages ID in CXML format.
	Reject Invoice CXML	Rejects the specified invoice submitted by suppliers in SAP business network.
Approvals Procurement Management	Look up Approvals Status	Retrieves tasks that are pending for approval.
	Look up Downstream Approvals Stream	Retrieves details related to the approvable invoices or requisitions.

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Category	Action	Description
	Update Downstream Approval Status	Retrieves the details of approval entities.
Approval Sourcing Management	Create Approval Status	Performs the specified action on an entity. Possible values for the entity task are Approve, Deny, and DenyWithResubmit.
	Look up Approval Entities	Retrieves the details of approval entities.
Buyer Management	Look up Purchase Order Lines Stream	Retrieves information from line items in purchase orders for a specified buyer.
	Look up Purchase Orders Stream	Retrieves header information in purchase orders for a specified buyer.
	Look up Shipment Notice Items Stream	Retrieves details of all the items in the shipment notice.
	Look up Shipment Notices Stream	Retrieves shipment related data including delivery, transport, and supplier details.
Procurement Export Management	Look up Downstream Supplier Locations	Initiates an Ariba export process, prompting the system to generate and deliver a ZIP file which contains essential data stored as a response within the user's selected data source.
	Look up Receipts	Initiates an Ariba export process, prompting the system to generate and deliver a ZIP file which contains essential data stored as a response within the user's selected data source.
Procurement Import Management	Import Downstream Supplier	Creates or updates supplier details in Ariba system along with supplier location and supplier remittance location.
Receipt Management	Create Receipt	Creates receipt or import receipt from external applications.
Requisition Management (SOAP-based)	Create Requisition	Creates a requisition record with the provided details.
	Update Requisition	Updates a requisition record with the specified information.
	Cancel requisition	Cancels a requisition record with the details provided.
Procurement Management (REST-based)	Look up Conversion Rates Stream	Retrieves details related to conversion rates.
	Look up Cost Centers Stream	Retrieves cost centers details from SAP ARIBA REST.
	Look up Currency Rates Stream	Retrieves details related to the currency rates.

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Category	Action	Description
	Look up Fixed Assets Stream	Retrieves fixed assets details from SAP ARIBA REST.
	Look up GL Accounts Stream	Retrieves details of the available primary data entities.
	Look up Legal Entities Stream	Retrieves metadata for legal entity.
	Look up Material Groups Stream	Retrieves the primary data of material group from SAP Ariba.
	Look up Materials Stream	Retrieves the general data of materials in SAP Ariba REST.
	Look up Payment Terms Stream	Retrieves details of the available primary data entities.
	Look up Purchase Groups Stream	Retrieves purchase group details from SAP system.
	Look up Purchasing Organizations Stream	Retrieves purchasing organization details from SAP ARIBA REST.
	Look up Upstream Supplier Locations Stream	Retrieves the primary data of supplier locations.
Sourcing Event Management	Create Award Scenario	Creates an award scenario with the provided details.
	Create Event Line Items	Adds line items to the specified event and sets term values as specified.
	Create Event Questions	Adds questions to the specified event and sets term values as specified.
	Create Item Attachments	Uploads a file as an attachment for the specified item and term in the specified event. The item and term must exist. The event state must be **Draft**.
	Create Sourcing Event	Initiates the process of creating a sourcing event, such as a request for proposal (RFP), within the SAP Ariba Event Management.
	Create Supplier Award	Awards the supplier by recognizing their successful proposal.
	Create Supplier Invitations	Invites multiple suppliers to the specified event.
	Delete Supplier Invitations	Deletes multiple suppliers for the specified event.
	Download Attachment from	Retrieves details of the supplier response.

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Category	Action	Description
	Supplier Bid Responses	
	Look up Awarded Bids	Retrieves details of the awarded bids for an event.
	Look up Event Templates	Retrieves sourcing template IDs and other template details, including item definitions.
	Look up Supplier Bids	Retrieves supplier bids for an event.
	Update Event State	Modifies an event's state using its unique identifier that is, Event ID.
Supplier Management	Create Sourcing Project	Creates a sourcing project with the provided details.
	Update Sourcing Project	Updates the project header fields of an existing sourcing project.
Sourcing Management (REST-based)	Look up Departments Stream	Retrieves the department primary data available in the system.
Supplier Management (REST-based)	Look up Downstream Remittance Location Stream	Retrieves details of the available master data entities.
	Look up Downstream Suppliers Stream	Retrieves#details related to the#suppliers.
Supplier Management (SOAP-based)	Create Suppliers	Creates a supplier with the provided details.
	Look up Upstream Suppliers Stream	Retrieves the general data of the primary supplier.
Contract Management	Create Contract	Creates contracts with the provided details, in contract workspaces.
	Look up Contracts Stream	Retrieves#details related to contract workspaces.
Async Reporting Job Management	Create Job	Creates the job to retrieve the record for PO and PR.
	Look up Job Status	Retrieves details of the required job.
	Look up transactions	Retrieves the requisition and purchase order details based on **Job ID** and **File Name**.

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Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
SAP Ariba approvals procurement management AI agent	Manages procurement approvals and workflows within SAP Ariba. This AI agent enables users to track approval statuses, streamline procurement processes, and maintain operational control through seamless integration with SAP Ariba.
SAP Ariba sourcing event management AI agent	Manages sourcing events and supplier-related processes within SAP Ariba. This AI agent supports tasks such as handling supplier bids, managing award scenarios, and updating event states, helping procurement teams and sourcing managers optimize workflows and improve operational efficiency.
SAP Ariba invoice management AI agent	Manages invoice-related tasks within SAP Ariba. This AI agent enables users to look up pending message IDs and retrieve invoice details, helping streamline invoice management and improve operational efficiency in SAP Ariba environments.
SAP Ariba procurement export management AI agent	Manages procurement export tasks and SAP Ariba integration within IntegrationHub. This AI agent provides capabilities such as looking up receipts to streamline procurement processes and enhance operational efficiency. It is ideal for procurement managers, integration specialists, and business users who need seamless access to SAP Ariba data and actions.
SAP Ariba approvals sourcing management AI agent	Manages approval workflows and sourcing management processes within SAP Ariba. This

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AI Agent	Description
	AI agent can perform actions such as creating approval statuses to streamline approvals and sourcing activities, helping users enhance efficiency in SAP Ariba integrations and approvals management.

Available sample agentic workflows

Install Now Assist for Integration Hub and start using the available sample agentic workflows and AI agents. For more information, see Now Assist for Integration Hub.

In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. Use the available sample agentic workflow in AI Agent Studio so that AI agents can coordinate to solve complex problems. To modify the available sample agentic workflow as per your requirement, see Modify an agentic workflow.

Available sample agentic workflow includes:

Sample agentic workflow	Description	AI agents used	Always ON by default?
Approval Status Lookup and Creation	Identifies the user's approval-related intent, validates employee identity, executes the required SAP Ariba approval actions, and returns a single consolidated, HR-focused summary of the results.		No **Note:** To activate the workflow, see Activate an agentic workflow template.

Spoke module

The SAP Ariba spoke adds the SAP Ariba Spoke application to your instance and includes these modules:

Module	Description
Ariba Export Configuration Definition	Displays the list of available export configurations. By default, 33 export configurations are available along with the spoke. You can modify the default export configuration or create export configurations, according to requirements. For example, if you have used the Execute Ariba Export Task action in your flow to export receipts, data is retrieved from your SAP Ariba instance to ServiceNow instance. You must copy these records to data source. Otherwise, the records are deleted after the time period mentioned in the *`Ariba Export Task Scheduler`* scheduled script has lapsed. You can use the Copy Ariba File To Data

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Module	Description
	Source action in your flow to copy the record to your data source.
Ariba Export Task Execution	Displays the CSV files generated when data is exported from your SAP Ariba instance to ServiceNow instance. You must copy these records to data source. Otherwise, the records are deleted after the time period mentioned in the *`Ariba Export Task Scheduler`* scheduled script has lapsed.
Ariba Import Configuration Definition	Displays the list of available import configurations. By default, two import configurations are available along with the spoke. You must use Execute Ariba Import Task action in your flow to create the required records. • If you have selected the **MasterDataBatchPull** task in the Execute Ariba Import Task action, the primary data records for the sourcing suite are created or updated in your SAP Ariba instance. • If you have selected the **CombinedDataPull** task in the Execute Ariba Import Task action, the primary data records for the buying suite are created or updated in your SAP Ariba instance.
Supplier IDs Buyer	Displays information about the suppliers in the buying suite. Admin must create the supplier records here. The Look Up Supplier IDs Buyer Records action in the Import Supplier Organizations Buyer sample flow uses these records to run the flow.
Supplier IDs Sourcing	Displays information about the suppliers in the sourcing suite. An admin must create the supplier records here. The Look Up Supplier IDs Sourcing Records action in the Import Supplier Organizations Sourcing sample flow uses these records to run the flow.
Supplier Organizations Buyer	Displays information about the supplier organizations in the buying suite. Admin must create records here. The Look Up Supplier Organizations Buyer Records action in the Import Supplier Organizations Buyer sample flow uses these records to run the flow.
Supplier Organizations Sourcing	Displays information about the supplier organizations in the sourcing suite. An admin must create records here. The Look Up Supplier Organizations Sourcing Records action in the Import Supplier Organizations

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Module	Description
	Sourcing sample flow uses these records to run the flow.

Data accessed through these spoke modules is stored in these tables:

Table	Description
Ariba Export Configuration Definition [sn_sap_ariba_spoke_ariba_file_definition]	Stores information about the export configurations.
Ariba Import Configuration Definition [sn_sap_ariba_spoke_ariba_import_configuration_definition]	Stores information about the import configurations.
Ariba Export Task Execution [sn_sap_ariba_spoke_ariba_task_execution]	Stores information about the CSV files generated when data is exported from your SAP Ariba instance to ServiceNow instance.
Supplier Organizations Sourcing [sn_sap_ariba_spoke_import_supplier_organizations_csv]	Stores information about the supplier organizations in the sourcing suite. Admin must create these records in the Supplier Organizations Sourcing module.
Supplier IDs Sourcing [sn_sap_ariba_spoke_supplier_ids]	Stores information about the suppliers in the sourcing suite. Admin must create these records in the Supplier IDs Sourcing module.
Supplier IDs Buyer [sn_sap_ariba_spoke_supplier_ids_buyer]	Stores information about the suppliers in the buying suite. Admin must create these records in the Supplier IDs Buyer module.
Supplier Organizations Buyer [sn_sap_ariba_spoke_supplier_organizations]	Stores information about the supplier organizations in the buying suite. Admin must create these records in the Supplier Organizations Buyer module.

Spoke scheduled script and system property

A scheduled script, *Ariba Export Task Scheduler*, and system property, *sn_sap_ariba_spoke.ariba.export.task.scheduler*, are available along with the spoke. The system property defines the number of days by which all the records older than this will be purged. The script uses this value to purge the records that have not been copied to the data source.

- To view the scheduled script, enter `sysauto_script_list.do` in the filter navigator and search for the script, *Ariba Export Task Scheduler*.
- To view the system property, navigate to **System Properties** > **All Properties** and search for the system property, *sn_sap_ariba_spoke.ariba.export.task.scheduler*.

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You can configure the scheduled script and system property according to your requirement.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

These connection and credential alias records are available along with the spoke:

Connection & Credential Alias	Associated spoke action category
SAP_Ariba_Import	Import Management
SAP_Ariba_Export	Export Management
SAP_Ariba_Sourcing	Sourcing Management
SAP_Ariba_Suppliers	Supplier Management (SOAP-based)
SAP Ariba SSH	SSH Management
SAP Ariba Rest Procurement	Procurement Management (REST-based)
SAP Ariba Rest Buyer	Buyer Management
SAP Ariba Rest Sourcing	Sourcing Management (REST-based)
SAP Ariba Procurement Export	Procurement Export Management
SAP Ariba Soap Receipts	Receipt Management
SAP Ariba Procurement Import	Procurement Import Management
SAP Ariba Rest Suppliers	Supplier Management (REST-based)
SAP Ariba Approvals Procurement	Approvals Procurement Management
SAP Ariba Approvals Sourcing	• Approvals Sourcing Management • Approvals Procurement Management
SAP Ariba Rest Event	Sourcing Event Management
SAP Ariba Rest Ship Notices	Buyer Management
SAP Ariba Soap Requisition	Requisition Management(SOAP-based)

For information about setting up the spoke, see Set up the SAP Ariba spoke.

MID Server requirements

These actions use REST calls, which can run on an instance or MID Server. Use the connection record associated with the SAP Ariba alias to configure where actions run as well as set MID Server selection attributes. For more information about running actions on the MID Server, see Integration steps

Note: The Linux server that is needed to create the SSH credential record, must be installed in the same network's machine or virtual machine where your MID Server is installed.

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To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the SAP Ariba spoke

Integrate the ServiceNow instance and SAP Ariba by using the SSH, Basic Auth, and API Key credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SAP Ariba spoke.
- Role required: admin.

About this task

For information about the connection and credential alias record that must be configured to use actions in an action category, see Connection and credential alias requirements.

Procedure

1. Configure the **SAP_Ariba_Import** connection and credential alias record.

   a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

   b. Open the record, **SAP_Ariba_Import**.

   c. Click the Create New Connection & Credential related link.

   d. On the form, fill these values.

Create Connection and Credential form

Field	Description
Please Enter the Connection Information	
Connection Name	Name to identify the connection record. For example, `SAP Ariba Import Connection`.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://s1.ariba.com`
Realm value	Realm of your SAP Ariba instance.
Shared secret	Integration password provided for shared secret-based authentication. For more information, see Shared secret-based authentication in SAP Help Portal.
Please Enter the Credential Information	
Credential Name	Name to identify the credential record. For example, `SAP Ariba Import Credential`.
API Key	Integration password provided for shared secret-based authentication. For more

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Field	Description
	information, see Shared secret-based authentication in SAP Help Portal.

e. Click **Create**.

2. Configure the **SAP_Ariba_Export** connection and credential alias record.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the record, **SAP_Ariba_Export**.

c. Click the Create New Connection & Credential related link.

d. On the form, fill these values.

Create Connection and Credential form

Field	Description
Please Enter the Connection Information	
Connection Name	Name to identify the connection record. For example, `SAP Ariba Export Connection`.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://s1.ariba.com`
Realm value	Realm of your SAP Ariba instance.
Please Enter the Credential Information	
Credential Name	Name to identify the credential record. For example, `SAP Ariba Export Credential`.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.

e. Click **Create**.

3. Configure the **SAP_Ariba_Sourcing** connection and credential alias record.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the record, **SAP_Ariba_Sourcing**.

c. Click the Create New Connection & Credential related link.

d. On the form, fill these values.

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Create Connection and Credential form

Field	Description
Please Enter the Connection Information	
Connection Name	Name to identify the connection record. For example, SAP `Ariba Sourcing Connection`.
Connection URL	Integration Task **URL** created when you enabled SOAP service of the Import Sourcing Project task for the inbound endpoint in **Administration**. For information about Integration Task **URL** and *`targetNamespace`*, see Enable an Integration Task in SAP Help Portal.
Target Namespace	Value of the *`targetNamespace`* parameter in WSDL file created in **Administration**. For information about Integration Task **URL** and *`targetNamespace`*, see Enable an Integration Task in SAP Help Portal.
Please Enter the Credential Information	
Credential Name	Name to identify the credential record. For example, SAP `Ariba Sourcing Credential`.
User Name	User name to log in to your SAP Ariba instance.
Password	Login password provided under HTTP Authentication when you created an inbound endpoint in **Administration**. For information about creating an endpoint, see Create New Integration End-Point in SAP Help Portal.

e. Click **Create**.

4. Configure the **SAP_Ariba_Suppliers** connection and credential alias record.

   a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

   b. Open the record, **SAP_Ariba_Suppliers**.

   c. Click the Create New Connection & Credential related link.

   d. On the form, fill these values.

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Create Connection and Credential form

Field	Description
Please Enter the Connection Information	
Connection Name	Name to identify the connection record. For example, SAP `Ariba Suppliers Connection`.
Connection URL	Integration Task **URL** created when you enabled SOAP service of the Import Sourcing Project task for the inbound endpoint in **Administration**. For information about Integration Task **URL** and *`targetNamespace`*, see Enable an Integration Task in SAP Help Portal.
Target Namespace	Value of the *`targetNamespace`* parameter in WSDL file created in **Administration**. For information about Integration Task **URL** and *`targetNamespace`*, see Enable an Integration Task in SAP Help Portal.
Please Enter the Credential Information	
Credential Name	Name to identify the credential record. For example, SAP `Ariba Sourcing Credential`.
User Name	User name to log in to your SAP Ariba instance.
Password	Login password provided under HTTP Authentication when you created an inbound endpoint in **Administration**. For information about creating an endpoint, see Create New Integration End-Point in SAP Help Portal.

e. Click **Create**.

5. Create an SSH credential record.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the record, **SAP Ariba SSH**.

c. In the **Credentials** tab, click **New**.
The system displays the message `What type of Credentials would you like to create?`.

d. Select **SSH Credentials**.

e. On the form, fill in the fields.

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Field	Description
Name	Name to identify the credential record. For example, `SAP Ariba SSH Credential`.
User name	User name to log in to the Linux server on which the SFTP and SSH are set up.
Password	Password to log in to the Linux server on which the SFTP and SSH are set up.

Note: The Linux server must be installed in the same network's machine or virtual machine where your MID Server is installed.

f. Click **Submit**.

6. Configure the **SAP Ariba Rest Procurement** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Integrations** tab.

c. Under **Connections**, toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Rest Procurement** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://s1.ariba.com`.
API Version	API version of the SAP Ariba instance.
Realm Value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.
Credential Information	
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your

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Field	Description
	Application's Application Key and OAuth Client ID in SAP Help Portal.
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

7. Configure the **SAP Ariba Rest Buyer** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Rest Buyer** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://s1.ariba.com`.
API Version	API version of the SAP Ariba instance.
Realm Value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.
Ariba Network ID	Unique identifier of the SAP Ariba network account.
Credential Information	
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

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Field	Description
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

8. Configure the **SAP Ariba Rest Sourcing** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Rest Sourcing** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://s1.ariba.com`.
API Version	API version of the SAP Ariba instance.
Realm Value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.
Credential Information	
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your

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Field	Description
	Application's Application Key and OAuth Client ID in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

9. Configure the **SAP Ariba Procurement Export** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Procurement Export** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://s1.ariba.com`.
Realm Value	Realm of your SAP Ariba instance.
Shared Secret	Integration password provided for shared secret-based authentication. For more information, see Shared secret-based authentication in SAP Help Portal.

h. Click **Create Connection**.

10. Configure the **SAP Ariba SOAP Receipts** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba SOAP Receipts** connection.

e. Click **View Details**.

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f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://s1.ariba.com`.
Credential Information	
User name	User name to log in to your SAP Ariba instance.
Password	Login password provided under HTTP Authentication when you created an inbound endpoint in Administration. For information about creating an endpoint, see Create New Integration End-Point in SAP Help Portal.

h. Click **Create Connection**.

11. Configure the **SAP Ariba Procurement Import** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Procurement Import** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://s1.ariba.com`.
Realm	Realm of your SAP Ariba instance.
Credential Information	

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Field	Description
Credential Name	Name to identify the credential record.
User name	User name to log in to your SAP Ariba instance.
Password	Login password provided under HTTP Authentication when you created an inbound endpoint in Administration. For information about creating an endpoint, see Create New Integration End-Point in SAP Help Portal.

h. Click **Create Connection**.

12. Configure the **SAP Ariba Rest Suppliers** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Rest Suppliers** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://s1.ariba.com`.
API Version	API version of the SAP Ariba instance.
Realm value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.
Credential Information	
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

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Field	Description
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

13. Configure the **SAP Ariba Approvals Procurement** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Approvals Procurement** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://openapi.ariba.com/`.
API Version	API version of the SAP Ariba instance.
Realm value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.
Credential Information	
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your

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Field	Description
	Application's Application Key and OAuth Client ID in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

14. Configure the **SAP Ariba Approvals Sourcing** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Approvals Sourcing** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://openapi.ariba.com/`.
API Version	API version of the SAP Ariba instance.
Realm value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.
Credential Information	
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

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15. Configure the **SAP Ariba Rest Event** connection.

    a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

    b. Click the **Connections** tab.

    c. Toggle and enable the **Outbound** connections.

    d. Search for **SAP Ariba Rest Event** connection.

    e. Click **View Details**.

    f. Click **Add Connection**.

    g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://openapi.ariba.com/`.
API Version	API version of the SAP Ariba instance.
Realm value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.
Credential Information	
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

    h. Click **Create and Get OAuth Token**.

16. Configure the **SAP Ariba Soap Requisition** connection.

    a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

    b. Click the **Connections** tab.

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c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Soap Requisition** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Realm	Realm of your SAP Ariba instance.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://example.ariba.com/Buyer/soap/sample/RequisitionImportPull`.
Credential Information	
User name	User name to log in to your SAP Ariba instance.
Password	Login password provided under HTTP Authentication when you created an inbound endpoint in Administration. For information about creating an endpoint, see Create New Integration End-Point in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

17. Configure the **SAP Ariba Rest Invoices** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Rest Invoices** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

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Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Buyer Network ID	Unique identifier assigned to a buyer's organization within the Ariba Network.
Shared Secret	Unique code or key used to authenticate the integration between the Ariba Network and ServiceNow instance.
User Agent	Software or application used to access the Ariba Network.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://example.ariba.com`.

h. Click **Create and Get OAuth Token**.

18. Configure the **SAP Ariba Async Reporting Job** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Async Reporting Job** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://openapi.ariba.com`.
API version	API version of the SAP Ariba instance.
Realm value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration

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Field	Description
	for Master Data Integration in SAP Help Portal.
Credential Information	
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

19. Configure the **SAP Ariba Rest Contracts** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Rest Contracts** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://openapi.ariba.com`.
API version	API version of the SAP Ariba instance.
Realm value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.
Credential Information	

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Field	Description
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

20. Configure the **SAP Ariba Rest Ship Notices** connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Connections** tab.

c. Toggle and enable the **Outbound** connections.

d. Search for **SAP Ariba Rest Ship Notices** connection.

e. Click **View Details**.

f. Click **Add Connection**.

g. On the form, fill in these values.

Field	Description
Connection Information	
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to SAP Ariba instance. For example, `https://openapi.ariba.com`.
API version	API version of the SAP Ariba instance.
Realm value	Realm of your SAP Ariba instance.
API Key	Integration password provided for shared secret-based authentication. For more information, see Security Configuration for Master Data Integration in SAP Help Portal.
Credential Information	
OAuth Client ID	Client ID of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

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Field	Description
OAuth Client Secret	Client Secret of your SAP Ariba instance. For more information, see Finding Your Application's Application Key and OAuth Client ID in SAP Help Portal.

h. Click **Create and Get OAuth Token**.

What to do next

Create buyer and supplier records in these spoke modules:

- Supplier IDs Buyer
- Supplier IDs Sourcing
- Supplier Organizations Buyer
- Supplier Organizations Sourcing

Actions in the sample flows require these records.

SAP Commerce Cloud Spoke

The SAP Commerce Cloud spoke is built by Bristlecone, Inc. Retrieve shopping cart content, order details, and order history for a selected customer.

Request apps on Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes. Starting on March 1st 2022, all SAP spokes will be available only on the Store.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for SAP Commerce Cloud Version: 2211-jdk21.1 but may be compatible with later versions.

Spoke requirements

SAP Commerce Cloud subscription.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

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Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke version

SAP Commerce Cloud Spoke v1.1.0 is the latest version. For version history of the spoke, see SAP Commerce Cloud spoke release notes.

Spoke actions

The SAP Commerce Cloud provides actions to automate tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Order Management	Look Up Order Details	Retrieves order details of the specified order.
	Look Up Orders	Retrieves the order history for the specified user ID.
Shopping Cart	Look Up Shopping Cart	Retrieves the shopping cart content for the specified user ID.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the SAP Commerce Cloud spoke.

Set up the SAP Commerce Cloud spoke

Integrate your ServiceNow instance with the SAP Commerce Cloud to automate various actions on the SAP Commerce Cloud. For example, you can set up a flow that looks up a shopping cart at a specified time every day.

Before you begin

- Request an Integration Hub subscription.
- Install the SAP Commerce Cloud plugin.
- Role required: admin.
- Access to the SAP Backoffice account.

Create the SAP Commerce Cloud credentials

Generate the credentials that you use to create the connection record for the SAP Commerce Cloud spoke. Your ServiceNow instance uses the connection record connect with the SAP Commerce Cloud.

Before you begin

Role required: admin

Access to the SAP Backoffice account.

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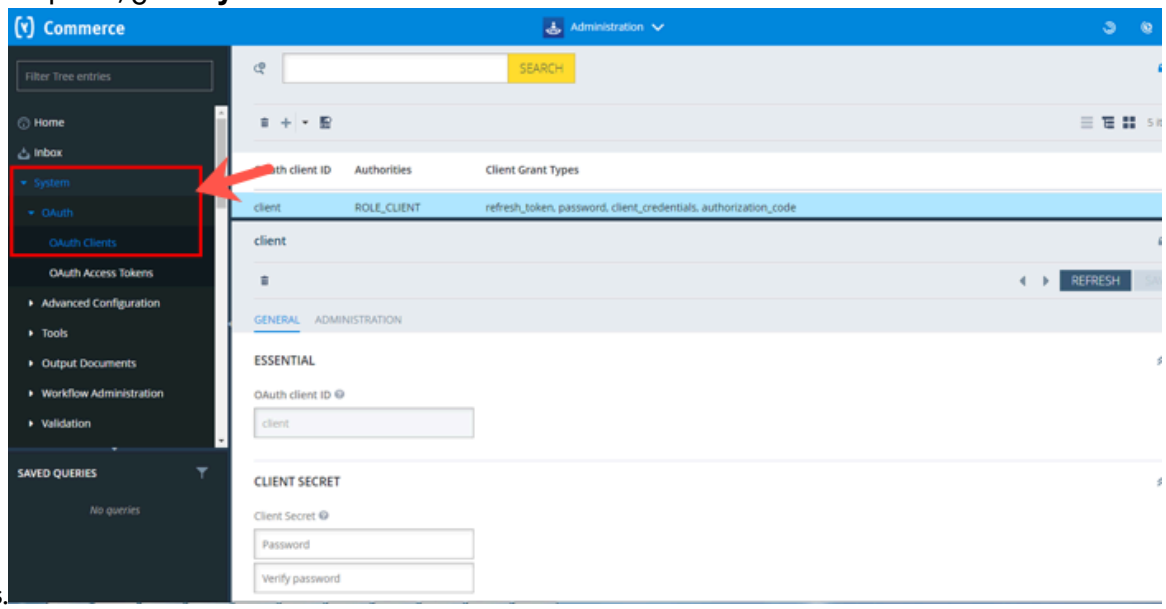
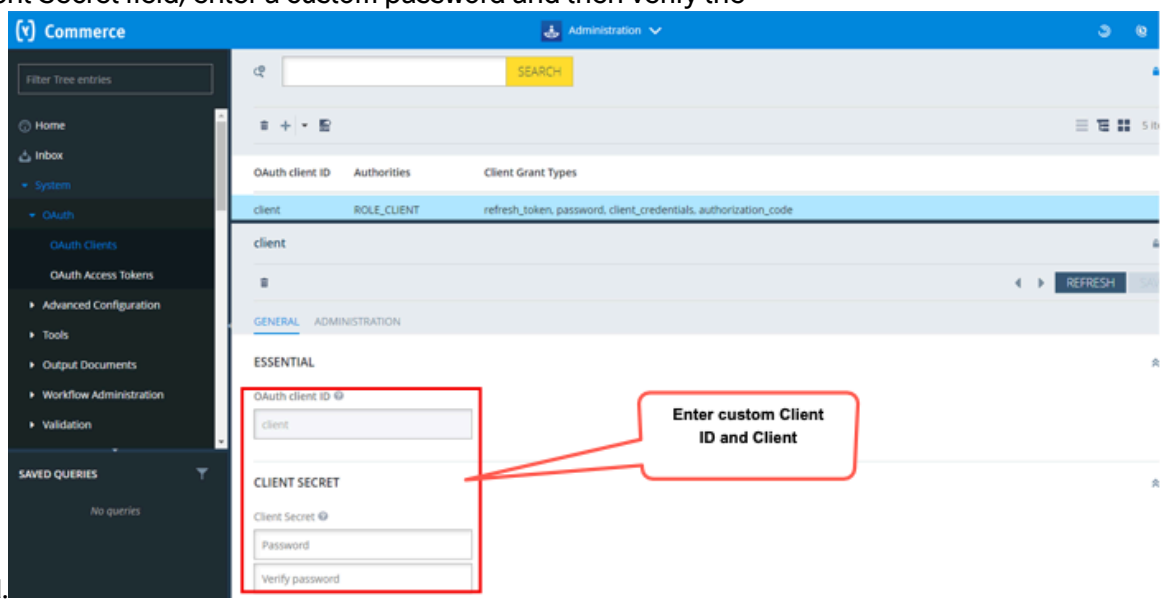
Procedure

1. Log in to the SAP Backoffice account.
2. On the left panel, go to **System** > **OAuth** > **OAuth Clients**.



3. To create a client ID, select the Add Client ID icon ( ).
4. In the OAuth client ID, enter a custom client ID.
5. In the Client Secret field, enter a custom password and then verify the password.



6. Under BASIC, add the details.

   a. Under Authorities, add ROLE_CLIENT.

   b. Under Client Grant Types, add the details.

   - client_credentials
   - refresh_token

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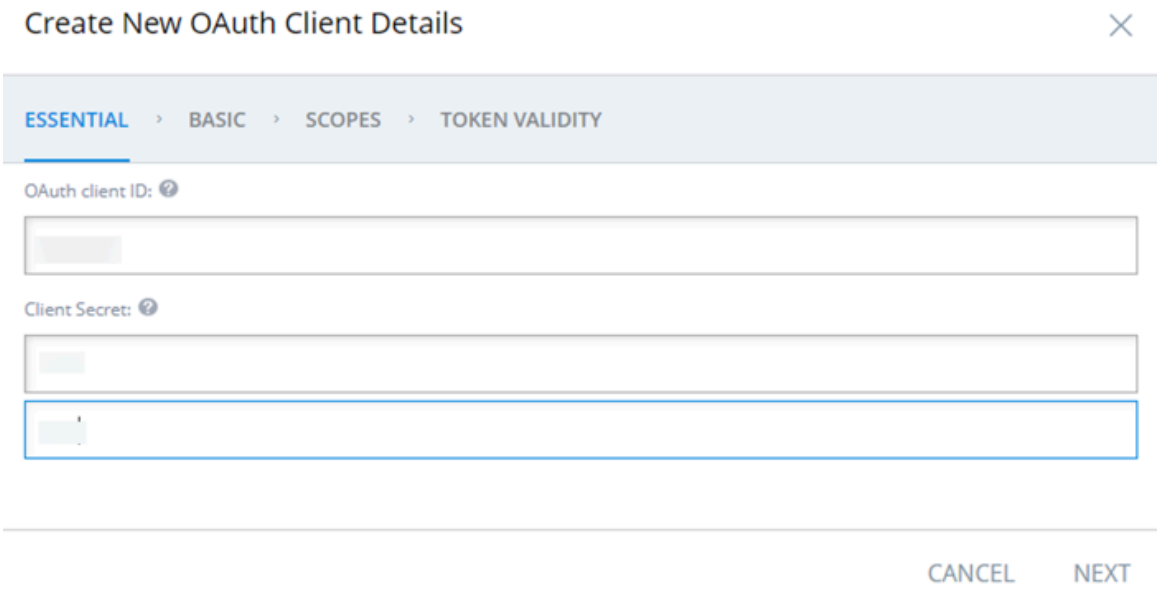
- password
- authorization_code

c. Under Scopes, add basic.

7. On the Create New OAuth Client Details window, do the



steps.

a. Under ESSENTIAL, enter the custom OAuth client ID and client secret.

b. Under BASIC, add ROLE_CLIENT and under Client Grant Types, add the values.

- client_credentials
- refresh_token
- password
- authorization_code

c. Under SCOPES, add enter basic.

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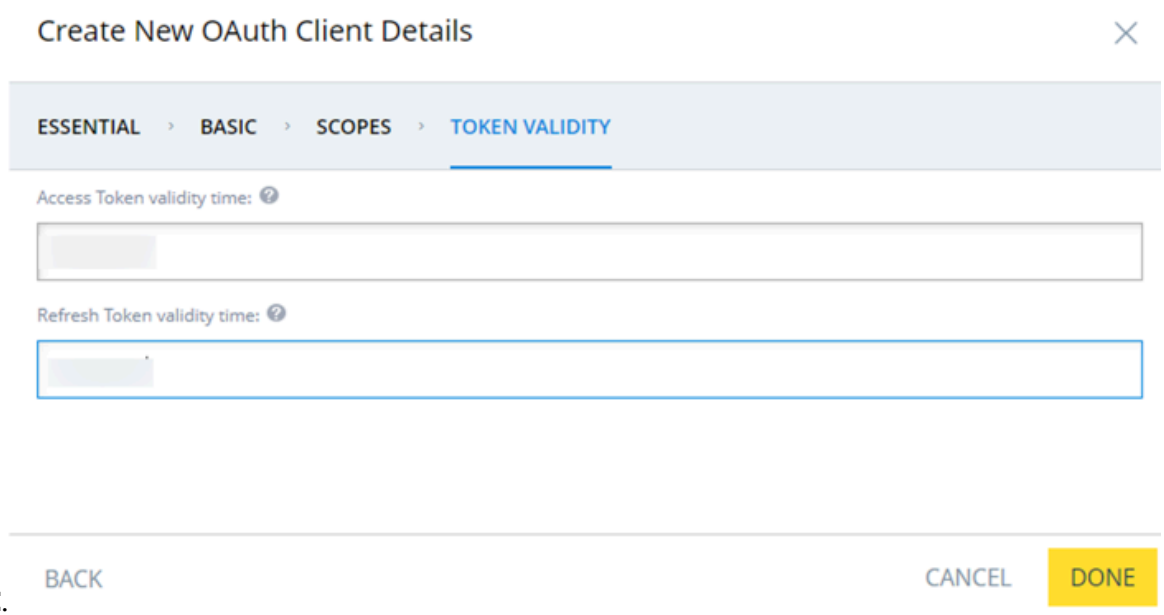
d. Under TOKEN VALIDITY, enter the time for which the token to access the SAP Commerce Cloud is valid.

e. Select



DONE.

The credentials to create a SAP Commerce Cloud connection record are created.

Create connection record for SAP Commerce Cloud spoke

Create a connection record that enables your ServiceNow instance to connect with the SAP Commerce Cloud record. The connection record has the underlying connection information required to integrate with SAP Commerce Cloud.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select **Connections**.
3. Turn on the Outbound tab.
4. In the Search all connections field, enter `SAP Commerce Cloud`.
5. On the SAPCommerceCloud card, select **View Details**.
6. Select **Configure**.
7. Fill the form.

Configure Connection

Field	Description
Connection Name	Name of the connection record. The default and read-only name of the first connection record is SAPCommerceCloud. To provide a custom name to a connection record, you

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Field	Description
	must create a connection record by selecting **Add Connection**.
Connection URL	URL that your ServiceNow instance uses to connect to the SAP Commerce Cloud.
OAuth Client ID	Client ID that you generated on your SAP Backoffice account.
OAuth Client Secret	Client secret that you had generated on your SAP Backoffice account.
OAuth Redirect URL	URL of your ServiceNow instance in the format `https://<instance-name>.service-now.com/oauth_redirect.do`.
OAuth Token URL	URL in the format `https://<instance-name>/authorizationserver/oauth/token`.

8. Select **Create and Get OAuth Token.**
   The OAuth token is generated and your ServiceNow is connected to the SAP Commerce Cloud.

Create a credential record for the SAP Commerce Cloud

Integrate the ServiceNow instance and SAP Commerce Cloud spoke by creating a custom OAuth application in SAP Commerce Cloud to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate SAP Commerce Cloud.
- Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **OAuth 2.0 Credentials**.
4. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, SAP Commerce Cloud cred Cred.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile created during the registration of SAP Commerce Cloud as an OAuth provider. For example, SAP Commerce Cloud default_profile OAuth Profile.

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Field	Description
Applies to	Option to specify if the credential applies to all MID Servers in your network, or to one or more **Specific MID servers**. Specify the MID Servers that should use this credential in the **MID servers** field.
Order	Order to apply this credential. For example, `100`.
Credential alias	Credential alias associated with the spoke.

Create a connection record for the SAP Commerce Cloud

Create a connection record for your SAP Commerce Cloud account. The SAP Commerce Cloud connection and credential aliases use these connections to perform actions in SAP Commerce Cloud.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for SAP Commerce Cloud.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `SAP Commerce Cloud Connection`.
Credential	Credential record created for SAP Commerce Cloud spoke. For example, `SAP Commerce Cloud Cred`.
Connection alias	Alias record associated with this connection.
Host	IP address of the target host where the SAP Commerce Cloud server is installed.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.

5. Click **Submit**.

SAP Concur Spoke

The SAP Concur spoke is built by Bristlecone, Inc. Manage expenses, payments, purchases, users, travel, and so on in the SAP Concur account from your ServiceNow instance.

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Request apps on Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes. Starting on March 1st 2022, all SAP spokes will be available only on the Store.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

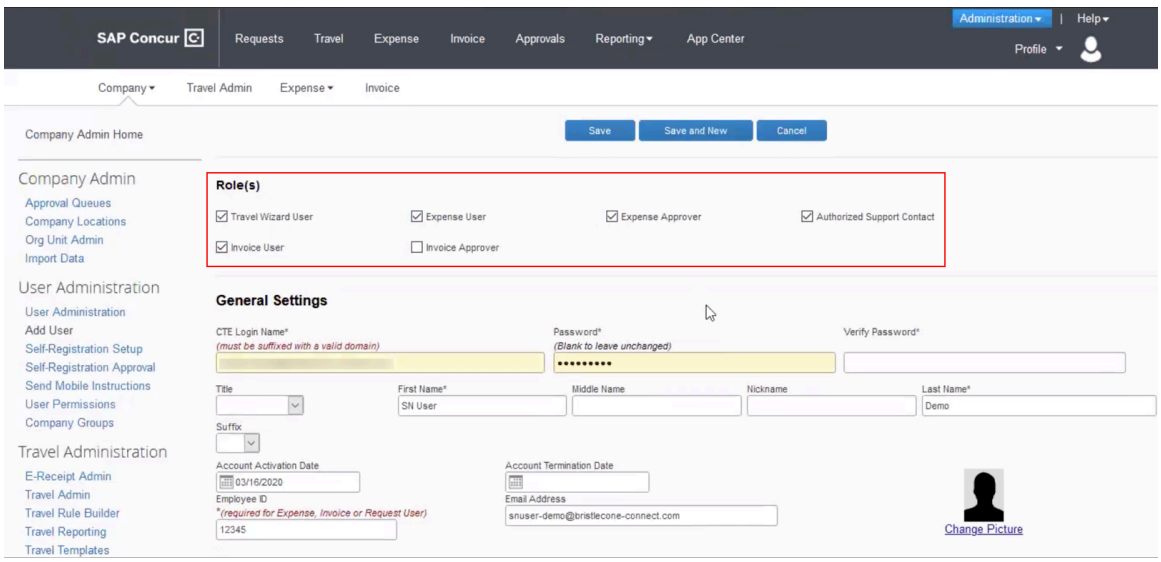
This spoke was built for SAP Concur API versions v3.0 and v4.0, but may be compatible with later versions.

Spoke version

SAP Concur spoke v2.3.3 is the latest version. For version history of the spoke, see SAP Concur spoke release notes.

Spoke requirements

- SAP Concur API user with these roles:
  - Travel Wizard User
  - Expense User
  - Expense Approver
  - Authorised Support Contact
  - Invoice User



- SAP Concur API user with these Expense API and Invoice User permissions.

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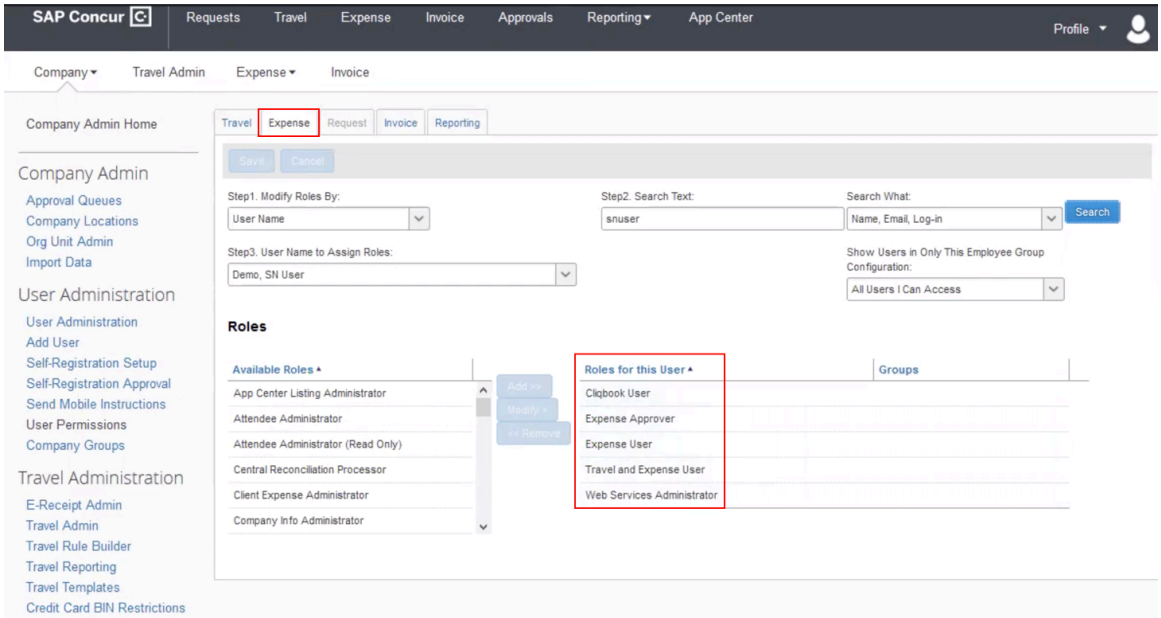

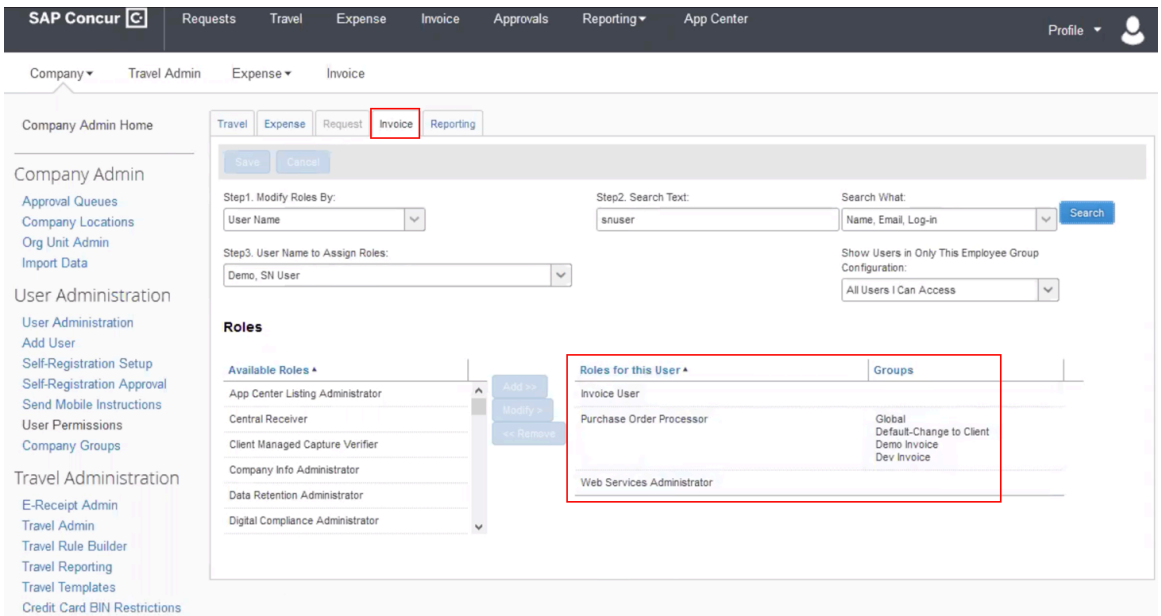

- Contact SAP Concur Implementation team to obtain values of Client ID, Client Secret, Company ID, and Company Request Token, and define the scope of the client application.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Remote Tables (com.glide.script.vtable)

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Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The SAP Concur spoke provides a sample flow, Get All Modified Expense Reports to demonstrate retrieving the expense reports modified within 24 hours of the provided Expense Report Last Modified Date. To customize the sample flow, copy it to the required application scope.

Spoke subflows

The SAP Concur spoke provides a sample subflow, Get Expense Report Workflow Step ID to demonstrate retrieving the Workflow Step ID of an expense report on the basis of whether the given expense report is submitted or not. The output Workflow Step ID is required to run the Execute Workflow Action for Expense Report action. To customize the sample subflow, copy it to the required application scope.

Spoke actions

The SAP Concur spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Expense Configuration Management	Get Expense Group Configurations	Retrieves all the expense group configuration for the specified user.
Expense Entry Management	Create Expense Entry	Creates a new expense entry for the specified user.
	Delete Expense Entry	Deletes the specified expense entry.
	Get Expense Entry Details	Retrieves details of the specified expense entry.
	Look up Expense Entries	Retrieves all expense entries owned by the user.
	Look up Expense Itemizations Stream	Retrieves all expense itemizations owned by the user.
	Update Expense Entry	Updates details of the specified expense entry.
Expense Report Management	Create Expense Report	Creates an expense report with the supplied data.
	Execute Workflow Action for Expense Report	Executes a workflow action for an expense report using it's workflow step ID. **Note:** One of the action inputs is Workflow Step ID. Use the default subflow, Get Expense Report Workflow Step ID, to obtain the required Workflow Step ID value.

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Category	Action	Description
	Get Expense Report Details	Retrieves details of the specified expense report.
	Look up Comments	Retrieves the comments from the specified report header and from the specific expense within an expense report.
	Look up Expense Reports	Retrieves all expense reports owned by the user, based on the search criteria.
	Look up Expense Reports After Last Modified Date	Retrieves the reports modified within 24 hours after the specified Report Last Modified Date.
	Submit Expense Report	Submits an expense report for the specified report.
	Update Expense Report	Updates details of the expense report for the specified report.
Itinerary Management	Look up Itinerary by Trip ID	Retrieves information about the required trip.
Payment Request Management	Create Payment Request	Creates a payment request with all relevant details, including line items and associated allocations.
	Get Payment Request Details	Retrieves details such as Payment Request Header, Payment Request Line Item and Payment Request Allocation, for the specified payment request.
	Update Payment Request	Updates details of the specified payment request such as line items and associated allocations.
Purchase Order Management	Create Purchase Order	Creates a purchase order in SAP Concur.
	Get Purchase Order Details	Retrieves information about the specified purchase order.
	Update Purchase Order	Updates details of the specified purchase order.
Receipt Management	Get Expense Entry Receipt Image URL	Retrieves expense entry receipt image URL of the specified expense entry.
	Get Expense Report Receipt Image URL	Retrieves expense report receipt image URL of the specified expense report.
	Post Expense Report Receipt Image	Creates a receipt image for the specified expense report.
User Management	Get User Details	Retrieves details of the specified user. **Note:** Details of only the expense users are retrieved using this action.
	Look up Users	Retrieves details of the required user, based on the provided search criteria.

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Category	Action	Description
	Look up Users Stream	Retrieves details of all users in a given company. The filter operation can also be used to retrieve the required user's identity information.
Webhook Management	Create Webhook Subscription	Creates subscriptions in SAP Concur for the selected topic with provided endpoint.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
SAP Concur payment request management AI agent	Manages and retrieves payment request details.
SAP Concur expense report management AI agent	Manages and submits expense reports, retrieves detailed information, and manages comments
SAP Concur purchase order management AI agent	Manages purchase order operations and retrieves the required purchase order details.
SAP Concur expense entry management AI agent	Manages and retrieves expense entry details.
SAP Concur receipt management AI agent	Manages receipts by enabling users to perform tasks such as uploading receipt images to expense reports, retrieving URLs for expense entry receipt images, and obtaining URLs for expense report receipt images.
SAP Concur itinerary management AI agent	Manages itineraries and expenses, and retrieves the required itinerary information.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

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Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Available sample agentic workflows

Install Now Assist for Integration Hub and start using the available sample agentic workflows and AI agents. For more information, see Now Assist for Integration Hub.

In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. Use the available sample agentic workflow in AI Agent Studio so that AI agents can coordinate to solve complex problems. To modify the available sample agentic workflow as per your requirement, see Modify an agentic workflow.

Available sample agentic workflow includes:

Sample agentic workflow	Description	AI agents used	Always ON by default?
Get Purchase Order and Payment Request Details	Retrieves purchase order information and the corresponding payment request details for review and processing.	• SAP Concur payment request management AI agent • SAP Concur purchase order management AI agent	No **Note:** To activate the workflow, see Activate an agentic workflow template.
Upload Expense Receipt Image and Submit Expense Report	Retrieves recently updated expense reports, uploads a receipt image to an expense report, and submits the expense report for approval.	• SAP Concur receipt management AI agent • SAP Concur expense report management AI agent	No **Note:** To activate the workflow, see Activate an agentic workflow template.

Spoke module

The SAP Concur spoke adds the SAP Concur Spoke application to your instance and includes these modules:

Module	Description
SAP Concur Expense Entries	View details of the expense entries. After you Set up the SAP Concur spoke and map the users in the SAP Concur User Mappings module, the system retrieves details of the expense entries and populates in this module.
SAP Concur Expense Report Details	View the expense report details. Configure the default flow Get All Modified Expense Reports as per your requirement to retrieve and populate data.

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Module	Description
SAP Concur Expense Report Last Modified Date	View the latest timestamp or last modified date on which the flow was executed or reports were filtered. Configure the default flow Get All Modified Expense Reports as per your requirement to retrieve and populate data.
SAP Concur Expense Reports	View the expense reports. After you set up the Set up the SAP Concur spoke and map the users, the system retrieves details of the expense reports and populates in this module.
SAP Concur User Mappings	Map ServiceNow users to their corresponding User IDs in SAP Concur.

Spoke user roles

The SAP Concur spoke provides these user roles to control access to data:

User role	Description
sn_sap_concur_spok.SAP Concur Spoke Admin	Users with this role can perform all operations.
sn_sap_concur_spok.SAP Concur Expense Entries User	Users with this role can only view the data available in the SAP Concur Expense Entries module.
sn_sap_concur_spok.SAP Concur Expense Reports User	Users with this role can only view the data available in the SAP Concur Expense Reports module.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the SAP Concur spoke.

Configure the SAP Concur spoke

Configure the SAP Concur spoke to integrate your ServiceNow instance with SAP Concur. After integration, you can create flows and automate actions on SAP Concur. For example, you can create a flow so that when a trigger occurs, it gets itinerary details based on the trip ID.

Before you begin

- Request an Integration Hub subscription.
- Activate the SAP Concur spoke.
- Role required: admin.

Procedure

1. Configure the SAP Concur Event Subscription Service alias.

   a. Navigate to **All** > **Process Automation** > **Flow Designer**.

   b. Select Connections.

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c. Turn on the Outbound tab.

d. In the Search all connections field, enter `SAP Concur`.

e. On the SAP Concur Event Subscription Service card, select **View Details**.

f. Select **Configure**.

g. Fill the form.

Configure Connection

Field	Description
Name	Name of the connection record. The default and read-only name of the first connection record is the SAP Concur Event Subscription Service. To create a record with your custom name, select **Add Connection**.
Connection URL	URL to connect to SAP Concur APIs in the format `https://www-{region}.api.concursolutions.com`.
Version	API version.
Token URL	Token URL to get the OAuth token in the format `https://{region}.api.concursolutions.com/oauth2/v0/token`.
Client ID	Client ID generated on SAP Concur. **Note:** If you don't have the client ID, contact your SAP Concur SME.
Client Secret	Client secret generated on SAP Concur. **Note:** If you don't have the client secret, contact your SAP Concur SME.

h. Select **Configure and get OAuth Token**.
The OAuth token is generated and the connection record for the SAP Concur Event Subscription Service alias is created.

2. Configure the SAP Concur v4 APIs alias.

a. Navigate to **All** > **Process Automation** > **Flow Designer**.

b. Select Connections.

c. Turn on the Outbound tab.

d. In the Search all connections field, enter `SAP Concur`.

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e. On the SAP Concur v4 APIs card, select **View Details**.

f. Select **Configure**.

g. Fill the form.

Configure Connection

Field	Description
Name	Name of the connection record. The default and read-only name of the first connection record is the SAP Concur v4 APIs. To create a record with your custom name, select **Add Connection**.
Connection URL	URL to connect to SAP Concur APIs in the format `https://{region}.api.concursolutions.com`.
Version	API version.
Token URL	Token URL to get the OAuth token in the format `https://{region}.api.concursolutions.com/oauth2/v0/token`.
Client ID	Client ID generated on SAP Concur. **Note:** If you don't have the client ID, contact your SAP Concur SME.
Client Secret	Client secret generated on SAP Concur. **Note:** If you don't have the client secret, contact your SAP Concur SME.

h. Select **Configure and get OAuth Token**.
The OAuth token is generated and the connection record for the SAP Concur v4 APIs alias is created.

3. Configure the SAP Concur alias.

a. Navigate to **All** > **Process Automation** > **Flow Designer**.

b. Select Connections.

c. Turn on the Outbound tab.

d. In the Search all connections field, enter `SAP Concur`.

e. On the SAPConcur card, select **View Details**.

f. Select **Configure**.

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g. Fill the form.

Configure Connection

Field	Description
Name	Name of the connection record. The default and read-only name of the first connection record is the SAPConcur. To create a record with your custom name, select **Add Connection**.
Connection URL	URL to connect to SAP Concur APIs in the format `https://{region}.api.concursolutions.com`.
Token URL	Token URL to get the OAuth token in the format `https://{region}.api.concursolutions.com/oauth2/v0/token`.
Client ID	Client ID generated on SAP Concur. **Note:** If you don't have the client ID, contact your SAP Concur SME.
Client Secret	Client secret generated on SAP Concur. **Note:** If you don't have the client secret, contact your SAP Concur SME.
OAuth Redirect URL	OAuth redirect URL in the format `https://<instancename>.service-now.com/oauth_redirect.do`.

h. Select **Configure and get OAuth Token**.
The OAuth token is generated and the connection record for the SAPConcur alias is created.

Set up the SAP Concur spoke

Integrate the ServiceNow instance and SAP Concur by creating a custom OAuth application in SAP Concur to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SAP Concur spoke.
- Role required: admin

Procedure

1. Register SAP Concur as an OAuth provider.

a. Navigate to **System OAuth** > **Application Registry**.

b. Click **New**.

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The system displays the message **What kind of OAuth application?**

c. Select **Connect to a third party OAuth Provider**.
The system displays a blank Application Registries form.

d. On the form, fill these values.

Field	Description
Name	Name to uniquely identify the application registry. For example, SAP `Concur OAuth`.
Client ID	Client ID of your SAP Concur client application. Contact SAP Concur Implementation team to obtain this value.
Client Secret	Client secret of your SAP Concur client application. Contact SAP Concur Implementation team to obtain this value.
Default Grant type	Grant type used to establish the token. Select **Resource Owner Password Credentials**.
Token URL	URL from which the ServiceNow instance obtains the access token. Format of the token URL is, `https://<host-name>/oauth2/v0/token`. Here, host name is the fully qualified domain name of the target host where SAP Concur is installed.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`.

e. Right-click the form header, and click **Save**.

- The system validates the OAuth credentials and populates the **Redirect URL**.
- The system populates **OAuth Entity Profile** with **Grant Type** as **Resource Owner Password Credentials**. For example, **OAuth Entity Profile** is created with default **Name**, **SAPConcur**

2. Create a credential record for the SAP Concur spoke.

a. Navigate to **Connections & Credentials** > **Credentials**.

b. Click **New**.
The system displays the message **What type of Credentials would you like to create?**.

c. Select **OAuth 2.0 Credentials**.

d. On the form, fill these values.

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Field	Value required
Name	Name to uniquely identify the record. For example, enter `SAP Concur Cred`.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile you created when you registered the custom SAP Concur application as an OAuth provider. For example, select **SAPConcur**.
Applies to	Select the MID Servers that can use this credential. For example, select **All MID Servers**.
Order	Select the order to apply this credential. For example, enter `100`.

e. Save the record.

3. Create a connection record for the SAP Concur spoke.

a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

b. Open for the record, **SAPConcur**.

c. From the **Connections** tab, click **New**.

d. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `SAP Concur Connection`.
Credential	Credential record you created for SAP Concur. For example, select **SAP Concur Cred**.
Connection URL	Connection URL to connect to SAP Concur in this format: `<Host>/api`.
Host	Fully qualified domain name of the target host where SAP Concur is installed. For example, `us.api.concursolutions.com` or `eu.api.concursolutions.com`.
Protocol	`https`
Base path	`/api`

e. Click **Submit**.

4. Generate OAuth token by providing the SAP Concur API user credentials.

a. Navigate to **Connections & Credentials** > **Credentials**.

b. Open the credential record you had created.

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Example: **SAP Concur Cred**

c. Click the **Get OAuth Token** related link and provide the SAP Concur API user credentials to generate the OAuth token.

5. Configure the connection, **SAP Concur Event Subscription Service**.

a. Navigate to **Process Automation** > **Flow Designer**.

b. Click the **Connections** tab.

c. Locate the **SAP Concur Event Subscription Service** connection alias and click **View Details**.

d. To configure the spoke for the first time, select **Configure** or click **Edit**.

e. On the **Connection** form, fill in the fields.

Field	Description
Name	Name of the connection alias record.
Connection URL	Connection URL in this format: `https://www-<Region>.api.concursolutions.com`. Replace `<Region>` with the appropriate SAP Concur region.
Version	Enter `v4`.
Token URL	Token URL in this format: `https://<Region>.api.concursolutions.com/oauth2/v0/token`. Replace `<Region>` with the appropriate SAP Concur region.
Client ID	Client ID of your SAP Concur client application. Contact SAP Concur Implementation team to obtain this value.
Client Secret	Client secret of your SAP Concur client application. Contact SAP Concur Implementation team to obtain this value.

f. Click **Create and Get OAuth Token**.

A confirmation message is displayed that the OAuth token is generated successfully.

6. Configure the connection, **SAP Concur v4 APIs**.

a. Navigate to **Process Automation** > **Flow Designer**.

b. Click the **Connections** tab.

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c. Locate the **SAP Concur v4 APIs** connection alias and click **View Details**.

d. Click **Edit** or if you are configuring the spoke for the first time, click **Configure**.

e. On the **Connection** form, fill in the fields.

Field	Description
Name	Name of the connection alias record.
Connection URL	Connection URL in this format: `https://<Region>.api.concursolutions.com`. Replace `<Region>` with the appropriate SAP Concur region.
Version	Enter `v4`.
Token URL	Token URL in this format: `https://<Region>.api.concursolutions.com/oauth2/v0/token`. Replace `<Region>` with the appropriate SAP Concur region.
Client ID	Client ID of your SAP Concur client application. Contact SAP Concur Implementation team to obtain this value.
Client Secret	Client secret of your SAP Concur client application. Contact SAP Concur Implementation team to obtain this value.

f. Click **Create and Get OAuth Token**.
In a new window, you will be prompted to enter **Username** and **Password**.

g. For **Username**, provide the Company ID of the SAP Concur instance and for **Password**, provide the value of Company Request Token.

> **Note:** Contact SAP Concur Implementation team to obtain the values of Company ID and Company Request Token.

h. Click **Get OAuth Token**.

7. Map SAP Concur users to the ServiceNow user in the SAP Concur User Mappings module.

a. Navigate to **SAP Concur Spoke** > **SAP Concur User Mappings**.

b. Click **New**.

c. On the form, fill these values.

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Field	Description
ServiceNow User	Reference to the user record in the User [sys_user] table.
SAP Concur User ID	User ID of the required user in SAP Concur.

d. Click **Submit**.

Note: If a user attempts to access data in the SAP Concur Expense Entries module without being mapped to the corresponding SAP Concur User ID in the SAP Concur User Mappings module, this error message is displayed.`A user with username adminn does not exist.`

Map the ServiceNow user to the correspnding User ID in SAP Concur too access data in the SAP Concur Expense Entries module.

- SAP Concur spoke is set up.
- Data is retrieved and displayed in the SAP Concur Expense Entries and SAP Concur Expense Reports modules.

SAP ECC IDoc Spoke

The SAP ECC IDoc spoke is built by Bristlecone, Inc. Manage finance, items, and procurement in SAP ECC IDoc account from your ServiceNow instance.

Request apps on Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes. Starting on March 1st 2022, all SAP spokes will be available only on the Store.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SAP ECC IDoc spoke v1.5.1 is the latest version. For version history of the spoke, see SAP ECC IDoc spoke release notes.

Supported versions

This spoke was built for these SAP ECC IDoc versions, but may be compatible with later versions:

- SAP application version: SAP ECC6 (Spoke is developed on EHp8.)
- NetWeaver Version: SAP NW 7.5
- SAP JCo:3.0.20

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Spoke requirements

- Contact the admin of your SAP ECC IDoc account and obtain these SAP proprietary JAR files and other required files:
  - `sapidoc3.jar` and `sapjco3.jar`.
  - `libsapjco3.so`: If your MID Server is installed on a Linux machine, obtain this file.
  - `sapjco3.dll`: If your MID Server is installed on a Windows machine, obtain this file.

  A JAR file, `sapConnector-1.0.1.jar` is available along with the spoke to provide a custom interface between SAP ECC IDoc account and ServiceNow instance. The JAR file is installed as part of the spoke in your ServiceNow instance.
- Copy and record the client value of the target host where the SAP ECC IDoc server is installed.
- If you are using this spoke along with the SAP ECC RFC spoke, during spoke upgrades, ensure that you upgrade both the spokes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- Flow Designer Action Step - Script on MID (com.glide.hub.action_step.script_mid)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The SAP ECC IDoc spoke provides actions to automate SAP ECC IDoc tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Finance	Create Fixed Assets	Creates fixed asset in your SAP ECC IDoc account.
	Create GL Account	Creates a GL account in your SAP ECC IDoc account.
	Create Invoice	Creates an invoice document in your SAP ECC IDoc account.
	Post Journal Entry	Posts a journal entry in your SAP ECC IDoc account.
	Update Fixed Assets	Updates details of the fixed assets in your SAP ECC IDoc account.
	Update GL Account	Updates details of the specified GL account in your SAP ECC IDoc account.
Items	Create Material	Creates a material (item) in your SAP ECC IDoc account.
	Update Material	Updates details of the specified material (item) in your SAP ECC IDoc account.
Procurement	Create Goods Receipt	Creates a goods receipt in your SAP ECC IDoc account.

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Category	Action	Description
	Create Purchase Order	Creates a purchase order in your SAP ECC IDoc account.
	Create Vendor	Creates a vendor in your SAP ECC IDoc account.
	Update Purchase Order	Updates details of the specified purchase order in your SAP ECC IDoc account.
Customer	Create Customer	Creates a customer account in SAP ECC IDoc.
	Update Customer	Update details of the required customer account in SAP ECC IDoc.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

MID Server requirements

These actions use Remote Function Call (RFC) protocol (SAP Proprietary protocol – SAP Standard Interface) leveraging Application Link Enabling (ALE) framework, which can run on an instance or MID Server. Use the connection record associated with the SAP ECC IDoc alias to configure where actions run as well as set MID Server selection attributes. For more information about running actions on the MID Server, see Integration steps.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the SAP ECC IDoc spoke

Integrate the ServiceNow instance and SAP ECC IDoc spoke by using the Basic Auth credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SAP ECC IDoc spoke.
- Role required: admin.

Configure MID Server for the SAP ECC IDoc spoke

Configure MID Server using the SAP proprietary JAR files to integrate SAP ECC IDoc account with your ServiceNow® instance.

Before you begin

Role required: admin.

Procedure

1. **Optional:** Navigate to **All** > **System Properties** > **Security**.

   Note: This is applicable only if your MID Server is installed on a Linux machine

2. **Optional:** Disable the MIME type validation for file attachments.

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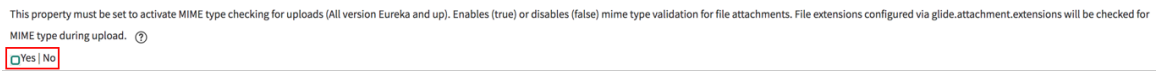

Note: This is applicable only if your MID Server is installed on a Linux machine.

3. Navigate to **MID Server** > **JAR Files**.
4. Upload the required SAP proprietary files (JAR, SO, or DLL) obtained after contacting your SAP ECC IDoc admin.
   For more information, see Synchronize a JAR file to MID Servers.

What to do next

Ensure that the files are synchronised in the `<MID-Server-root-directory>/agent/extlib` directory. If the files aren't synchronised, restart the MID Server.

Create a credential record for the SAP ECC IDoc spoke

Create a credential record for the SAP ECC IDoc account. The SAP ECC IDoc spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **Basic Auth Credentials**.
4. On the form, fill these values.

Basic Auth Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `SAP ECC IDoc Cred`.
User name	User name to log in to your SAP ECC IDoc account.
Password	Password to authenticate and log in to your SAP ECC IDoc account.
Active	Option to actively use the credential record.
Order	Order to apply this credential. For example, `100`.
Credential alias	Credential alias associated with the spoke.

5. Click **Submit**.

Create a connection record for the SAP ECC IDoc spoke

Create a connection record for your SAP ECC IDoc account. The SAP ECC IDoc spoke connection and credential aliases use these connections to perform actions in SAP ECC IDoc.

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Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for SAP ECC IDoc.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `SAP ECC IDoc Connection`.
Credential	Credential record created for SAP ECC IDoc spoke. For example, `SAP ECC IDoc Cred`.
Connection alias	Alias record associated with this connection.
Host	Fully qualified domain name of the target host where the SAP ECC IDoc server is installed.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use a MID Server for this connection. Select the check box and define the fields in the **Advanced MID Server Configuration** tab.

5. In the **Advanced MID Server Configuration** tab, provide these details.

Field	Description
Capabilities	Capabilities the MID Server must support to be eligible for selection. The system runs the action or activity from a MID Server that supports the selected capabilities. Required capabilities determine which MID Server is selected at runtime. To learn more about how a MID Server is selected during runtime, see MID Server selection.
MID Application	Application the MID Server must support to be eligible for selection. The system runs the action from a MID Server that supports the selected application. To learn more about how a MID Server is selected during runtime, see MID Server selection.

6. In the **Attributes** tab, provide these details.

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Field	Description
Client	Client value of the target host where the SAP ECC IDoc server is installed.
u_system_number	System number of the target host where the SAP ECC IDoc server is installed.
u_lang	Language selected in the target host where the SAP ECC IDoc server is installed.

7. Click **Submit**.

SAP ECC RFC Spoke

The SAP ECC RFC spoke is built by Bristlecone, Inc. Manage items, journals, procurements, and others, in SAP ECC RFC account from your ServiceNow® instance.

Request apps on Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes. Starting on March 1st 2022, all SAP spokes will be available only on the Store.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SAP ECC RFC spoke v2.12.0 is the latest version. For version history of the spoke, see SAP ECC RFC spoke release notes.

Supported versions

This spoke was built for these SAP ECC RFC versions and the spoke is compatible with versions listed below:

- SAP application version where spoke is developed: SAP EHP8 for ERP6.0
- Compatible SAP application versions: SAP ECC6.0 Base pack until latest SAP EHP8 for ERP6.0
- SAP JCo: 3.0.20 or later

Spoke requirements

- Contact the admin of your SAP ECC RFC account and obtain these SAP proprietary JAR files and other required files:
  - `sapjco3.jar`.
  - `libsapjco3.so`: If your MID Server is installed on a Linux machine, obtain this file.
  - `sapjco3.dll`: If your MID Server is installed on a Windows machine, obtain this file.

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A JAR file, `sapConnector-1.0.1.jar`, is available along with the spoke to provide custom interface to interact and execute RFCs and IDocs in the SAP ECC RFC account. The JAR file is installed as part of the spoke in your ServiceNow instance.

- Copy and record the client value of the target host where the SAP ECC RFC server is installed.
- Configure the values of these system properties:
  - *com.snc.process_flow.reporting.serialized.val_size_limit*: This property serializes JSON objects and ensures that the data is in the required format. Specify the number of bytes as per your requirement. For more information, see Workflow Studio system\n properties.
  - *glide.rest.max_content_length*: This property specifies the payload size. Specify the maximum payload size you want to use in your flows. The maximum value you can specify for this property is, 25 MB.
- If you are using this spoke along with the SAP ECC IDoc, SAP S4 HANA IDoc, SAP S4 HANA RFC spokes, during spoke upgrades, ensure that you upgrade all the spokes to their latest versions.

Note: If you are upgrading the spoke from an earlier version, make sure to restart the MID server.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The SAP ECC RFC spoke provides sample flows to demonstrate automating the SAP ECC RFC tasks. To customize a sample flow, copy it to the required application scope. Available sample flows include:

Flow	Description
Retrieve Users By Role	Retrieves details of the SAP ECC RFC users with the specified role. The user details can be accessed by navigating to **SAP ECC RFC Spoke** > **SAP ECC Users**.
Retrieve Incoming Invoice	Retrieves details of the incoming SAP ECC RFC invoices. The invoice details can be accessed by navigating to **SAP ECC RFC Spoke** > **SAP ECC Invoices Data**.
Create Sales Order and Look up Status	Creates a sales order and retrieves the status information.
Create Cost Center	Demonstrates how to use the Execute RFC and Create Table Field Object actions.

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Spoke actions

The SAP ECC RFC spoke provides actions to automate SAP ECC RFC tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Items	Look up Material Groups	Retrieves the list of material groups from your SAP ECC RFC account.
	Look up Materials By Plant	Retrieves the list of materials (items) based on plant selection criteria.
	Look up Materials by Storage Location	Retrieves the list of materials (items) based on the storage location selection criteria.
Journals	Post Journal Entry	Posts a journal entry to a GL account in your SAP ECC RFC account.
	Reverse Journal Entry	Reverses a journal entry in a GL account in your SAP ECC RFC account.
Lookups	Look up Cost Centers by Controlling Area	Retrieves cost centers based on the controlling area from your SAP ECC RFC account.
Metadata Retrieval	Look up RFC Input Schema	Retrieves the input schema for the RFC, from SAP ECC RFC dynamically.
	Look up RFC Output Schema	Retrieves the output schema from SAP ECC RFC dynamically, for the selected RFC.
	Look up RFC Table Field Input Metadata	Dynamically retrieves the input schema from SAP ECC RFC, for the selected field in the RFC tables.
	Look up RFC Table Field Output Metadata	Dynamically retrieves the output schema from SAP ECC RFC, for the selected field in the RFC tables.
	Look up RFC Tables Input Metadata	Dynamically retrieves the tables input schema for the RFC, from SAP ECC RFC.
	Look up RFC Input Metadata	Dynamically retrieves the input schema for the RFC, from SAP ECC – RFC.
	Look up RFC Output Metadata	Dynamically retrieves the output schema from SAP ECC - RFC, for the selected RFC.
Procurement	Authorize Payment	Creates an authorize payment document in SAP ECC RFC.
	Authorize Payment for Non-PO Invoice	Creates an authorize payment document for create non purchase order invoice in SAP ECC RFC.
	Create Fixed Asset	Create a fixed asset in SAP ECC RFC.
	Create Service Goods Receipt	Creates a Service goods receipt document in SAP ECC - RFC.
	Create Goods Receipt	Creates a goods receipt document in SAP ECC RFC.
	Create Invoice	Creates an invoice in SAP ECC RFC.
	Cancel Invoice	Cancels an invoice document in SAP ECC - RFC.

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Category	Action	Description
	Cancel Goods Receipt	Cancels a goods receipt document in SAP ECC - RFC.
	Create Non Purchase Order Invoice	Creates a non purchase order invoice document in SAP ECC – RFC.
	Cancel Non Purchase Order Invoice	Cancels a non purchase order invoice document in SAP ECC – RFC.
	Create Purchase Order	Creates a purchase order in SAP ECC RFC.
	Create Vendor	Creates a vendor in SAP ECC RFC.
	Update Vendor	Updates details of a vendor in SAP ECC RFC.
	Look up Asset Category	Retrieves details of the specified asset from SAP ECC - RFC.
	Look up Invoices	Retrieves details of the specified invoice from SAP ECC - RFC.
	Look up Invoices By Date	Retrieves invoices from SAP ECC RFC based on the provided date.
	Look up Purchase Orders and Purchase Order Lines	Retrieves details of the purchase order and purchase order lines from SAP ECC - RFC.
	Look up Purchase Order Attachments	Retrieves the details of the purchase order from SAP ECC - RFC.
	Look up Receipts	Retrieves the details of the receipts from SAP ECC - RFC.
	Look up Vendors	Retrieves vendors details from SAP ECC - RFC.
	Look up Advance Shipment Notices	Retrieves details of the advance shipment notices in SAP ECC - RFC.
	Look up Payment Status for Invoice	Retrieves the payment status for invoice from SAP ECC - RFC.
	Update Purchase Order	Updates an existing purchase order in SAP ECC RFC
Records Management	Execute RFC	Executes an RFC from the available list for the create, update, or read operations.
	Execute RFC for Look up Operations	Executes an RFC from the available list of read operations.
Bills and Payment	Look Up Bill Details By ID	Retrieves bills based on sales order from SAP ECC RFC.
	Look Up Outstanding Balance	Retrieves outstanding balance of a customer from SAP ECC RFC.
	Look Up Payments	Retrieves pending payments of the customer from SAP ECC RFC.
Customer	Look Up Customer Info	Retrieves customer information based on company code and customer from SAP ECC RFC.

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Category	Action	Description
Transfer Order	Create Transfer Order and Line Items	Creates a transfer order in SAP ECC - RFC.
	Look up Transfer Order and Line Items	Retrieves transfer orders from SAP ECC - RFC.
Utility	Create Table Field Object	Envelops user inputs for the selected table field of given BAPI in an object.
Inventory (or) Sales	Look Up Inventory of Parts	Retrieves inventory for the plant and material from SAP ECC RFC.
Finance Management	Create Asset	Creates an asset in SAP ECC - RFC with the provided details.
Sales Order	Create Sales Order	Creates a sales order in SAP ECC RFC.
	Look Up Sales Order	Retrieves sales order details from SAP ECC RFC.
	Look Up Sales Orders	Retrieves sales orders based on customer from SAP ECC RFC.
	Update Sales Order	Updates details of the required sales order in SAP ECC RFC.

Spoke modules

The SAP ECC RFC spoke adds the SAP ECC RFC Spoke application to your instance and includes these modules:

Module	Description
SAP ECC Flow Executions	Displays the last successful execution date of the Retrieve Incoming Invoice flow. Before the first flow execution, you must create a record in this module to specify the date from which the incoming invoice details should be fetched.
SAP ECC Invoices Data	Displays the records retrieved by the Retrieve Incoming Invoice flow.
SAP ECC RFCs	Displays the list of BAPIs. The Execute RFC action and Execute RFC for Look up Operations actions uses this as input. **Note:** Value of Operation Type is used to specify the kind of operation BAPI is expected to do. If the operation is read, the operation will be available in both Execute RFC for Look up Operations and Execute RFC actions. If the operation is write, the operation is only available for Execute RFC action as input.
SAP ECC Users	Displays details of the SAP ECC RFC users. The Retrieve Users By Role flow retrieves details of the users with the specified role.

Spoke user roles

The SAP ECC RFC spoke provides user roles to control access to data.

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- Users with the sn_sap_ecc_rfc_spo.SAP_ECC_RFC_Spoke_Admin role have access to the spoke tables.
- Users with the sn_sap_ecc_rfc_spo.SAP_ECC_RFC_Spoke_Read role can view data in the SAP ECC RFCs table and module.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the SAP ECC RFC spoke.

MID Server requirements

These actions use Remote Function Call (RFC) protocol (SAP Proprietary protocol – SAP Standard Interface), which can run on an instance or MID Server. Use the connection record associated with the SAP ECC RFC spoke alias to configure where actions run as well as set MID Server selection attributes. For more information about running actions on the MID Server, see Integration steps

Note:

- If the MID Server is installed on a Linux machine, perform the configurations as outlined in Configure MID Server for the SAP ECC RFC spoke.
- If the MID Server is installed on a Windows machine, no configurations are needed.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the SAP ECC RFC spoke

Integrate the ServiceNow instance and SAP ECC RFC account by using the Basic Auth credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SAP ECC IDoc spoke.
- Role required: admin.

Configure MID Server for the SAP ECC RFC spoke

Configure MID Server using the SAP proprietary JAR files to integrate SAP ECC RFC account with your ServiceNow® instance.

Before you begin

Role required: admin.

Procedure

1. **Optional:** Navigate to **All** > **System Properties** > **Security**.

   Note: This is applicable only if your MID Server is installed on a Linux machine

2. **Optional:** Disable the MIME type validation for file attachments.

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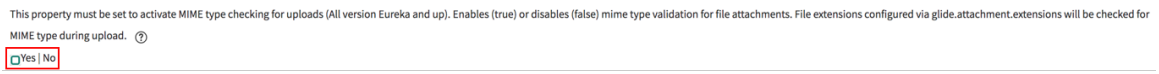

Note: This is applicable only if your MID Server is installed on a Linux machine

3. Navigate to **MID Server** > **JAR Files**.
4. Upload the required SAP proprietary files (JAR, SO, or DLL) obtained after contacting your SAP ECC RFC admin.
   For more information, see Synchronize a JAR file to MID Servers.

What to do next

Ensure that the files are synchronised in the `<MID-Server-root-directory>/agent/extlib` directory. If the files aren't synchronised, restart the MID Server.

Create a credential record for the SAP ECC RFC spoke

Create a credential record for the SAP ECC RFC account. The SAP ECC RFC spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **Basic Auth Credentials**.
4. On the form, fill these values.

Basic Auth Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `SAP ECC RFC Cred`.
User name	User name to log in to your SAP ECC RFC account.
Password	Password to authenticate and log in to your SAP ECC RFC account.
Active	Option to actively use the credential record.
Order	Order to apply this credential. For example, `100`.
Credential alias	Credential alias associated with the spoke.

5. Click **Submit**.

Create a connection record for the SAP ECC RFC spoke

Create a connection record for your SAP ECC RFC account. The SAP ECC RFC spoke connection and credential aliases use these connections to perform actions in SAP ECC RFC.

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Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for SAP ECC RFC.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `SAP ECC RFC Connection`.
Credential	Credential record created for SAP ECC RFC spoke. For example, `SAP ECC RFC Cred`.
Connection alias	Alias record associated with this connection.
Host	IP address of the target host where the SAP ECC RFC server is installed.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use a MID Server for this connection. Select the check box and define the fields in the **Advanced MID Server Configuration** tab.

5. In the **Advanced MID Server Configuration** tab, provide these details.

Field	Description
Capabilities	Capabilities the MID Server must support to be eligible for selection. The system runs the action or activity from a MID Server that supports the selected capabilities. Required capabilities determine which MID Server is selected at runtime. To learn more about how a MID Server is selected during runtime, see MID Server selection.
MID Application	Application the MID Server must support to be eligible for selection. The system runs the action from a MID Server that supports the selected application. To learn more about how a MID Server is selected during runtime, see MID Server selection.

6. In the **Connection Attributes** tab, provide these details.

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Field	Description
Client	Client value of the target host where the SAP ECC RFC server is installed.
System Number	System number of the target host where the SAP ECC RFC server is installed.
Language	Language selected in the target host where the SAP ECC RFC server is installed.

7. **Optional:** If you intend to connect to an SAP load-balanced environment, provide values for these additional fields in the **Connection Attributes** tab:
   - **Message Server**
   - **Group**
   - **Host**
8. Click **Submit**.

SAP Fieldglass Spoke

The SAP Fieldglass spoke is built by Bristlecone, Inc. Manage job postings, workers, timesheets and expenses, and approvals in SAP Fieldglass account from your ServiceNow instance.

Request apps on Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes. Starting on March 1st 2022, all SAP spokes will be available only on the Store.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SAP Fieldglass spoke v1.3.1 is the latest version. For version history of the spoke, see SAP Fieldglass spoke release notes.

Supported versions

This spoke was built for SAP Fieldglass v2.0, but may be compatible with later versions.

Note: SAP Fieldglass APIs doesn't support JSON by default. You must reach out to the SAP Fieldglass support to enable JSON support for the APIs.

Spoke requirements

- Copy and record the API Key. Contact the SAP Fieldglass support team if you don't have the value.
- By default, all APIs are not enabled. Contact the SAP Fieldglass support team to enable these APIs and enable JSON support for these APIs:

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API Type	API
Job Posting	Job Posting Upload
	Job Posting Update Upload
	Job Posting Redistribution Upload
	Job Posting Cost Center Allocation Upload
	Standard Job Posting Qualification Upload
	Job Posting Close Upload
	Job Seeker Reject Upload
Supplier Job Posting	Get Job Posting
	Submit Job Seeker
Work Order Management	Work Order Upload
	Work Order Revision Upload
	Work Order Close Upload
Supplier - Work Order	Get Work Order Offer
	Accept Work Order Offer
	Accept Work Order Multiple Rate
	Decline Work Order Offer
	Accept Work Order Revision
	Decline Work Order Revision
Workers	Active Worker Delta Single Line Download (LastRundate)
	Active Worker Download
Time Sheet and Expense	Time Sheet Upload
	Expense sheet Upload
	Approved Expense sheet download (LastRundate)
	Approved Timesheet Fixed Format Download (LastRundate)
	Time Sheet Rejection Upload
Approvals and Rejection	approvals
Master Data	Supplier Download
	Reason Code Download
	Business unit Download
	Cost center Download
	Legal Entity Download
	Shift Download
	Rate Schedule Download
	Site Details Download

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- Encryption Support (com.glide.encryption)
- Key Management Framework plugin (com.glide.kmf.global)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The SAP Fieldglass spoke provides sample flows to demonstrate automating the tasks. To customize a sample flow, copy it to the required application scope. Available sample flows include:

Flow	Description
Sample Look up Approval and Metadata Flow	Approves the pending approvals in SAP Fieldglass.
Sample Look up Flow	Retrieves or downloads data related to currently active workers and data related to workers who had revisions since the last successful run date of the connector.

Spoke actions

The SAP Fieldglass spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Buyer - Approvals and Rejection	Approve	Approves the pending approvals in SAP Fieldglass.
	Look up Pending Approvals	Retrieves the list of pending approvals.
	Look up Reject Reasons	Retrieves the list of available reject reasons.
	Reject	Rejects the pending approvals in SAP Fieldglass.
Buyer - Job Posting	Close Job Posting	Closes the specified job posting in SAP Fieldglass.
	Close Job Posting Bulk	Closes multiple job postings in SAP Fieldglass.

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Category	Action	Description
	Create Job Posting	Creates a job posting in SAP Fieldglass.
	Reject Job Seeker	Rejects the specified job seeker in SAP Fieldglass.
	Reject Job Seeker Bulk	Rejects multiple job seekers in SAP Fieldglass.
	Update Job Posting	Updates details of the required job posting.
	Update Job Posting Cost Center Allocation	Updates the cost center code for the existing job posting.
	Update Job Posting Cost Center Allocation Bulk	Updates the cost center code for multiple existing job postings.
	Update Job Posting Distribution	Distributes single or bulk job posting to the suppliers.
	Update Job Posting Qualification	Updates or uploads one or more job posting templates or qualifications data for the required job posting.
Buyer - Time Sheet and Expense	Look up Approved Expense Sheets	Retrieves details of the approved expense sheets.
	Look up Approved Time Sheets	Retrieves details of the approved time sheet.
	Reject Time Sheet Bulk	Rejects single or bulk time sheet.
	Upload Expense Sheet	Uploads expense sheet in SAP Fieldglass.
	Upload Time Sheets	Uploads time sheets in SAP Fieldglass.
Buyer - Work Order Management	Close Work Order	Closes a work order if workers have not been on-boarded.
	Revise Work Order	Revises the specified work order in SAP Fieldglass.
	Upload Work Order	Uploads work order to SAP Fieldglass.
Buyer - Workers	Look up Active Workers	Retrieves or downloads data related to currently active workers.
	Look up Active Workers Delta	Retrieves or downloads data related to workers who had revisions since the last successful run date of the connector.
	Upload SOW Worker	Uploads or creates an SOW Worker for the existing Statement Of Work.
Metadata Retrieval	Get Buyer Token	Generates access token for SAP Fieldglass buyer.
	Get Supplier Token	Generates access token for the SAP Fieldglass supplier.
	Last Run Date	Retrieves the required data after the last run date.
	Look up Business Units	Retrieves list of the available business units.
	Look up Cost Centers	Retrieves list of the available Cost Centers.

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Category	Action	Description
	Look up Legal Entities	Retrieves list of the available legal entities.
	Look up Rate Schedules	Retrieves list of the available rate schedules.
	Look up Reason Codes	Retrieves list of the available reason codes.
	Look up Shift Details	Retrieves list of the available shifts.
	Look up Site Details	Retrieves list of the available sites.
	Look up Suppliers	Retrieves list of the available suppliers.
	Sample JSON Parser Action	Parses the JSON object and converts it to an array of objects.
Supplier - Job Posting	Get Job Posting	Retrieves details of the required job posting.
	Submit Job Seeker	Submits a job seeker in SAP Fieldglass.
Supplier - Work Order	Accept Work Order Multiple Rates	Accepts work order multiple rates in SAP Fieldglass.
	Accept Work Order Offer	Accepts work order in SAP Fieldglass.
	Accept Work Order Revision	Accepts the revised work order in SAP Fieldglass.
	Accept Work Order Revision Multiple Rates	Accepts the revised Work order with multiple Rates.
	Decline Work Order Offer	Declines the specified work order.
	Decline Work Order Revision	Declines the revised work order.
	Get Work Order Offer	Retrieves details of the required work order.

Spoke modules

The SAP Fieldglass spoke adds the SAP Fieldglass Spoke application to your instance and includes these modules:

Module	Description
Active Worker Downloads	Displays details of the active workers. Data is retrieved when you run the Look up Active Workers spoke action.
Create Job Postings	Displays details about the job postings. Data is retrieved from the SAP Fieldglass instance after you set up the webhook. For more information, see Set up webhook for the SAP Fieldglass spoke.
SAP Fieldglass Buyer Credentials	Displays the buyer credential records.

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Module	Description
SAP Fieldglass Modules	Displays details about the modules. The spoke actions internally use these modules during flow execution. You can manage the modules as per your requirement.
SAP Fieldglass Supplier Credentials	Displays the supplier credential records.
SAP Fieldglass Webhook Registries	Displays the webhook registries. You can create webhook registry for an event as per your requirement. For more information, see Set up webhook for the SAP Fieldglass spoke.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Two connection and credential aliases are available along with spoke; one record for supplier and another record for buyer. For information about setting up the spoke, see Set up the SAP Fieldglass spoke.

Generate API key

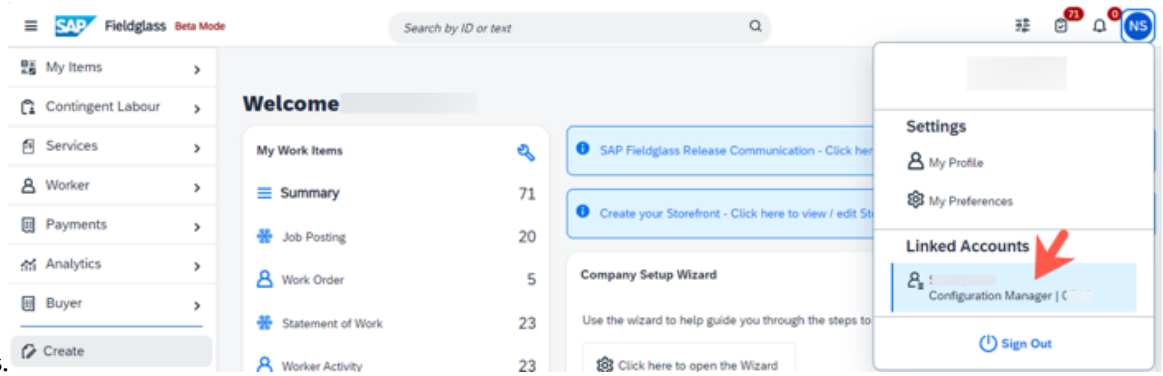
Generate an API key on the SAP Fieldglass tenant to enable your ServiceNow instance to connect to the SAP Fieldglass tenant. You provide the API key on the SAP Fieldglass spoke connection record and the SAP Fieldglass tenant authenticates your ServiceNow instance based on the API key.

Before you begin
Role required: admin

Access to SAP Fieldglass tenant account.

Procedure

1. Log in to your SAP Fieldglass tenant account.
2. Select Linked Accounts.



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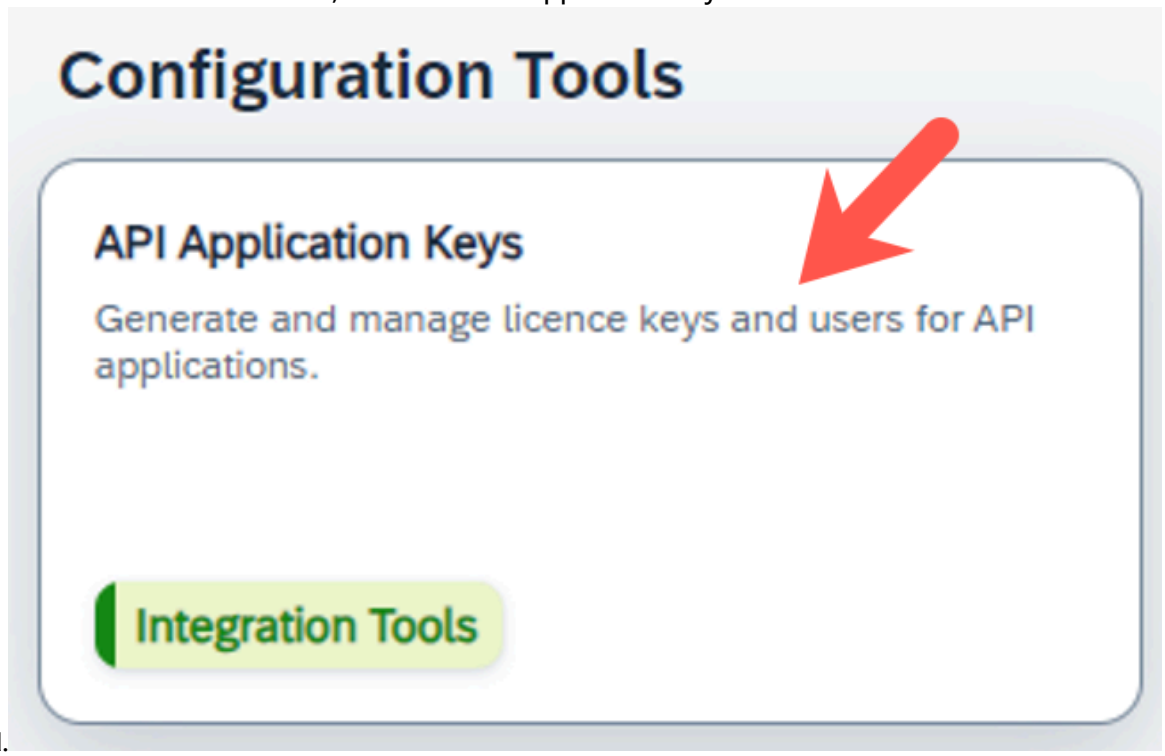
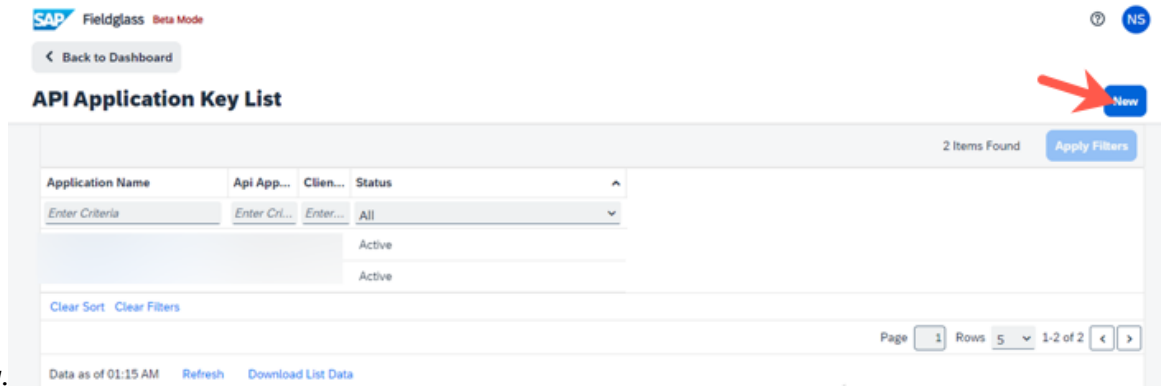
3. On the Self-Service Dashboard, select the API Application Keys card.



4. Select **New**.



5. On the Create Application Key page, enter values.
   - Application Name: Name of the application.
   - Description: Custom description of the API key.

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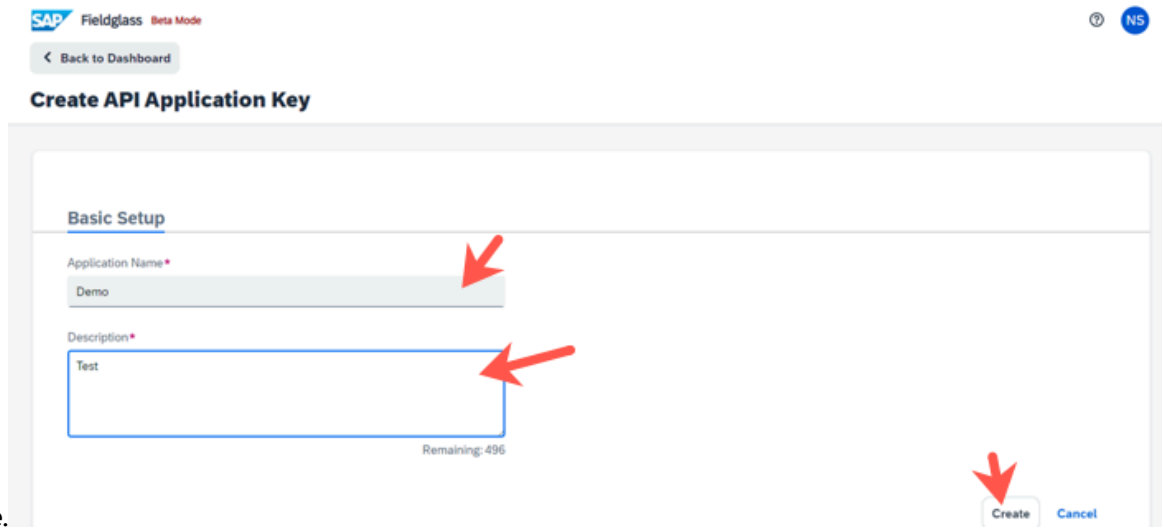
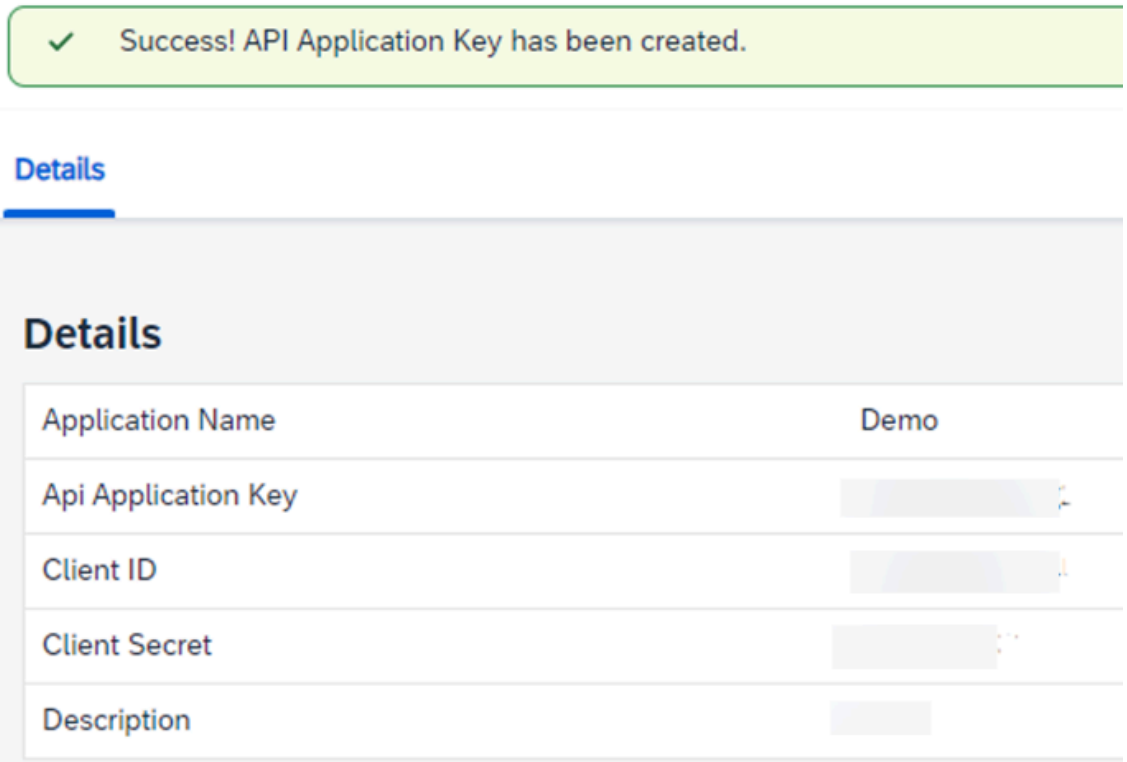
6. Select



Create.
The API key and other details are



generated.

Configure SAP Fieldglass connection record

Configure the connection record to enable your ServiceNow instance to connect with the SAP Fieldglass tenant.

Before you begin

- Request an Integration Hub subscription.
- Ensure you've generated the API key from the SAP Fieldglass tenant.
- Activate the SAP Fieldglass spoke.
- Role required: admin.

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Procedure

1. Configure the connection record for the SAPFieldGlassBuyer alias.
   a. Navigate to **All** > **Process Automation** > **Flow Designer**.
   b. Select Connections.
   c. Turn on the Outbound tab.
   d. In the Search all connections field, enter `SAP Fieldglass`.
   e. On the SAP SAPFieldGlassBuyer card, select **View Details**.
   f. Select **Configure**.
   g. Fill the form.

Configure Connection

Field	Description
Name	Name of the connection record. The default and read-only name of the first connection record is the SAPFieldglassBuyer Connection. To create a record with your custom name, select **Add Connection**.
Connection URL	URL to connect to SAP Fieldglass APIs in the format `https://<SAP Fieldglass environment URL>.com/api`.
Name	Custom name of the credentials to access the SAP Fieldglass tenant.
User name	User name to log in to the SAP Fieldglass tenant.
Password	Password to log in to the SAP Fieldglass tenant.
APIKey	API key of the buyer.

   h. Select **Configure Connection**.

2. Configure the connection record for the SAPFieldGlassSupplier alias.
   a. Navigate to **All** > **Process Automation** > **Flow Designer**.
   b. Select Connections.
   c. Turn on the Outbound tab.
   d. In the Search all connections field, enter `SAP Fieldglass`.

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e. On the SAP SAPFieldGlassSupplier card, select **View Details**.

f. Select **Configure**.

g. Fill the form.

Configure Connection

Field	Description
Name	Name of the connection record. The default and read-only name of the first connection record is the SAPFieldGlassSupplier Connection. To create a record with your custom name, select **Add Connection**.
Connection URL	URL to connect to SAP Fieldglass APIs in the format `https://<SAP Fieldglass environment URL>.com/api`.
Name	Custom name of the credentials to access the SAP Fieldglass tenant.
User name	User name SAP Fieldglass buyer tenant.
Password	Password of SAP Fieldglass buyer tenant.
APIKey	API key of the supplier.

h. Select **Configure Connection**.

Set up the SAP Fieldglass spoke

Integrate the ServiceNow instance and SAP Fieldglass account using API keys to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate SAP Fieldglass spoke.
- Role required: admin

Procedure

1. Configure the connection and credential alias record for the SAP Fieldglass buyer instance.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the record, **SAPFieldGlassBuyer**.

c. Click the Create New Connection & Credential related link.

d. On the form, fill these values.

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Create Connection and Credential form

Field	Description
Please Enter the Connection Information	
Name	Name to identify the connection record. For example, SAP `Fieldglass Buyer Connection`.
Connection URL	URL of the SAP Fieldglass buyer instance.
Please Enter the Credential Information	
Name	Name to identify the credential record. For example, SAP `Fieldglass Buyer Credential`.
User name	User name to log in to your SAP Fieldglass buyer instance.
Password	Password to log in to your SAP Fieldglass buyer instance.
APIKey	API key of your SAP Fieldglass buyer instance.

e. Click **Create**.

2. Configure the connection and credential alias record for the SAP Fieldglass supplier instance.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the record, **SAPFieldGlassSupplier**.

c. Click the Create New Connection & Credential related link.

d. On the form, fill these values.

Create Connection and Credential form

Field	Description
Please Enter the Connection Information	
Name	Name to identify the connection record. For example, SAP `Fieldglass Supplier Connection`.
Connection URL	URL of the SAP Fieldglass supplier instance.
Please Enter the Credential Information	
Name	Name to identify the credential record. For example, SAP `Fieldglass Supplier Credential`.
User name	User name to log in to your SAP Fieldglass supplier instance.

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Field	Description
Password	Password to log in to your SAP Fieldglass supplier instance.
APIKey	API key of your SAP Fieldglass supplier instance.

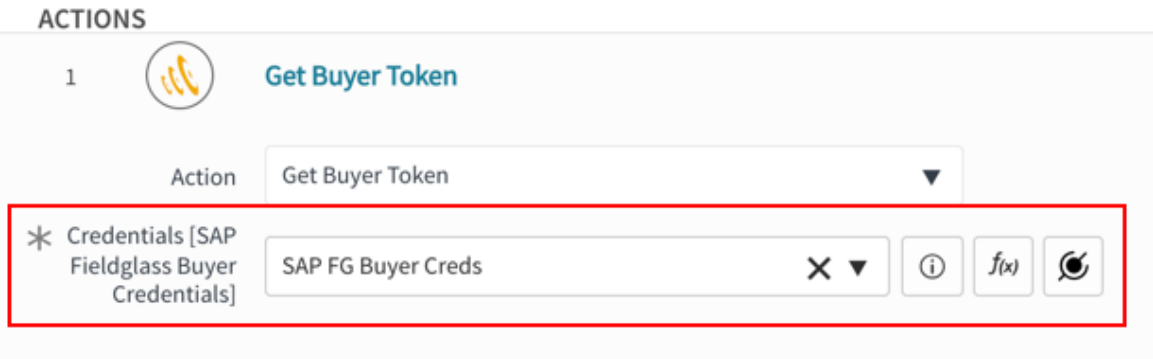
e. Click **Create**.

3. Create flow to generate buyer token.

a. Navigate to **Flow Designer** > **Designer**.

b. Create a flow and include the Get Buyer Token spoke action.
For more information about creating flows, see Building flows.

c. Select the buyer credential record for **Credentials [SAP Fieldglass Buyer Credentials]**.



d. Test the flow.
After successful execution, these fields are auto-populated in the SAP Fieldglass Buyer credential record:

- **Access Token**: Access token is generated.
- **Token Status**: Status is set to **Active**.
- **Expiry**: Expiry date and time of the access token is displayed.

4. Create flow to generate supplier token.

a. Navigate to **Flow Designer** > **Designer**.

b. Create a flow and include the Get Supplier Token spoke action.
For more information about creating flows, see Building flows.

c. Select the supplier credential record for **Credentials [SAP Fieldglass Supplier Credentials]**.

d. Test the flow.
After successful execution, these fields are auto-populated in the SAP Fieldglass Supplier credential record:

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- **Access Token**: Access token is generated.
- **Token Status**: Status is set to **Active**.
- **Expiry**: Expiry date and time of the access token is displayed.

Set up webhook for the SAP Fieldglass spoke

Retrieve the required information from SAP Fieldglass instance to your ServiceNow instance by setting up webhook to authenticate the requests.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **SAP Fieldglass Spoke** > **SAP Fieldglass Webhook Registries**.
2. Click **New**.
3. On the form, fill in the fields.

SAP Fieldglass Webhook Registry form

Field	Description
SAP Fieldglass Event	Event for which you want to set up the webhook. For example, `Create job posting`.
User name	Leave this field empty.
Password	Leave this field empty.
SAP Fieldglass Instance	URL of your SAP Fieldglass instance.

4. Click **Generate UserName and Password**.
   User name and **Password** are displayed.
5. Copy and record the values.
6. Share information with the appropriate teams.
   - Contact the SAP Fieldglass team to configure the webhook endpoint.
   - Share the user name and password combination with the SAP Fieldglass team.

SAP S4 HANA IDoc Spoke

The SAP S4 HANA IDoc spoke is built by Bristlecone, Inc. Manage finance, items, and procurement in SAP S4 HANA IDoc account from your ServiceNow instance.

Request apps on Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes. Starting on March 1st 2022, all SAP spokes will be available only on the Store.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

SAP S4 HANA IDoc spoke v1.2.0 is the latest version. For version history of the spoke, see SAP S4 HANA IDoc spoke release notes.

Supported versions

This spoke was built for SAP S4 HANA IDoc 2023.

Spoke requirements

- Contact the admin of your SAP S4 HANA IDoc account and obtain these SAP proprietary JAR files and other required files:
  - `sapidoc3.jar` and `sapjco3.jar`.
  - `libsapjco3.so`: If your MID Server is installed on a Linux machine, obtain this file.
  - `sapjco3.dll`: If your MID Server is installed on a Windows machine, obtain this file.

  A JAR file, `sapConnector-1.0.1.jar` is available along with the spoke to provide a custom interface between SAP S4 HANA IDoc account and ServiceNow instance. The JAR file is installed as part of the spoke in your ServiceNow instance.
- Copy and record the client value of the target host where the SAP S4 HANA IDoc server is installed.
- To retrieve information for authorization purposes, use the Execute RFC spoke action in the SAP S4 HANA RFC Spoke.
- If you are using this spoke along with the SAP ECC IDoc, SAP ECC RFC, SAP S4 HANA RFC spokes, during spoke upgrades, ensure that you upgrade all the spokes to their latest versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- Flow Designer Action Step - Script on MID (com.glide.hub.action_step.script_mid)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The SAP S/4 HANA IDoc spoke provides actions to automate SAP S4 HANA IDoc tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Customer Account	Create Customer Account	Creates a customer account in SAP S/4HANA.
	Update Customer Account	Updates details of the specified customer account in SAP S/4HANA.
Finance	Create Fixed Assets	Creates a fixed asset in SAP S4 HANA IDoc.

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Category	Action	Description
	Create GL Account	Creates a GL account in SAP S4 HANA IDoc.
	Create Invoice	Creates an invoice document in SAP S4 HANA IDoc.
	Post Journal Entry	Posts a journal entry to a GL account in SAP S4 HANA IDoc.
	Update Fixed Assets	Updates details of a fixed asset in SAP S4 HANA IDoc.
	Update GL Account	Updates details of the specified GL account in SAP S4 HANA IDoc.
Items	Create Material	Creates a material (item) in SAP S4 HANA IDoc.
	Update Material	Updates details of the specified material (item) in SAP S4 HANA IDoc.
Procurement	Create Goods Receipt	Creates a goods receipt in SAP S4 HANA IDoc.
	Create Purchase Order	Creates a purchase order in SAP S4 HANA IDoc.
	Create Vendor	Creates a vendor in SAP S4 HANA IDoc.
	Update Purchase Order	Updates details of the specified purchase order in SAP S4 HANA IDoc.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the SAP S4 HANA IDoc spoke.

MID Server requirements

These actions use Remote Function Call (RFC) protocol (SAP Proprietary protocol – SAP Standard Interface) leveraging Application Link Enabling (ALE) framework, which can run on an instance or MID Server. Use the connection record associated with the SAP S4 HANA IDoc alias to configure where actions run as well as set MID Server selection attributes. For more information about running actions on the MID Server, see Integration steps

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the SAP S4 HANA IDoc spoke

Integrate the ServiceNow instance and SAP S4 HANA IDoc spoke by using the Basic Auth credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SAP S4 HANA IDoc spoke.
- Role required: admin.

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Note: To retrieve information, use the Execute RFC spoke action in the SAP S4 HANA RFC Spoke.

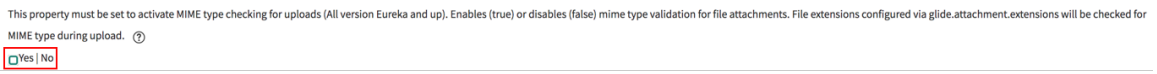
Procedure

1. Configure MID Server using the SAP proprietary JAR files.

   a. **Optional:** Navigate to **System Properties** > **Security**.

   Note: This is applicable only if your MID Server is installed on a Linux machine

   b. **Optional:** Disable the MIME type validation for file attachments.

   Note: This is applicable only if your MID Server is installed on a Linux machine.

   c. Navigate to **MID Server** > **JAR Files**.

   d. Upload the required SAP proprietary files (JAR, SO, or DLL) obtained after contacting your SAP S4 HANA IDoc admin.
   For more information, see Synchronize a JAR file to MID Servers.

   Note: Ensure that the files are synchronised in the `<MID-Server-root-directory>/agent/extlib` directory. If the files aren't synchronised, restart the MID Server.

2. Create a credential record for the SAP S4 HANA IDoc account.

   a. Navigate to **Connections & Credentials** > **Credentials**.

   b. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`

   c. Select **Basic Auth Credentials**.

   d. On the form, fill these values.

Basic Auth Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `SAP S4 HANA IDoc Cred`.
User name	User name to log in to your SAP S4 HANA IDoc account.
Password	Password to authenticate and log in to your SAP S4 HANA IDoc account.
Active	Option to actively use the credential record.
Order	Order to apply this credential. For example, `100`.

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Field	Description
Credential alias	Credential alias associated with the spoke.

e. Click **Submit**.

3. Create a connection record for your SAP S4 HANA IDoc account.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the alias record for SAP S4 HANA IDoc.

c. From the **Connections** tab, click **New**.

d. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `SAP S4 HANA IDoc Connection`.
Credential	Credential record created for SAP S/4 HANA IDoc spoke. For example, `SAP S4 HANA IDoc Cred`.
Connection alias	Alias record associated with this connection.
Host	Fully qualified domain name of the target host where the SAP S4 HANA IDoc server is installed.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use a MID Server for this connection. Select the check box and define the fields in the **Advanced MID Server Configuration** tab.

e. In the **Advanced MID Server Configuration** tab, provide these details.

Field	Description
Capabilities	Capabilities the MID Server must support to be eligible for selection. The system runs the action or activity from a MID Server that supports the selected capabilities. Required capabilities determine which MID Server is selected at runtime. To learn more about how a MID Server is selected during runtime, see MID Server selection.
MID Application	Application the MID Server must support to be eligible for selection. The system runs the action from a MID Server that supports the selected application.

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Field	Description
	To learn more about how a MID Server is selected during runtime, see MID Server selection.

f. In the **Attributes** tab, provide these details.

Field	Description
Client	Client value of the target host where the SAP S4 HANA IDoc server is installed.
u_system_number	System number of the target host where the SAP S4 HANA IDoc server is installed.
u_lang	Language selected in the target host where the SAP S4 HANA IDoc server is installed.

g. Click **Submit**.

SAP S4 HANA OData spoke

The SAP S4 HANA OData spoke is built by Bristlecone, Inc. Manage items, journals, procurements, and transactions in the SAP S4 HANA OData account from your ServiceNow® instance.

Request apps on Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes. Starting on March 1st 2022, all SAP spokes will be available only on the Store.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SAP S4 HANA OData spoke v1.13.0 is the latest version. For version history of the spoke, see SAP S4 HANA OData Spoke release notes.

Supported versions

This spoke was tested with SAP S/4HANA version 2023.

Spoke requirements

- SAP S4 HANA OData account
- Configure the value of this system property:

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com.snc.process_flow.reporting.serialized.val_size_limit: This property serializes JSON objects and ensures that the data is in the required format. Specify the number of bytes as per your requirement. For more information, see Workflow Studio system properties.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Scheduled jobs

The SAP S4 HANA OData spoke is shipped with the *Generate Token and Cookie* scheduled job.

Generate Token and Cookie: This scheduled job is run every 26 minutes, which creates a token and cookie.

Note: The Fetch Token action depends on this scheduled job.

Spoke actions

The SAP S4 HANA OData spoke provides actions to automate SAP S4 HANA OData tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Contract Management	Create Contract	Creates a new purchase contract in SAP S4 HANA with one or more items. Validates the payload before submission.
	Look up Contracts Stream	Retrieves details of all items across purchase contracts from SAP S4 HANA.
Sourcing Management	Create Sourcing Request	Creates a request for quotation in SAP S4 HANA by setting header details.
	Look up Sourcing Requests Stream	Retrieves the header details of all the requests for quotations from SAP S4 HANA.
Catalog Management	Create Material	Creates a material record in SAP S4 HANA by setting the required header details.
	Delete Material	Deletes the material record for the specified product number from SAP S4 HANA.

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Category	Action	Description
Primary Data Management	Look up Company Codes Stream	Retrieves details of all the available company codes.
	Look up Currencies Stream	Retrieves details of all the available currencies.
	Look up Business Partners Stream	Retrieves business partner's data fields of all the available records in the system.
	Look up FX Rates Stream	Retrieves details of all the currency foreign exchange rates.
	Look up Cost Centers Stream	Retrieve details of all the cost centers.
	Look up GL Accounts in Chart of Accounts Stream	Retrieves the details of all general ledger accounts available in your system.
	Look up Chart of Accounts Stream	Retrieves details of the available charts of accounts.
	Look Up Plant Addresses Stream	Retrieves details of the specified plant address master.
	Look up Purchasing Organizations Stream	Retrieves details of all the purchasing organizations.
	Look up Payment Terms Stream	Retrieves all the details of the payment terms.
	Look up Purchase Group Stream	Retrieves details of the specified purchasing group master.
	Look up Material Groups Stream	Retrieves the materials groups stream synchronously.
	Look up Base Unit of Measure Stream	Retrieves the list of entries from unit of measure text.
	Look up Business Partner Addresses Stream	Retrieves business partner address data fields of all the available records in your SAP S4 HANA OData account.
	Look up Materials Stream	Retrieves details of all general data of product master.
Utility Management	Look up Last Run Date	Retrieves the last run date and time of the flow.
	Fetch Token	Retrieves the CSRF (Cross-Site Request Forgery) token and cookie for other spoke actions. **Note:** This action is run every 6 hours through the Generate Token and Cookie scheduled job and update the system properties.
Purchase Order Management	Update Purchase Order Line	Updates the item details of an item in a purchase order using the Purchase Order Number and Purchase Order Item.

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Category	Action	Description
	Update Purchase Order for ASN	Updates the item details in a purchase order.
	Update Purchase Order	Updates the header details for the specified purchase order number.
	Look up Purchase Orders Stream	Retrieves general details of the specified product master.
	Create Non Purchase Order Invoice	Creates a supplier invoice using, for example, the company code, the invoice gross amount, and the invoicing party.
	Cancel Purchase Order Line	Deletes an item in a purchase order for the specified purchase order number and item number.
	Create Purchase Order	Creates a purchase order with the specified details.
	Create Line Item on Existing Purchase Order	Creates a line item in the existing purchase order with the header and item details passed in the request body.
	Look up Purchase orders Stream	Retrieves details of all purchase orders and the related items.
	Look up Purchase order Line Items Stream	Retrieves details of all purchase order line items.
Payment Management	Authorize Payment	Removes payment blocks that are set at the time of document creation.
	Look up Payment Term	Retrieves details of the payment terms.
	Look up Payments and Payment Status Stream	Retrieves payment information such as transaction currency, customer, payment status, accounting document and posting date.
Receipt Management	Create Service Goods Receipt	Creates service goods receipt in SAP S4 HANA OData.
	Cancel Goods Receipt	Cancels the material document for the specified material document number and material document year.
	Create Goods Receipt	Creates a material document compost by header and item for a specific business process.
	Create Receipt for Advance Shipment Notification	Creates a material document with a header and item for a business process.
	Look up Receipt	Retrieves the receipt details for the specified material document and other material document details.
Invoice Management	Create Invoice	Creates a supplier invoice based on the specified details, such as, company code, invoice gross amount, and invoicing party
	Cancel Invoice	Delete a supplier invoice that hasn't been posted using the supplier invoice and the fiscal year.

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Category	Action	Description
	Look up Invoices Stream	Retrieves general data of supplier master.
Shipment Management	Create Advance Shipment Notification	Creates an inbound delivery based on the specified purchase order.
	Look up Advance Shipment Notification	Retrieves the advance shipment notification details for the specified delivery document number.
	Look up Ship-to-Plant Addresses Stream	Retrieves the plant address details.
Supplier Management	Create Supplier	Creates a supplier.
	Delete Supplier Bank Account	Deletes the bank data for the specified business partner number and bank identification number.
	Look up Suppliers Stream	Retrieves details of the specified supplier master.
	Update Business Partner Address	Updates business partner address data of the record identified by address ID and business partner number.
	Update Supplier Company	Updates the supplier company data by using the Supplier and Company Code fields.
	Update Business Partner Bank	Updates bank data of the business partner record identified by business partner number and bank identification.
	Update Supplier	Updates the details of the specified supplier.
	Update Supplier Fax Number	Updates the fax number by using Address ID.
	Update Supplier Email Address	Updates email address by using Address ID.
	Update Supplier Phone Number	Updates business partner mobile or telephone address data of the record identified by Address ID.
	Create Company Code for Existing Supplier	Creates a company code for an existing supplier.
	Create Bank Details for Existing Supplier	Creates new business partner bank data linked to business partner.

Spoke module

The SAP S4 HANA OData spoke adds a SAP S4 HANA OData module to your ServiceNow instance.

Module	Description
Remote Table > **Purchase Orders**	Retrieves all the existing purchase orders in SAP S4 HANA OData.

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Module	Description
Inbound flow > **Purchase Orders**	Lists the most recent changes in purchase order status between the most recent successful runtime and the present runtime.
Inbound flow > **Last Successful Execution**	Lists the last successful execution details of the flows.

Spoke flow

The SAP S4 HANA OData spoke adds the following flow.

Flow	Description
Sample Look up Purchase Orders Flow	Retrieves the list of most recent changes in purchase order status between the most recent successful runtime and the present runtime.

Spoke subflow

The SAP S4 HANA OData spoke adds the following subflow.

Subflow	Description
Sample Create Purchase Order Subflow	Searches if a purchase order exists and creates a purchase order when no results are found.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up SAP S4 HANA OData spoke

Integrate the ServiceNow instance and SAP S4 HANA OData spoke by using the Basic Auth credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SAP S4 HANA OData spoke.
- Role required: admin.

Create a connection record for the SAP S4 HANA OData spoke

Create a credential record for the SAP S4 HANA OData spoke. The SAP S4 HANA OData spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

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Procedure

1. Navigate to **All** > **Connections & Credentials Aliases**.
2. Open the **SAP S4 HANA OData** record.
3. From the Related Links tab, select **Create New Connection & Credential**.
4. On the Create Connection and Credential form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection record. For example, `SAP S4 HANA OData Connection`.
Connection URL	Fully qualified domain name of the target host where the SAP S4 HANA OData server is installed.
Use MID server	Option to select MID server. This field selected by default.
User Name	User name of your SAP S4 HANA OData account.
Password	Password of your SAP S4 HANA OData account.

5. Click **Create**.

SAP S4 HANA Public Cloud Spoke

The SAP S4 HANA Public Cloud spoke is built by Bristlecone, Inc. Manage primary data, purchase orders, receipts, and suppliers in SAP S4 HANA public cloud instance from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SAP S4 HANA Public Cloud spoke v 1.3.0 is the latest version. For version history of the spoke, see SAP S4 HANA Cloud Spoke release notes.

Supported versions

This spoke was built for SAP S4 HANA 2023.

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Spoke requirements

- SAP S4 HANA Public Cloud account
- Configure the value of this system property:

  com.snc.process_flow.reporting.serialized.val_size_limit: This property serializes JSON objects and ensures that the data is in the required format. Specify the number of bytes as per your requirement. For more information, see Workflow Studio system properties.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The SAP S4HANA Public Cloud spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Primary Data Management	Look up Business Partner Addresses Stream	Retrieves business partner address data fields of all the available records in the system.
	Look up Business Partners Stream	Retrieves business partner's data fields of all the available records in the system.
	Look up Base Unit of Measure Stream	Reads a set of entries from the Unit of Measure text.
	Look up Chart of Accounts Stream	Retrieves details of the available charts of accounts.
	Look up Company	Retrieves the details related to Company Codes.

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Category	Action	Description
	Codes Stream	
	Look up Cost Centers Stream	Retrieve details of all cost centers.
	Look up GL Accounts in Chart of Accounts Stream	Retrieves the details of the available General Ledger (GL) accounts for the chart of accounts.
	Look up Material Groups Stream	Retrieves the materials groups stream synchronously.
	Look up Materials Stream	Retrieves details of all general data of product master.
Purchase Order Management	Look up Purchase Orders Stream	Retrieves general data of the required product master.
	Create Purchase Order and PO Lines	Creates a new purchase order with the header and item details passed in the request body.
Receipt Management	Create Receipt	Creates a material document by header and item for the specific business process.
	Create Service Goods Receipt	Creates a service goods receipt in SAP S4 Hana Cloud.
	Look up Receipts Stream	Retrieves details related to material documents.
Supplier Management	Create Supplier	Creates a new supplier with the provided details.
	Look up Suppliers Stream	Retrieves general data of the supplier master.
Invoice Management	Create Invoice	Creates a supplier invoice using the company code, invoice gross amount, and invoicing party.
	Look up Invoices Stream	Reads the supplier invoice data using, for example, the supplier invoice, the fiscal year, the company code, the document currency, the document date, the invoice gross amount, the invoicing party and the posting date.
Shipment Management	Look up Advance	Retrieves general data of the required advanced shipment notices.

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Category	Action	Description
	Shipment Notification Stream	
Utility Management	Fetch Token and Cookie	Retrieves the CSRF (Cross-Site Request Forgery) token and cookie for other spoke actions. **Note:** This action runs every 6 hours through the Generate Token and Cookie scheduled job and updates the system properties.
User Management	Look up Users Stream	Retrieves the general data of the users present in the system. The data fetched are user ID, user name, description, email address, and so on.

Spoke scheduled job

The SAP S4HANA Public Cloud spoke provides a scheduled job, Generate Token and Cookie - Cloud Spoke. This scheduled job is run every 26 minutes, which creates a token and cookie. The Fetch Token and Cookie spoke action depends on this scheduled job.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Setup the SAP S4 HANA Public Cloud spoke.

Setup the SAP S4 HANA Public Cloud spoke

Integrate the ServiceNow instance and SAP S4 HANA public cloud instance by using basic authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SAP S4 HANA Public Cloud spoke.
- Role required: admin.

Procedure

1. Navigate to **All** > **Integration Hub** > **Connection & Credential Aliases**.
2. Open the record, **SAP S4 HANA Cloud**.
3. Click the **Create New Connection & Credential** related link.
4. On the form, fill in these values.

Field	Description
Connection Name	Name to identify the connection record.
Connection URL	URL to connect to SAP S4 HANA public cloud instance.

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Field	Description
User Name	User name to log in to the SAP S4 HANA public cloud instance.
Password	Password to log in to the SAP S4 HANA public cloud instance.

5. Click **Create**.

SAP S4 HANA RFC Spoke

The SAP S4 HANA RFC spoke is built by Bristlecone, Inc. Manage procurement, records, journals, and others, in SAP S4 HANA RFC account from your ServiceNow® instance.

Request apps on Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes. Starting on March 1st 2022, all SAP spokes will be available only on the Store.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SAP S4 HANA RFC spoke v2.7.0 is the latest version. For version history of the spoke, see SAP S4 HANA RFC spoke release notes.

Supported versions

This spoke was built for SAP S4 HANA RFC 2023.

Spoke requirements

- Contact the admin of your SAP S4 HANA RFC account and obtain these SAP proprietary JAR files and other required files:
  - `sapjco3.jar`.
  - `libsapjco3.so`: If your MID Server is installed on a Linux machine, obtain this file.
  - `sapjco3.dll`: If your MID Server is installed on a Windows machine, obtain this file.

  A JAR file, `sapConnector-1.0.jar`, is available along with the spoke to provide custom interface to interact and execute RFCs and IDocs in the SAP S4 HANA RFC account. The JAR file is installed as part of the spoke in your ServiceNow instance.
- Copy and record the client value of the target host where the SAP S4 HANA RFC server is installed.
- Configure the values of these system properties:

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- *com.snc.process_flow.reporting.serialized.val_size_limit*: This property serializes JSON objects and ensures that the data is in the required format. Specify the number of bytes as per your requirement. For more information, see Workflow Studio system\n properties.
- *glide.rest.max_content_length*: This property specifies the payload size. Specify the maximum payload size you want to use in your flows. The maximum value you can specify for this property is, 25 MB.

- If you are using this spoke along with the SAP ECC IDoc, SAP S4 HANA IDoc, SAP ECC RFC spokes, during spoke upgrades, ensure that you upgrade all the spokes to their latest versions.

Note: To retrieve information for authorization purposes, use the Execute RFC spoke action.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The SAP S/4 HANA RFC spoke provides sample flows to demonstrate automating the SAP S4 HANA RFC tasks. To customize a sample flow, copy it to the required application scope. Available sample flows include:

Flow	Description
Retrieve Incoming Invoice	Retrieves the invoice data periodically. This data is displayed in the SAP S/4HANA Invoice Data module.
Retrieve Users by Role	Retrieves details of the users, based on the provided user role. This data is displayed in the SAP S/4HANA Users Records module.

Spoke actions

The SAP S/4 HANA RFC spoke provides actions to automate SAP S4 HANA RFC tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Items	Look up Material Groups	Retrieves details of the material groups.
	Look up Materials by Plant	Retrieves details of the materials (items) based on plant selection criteria.
	Look up Materials by Storage Locations	Retrieves details of the materials (items) based on storage location selection criteria.

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Category	Action	Description
Journals	Post Journal Entry	Posts a journal entry to a GL Account in SAP S4 HANA RFC.
	Reverse Journal Entry	Reverses a journal entry in a GL Account in SAP S4 HANA RFC.
Lookups	Look up Cost Centers by Controlling Area	Retrieves details of the cost centers based on the controlling area.
Metadata Retrieval	Get RFC Input Schema	Dynamically retrieves the input schema for the RFC.
	Get RFC Output Schema	Dynamically retrieves the output schema for the RFC.
	Look up RFC Table Field Input Metadata	Dynamically retrieves the input schema from SAP S4 HANA RFC for the selected field in the RFC tables.
	Look up RFC Table Field Output Metadata	Dynamically retrieves the output schema from SAP S4 HANA RFC for the selected field in the RFC tables.
	Look up RFC Tables Input Metadata	Dynamically retrieves the tables input schema for the RFC from SAP S4 HANA RFC.
Procurement	Authorize Payment	Creates an authorize payment document in SAP S/4 HANA - RFC.
	Create Fixed Asset	Creates a fixed asset in SAP S4 HANA RFC.
	Create Goods Receipt	Creates a goods receipt document in SAP S4 HANA RFC.
	Create Invoice	Creates an invoice document in SAP S4 HANA RFC.
	Cancel Invoice	Cancels an invoice document in SAP S/4HANA RFC.
	Cancel Goods Receipt	Cancels a goods receipt document in SAP S/4HANA - RFC.
	Create Non Purchase Order Invoice	Creates a non purchase order invoice document in SAP S4 HANA – RFC.
	Create Purchase Order	Creates a purchase order in SAP S4 HANA RFC.
	Create Service Goods Receipt	Creates a service goods receipt document in SAP S/4HANA - RFC.
	Create Vendor	Creates a vendor in SAP S/4HANA - RFC.
	Look up Asset Category	Retrieves details about the specified asset from SAP S/4HANA - RFC.
	Look up Invoices	Retrieves details of the invoices from SAP S/4 HANA - RFC.
	Look up Purchase Order Attachments	Retrieves details of the Purchase Order attachment from SAP S/4HANA RFC.
	Look up Invoices by Date	Retrieves details of the invoices based on entry date.
	Look up Purchase Orders and Purchase Order Lines	Retrieves details of the Purchase Orders and Purchase Order Lines from SAP S/4 HANA - RFC.
	Look up Receipts	Retrieves details of the receipts from SAP S/4HANA RFC.

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Category	Action	Description
	Look up Vendors	Retrieves vendors details from SAP S/4HANA - RFC.
	Look up Advance Shipment Notices	Retrieves Advance Shipment Notices in SAP S/4HANA - RFC.
	Look up Payment Status for Invoice	Retrieves the payment status for invoice from SAP S/4HANA - RFC.
	Update Purchase Order	Updates details of the specified purchase order.
	Update Vendor	Updates details of a vendor in SAP S/4HANA - RFC.
Records Management	Execute RFC	Executes an RFC from the available list for create, update, or read operation.
	Execute RFC For Look up Operations	Executes an RFC from the available list.
Transfer Order	Create Transfer Order and Line Items	Creates a transfer order in SAP S/4HANA - RFC.
	Look up Transfer Order and Line Items	Retrieves transfer orders from SAP S/4HANA - RFC.
Utility	Create Table Field Metadata	Envelops user inputs for the selected table field of the given BAPI in an object.
Finance Management	Create Asset	Create an asset in SAP S4 HANA - RFC with the provided details.
Sales Order	Create Sales Order	Creates a sales order in SAP S/4HANA - RFC.
	Look up Sales Order	Retrieves sales order details from SAP S/4HANA - RFC.
	Look up Sales Orders	Retrieves sales orders based on given customer number from SAP S/4HANA - RFC.
	Update Sales Order	Updates details of the given sales order in SAP S/4HANA - RFC.
Bills and Payments	Look up Bill Details By ID	Retrieves bill details for the given document ID from SAP S/4HANA - RFC.
	Look up Outstanding Balance	Retrieves outstanding balance of a customer from SAP S/4HANA - RFC.
	Look up Payments	Retrieves pending payments of the customer from SAP S/4HANA - RFC.
Customer Management	Look up Customer Information	Retrieves customer information for the given company code and customer number from SAP S/4HANA - RFC.
Inventory (or) Sales	Look up Inventory of Parts	Retrieves inventory for the given plant and material from SAP S/4HANA-RFC.

Spoke module

The SAP S/4 HANA RFC spoke adds the SAP S4 HANA RFC Spoke application to your instance and includes these modules:

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Module	Description
SAP S/4 HANA - RFCs	Displays the list RFCs. Some RFCs are provided along with spoke. You can create additional RFCs as per your requirement. The Execute RFC action uses these records as an input.
SAP S/4 HANA Flow Executions	Displays the dates on which the Retrieve Incoming Invoice flow is executed. After you set up the SAP S4 HANA RFC spoke, create a record to specify the date up to which you want to retrieve the invoice data. For more information, see Set up the SAP S4 HANA RFC spoke.
SAP S/4 HANA Invoice Data	Displays details of the invoice data. Customize and execute the default flow, Retrieve Incoming Invoice to retrieve the invoice data.
SAP S/4 HANA Users Records	Displays details of the users, based on their user role. Customize and execute the default flow, Retrieve Users by Role to retrieve the user information.

Spoke user roles

The SAP S4 HANA RFC provides the sn_sap_s4_hana_rfc.SAP_S4_HANA_RFC_Spoke_Admin user role to control access to data. Users with the sn_sap_s4_hana_rfc.SAP_S4_HANA_RFC_Spoke_Admin role have access to the spoke tables.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

MID Server requirements

These actions use Remote Function Call (RFC) protocol (SAP Proprietary protocol – SAP Standard Interface), which can run on an instance or MID Server. Use the connection record associated with SAP S4 HANA RFC spoke alias to configure where actions run as well as set MID Server selection attributes. For more information about running actions on the MID Server, see Integration steps

Note:

- If the MID Server is installed on a Linux machine, perform the configurations as outlined in Set up the SAP S4 HANA RFC spoke.
- If the MID Server is installed on a Windows machine, no configurations are needed.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the SAP S4 HANA RFC spoke

Integrate the ServiceNow instance and SAP S4 HANA RFC spoke by using the Basic Auth credentials to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the SAP S4 HANA RFC spoke.
- Role required: admin.

Note: To retrieve information for authorization purposes, use the Execute RFC spoke action.

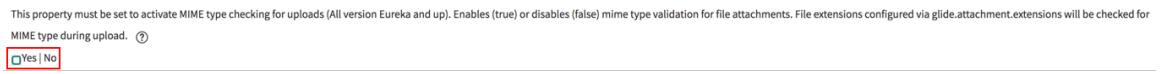
Procedure

1. Configure MID Server using the SAP proprietary JAR files.

   a. **Optional:** Navigate to **System Properties** > **Security**.

   Note: This is applicable only if your MID Server is installed on a Linux machine

   b. **Optional:** Disable the MIME type validation for file attachments.

   Note: This is applicable only if your MID Server is installed on a Linux machine.

   c. Navigate to **MID Server** > **JAR Files**.

   d. Upload the required SAP proprietary files (JAR, SO, or DLL) obtained after contacting your SAP S4 HANA RFC admin.
   For more information, see Synchronize a JAR file to MID Servers.

   Note: Ensure that the files are synchronized in the `<MID-Server-root-directory>/agent/extlib` directory. If the files aren't synchronized, restart the MID Server.

2. Create a credential record for the SAP S4 HANA RFC account.

   a. Navigate to **Connections & Credentials** > **Credentials**.

   b. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`

   c. Select **Basic Auth Credentials**.

   d. On the form, fill these values.

Basic Auth Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `SAP S4 HANA RFC Cred`.
User name	User name to log in to your SAP S4 HANA RFC account.

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Field	Description
Password	Password to authenticate and log in to your SAP S4 HANA RFC account.
Active	Option to actively use the credential record.
Order	Order to apply this credential. For example, `100`.
Credential alias	Credential alias associated with the spoke.

e. Click **Submit**.

3. Create a connection record for your SAP S4 HANA RFC account.

a. Navigate to **Connections & Credentials** > **Connections & Credentials Aliases**.

b. Open the alias record for SAP S4 HANA RFC.

c. From the **Connections** tab, click **New**.

d. On the form, fill in the fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `SAP S4 HANA RFC Connection`.
Credential	Credential record created for SAP S/4 HANA IDoc spoke. For example, `SAP S4 HANA RFC Cred`.
Connection alias	Alias record associated with this connection.
Host	Fully qualified domain name of the target host where the SAP S4 HANA RFC server is installed.
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use a MID Server for this connection. Select the check box and define the fields in the **Advanced MID Server Configuration** tab.

e. In the **Advanced MID Server Configuration** tab, provide these details.

Field	Description
MID Selection	Option to select MID Server as required. This field is available when **Define Connection Inline** is selected from the Source Connection list.
MID Application	Option to use a MID Server to run the SFTP step. This field is available when **Define Connection Inline** is selected from the

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Field	Description
	Source Connection list and **Auto-Select MID Server** is selected from the MID Selection list. To learn more about how a MID Server is selected during runtime, see MID Server selection.
Capabilities	Capability of the MID Server. Select **SSH**. This field is available when **Define Connection Inline** is selected from the Source Connection list and **Auto-Select MID Server** is selected from the MID Selection list. Required capabilities determine which MID Server is selected at runtime. To learn more about how a MID Server is selected during runtime, see MID Server selection.
MID Server	Data pill of the required MID Server. This field is available when **Define Connection Inline** is selected from the Source Connection list and **Specific MID Server** is selected from the MID Selection list.

f. In the **Attributes** tab, provide these details.

Field	Description
u_client	Client value of the target host where the SAP S4 HANA RFC server is installed.
u_system_number	System number of the target host where the SAP S4 HANA RFC server is installed.
u_lang	Language selected in the target host where the SAP S4 HANA RFC server is installed.

g. Click **Submit**.

4. Create a record in the SAP S/4HANA Flow Executions module to specify date up to which you want to retrieve the invoice data.

a. Navigate to **SAP S/4HANA - RFC Spoke** > **SAP S/4HANA Flow Executions**.

b. Click **New**.

c. In **Last Successful Execution**, specify the date up to which you want to retrieve the invoice data.

d. Click **Submit**.
The Retrieve Incoming Invoice flow takes this date as an input and retrieves the invoice data. Depending on the configured flow trigger, the Retrieve Incoming Invoice flow periodically retrieves the invoice data. To view the invoice data, navigate to **SAP S/4HANA - RFC Spoke** > **SAP S/4HANA Invoice Data**.

Result
The spoke is configured and the actions can be used.

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Note: If you want to use multiple connections, ensure that you create them as child alias records under the default connection alias record. Also, you must ensure that all the connection records are active.

SCCM Usage Metering Spoke

Manage the process of fetching software usage data from a Microsoft System Center Configuration Management (SCCM) Usage Metering server. Get data about software usage metering and when the software was last used using this spoke.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SCCM Usage Metering spoke v1.0.2 is the latest version. For version history of the spoke, see SCCM Usage Metering spoke release notes.

Supported versions

This spoke was built for Microsoft SCCM version 1602, but may be compatible with later versions.

Spoke Requirements

- Microsoft System Center Configuration Management Usage Metering Server version 2012 R2 with software metering enabled. For more information about software metering, see Software metering in Configuration Manager

  Note: Ensure that metering rules are configured in SCCM for the required software.

- Microsoft SQL Server 2014

Spoke flows and subflows

This spoke has no flows and subflows.

Spoke actions

The SCCM Usage Metering spoke provides actions to retrieve software usage data from a Microsoft System Center Configuration Management Usage Metering server. Available actions include:

Spoke actions

Action	Description
Get Software Last Used Data	Retrieves the last usage data of the required software from the Microsoft SCCM server.

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Spoke actions (continued)

Action	Description
Get Software Usage Data	Retrieves usage metering of the required software from the Microsoft SCCM server.

Note:

The spoke actions support a maximum payload of 10 MB from the SCCM server for the JDBC step.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the SCCM Usage Metering spoke.

MID Server requirements

These actions use REST calls, which can run on an instance or MID Server. Use the connection record that is associated with the Microsoft SCCM Usage Metering alias to configure where actions run as well as to set MID Server selection attributes. For more information, see MID server.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the SCCM Usage Metering spoke

Integrate the ServiceNow instance and SCCM using Java Database Connectivity (JDBC) credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SCCM Usage Metering spoke.
- Role required: admin.

Create Connection records for the SCCM Usage Metering spoke

Create Connection records to the SCCM server. The SCCM Usage Metering spoke connection and credential aliases use these connections to perform actions in SCCM.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Credentials & Connections** > **Connections**.
2. Click **New** and select **JDBC Connection**.
3. On the form, fill in the fields.
   The database selection in the **Format** field determines which fields are available.

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Field	Description
Name	Unique name of the JDBC connection. For example, `JDBC MySQLProd`.
Credential	Credential for the JDBC provider. Enter the user name and password of the database.
Connection alias	Alias record associated with the connection.
Query timeout	Maximum elapsed time the JDBC query allowed to run without a response.
Connection timeout	Maximum elapsed time for the JDBC activity to wait while attempting to connect to the target database.
Active	Option to make the connection active.
Domain	Domain for the table. By default, the JDBC Connection [jdbc_connection] table runs in the global domain.
Format	Database type for the connection. The choices are: ○ **MySQL** ○ **Oracle** ○ **SQLServer** ○ **None**
Host	Host name or IP address of the database server.
Oracle port	Port that the Oracle database is using. The default value is **1521**. **Note:** This field is available when **Oracle** is selected from the Format list.
Oracle sid	Oracle database site identifier. The default value is **orcl**. **Note:** This field is available when **Oracle** is selected from the Format list.
Database name	Name of the database. **Note:** This field is available when **MySQL** or **SQLServer** is selected from the Format list.
Override default port	Port that the selected database is using. **Note:** This field is available when **MySQL** or **SQLServer** is selected from the Format list.
Instance name	Instance name for the selected SQLServer. **Note:** This field is available when **SQLServer** is selected from the Format list.

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Field	Description
Connection URL	URL that MID Server uses to connect to the specified database. The URL is created automatically when you save the form, and is read-only for the default databases. For example, jdbc:<database>://<hostname>;selectMethods=cursor;databaseName=<database_name>. **Note:** If the format selected is not one of the default databases, you must create the connection URL manually. So that the MID Server can create the connection.
Use MID server	Option to use a MID Server for the action. If selected, define fields in the **Advanced MID Server Configuration** section.
Capabilities	Capabilities that the MID Server must support to be eligible for selection. Only displays if **Use MID server** is selected. To learn more about how a MID Server is selected during runtime, see MID Server selection.
MID Application	Application that the MID Server must support to be eligible for selection. Only displays if **Use MID server** is selected. To learn more about how a MID Server is selected during runtime, see MID Server selection.

Create Credential records for the SCCM Usage Metering spoke

Create Credential records to the SCCM server. The SCCM Usage Metering spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
3. Select **JDBC Credentials**.
4. On the form, fill these values.

Field	Description
Name	Name to uniquely identify the credential.
Active	Option to use the credentials.
Applies to	Option to verify if the credentials apply to **All MID servers** in your network, or to one or more **Specific MID servers**. Specify the MID Servers that should use these credentials in the **MID servers** field.
Order	Order to apply this credential. For example, enter 100.
User name	User name to access the database.

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Field	Description
Password	Password to access the database.
Credential alias	Credential alias associated with the spoke.

5. Click **Submit**.

Secureworks CTP Spoke

Integrate ServiceNow instance with Secureworks Counter Threat Platform (CTP). Manage events and tickets in Secureworks Counter Threat Platform from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Secureworks CTP spoke v1.0.3 is the latest version. For version history of the spoke, see Secureworks CTP spoke release notes.

Supported versions

This spoke was built for Secureworks CTP V4, but may be compatible with later versions.

Spoke requirements

Secureworks portal account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Secureworks CTP spoke provides actions to automate Secureworks CTP tasks when events occurs in your ServiceNow instance. Available actions include:

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Category	Action	Description
Event Management	Get Event Details	Retrieves the details of a specific event.
	Get Recent Events	Retrieves details of a list of recent events.
Ticket Management	Assign Ticket To Secureworks SOC	Assigns a ticket to the Secureworks Security Operations Centers (SOC) Team.
	Close Secureworks Ticket	Closes the specified Secureworks ticket.
	Get Ticket Details	Retrieves the details of the specified Secureworks ticket.
	Look up Tickets	Retrieves a list of tickets from Secureworks.
	Post Worklog to Secureworks Ticket	Adds a worklog to the Secureworks ticket.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Secureworks CTP spoke.

Set up the Secureworks CTP spoke

Integrate the ServiceNow instance and Secureworks CTP by registering a custom application in Secureworks Portal to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Secureworks CTP spoke.
- Create an API password from the Account Management section of your Secureworks CTP account.
- Role required: admin.

Create a credential record for the Secureworks CTP spoke

Create a credential record for the Secureworks CTP account. The Secureworks CTP spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`

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3. Select **API Key Credentials**.
4. On the form, fill these fields.

API Key Credentials

Field	Description
Name	Name to uniquely identify the record. For example, enter `Secureworks Cred`
Active	Option to actively use the credential record.
API Key	API key generated in your Secureworks account. Enter the API key in this format: `APIKEY username:password`
Applies to	MID Servers that can use this credential.
Order	Sequence in which the credential is applied.
Credential alias	Alias to use the credential. Click the padlock icon and enter `sn_sw_ctp_spoke.Secureworks`

5. Right-click the form header and click **Submit**.

Create a connection record for the Secureworks CTP spoke

Create a connection record for your Secureworks account. The Secureworks CTP spoke connection and credential aliases use these connections to perform API actions in Secureworks portal.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for **Secureworks**.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Secureworks Connection`.
Credential	Credential record created for Secureworks CTP spoke. Enter the credential you created. For example`Secureworks Cred`.
Connection alias	Alias record associated with this connection. The default alias is `sn_sw_ctp_spoke.Secureworks`.
Connection URL	Base URL to connect to **Secureworks**. Enter: `https://api.secureworks.com`
Active	Option to actively use the connection record.

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Field	Description
Domain	Domain that the action runs in.

5. Click **Submit**.

ServiceNow Remote Instance Spoke

Integrate your local and remote ServiceNow instances to export, import, and manage records from your local instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription on the local instance where it will be installed. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

ServiceNow Remote Instance spoke v2.3.2 is the latest version. For version history of the spoke, see ServiceNow Remote Instance spoke release notes.

Supported versions

This spoke was built for the Orlando version and later.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke requirements

Ensure that the spoke users have only the required minimum permissions to access data in ServiceNow tables. Do not assign elevated privilege roles to users of this spoke unless very much required. This practice ensures controlled access to data.

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Note: The terms remote instance and local instance are used in these contexts:

- Local instance: This is the ServiceNow instance from which the communication is initiated and established.
- Remote instance: This is the ServiceNow instance with which the local instance communicates.

Spoke actions

The ServiceNow Remote Instance spoke provides actions to export, import, and manage records when events occurs in your local ServiceNow instance. Available actions include:

Category	Action	Description
Change request Management	Export Change Request Record	Exports a change request record to a remote instance from the local instance.
	Import Change Request Record	Imports a record from the Change Request table of the remote instance to the local instance.
Incident Management	Export Incident Record	Exports an Incident record to a remote instance from the local instance.
	Import Incident Record	Imports a record from Incident table of the remote instance to the local instance.
Problem Management	Export Problem Record	Exports a Problem record to a remote instance from the local instance.
	Import Problem Record	Imports a record from Problem table of the remote instance to the local instance.
Table Management	Look Up Fields By Remote Table	Retrieves all the fields from the given remote table.
	Look Up Local Import Set Tables	Retrieves information about the given local import set table.
	Look Up Remote Import Set Tables	Retrieves information about the given remote import table.
	Look Up Remote Tables	Retrieves information about the given remote table.
Attachment Management	Copy Attachment From Remote Instance	Copies the required attachment from the remote instance. **Note:** You must select the required attachment using data pills only.
	Copy Attachment To Remote Instance	Copies the required attachment to the remote instance. **Note:** You must select the required attachment using data pills only.
	Look Up Local Attachments Names	Retrieves name of the required attachment.
Case Management	Export Case as Incident	Exports a case record as an incident record to a remote instance from the local instance.

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Category	Action	Description
	Export Case Record	Exports a case record to the remote instance from the local instance.
	Export Case Task Record	Exports a Case Task record to the remote instance from the local instance.
	Export Incident as Case	Exports an incident record as a case record to the remote instance from the local instance.
	Import Case as Incident	Imports a record from the case table of the remote instance as an incident record to the local instance.
	Import Case Record	Imports a record from the Case table of the remote instance to the local instance.
	Import Case Task Record	Imports a record from the Task table of the remote instance to the local instance.
	Import Incident as Case	Imports a record from the Incident table of the remote instance as a case record to the local instance.
Record Management	Create or Update Remote Record	Creates a record or updates an existing record in the remote instance.
	Create or Update Remote Record Using Import Set	Creates a record in the remote import set.
	Create Remote Record	Creates record in remote instance.
	Delete Remote Record	Deletes record in remote instance.
	Export Record Using Import Set	Exports a record from the selected local table to a remote instance.
	Get Remote Record	Retrieves the required record information from the remote instance.
	Import Record Using Import Set	Imports a record from table in the remote instance to the local instance.
	Look Up Remote Record	Retrieves the required record from the remote Instance.
	Look Up Remote Records	Retrieves multiple records from the remote instance table.
	Update Remote Record	Updates the required record in the remote instance.

Note: The **Company** field is required to import or export records using the default transform maps. However, users can modify the transform maps as per their requirement. Also, use the import sets when working with integration involving data transfer.

Spoke user role

The ServiceNow Remote Instance spoke provides the Remote Instance Admin (sn_now_remote_spk.Remote Instance Admin) role that provides administrative rights for all tables that are avaiable with the ServiceNow Remote Instance spoke.

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Spoke transform maps

The ServiceNow Remote Instance spoke provides sample transform maps in active state and associated sample target tables to demonstrate using transform maps to save the remote ServiceNow instance data in your local ServiceNow tables. You can use these sample transform maps and target tables as reference to create transform maps as per your requirement.

For more information, see Transform maps.

Note:

- By default, the sample transform maps uses **sys_id** as the coalesce field. You can customise the transform map script as per your requirement to change the coalesce field.
- By default, the export and import actions use the spoke tables. You can change this to use different import sets.
- The time zones may be different in your ServiceNow instances. Ensure that you customise flows accordingly.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Two connection and credential aliases are required for this spoke; one for the local instance and other for the remote instance. For information about setting up the spoke, see Set up the ServiceNow Remote Instance spoke.

Set up the ServiceNow Remote Instance spoke

Integrate the local and remote ServiceNow instances by creating an OAuth API endpoint in the remote ServiceNow instance to authenticate requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the ServiceNow Remote Instance spoke in remote and local ServiceNow instances.

Note: The terms remote instance and local instance are used in these contexts:

- Local instance: This is the ServiceNow instance from which the communication is initiated and established.
- Remote instance: This is the ServiceNow instance with which the local instance communicates.

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- Role required: admin.

Note: Admin role is required to only set up the spoke.

To use the spoke, you can either have the admin role or have only the required minimum permissions to access data in the required ServiceNow tables along with the import_transformer role. Do not assign elevated privilege roles to users of this spoke unless needed. This practice ensures controlled access to data.

The integration users must have the flow_operator and other required roles to access the table they want to interact with. Also, they need roles to access the Table [sys_db_object] and Dictionary Entry [sys_dictionary] tables to show dynamic options such as, table names and fields in a table.

Register remote ServiceNow instance as an OAuth provider

Register remote ServiceNow instance as an OAuth provider so that the local ServiceNow instance can request OAuth 2.0 tokens.

Before you begin

- In the remote ServiceNow instance:
  - Create an OAuth API endpoint for external clients. In **Redirect URL**, specify the URL of the local ServiceNow instance in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`. For more information, see Create an endpoint for clients to access the instance.
  - Copy and record the values of Client ID and Client Secret.
- Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Open for the record, **RemoteSpoke**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Client ID created in the remote ServiceNow instance.
Client Secret	Client Secret created in the remote ServiceNow instance.
Authorization URL	URL of the remote ServiceNow instance in this format: `https://<instance-name>.service-now.com/oauth_auth.do`.
Token URL	URL of the remote ServiceNow instance in this format: `https://<instance-name>.service-now.com/oauth_token.do`.
Redirect URL	URL of the local ServiceNow instance in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`.
Default Grant Type	Grant type used to establish the token. Select **Authorization Code**.
Refresh Token Lifespan	Time, in seconds, that the refresh token is valid. The default time is 8,640,0000 seconds.

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Field	Description
PKCE required	Option to enable public clients to require PKCE for an authorization. **Note:** You can use only **Authorization Code** as the **Default Grant type** when **PKCE** is enabled.
Application	Application scope that contains this record.
Accessible from	Application scope that this registry is accessible from.
Active	Option to actively use the application registry.

4. Right-click the form header, and click **Save**.

Create Credential record for the remote ServiceNow instance

Create credential record for the remote ServiceNow instance. The ServiceNow Remote Instance spoke connection and credential alias uses these credentials to authorize actions.

Before you begin
Role required: admin.

Note: You must perform this task in a local ServiceNow instance.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
3. Select **OAuth 2.0 Credentials**.
4. On the form, fill in the fields.

Field	Value required
Name	Name to uniquely identify the record. For example, `Remote Credentials`.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile created during the registration of the remote ServiceNow instance as an OAuth provider. For example, select **RemoteSpoke default_profile**.
Order	Order that the credentials are used. For example, enter `100`.

5. Right-click the form header and click **Submit**.
6. To generate the OAuth token, click the **Get OAuth Token** related link.

Create Connection record for the remote ServiceNow instance

Create Connection record for your remote ServiceNow instance. The ServiceNow Remote Instance spoke connection and credential aliases use these connections to perform actions.

Before you begin
Role required: admin.

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Note: You must perform this task in a local ServiceNow instance.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record, **ServiceNowRemoteInstance**.
3. From the **Connections** tab, click **New**.
4. On the form, fill in the fields.

HTTP(s) Connection form

Field	Value required
Name	Name to uniquely identify the record. For example, `Remote Connection`.
Credential	Credential record created for remote ServiceNow instance. For example, **Remote Credentials**.
Connection alias	Alias record associated with this connection.
URL builder	**Note:** Do not select the check box.
Connection URL	URL of the remote ServiceNow instance. For example, `https://<remote-instance-name>.service-now.com/`.
Active	Option to actively use the connection.
Domain	Domain that the action or activity runs in.

5. Click **Submit**.

Create Credential record for the local ServiceNow instance

Create credential record for the local ServiceNow instance. The ServiceNow Remote Instance spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Note: You must perform this task in a local ServiceNow instance.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
3. Select **Basic Auth Credentials**.
4. On the form, fill in the fields.

Field	Value required
Name	Name to uniquely identify the record. For example, `Local Credentials`.

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Field	Value required
Username	Username to log in to the local ServiceNow instance.
Password	Password to log in to the local ServiceNow instance.
Active	Option to actively use the credential record.

5. Right-click the form header and click **Submit**.

Create Connection record for the local ServiceNow instance

Create Connection record for your local ServiceNow instance. The ServiceNow Remote Instance spoke connection and credential aliases use these connections to perform actions.

Before you begin

Role required: admin.

Note: You must perform this task in a local ServiceNow instance.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record, **ServiceNowRemoteInstanceLocalAlias**.
3. From the **Connections** tab, click **New**.
4. On the form, fill in the fields.

HTTP(s) Connection form

Field	Value required
Name	Name to uniquely identify the record. For example, `Local Connection`.
Credential	Credential record created for local ServiceNow instance. For example, **Local Credentials**.
Connection alias	Alias record associated with this connection.
Connection URL	URL of the local ServiceNow instance. For example, `https://<local-instance-name>.service-now.com/`.
Active	Option to actively use the connection.
Domain	Domain that the action or activity runs in.

5. Click **Submit**.

ServiceNow University Spoke

Manage the courses on the ServiceNow University platform from your ServiceNow instance. For example, get the details of all the courses on ServiceNow University by executing a spoke action from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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ServiceNow University spoke subscription

The ServiceNow University spoke is available with the ITSM Enterprise license. You can integrate Coaching with Learning with ServiceNow University. For more information, see External Content Integration Sources.

Spoke version

ServiceNow University Spoke v1.1.1 is the latest version. For version history of the spoke, see ServiceNow University Spoke release notes.

Spoke actions

The ServiceNow University spoke provides actions to automate ServiceNow University tasks when events occurs in your ServiceNow instance. Available actions include:

Action	Description
Look up Courses Stream	Provides course details.
Look up User Courses Activity Stream	Provides course activity for all users for a specific time period.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up the ServiceNow University spoke

Connect ServiceNow University with Coaching with Learning to pull courses from ServiceNow University into your ServiceNow instance.

Before you begin

- Request an Integration Hub subscription.
- Activate the ServiceNow University spoke.
- Role required: admin.

- Integrate Coaching with Learning with ServiceNow University. For more information, see External Content Integration Sources.
- Contact nowlearningapi@servicenow.com to get your spoke credentials.

  Note: You must have an ITSM Enterprise license subscription to get your spoke credentials.

- For more information on OAuth Credentials, see OAuth 2.0 credentials.

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Note: If you are using an earlier version of the ServiceNow University spoke and want to upgrade to ServiceNow University spoke v1.1.1, you must delete the existing connection and credential records.

To delete the existing connection and credential record:

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Search and open the default connection and credential record for the ServiceNow University spoke. For example, **ServiceNow University**.
3. Under the **Connections** tab, open the default HTTP(s) Connection record. For example, **ServiceNow University Connection**.
4. Click **Delete**. System prompts you confirm delete action.
5. Click **Delete**.
6. Navigate to **All** > **Connections & Credentials** > **Credentials**.
7. Search and open the default credential record for the Ansible spoke. For example, **ServiceNow University Credential**.
8. Click **Delete**. System prompts you confirm delete action.
9. Click **Delete**.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Now Learning** and click **View Details**.

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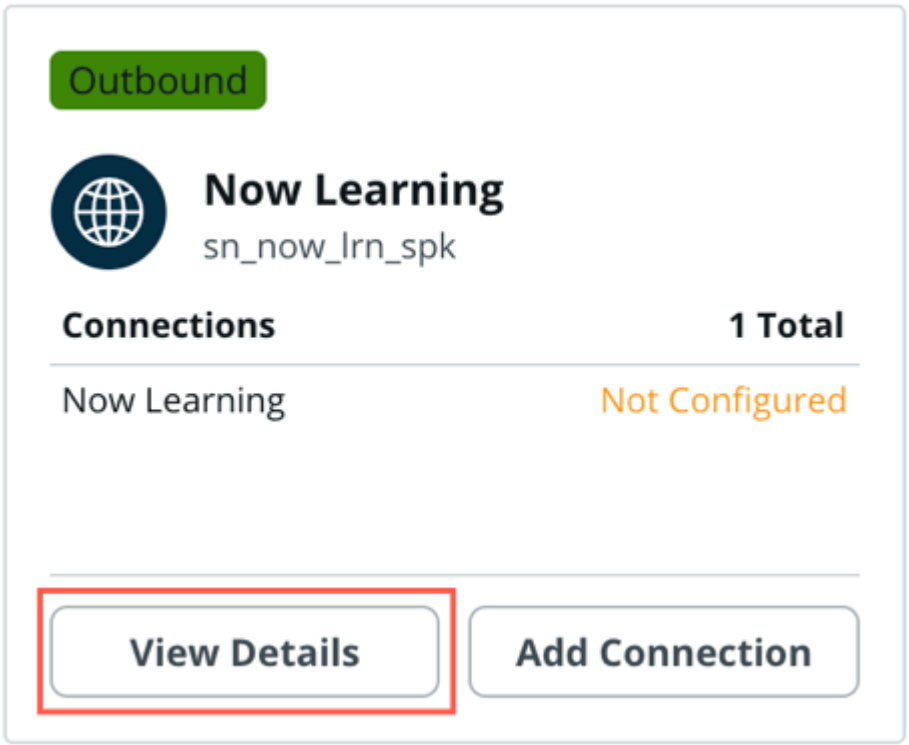
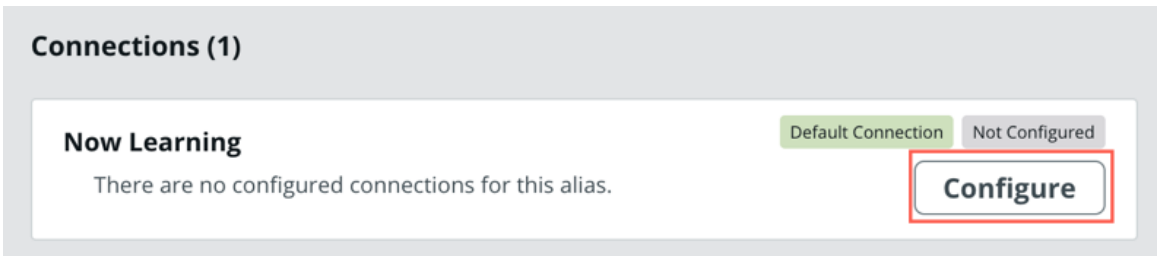
- To configure the default connection and credential alias record that is shipped along with the ServiceNow University spoke, click **View Details**.



- To manage more than one ServiceNow University spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the form, fill in these fields:

Field	Description
Connection Information	
Connection Name	A unique name for the connection; for example, Now Learning.
Connection URL	The ServiceNow server to retrieve the API information. **Default value**: https://api.servicenow.com.

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Field	Description
Ocp-Apim-Subscription-Key	Encryption key for the ServiceNow University subscription. Contact nowlearningapi@servicenow.com to get your encryption key.
Credential Information	
Credential Name	A unique name for the credential; for example, ServiceNow University Credential.
Application Registry Name	A unique name for the application registry; for example, ServiceNow University OAuth.
Token URL	OAuth server token endpoint in this format: `https://servicenowsignon.okta.com/oauth2/<id>/v1/token`. Replace `<id>` with the value of `authorizationServerId`.
Client Id	The Client ID of the application registered in the third-party OAuth server. Contact nowlearningapi@servicenow.com to get your Client ID.
Client Secret	The Client Secret of the application registered in the third-party OAuth server. Contact nowlearningapi@servicenow.com to get your client secret.

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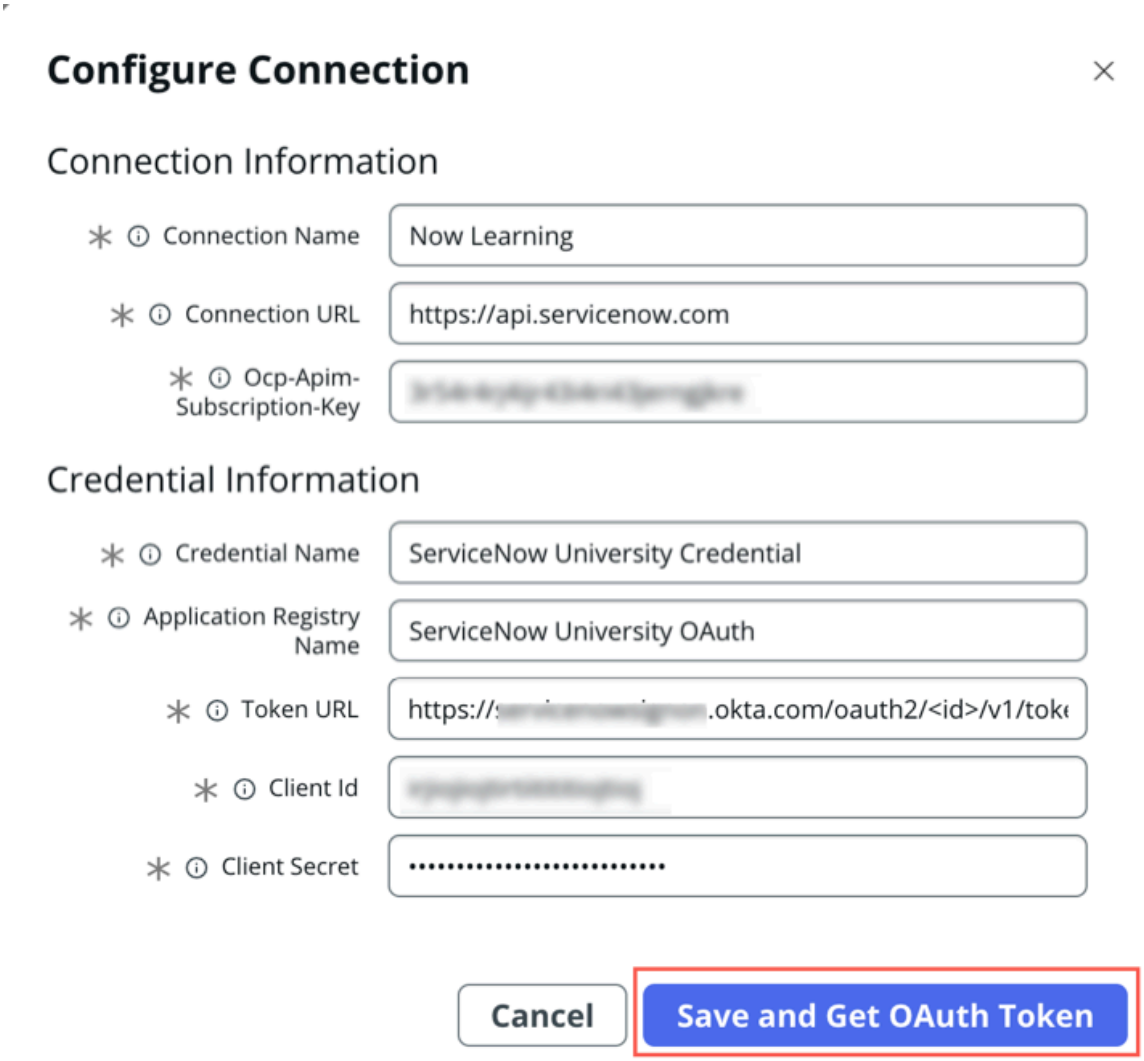

6. Click **Save and Get OAuth Token**.

Configure the ServiceNow University action flow in Workflow Studio

Integrate the ServiceNow instance and ServiceNow University by using the Oauth credentials to authenticate ServiceNow requests.

Before you begin

- Have ITSM Enterprise license subscription.
- Integrate Coaching with Learning with ServiceNow University. For more information, see External Content Integration Sources.
- Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select the **Actions** tab.
3. Get the course details from ServiceNow ServiceNow University.

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a. Select **Look up Courses Stream**.

b. In the **Inputs** action outline, select **Test** and specify the input value for the following fields:

Field	Description
Type	Type of course; for example, a path.
Updated	Fetches courses updates from the specified date.
Created	Fetches courses created from the specified date.
Order	The order in which the course must be displayed.
Page Size	The number of courses per page.
Offset	Fetches the item from the specified offset. For example, if the offset is 10, the application fetches it from the 10th item.

c. Select **Run Test**.

The **Outputs** action outline displays the following course details:

Field	Description
Number	Course identification number.
Name	Name of the content.
Short description	Short description for the content.
Description	Content description.
Type	Course type; for example, whether the course is a path or collection.
State	The status of each course; for example, whether it is in draft or published state.
Portal link	URL to access the course.

4. Configure the course activity for all users for a specific time period.

Note: The default time period for course activities is 30 days.

a. Select **Look up User Course Activity Stream**.

b. In the **Inputs** tab, specify the data type for the following fields:

Field	Description
States	The status of each course; for example, whether it is in draft or published state.

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Field	Description
User Emails	Email of the users associated with the course activity.
Enrolled	Date the user enrolled in the course.
Completed	Fetches courses that were completed after the specified date.
Updated	Fetches courses updates from the specified date.
Order	The order in which the course must be displayed.
Page Size	The number of pages to fetch.
Offset	Fetches the item from the specified offset. For example, if the offset is 10, the application fetches it from the 10th item.

c. Select **Run Test**.

In the **Outputs** tab, specify the output value for the following fields:

Field	Description
User Email	User emails associated with the course activity.
Content Name	Name of the content.
Content Number	The content identification number.
Percent Complete	Course percentage completion.
State	Course status.
Completion Date	The date when the course was completed.
Enrollment Date	The date when the user enrolled in the course.

Related topics

Building actions

Shodan Spoke

Manage exploits, alerts, hosts, and others, in Shodan account from your ServiceNow® instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Shodan spoke v1.1.0 is the latest version. For version history of the spoke, see Shodan Spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Shodan spoke provides actions to automate Shodan tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Exploit Management	Exploit Search	Searches for exploits from vulnerability data sources.
	Get Exploit Count	Retrieves the number of exploits for a specific query.
Network Alert Management	Get Alert Details	Retrieves details of the specific network alert.
	Look up Alerts	Retrieves the list of network alerts.
Search Management	Get Host Details	Retrieves details of all services that are associated with specified host IP.
	Get Host Count	Retrieves the total number of hosts that match the provided query and requested facet information.
	Search Shodan	Retrieves details from a Shodan search.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Two connection and credential alias records are available along with the Shodan spoke.

For information about setting up the spoke, see Set up the Shodan spoke.

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Set up the Shodan spoke

Integrate the Shodan account and your ServiceNow® instance using the API keys.

Before you begin

- Request an Integration Hub subscription.
- Activate the Shodan spoke.
- API key of your Shodan account.
- Role required: admin.

Configure a connection for Shodan spoke

Add and configure Shodan connections to authenticate ServiceNow® requests to the Shodan server.

About this task

You must configure two connections: Shodan and Shodan Exploit.

Before you begin

- Role required: admin
- Log in to your Shodan account and get the API Key.

Procedure

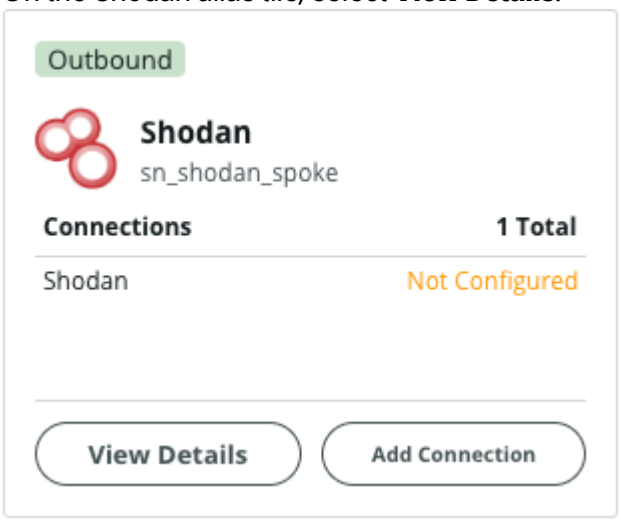
1. Configure the Shodan connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Select the **Integrations** tab.

c. In the Search all connections field, enter `Shodan`.
The **Outbound** tab is active by default. If it's not active, toggle it to activate.

d. On the Shodan alias tile, select **View Details**.



e. Select **Configure**.

f. Fill the form.

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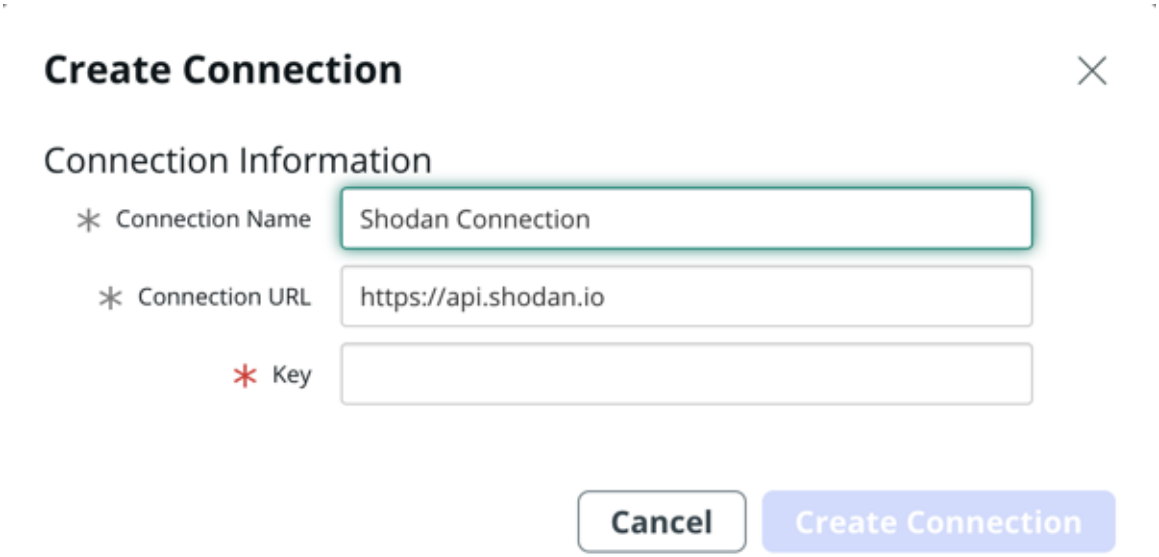
Shodan alias connection form

Field	Description
Connection Name	Name to identify the connection. The default value is Shodan.
Connection URL	URL to connect to Shodan. The default value is `https://api.shodan.io`
Key	API key from your Shodan account.



g. Select **Create Connection**.

2. Configure the Shodan Exploit connection.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Select the **Integrations** tab.

c. In the Search all connections field, enter `Shodan Exploit`.
The **Outbound** tab is active by default. If it's not active, toggle it to activate.

d. On the Shodan Exploit alias tile, select **View Details**.

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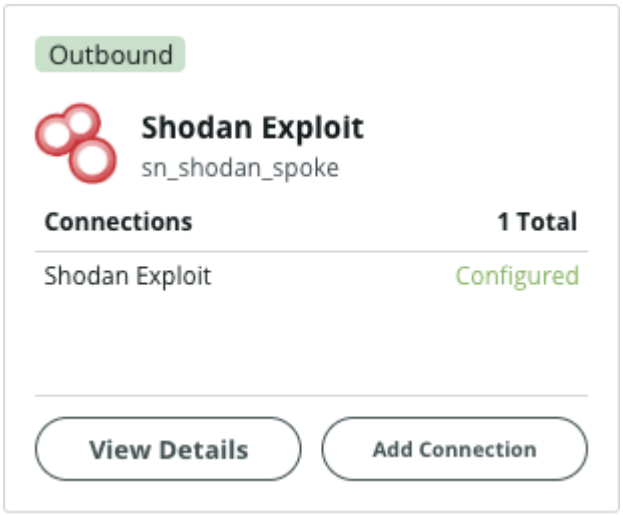
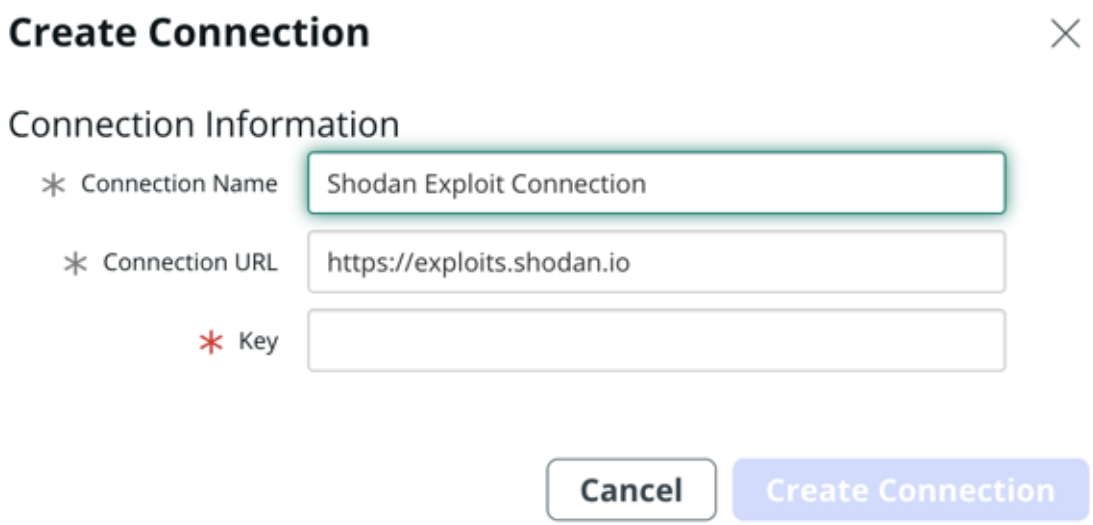


e. Select **Configure**.

f. Fill the form.

Shodan Exploit alias connection form

Field	Description
Connection Name	Name to identify the connection. The default value is Shodan.
Connection URL	URL to connect to Shodan. The default value is `https://api.shodan.io`
Key	API key from your Shodan account.



g. Select **Create Connection**.

Slack Spoke

Use the Slack spoke to post messages and manage access to channels.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview. To learn more about the subscription, contact your account manager.

Spoke version

The Slack spoke v1.9.3 is the latest version. For version history of the spoke, see Slack spoke release notes.

Slack account requirements

The Slack spoke requires creating a workspace and custom app on your Slack account to generate the OAuth 2.0 tokens for the Slack spoke. See Configure Slack app.

Note: The spoke set up procedure outlined here requires bot user tokens only. You can't use the Create User and Deactivate User actions while using the bot token scopes. To use these actions, you must obtain user token from your Slack account.

Spoke subflows

The Slack spoke provides some sample subflows to demonstrate automating the Slack workspace tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Insert Slack User Details by Member ID	Inserts details of the required user in the Slack User Cache module, based on the Member ID.
Insert Slack User Details by User ID	Inserts details of the required user in the Slack User Cache module, based on the User ID.
Post Actionable Message	Posts an actionable message to a Slack channel. **Note:** This subflow requires an outbound configuration as an input. Customize the default outbound configurations or create an outbound configuration as per your requirement. For more information, see Configure outbound configurations in ServiceNow instance.
Post Approval Message	Posts an approval message to a Slack channel. **Note:** This subflow requires an outbound configuration as an input. Customize the default outbound configurations or create an outbound configuration as per your requirement. For more information, see Configure outbound configurations in ServiceNow instance.
Respond to Slack Approval Message	Posts an acknowledgment message on a Slack channel.
Respond to Slack Command	Posts a response to a command on a Slack channel.
Respond to Slack Message Action	Posts a notification on a Slack channel.

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While customizing the subflows, make sure that the subflows are configured to avoid infinite loops.

Spoke actions

The Slack spoke provides actions to automate the Slack workspace tasks when events occur in the ServiceNow instance. Available actions include:

Category	Action	Description
Conversation Management	Add User to Channel	Adds an existing user to the specified channel in the Slack workspace.
	Archive Channel	Archives a channel in a Slack workspace.
	Rename Conversation	Renames a conversation.
	Look up Conversation Info	Retrieves information about a conversation.
	Create Channel	Creates a channel in a Slack workspace.
	Look Up Attachments Stream By Conversation or Member ID	Retrieves attachments related with the relevant channel, member, or bot user.
	Look up Channel History Stream	Retrieves the history of a channel. You must provide the channel ID, and the start and end date as inputs.
	Look up Conversation	Retrieves the conversation messages for a thread from the specified channel.
	Open Conversation	Opens or resumes a direct message or a multi-person direct message.
	Look up Conversation IDs Stream by Member ID	Retrieves details of the Conversation IDs related with the specified member on Slack.
	Set Topic for Channel	Sets the topic for a Slack channel.
	Remove User from Channel	Removes a user from a channel in the Slack workspace.
Notification Management	Post Actionable Message	Posts an actionable message to a Slack channel.

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Category	Action	Description
		Note: This action requires an outbound configuration as an input. Customize the default outbound configurations or create an outbound configuration as per your requirement. For more information, see Configure outbound configurations in ServiceNow instance.
	Post Approval Message	Posts an approval message to a Slack channel. **Note:** This action requires an outbound configuration as an input. Customize the default outbound configurations or create an outbound configuration as per your requirement. For more information, see Configure outbound configurations in ServiceNow instance.
	Post Change Details	Posts Change record details to a channel.
	Post Incident Details	Posts Incident record details to a channel.
	Post Message	Posts a message to a Slack Channel.
	Post Response to Slack	Posts a response to Slack.
	Update Approval Record	Updates an approval record.
	Post Problem Details	Posts a Problem record detail to a channel.
User Management	Create User	Creates a user in the Slack workspace. **Note:** This action requires a user token from the Slack account. If you have bot user tokens, you can't use this action.
	Deactivate User	Deactivates the specified user from the Slack workspace. **Note:** This action requires a user token from the Slack account. If you have bot user tokens, you can't use this action.
	Look up User	Returns information about the specified user or bot. The information can be name, time zone, workspace admin rights, and team ownership of a user or bot.
	Deactivate Subscription	Deactivates a user subscription in Slack. To use this action, perform the steps outlined in the Create a Slack Enterprise Grid application and Create a Slack Enterprise connection section in Integrating with Slack.

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Category	Action	Description
	Look up Access Logs Stream	Retrieves the access logs for all users since the provided oldest date. To use this action, perform the steps outlined in the Create a Slack workspace application and Create a Slack workspace connection section in Integrating with Slack.
	Look up Users Stream	Retrieves all users in the Slack Enterprise grid. To use this action, perform the steps outlined in the Create a Slack Enterprise Grid application and Create a Slack Enterprise connection section in Integrating with Slack.

Note:

- Create User and Deactivate User actions require the admin scope. The spoke set up procedure outlined here requires bot user tokens only. You can't use the Create User and Deactivate User actions while using the bot token scopes. To use these actions, you must obtain user token from your Slack account.
- The admin scope is available to Slack workspace owners only.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Slack user manager	Manages Slack users and integrates Slack actions with the ServiceNow workflows. It looks up users and streamlines user management and communication within the Slack Channels.
Slack notification manager	Automates workflows by executing the Slack Spoke actions. It enables the users to send notifications and updates such as details of incidents, problems, changes, and requests to the Slack channels. It streamlines communication and manages notifications better.

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AI Agent	Description
Slack conversation manager	Performs actions such as setting channel topics, renaming conversations, adding or removing users from channels, creating and archiving channels.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Spoke modules

The Slack spoke adds the Slack application to your ServiceNow instance. The Slack application includes these modules:

Module	Description
Slack Modal Configuration	Create modals and specify fields that should be displayed in your Slack modal.
Slack User Cache	Access information about users who have performed actions on the Slack channel that needed updates in the ServiceNow instance or a response from the ServiceNow instance.
Slack Channel Cache	Access information about the channels on which actions are performed that needed updates in the ServiceNow instance or response from ServiceNow instance.
Inbound Decisions	Specify events in Slack application for which actions must be performed in ServiceNow instance. For example, you can specify inbound decisions to update the task details in your ServiceNow instance when an approver approves the task on the relevant Slack channel. Five sample inbound decisions are available for your reference. Customize these decisions or create inbound decisions as per your requirement. When the conditions mentioned in the inbound decisions are met, the associated subflow is triggered and a record is created in the Slack User Cache module for the Slack user, who initiated the inbound action.
Inbound Decisions for Modals	Specify subflows that must be triggered when the required inbound decisions are met. When the conditions mentioned in the inbound decisions are met, the associated subflow is triggered and a record is created in the Slack User Cache module for the Slack user, who initiated the inbound action.
Slack Outbound Choices	Choices that should be displayed as a list on the Slack channels.
Inbound Slack Message	Access information about the inbound messages to your ServiceNow instance from the Slack application.

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Module	Description
Outbound Configurations	Specify events in ServiceNow instance for which actions must be performed on Slack application. For example, you can specify outbound configurations to send a message on Slack channel asking for approval when a task is created in your ServiceNow instance. Three sample outbound configurations are available for your reference. Customize these configurations or create outbound configurations as per your requirement. The outbound configurations also provide a template to the Post Actionable Message and Post Approval Message actions. For example, you can configure the outbound configurations to display the **Approve** and **Reject** buttons in the approval message that is sent on the relevant Slack channel. When the configurations mentioned in the outbound configurations are met, the relevant subflow is triggered to perform actions in the Slack application.
Slack Configurations	Provide information about the Slack app and Signing Key.

Data in these modules is populated from these spoke tables:

Table	Fields
Slack Channel Cache [sn_slack_ah_v2_slack_channel_cache]	• Channel ID • Channel Link • Channel Name • Creator • Document ID • Is Archived • Is Private • Source table
Slack Configurations [sn_slack_ah_v2_slack_configurations]	• Client Secret • Connection Alias • Property Name • Slack App
Slack Credential [sn_slack_ah_v2_slack_credential]	• Authentication Key • Active • Context Name

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Table	Fields
	• Domain Name • Privacy Key
Slack Outbound Choices [sn_slack_ah_v2_slack_outbound_choices]	• Name • Active • Language • Sequence • Domain • Value
Slack User Cache [sn_slack_ah_v2_slack_user_details]	• Display Name • Slack Member ID • Team ID • User
Slack Workspace Tokens [sn_slack_ah_v2_slack_workspace_tokens]	• Connection Alias • Slack App • Workspace Name
Slack Modal Configuration [sn_slack_ah_v2_slack_modal_configuration]	• Modal Title • Name • Script Validation • Custom Modal

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Slack spoke.

Set up Slack spoke

Integrate the ServiceNow instance and your Slack account by creating a custom OAuth application in Slack to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Slack spoke.
- Slack account.

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- Add Slack users to the User [sys_user] table of your ServiceNow instance, with **Email** being the unique identifier.
- Role required: admin.

About this task

The spoke set up procedure outlined here requires bot user tokens only. You can't use the Create User and Deactivate User actions while using the bot token scopes. To use these actions, you must obtain user token from your Slack account.

Configure Slack app

Create a custom OAuth application on your Slack workspace to enable OAuth 2.0 authentication with the Slack spoke.

Before you begin

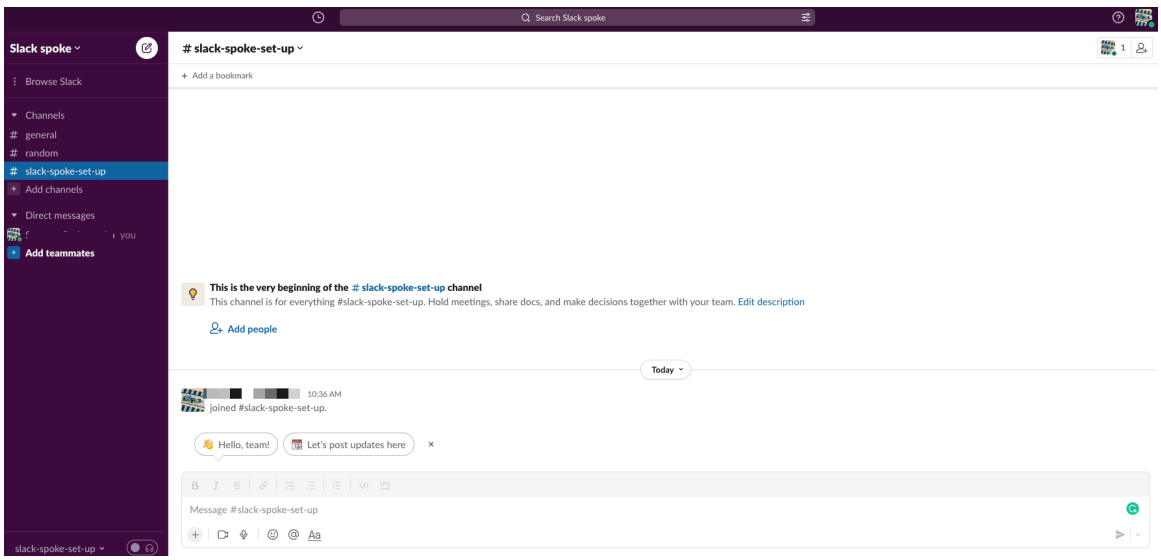
Role required: admin

About this task

Complete these steps from your Slack account. You can create an app or configure an existing app as per the configurations outlines here.

Procedure

1. Create a Slack workspace.
   To learn how to create a workspace, see Create a Slack workspace .The following image shows a typical Slack workspace.



2. Navigate to the Slack API console.
3. Click **Create an app**.
4. On the Create an app window, select the most appropriate method to create the app.

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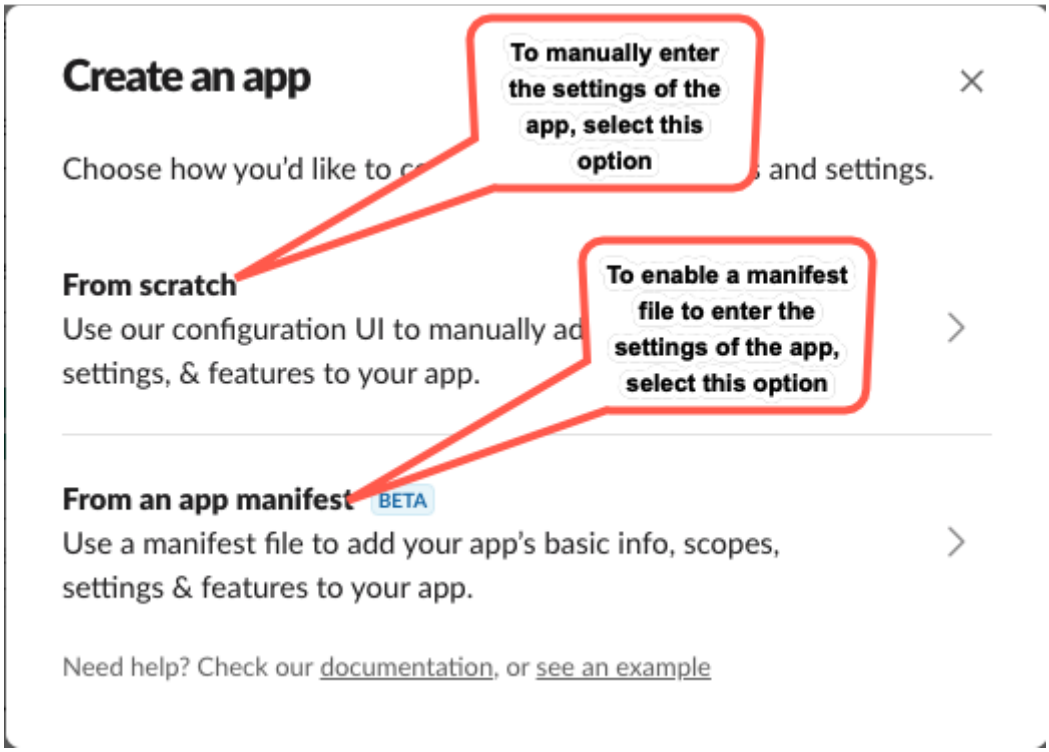

5. From the App Credentials page on the Basic Information page, copy and record the values of Client ID, Client Secret, and Signing Secret of your Slack app.

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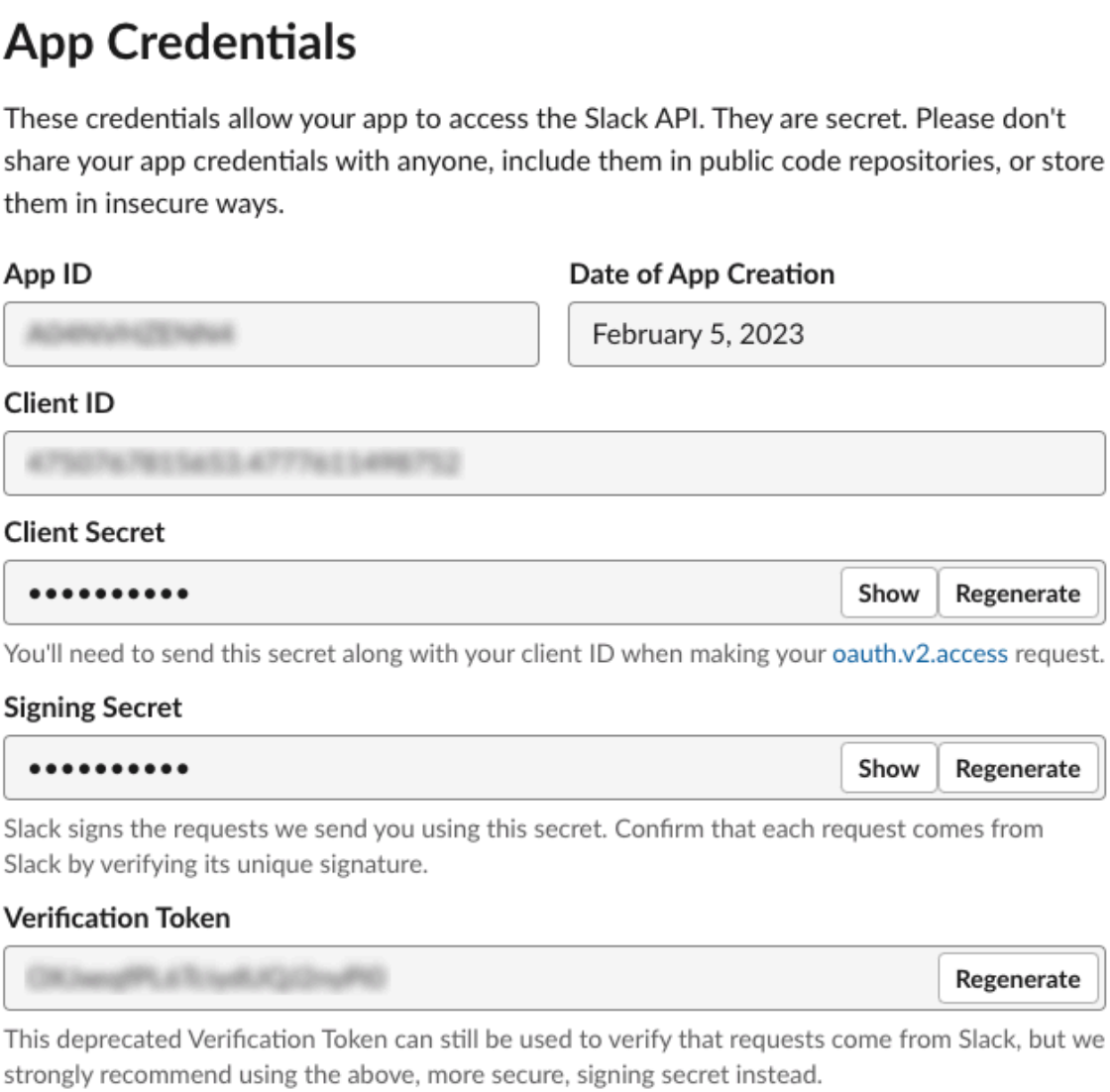

For more information, see the Obtain Client ID and Client Secret for later step.

6. On the OAuth & Permissions page:

   a. Specify the ServiceNow instance URL in **Redirect URLs** in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`.

   b. Add these bot token scopes:

   - channels:history
   - channels:manage
   - channels:read
   - chat:write
   - chat:write.customize
   - groups:read
   - im:read
   - mpim:read

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- groups:history
- groups:write
- im:history
- im:write
- mpim:history
- mpim:write
- users:read
- users:read.email
- files:read

For more information, see Scopes and permissions.

Note: The spoke set up procedure outlined here requires bot user tokens only. You can't use the Create User and Deactivate User actions while using the bot token scopes. To use these actions, you must obtain user token from your Slack account.

7. On the Slash Commands page, create a command and specify these values:

Field	Value
Command	/now
Request URL	https://<instance-name>.service-now.com/api/sn_slack_ah_v2/command_service/<slack-app-name>
Short Description	Description about the command.
Usage Hint	List of parameters than can be passed. For example, `[operation] [table]`.

For more information, see the Creating a Slash command step.

8. On the Interactivity & Shortcuts page:

   a. Enable **Interactivity** and specify the ServiceNow instance URL in **Request URL** in this format: `https://<instance-name>.service-now.com/api/sn_slack_ah_v2/slack/<slack-app-name>/interactivepayload`.
   For more information, see the Preparing your app for user interactions section.

   b. Create a shortcut that appears on messages and enter the value, `post_message_now` for **Callback ID**.
   For more information, see the Creating a shortcut section.

9. Create a Slack bot and add the bot to your Slack app and required channels.
   For more information, see Create a bot for your workspace.

Add Slack connection in ServiceNow instance

Add the Slack connection in Workflow Studio to configure the Slack spoke.

Before you begin
Role required: admin

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Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, the **Outbound** connections are displayed by default.

   Note: You can add multiple connections for your Slack spoke; one for each Slack workspace.

4. On the Slack spoke tile, click **View Details**.
5. In the Connections page, click **Configure**.
   The pop-up window displays a blank Configure Connection form.
6. On the form, fill these values.

Configure Connection form

Field	Description
Connection URL	URL to connect to Slack. Enter `https://slack.com`.
Credential Name	Name to identify the credential record. For example, `Slack Cred`.
OAuth Name	Name to identify the OAuth record. For example, `Slack OAuth`.
OAuth Client ID	Client ID of your Slack app.
OAuth Client Secret	Client Secret of your Slack app.
OAuth Redirect URL	Redirect URL provided in your Slack app. This value is auto-populated.

7. Click **Configure and Get OAuth Token**.
8. In the pop-up window, click **Allow**.
   The OAuth Access token is generated for the Slack spoke.

Provide Signing Key in ServiceNow instance

Provide Slack app details and Signing Key in your ServiceNow instance for authenticating requests from ServiceNow.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Slack** > **Slack Configurations**.
2. Open the default record.
   You can also create new record to provide other signing keys.
3. On the form, fill these values.

Slack Configuration form

Field	Description
Slack App	Name of your Slack app.

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Field	Description
	Note: This name should same as the app name provided while creating the Slack app.
Connection Alias	Connection alias associated with the selected app in the **Connections** tab.
Property Name	Name of the Slack configuration. Enter `Signing Secret`.
Signing Secret	Signing Secret of your Slack app.

4. Click **Update**.

Configure outbound configurations in ServiceNow instance

Specify events in ServiceNow instance for which actions must be performed on your Slack spoke application.

Before you begin

Role required: admin

About this task

The outbound configurations provide a template to the Post Actionable Message and Post Approval Message actions and subflows. You can customise the default outbound configurations or create outbound configuration as per your requirement.

Procedure

1. Navigate to **All** > **Slack** > **Outbound Configurations**.
2. Click **New** to create a outbound configuration template or click the default outbound configuration to configure it.
3. On the Outbound Configuration form, fill these values.

Outbound Configuration form

Field	Description
Name	Name to identify the outbound configuration record.
Message Title	Title of message that is posted in the Slack spoke channel. For example, `Pending approvals for {0}`.
Target Table	ServiceNow table from which the record details are retrieved.
Fields	Fields from the ServiceNow table whose values must be displayed in the message that is posted in the Slack spoke channel.
Buttons	Buttons for the relevant users to take action in the Slack spoke channel. For example, **Approve** or **Reject** a request. For more information about buttons and their styling, see Button element.

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Field	Description
	Note: Users must have the required permissions to perform the necessary actions. For example, user must have the required permissions to approve or reject a request. These permissions are based on user roles assigned to users in your ServiceNow instance.
Choice List	Slack outbound choices such as, Reject. These options are displayed as a list in the Slack channel.
Action ID	Unique identifier of the outbound configuration. **Note:** **Action ID** of the outbound configuration must be used in the relevant inbound decision to complete the flow. For example, **Action ID** of the Approval Message outbound configuration is provided in the Approval Decision inbound decision. This ensures that upon the request approval or rejection, update is made to the relevant record in your ServiceNow instance.

4. Click **Submit**.

Configure inbound decisions in ServiceNow instance

Specify events in your Slack spoke application for which actions must be performed in ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Slack** > **Inbound Decisions**.
2. Click **New**.
3. On the Decision form, fill these values.

Decision form

Field	Description
Label	Name to identify the inbound decision.
Answer	Subflow that must be triggered when the specified conditions are met.
Default Answer	Option to specify if this is the default answer. The default answer is applicable when the conditions are not met. **a.** Click the lookup icon (). **b.** Select the required subflow from the Document list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow]`.
Condition	Conditions to be met in your Slack application for which actions must be performed in ServiceNow instance. For updating relevant record in your ServiceNow instance, specify the **Action ID** value you had provided while configuring outbound configurations in the condition.

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Field	Description
	Note: **Action ID** of the outbound configuration must be used in the relevant inbound decision to complete the flow. For example, **Action ID** of the Approval Message outbound configuration is provided in the Approval Decision inbound decision. This ensures that upon the request approval or rejection, update is made to the relevant record in your ServiceNow instance.

4. Click **Submit**.
   When events meet conditions specified in the policy, the associated subflow is triggered.

   Note: These inbound decisions are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

   If you want to display modals in Slack, see Configure Slack modals in ServiceNow instance.

Configure Slack modals in ServiceNow instance

Create modal and specify fields that should be displayed in your Slack modal. Modal UI can be generated in two ways; automatically using a ServiceNow table and manually using a custom **View Payload**.

Before you begin
Role required: admin.

About this task
For example, if you want to create incident using modal in Slack, the Create Incident modal requires **Priority**, **Category**, and **Short Description** fields.

Note: Modals can be triggered from these interactive Slack components:

- Command,
- Block action,
- Global shortcut, and
- Message shortcut.

Procedure
1. To create a modal with UI that is automatically generated using a ServiceNow table:

   a. Navigate to **Slack** > **Slack Modal Configuration**.

   b. Click **New**.

   c. On the Slack Modal Configuration form, fill these values.

Slack Modal Configuration form

Field	Description
Name	Name to identify the record. For example, `Modal to create incident`.
Modal Title	Modal title that is displayed on Slack. For example, `Create Incident`.

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Field	Description
Table	ServiceNow table corresponding to the modal fields. For example, **Incident [incident]**.
Custom Modal	Option to configure a custom modal.
Input Fields	Inputs fields that should be displayed on Slack. For example, select **Priority**, **Category**, and **Short Description**. Ensure that these modal fields correspond to the selected ServiceNow table. For example, you can't display task related fields on a modal that creates an incident. **Note:** Only the string, date, and choice field types are supported.
Active	Option to actively use the record.

Script Validation	Script to validate inputs provided by the user in the modal. To validate the user-provided inputs, ensure that you are aware of the format in which values are retrieved from the modal and parse the response from Slack.
	
	The sample payload when user provides values for the **Priority**, **Category**, and **Short Description** fields in the Create Incident modal is:
	
	`{"priority":{"4gk":{"type":"static_select","selected_option":{"text":{"type":"plain_text","text":"1 - Critical","emoji":true},"value":"1"}}},"category":{"iV7":{"type":"static_select","selected_option":{"text":{"type":"plain_text","text":"Software","emoji":true},"value":"software"}}},"short_description":{"XS/Q=":{"type":"plain_text_input","value":"hemanth"}}}`
	
	To display validation errors in the modal, configure the script to return an object keys, status, and errorObject. errorObject should have a value of object that will be displayed on Slack. The object should have response_action and error.
	
	Also, configure the script to return an object with keys of status and statusMessage when there are no validation errors. statusMessage is optional and you can configure it as per your requirement.
	
	`var data = JSON.parse(payload);`
	`var key = Object.keys(data.short_description);`
	`var shortdesc = data.short_description[key[0]].value;`
	`var result = new Object;`
	`if (shortdesc.length > 10) {`
	`var obj = {`
	`'response_action': "errors",`
	`"errors": {`
	`"short_description": "You have reached your maximum limit of characters allowed"`
	`}`
	`};`
	`result = {`
	`"status": "error",`
	`"errorObject": obj`
	`};`
	`return result;`
	`} else {`
	`result = {`
	`"status": "success",`
	`"statusMessage": "`Request submitted successfully.`"`
	`};`
	`return result;`
	`}`
	`})();`

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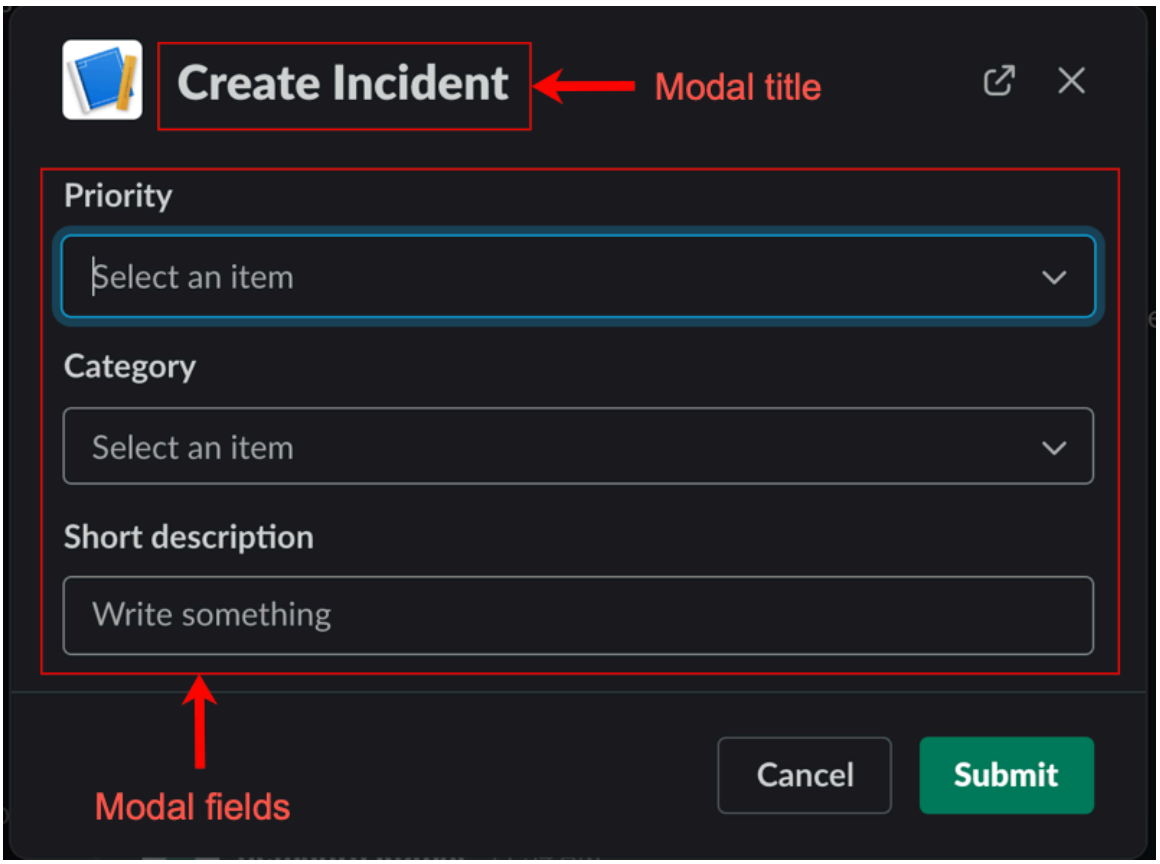
d. Right-click the form header and click **Save**.
The Create Incident modal is created in Slack.



2. To create a modal with UI that is manually generated using a custom **View Payload**:

a. Navigate to **Slack** > **Slack Modal Configuration**.

b. Click **New**.

c. On the Slack Modal Configuration form, fill these values.

Slack Modal Configuration form

Field	Description
Name	Name to identify the record. For example, `Modal to create incident`.
Custom Modal	Option to configure a custom modal. Select this check box.
View Payload	Payload generated by Slack Block Kit Builder that defines the modal UI. For more information, see Block Kit and Building with Block Kit.
Active	Option to actively use the record.
Script Validation	Script to validate inputs provided by the user in the modal. To validate the user-provided inputs, ensure that you are aware of the format in which values are retrieved from the modal and parse the response from Slack.

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Field	Description

	The sample payload when user provides values for the **Priority**, **Category**, and **Short Description** fields in the Create Incident modal is:
	
	`{"priority":{"4gk":{"type":"static_select","selected_option":{"text":{"type":"plain_text","text":"1 - Critical","emoji":true},"value":"1"}}},"category":{"iV7":{"type":"static_select","selected_option":{"text":{"type":"plain_text","text":"Software","emoji":true},"value":"software"}}},"short_description":{"XS/Q=":{"type":"plain_text_input","value":"hemanth"}}}`
	
	To display validation errors in the modal, configure the script to return an object keys, status, and errorObject. errorObject should have a value of object that will be displayed on Slack. The object should have response_action and error.
	
	Also, configure the script to return an object with keys of status and statusMessage when there are no validation errors. statusMessage is optional and you can configure it as per your requirement.
	
	`var data = JSON.parse(payload);`
	`var key = Object.keys(data.short_description);`
	`var shortdesc = data.short_description[key[0]].value;`
	`var result = new Object;`
	`if (shortdesc.length > 10) {`
	`var obj = {`
	`'response_action': "errors",`
	`"errors": {`
	`"short_description": "You have reached your maximum limit of characters allowed"`
	`}`
	`};`
	`result = {`
	`"status": "error",`
	`"errorObject": obj`
	`};`
	`return result;`
	`} else {`
	`result = {`
	`"status": "success",`
	`"statusMessage": "`Request submitted successfully.`"`
	`};`
	`return result;`
	`}`
	`})();`

d. Right-click the form header and click **Save**.
The Create Incident modal is created in Slack.

3. Specify conditions to define when the modals should be displayed:

a. Navigate to **Slack** > **Inbound Decisions For Modals** .

b. On the Decision form, fill these values.

Decision form

Field	Description
Label	Name to identify the inbound modal decision.
Answer	Modal that must be displayed when the specified conditions are met. Ensure that you select the required record from the Slack Modal Configuration [sn_slack_ah_v2_slack_modal_configuration] table.

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Field	Description
Default Answer	Option to specify if this is the default modal. The default modal is applicable when the conditions are not met.
Condition	Conditions to be met in your Slack application to display the modal.

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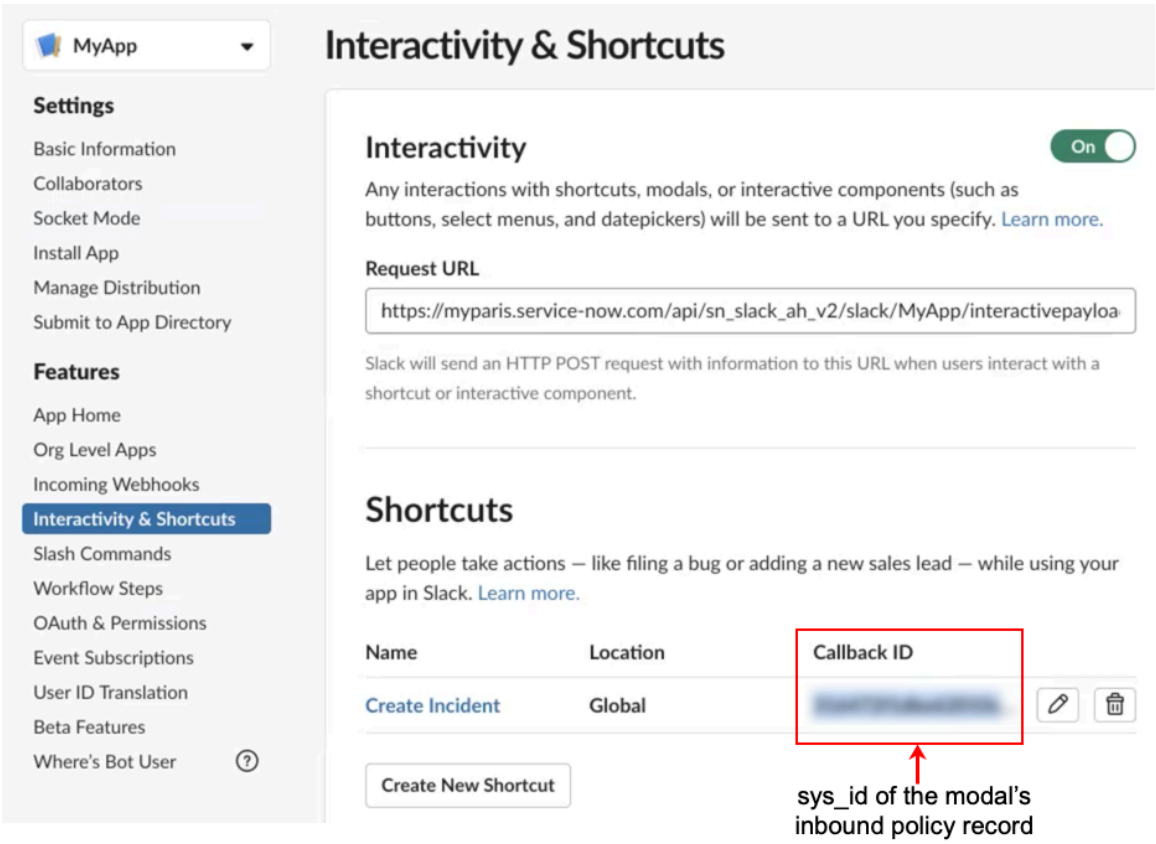
Note:

- Copy and record the value of sys_id. You can use this sys_id as the unique value in **Callback ID** while configuring the shortcut or message shortcut in your Slack app.



Note: Two system properties are added to handle the inbound communications:

System properties

Category	Property name	Description	Example

Slash commands	sn_slack_ah_v2.[illegible]special_characters	The characters encoded using the encodeURIComponent method are handled internally. To replace any additional special characters used in Slash commands in the Slack application with their encoded URI characters, add the characters in a JSON format.	{
			"~" : "%7E",
			"\(" : "%28",
			}

Interactivity &	sn_slack_ah_v2.interactivity.special_characters		

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c. Click **Submit**.
When events in Slack meet conditions specified in the policy, the associated modal is displayed.

Note: These inbound decisions are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

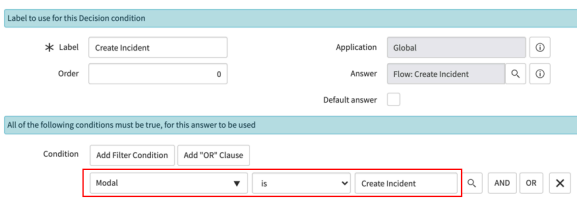
4. Specify tasks to be performed when user provides values in the modals by creating an inbound policy:

a. Navigate to **Slack** > **Inbound Decisions**.

b. Click **New**.

c. On the Decision form, fill these values.

Decision form

Field	Description
Label	Name to identify the inbound decision.
Answer	Subflow that must be triggered when the specified conditions are met.
Default Answer	Option to specify if this is the default answer. The default answer is applicable when the conditions are not met. i. Click the lookup icon ( ). ii. Select the required subflow from the Document list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow]`. Ensure that you have configured the subflow to process the response payload from Slack to automate tasks.
Condition	Conditions to be met to perform tasks in ServiceNow instance. Specify the modal record in the condition.  **Note:** **Condition** must have condition specific to the modal record only.

d. Click **Submit**.
When Slack user provides inputs in the modal, the associated subflow is triggered after validating the inputs. Depending on the automations configured in your subflow, tasks are performed.

Automate and customize Slack tasks

Automate Slack tasks as per your requirement, using the sample these scenarios as a reference.

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You can use the default outbound configurations, inbound decisions, and subflows as reference to customize tasks as per your requirement.

Example: Automate Slack commands

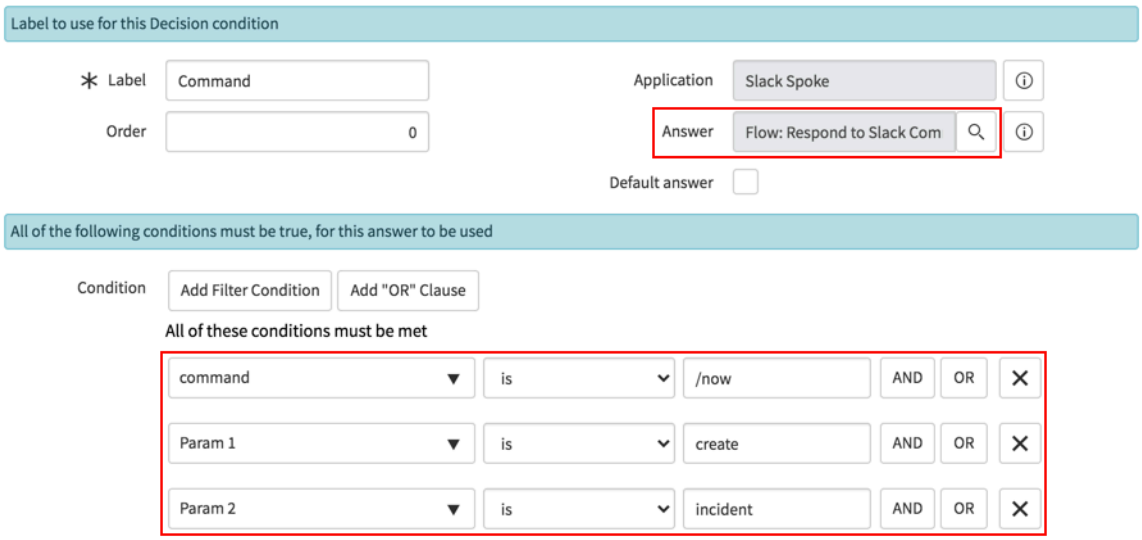
Perform these steps to automate events such as, create incident records, based on the Slack commands:

1. Configure the Slack commands on the Slash Commands page of your custom application. For more information, see Configure Slack app.
2. In Workflow Studio, create a subflow configure to create the incident records as per your requirement or create a copy of the default subflow, Respond to Slack Command, and configure it.

   Note: Create an action and use the payload in the subflow input as per your requirement.

3. Configure inbound decisions in ServiceNow instance.
   a. In the **Condition**, ensure that you specify the value of **command** as `/now` and specify the required parameters.

      Note: You can specify up to 2 parameters in your condition to trigger the required subflow.



   b. In **Answer**, select the subflow you had configured.

When a Slack user enters the command, `/now create incident <text>`, the condition specified in inbound decision is met and the associated subflow is triggered. Similarly, you can customize subflows and inbound decisions to configure more Slack commands such as:

- `/now list incidents` to list all active incidents assigned to the logged in user.
- `/now help` to display all available commands and their describe usage.
- `/now note [note]` to add notes to the required incident.
- `/now create incident [short description] > [optional: urgency] > [optional: impact]` to create an incident with specified short description, urgency, and impact. For example, `/now create incident Email is not working > 3 > 2`.

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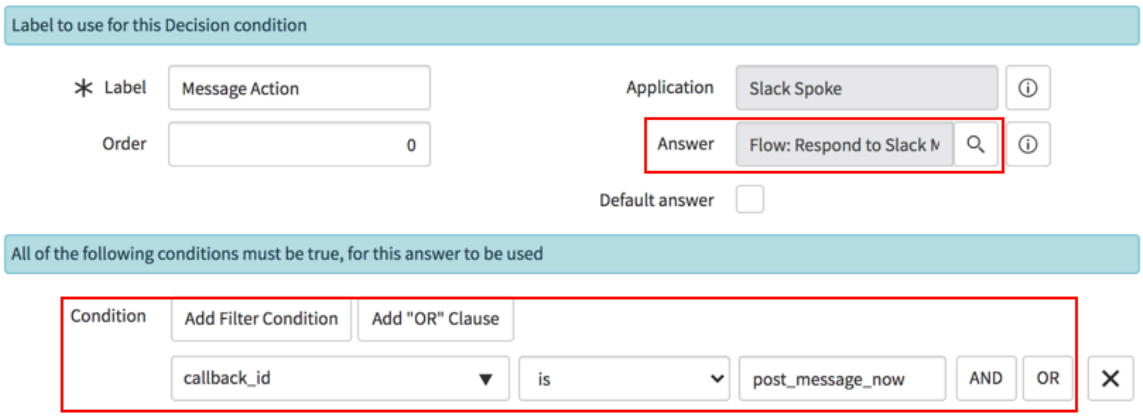
Example: Automate message actions

1. In your Slack custom application, create a shortcut that appears on messages and enter the value, `post_message_now` for **Callback ID**. For more information, see Configure Slack app.
2. In Workflow Studio, create a subflow configure to create the incident records as per your requirement or create a copy of the default subflow, Respond to Slack Message Action, and configure it.

   Note: Create an action and use the payload in the subflow input as per your requirement.

3. Configure inbound decisions in ServiceNow instance.
   a. In the **Condition**, ensure that you specify the value of **callback_id** as `post_message_now` and specify the required parameters.



   b. In **Answer**, select the subflow you had configured.

Example: Post an approval message

Perform these steps to automate posting an approval message on a Slack channel.

1. In Workflow Studio, create a copy of the default subflow, Respond to Slack Approval Action, and configure it as per your requirement.

   Note: Create an action and use the payload in the subflow input as per your requirement.

2. Configure outbound configurations in ServiceNow instance
   a. Open the default outbound configuration, **Approval Message**.
   b. In **Action ID** , specify the unique identifier for automating the task of posting an acknowledgement message. For example, value of **Action ID** can be `approval_request`.
3. Configure inbound decisions in ServiceNow instance.

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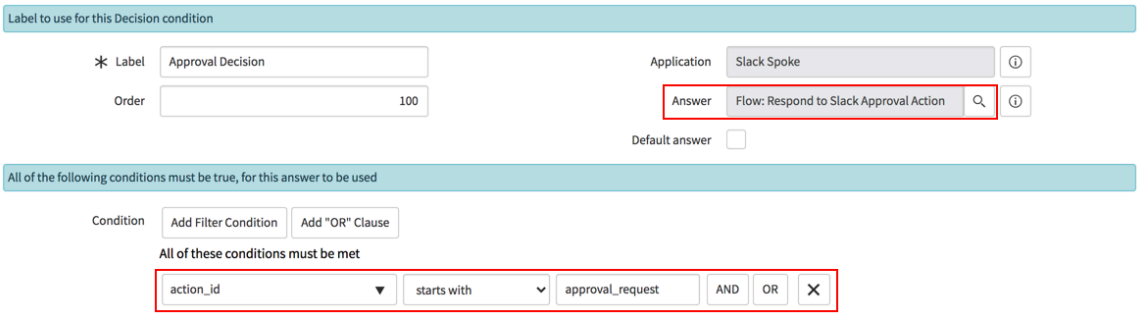
a. In the **Condition**, ensure that you specify the value of **Action ID** as `approval_request`. You can specify other conditions as per your requirement.



b. In **Answer**, select the subflow you had configured.

When the Slack events match the relevant the action ID, the associated subflow, that is, the Respond to Slack Approval Action subflow is triggered. This subflow contains the logic to update the required record and send the relevant acknowledgement message on Slack channel.

Example: Assign request based on acknowledgement

Perform these steps to automate assigning request:

1. In Workflow Studio, create a copy of the default subflow, On-Call Assign by Acknowledgement, and configure it as per your requirement.

   Note: Create an action and use the payload in the subflow input as per your requirement.

2. Configure outbound configurations in ServiceNow instance.
   a. Open the default outbound configuration, **On Call: Assign by Acknowledgement**.
   b. In **Action ID** , specify the unique identifier for automating the task of posting an acknowledgement message. For example, value of **Action ID** can be `on_call_assign_by_acknowledgement`.
3. Configure inbound decisions in ServiceNow instance.
   a. In the **Condition**, ensure that you specify the value of **Action ID** as `on_call_assign_by_acknowledgement`. You can specify other conditions as per your requirement.
   b. In **Answer**, select the subflow you had configured.

Example: Post an actionable message

Perform these steps to automate posting an actionable message:

1. Configure outbound configurations in ServiceNow instance.
   a. Open the default outbound configuration, **On Call: Assign by Acknowledgement**.
   b. Select **Target Table** and **Fields** as per your requirement. For example, **short_description** and **priority** from the **Task [task]** table.
   c. Select **Buttons** as per your requirement. For example, `Accept` and `Reject`.
   d. In **Action ID** , specify the unique identifier for automating the task of posting an acknowledgement message. For example, value of **Action ID** can be `on_call_assign_by_acknowledgement`.

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2. In Workflow Studio, create a copy of the default subflow, Post Actionable Message, and configure it as per your requirement.

   Note: Create an action and use the payload in the subflow input as per your requirement.

   a. In the **Record Sys_ID** input, provide the sys ID of the required record. For example, specify the sys ID of the task record.

   b. In the **Template** input, select template you had created in the outbound configurations.

3. Configure inbound decisions in ServiceNow instance.

   a. In the **Condition**, ensure that you specify the value of **Action ID** as `on_call_assign_by_acknowledgement`. You can specify other conditions as per your requirement.

   b. In **Answer**, select the subflow you had configured.

SmartRecruiters Spoke

The SmartRecruiters spoke provides actions to view and analyze meaningful usage data for SmartRecruiters software subscriptions. Analyze usage for your SmartRecruiters account based on more than 60 activities, including job application creation and job ad creation. Use this data to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SmartRecruiters Spoke v1.0.0 is the latest version. For version history of the spoke, see SmartRecruiters spoke release notes.

Supported versions

This spoke was built for the SmartRecruiters January 2021 release version, but may be compatible with later versions.

Spoke requirements

SmartRecruiters admin account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The SmartRecruiters spoke provides actions to automate SmartRecruiters tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Audit Management	Look up Audit Events Stream	Retrieves the list of audit events for all users.
User Management	Activate User	Activates the specified user's account.
	Deactivate User	Deactivates the specified user's account.
	Look up Users Stream	Retrieves the list of all users within an account.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the SmartRecruiters spoke.

Set up the SmartRecruiters spoke

Integrate the ServiceNow instance and SmartRecruiters by using API credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SmartRecruiters spoke.
- SmartRecruiters role required: admin.
- Role required: admin.

Generate a SmartRecruiters API key

Generate an API key for authenticating SmartRecruiters API requests.

Before you begin

Role required: SmartRecruiters admin

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Procedure

1. From a web browser, open SmartRecruiters.
2. Sign in using your admin credentials.
   The Administrator's view of the SmartRecruiters portal opens.
3. On the page header of the SmartRecruiters portal, click your profile icon and then select **Settings/Admin**.
   Your SmartRecruiter settings open.
4. Under Company Settings, locate the Administration section and then select **Apps & Integrations**.
   The Apps & Integrations page opens.
5. Select the **CREDENTIALS** tab and then click **NEW CREDENTIAL**.
6. When prompted to select the type of credential that you want to generate for your applications, select **API key**.
7. Click **Next**.
8. Enter a name for your API key in the **Credentials name** field.
9. Enter a description for your API key in the **Description** field.
10. Click **Generate**.
    SmartRecruiters automatically generates and displays your API key.
11. Copy your API key and save it in a secure location for later use.

Create a SmartRecruiters connection

Create a connection between your SmartRecruiters applications and your ServiceNow instance so that your instance can retrieve user data from your applications.

Before you begin

Role required: admin

Procedure

1. From your ServiceNow instance, navigate to **Process Automation** > **Flow Designer**.
   The Flow Designer launches in a new tab.
2. Select the **Connections** tab.
3. Locate your SmartRecruiters connection and then click **Add Connection**.
   The Create Connection dialog box opens.
4. On the dialog box, fill in the fields.

Create Connection dialog box

Field	Description
Connection Information	
Connection Name	Name of the SmartRecruiters connection. This field populates automatically.
Connection URL	URL for the connection. This field is automatically set to **https://api.smartrecruiters.com**.
Credential Information	

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Field	Description
API Key	API key for your SmartRecruiters applications. Enter the same API key that you generated in Generate a SmartRecruiters API key.

5. Click **Create Connection**.

Smartsheet Spoke

The Smartsheet spoke integrates the ServiceNow® platform with Smartsheet so that you can automate various actions, such as creating cells in a particular sheet when a database table is updated.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Smartsheet spoke v2.8.0 is the latest version. For version history of the spoke, see Smartsheet spoke release notes.

Supported versions

This spoke was built for Smartsheet v1.0.1, but may be compatible with later versions.

Spoke requirements

You must have a Smartsheet admin account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- The latest Smartsheet spoke plugin

Note: Some of these plugins are licensable features and need appropriate licenses, if used outside the spoke implementation. For information about licenses, contact your account manager.

Spoke subflows

The Smartsheet spoke provides sample subflows to demonstrate automating Smartsheet tasks. To customize a sample subflow, copy it to a new application scope. The available sample subflows are described in the following table:

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Smartsheet spoke subflow descriptions

Subflow	Description
Smartsheet Download Subscriptions	Downloads user subscriptions from the Smartsheet portal. To use this subflow, perform the steps outlined in Integrating with Smartsheet.
Smartsheet Update User Activity	Retrieves Smartsheet user activity. To use this subflow, perform the steps outlined in Integrating with Smartsheet.
Smartsheet Reclaim Subscription	Deactivates user accounts in Smartsheet. To use this subflow, perform the steps outlined in Integrating with Smartsheet.

Spoke actions

The Smartsheet spoke provides actions to automate Smartsheet tasks when events occur in your ServiceNow instance. The available actions are described in the following table:

Smartsheet spoke descriptions

Category	Action	Description
Attachment Management	Attach File to Sheet	Attaches a file to a sheet.
	Attach URL to Sheet	Attaches a URL to a sheet.
	Look up Attachment by ID	Retrieves the information about the attachments on a sheet.
	Look up Attachments Stream	Retrieves the information of all the attachments on a sheet.
Cell History	Look up Cell History Stream	Retrieves the information on the cell modification history.
Column Management	Create Column	Creates the columns in a sheet.
	Look up Column by ID	Retrieves the information about a column in a sheet.
	Look up Columns Stream	Retrieves the information of all the columns from the sheet.
	Update Column	Updates a column in a sheet.
Comment Management	Create Comment	Creates a comment in a sheet.
	Create Comment with Attachment	Creates a comment on a discussion with the attachment to a sheet. The comment provides context and useful information.

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Smartsheet spoke descriptions (continued)

Category	Action	Description
	Look up Comment by ID	Retrieves the information on a comment.
	Update Comment	Updates a comment on a sheet.
Cross Sheet Reference Management	Create Cross Sheet Reference	Creates the cross sheet reference between two sheets.
	Look up Cross Sheet Reference by ID	Retrieves the information about a cross sheet reference on a particular sheet.
	Look up Cross Sheet References Stream	Retrieves the information about all cross sheet references on a particular sheet.
Event Management	Check Event Reporting	Checks if the customer has the event reporting add-on enabled. If enabled, a value of 0 is returned. If not, a value of 1 is returned.
Folder Management	Create Folder in Folder	Creates a folder in the specified Smartsheet Folder.
	Create Folder in Workspace	Creates a folder in the specified Smartsheet workspace.
	List Folder Children Stream	Retrieves a paginated list of immediate child resources within a specified Smartsheet folder.
	List Workspace Children Stream	Retrieves a paginated list of immediate child resources within a specified Smartsheet workspace.
	Update Folder	Updates the name and the permalink of a folder.
Group Management	Create Group	Creates a group.
	Look up Org Groups Stream	Retrieves information on all the groups in the organization.
	Update Group	Updates the details of a group.
Row Management	Create Row	Creates a row in a sheet.
	Look up Row by ID	Retrieves information on a row in a specific sheet.
	Update Row	Updates a row in a sheet.
Send via Email Management	Email Report	Sends a report as an attachment to an email.
	Email Sheet	Sends a sheet as an attachment to an email.
	Send Rows via Email	Sends rows via email.
Sharing Management	Create Share Sheet	Shares a sheet with users and groups.
	Look up Sheet Shares Stream	Retrieves a list of all users and groups that share a sheet.

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Smartsheet spoke descriptions (continued)

Category	Action	Description
	Update Share Sheet	Updates the access level of a user or a group for a sheet.
Sheet Management	Create Sheet	Creates a sheet in the folder if the folder ID is provided. Else, it creates a sheet in the user's sheet folder.
	Look up Sheet by ID	Retrieves information on a sheet.
	Look up Sheets Stream	Retrieves a list of all the sheets that the user can access.
	Update Sheet	Updates a sheet.
User Management	Create User	Creates a user.
	Deactivate User	Deactivates the specified user account in Smartsheet.
	Downgrade User	Downgrades the user associated with the specified Smartsheet plan.
	Look up Admin User	Retrieves the details of the admin user that generated the access token.
	Look up User Activity Stream	Gets the details of user activities.
	Look up User by ID	Retrieves the details of a user.
	Look up User Subscription Stream	Retrieves information about all the users in Smartsheet.
	Look up Users Stream	Retrieves the information of all the users.
	Remove User	Deactivates a user account.
	Update User	Updates the details of a user.
Webhooks Management	Create Webhook	Creates a webhook.
	Delete Webhook	Deletes a webhook.
	Look up Webhook by ID	Retrieves the details of a webhook.
	Look up Webhooks Stream	Retrieves the details of all the webhooks.
	Reset Webhook Shared Secret	Resets the shared secret for a webhook.
	Update Webhook	Updates the details of a webhook.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

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Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Smartsheet user management AI agent	Enables Process Analysts to automate user management workflows within Smartsheet using Integration Hub. It can automate tasks such as create, update, remove users, and retrieve user information.
Smartsheet sheet management AI agent	Enables Process Analysts to automate sheet management workflows within Smartsheet using Integration Hub. It can automate looking up sheets by their ID.
Smartsheet column management AI Agent	Assists the Process Analyst in managing and automating column-related tasks in Smartsheet which enables better design and execution of flows in Integration Hub. The agent performs tasks such as fetch list of available columns in a sheet, and a specific column in a sheet.
Smartsheet attachment management AI Agent	Enables the Process Analyst to improve Smartsheet workflows by automating attachment-related tasks such as attaching files or URLs, looking up attachment streams, and looking up attachments by ID.
Smartsheet group management AI Agent	Enables the Process Analyst to improve group management workflows by automating certain tasks. The Process Analyst can automate tasks such as getting the list of available groups, and update group name.
Smartsheet sharing management AI agent	Enables the Process Analyst to improve workflows related to sharing in Smartsheet by automating certain actions such as looking

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AI Agent	Description
	up sheet share streams, and creating share sheets.
Smartsheet cross sheet reference management AI agent	Improves workflows related to cross-referencing of sheets by automating certain tasks such as looking up cross-sheet references stream and by ID, and creating a cross-sheet.
Smartsheet row management AI agent	Automates row management by performing certain tasks such as creating new rows, helping users manage data effectively and optimize their processes.
Smartsheet comment management AI agent	Automates various tasks related to comments such as adding a comment, adding a comment with attachment, updating a comment, and look up for a comment.
Smartsheet cell history AI agent	Automates various tasks related to the history of the data in the cells such as looking up cell history stream to retrieve and analyze historical data from Smartsheet cells,
Smartsheet folder management AI agent	Automates folder-related tasks such as fetch list of available folders, create a new folder, and update a folder.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Set up the Smartsheet spoke

Set up the Smartsheet spoke to enable integration between the ServiceNow® instance and Smartsheet.

Before you begin

- Request an Integration Hub subscription.
- Activate the Smartsheet plugin.
- Create an alias for Smartsheet Application Programming Interface (API) key.
- Role required: admin.

About this task

Setting up involves generating an API key on the Smartsheet and creating a connection and credential record on the ServiceNow instance.

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Generate the Smartsheet Application Programming Interface (API) key

Generate the Smartsheet API key to be a part of every API call in an HTTP authorization header. Authenticating the API key is a part of the integration process between the ServiceNow® instance and Smartsheet.

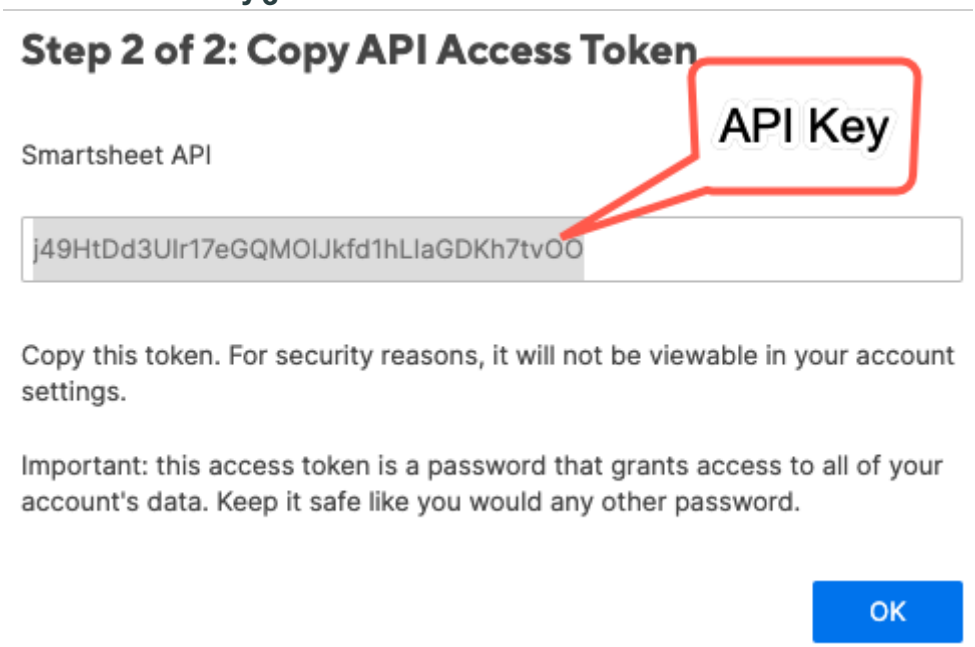
Before you begin

- Create an account with Smartsheet that is allowed to generate API keys.
- Role required: admin

Procedure

1. Log in to https://app.smartsheet.com/.
2. In the left pane, select the Smartsheet account icon.
3. Select **Personal Settings**.
4. Select the **API Access** tab.
5. Select **Generate new access token**.
6. In the API Access Token Name box, enter the name of the API token.
7. Select **OK**.
   An API key is generated, as shown in the following example.

Smartsheet API key generated



8. Select **OK**.

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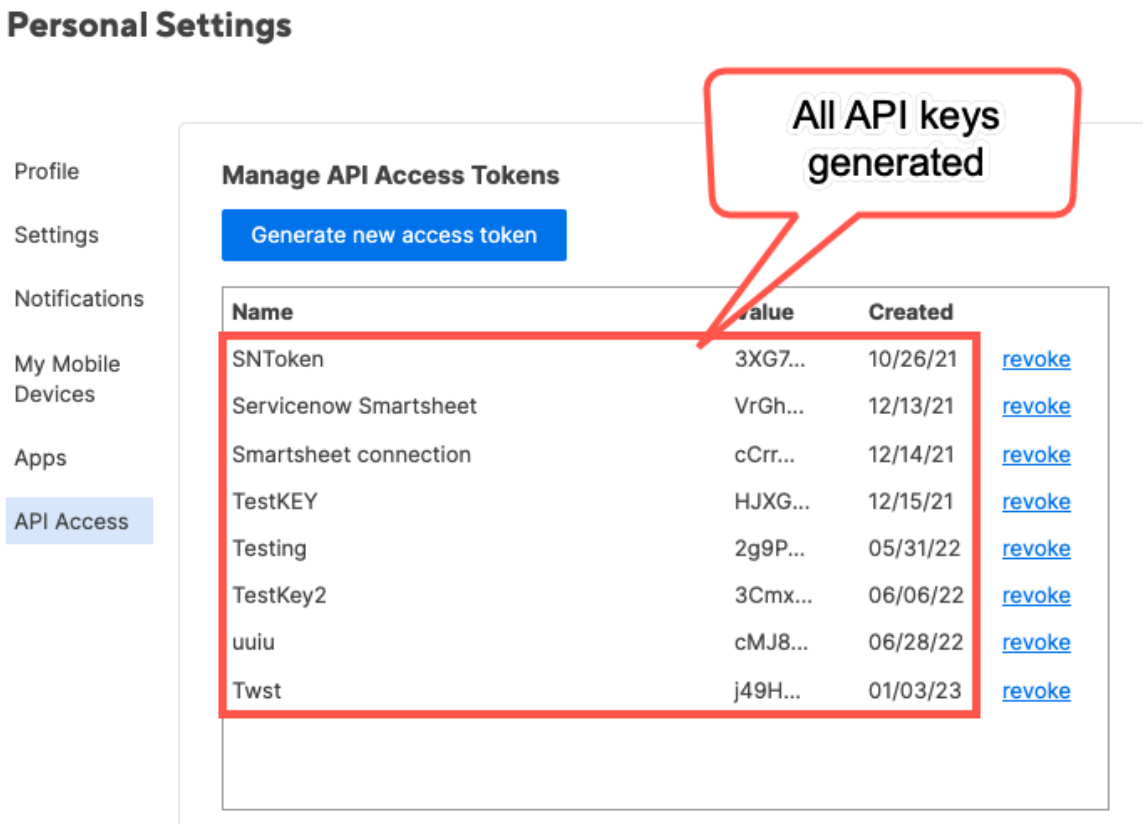
The generated API key is available in the Manage API Access Tokens section as shown in the following example.

All available Smartsheet API keys



Set up Smartsheet spoke connection and credentials

Set up the connection and credential record to enable the ServiceNow® instance to get authenticated and connected to Smartsheet.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connection & Credential Aliases**.
2. Open the record for the Smartsheet alias.
3. From the Related Links section, select **Create New Connection & Credential**.
   The following example shows the Create New Connection & Credential link that you select to set up a connection and credential record.

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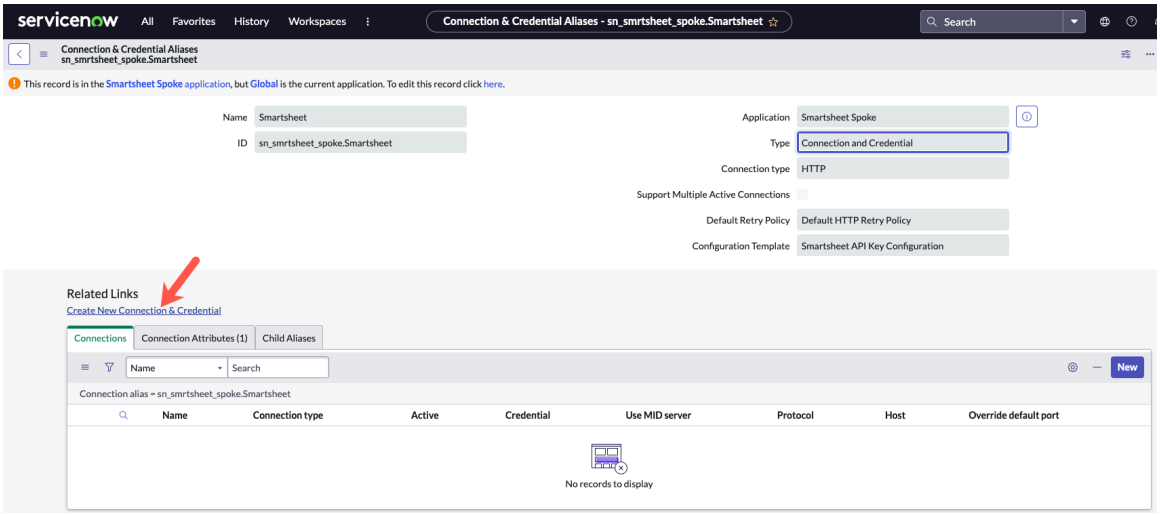
Smartsheet connection and credential record creation link



4. On the form, fill in these fields.

Smartsheet connection and credential record form

Field	Description
Name	User name that is used to connect to Smartsheet.
Connection URL	This field is automatically set to `https://api.smartsheet.com`. **Note:** Based on regions, replace the Connection URL with these respective URLs: ○ Smartsheet Gov: `https://api.smartsheetgov.com/` ○ Smartsheet Regions Europe: `https://api.smartsheet.eu/` ○ Smartsheet Regions Australia: `https://api.smartsheet.au/`
API Key	Application Programming Interface (API) key that is generated on Smartsheet. **Note:** To learn how to generate the API key, see Generate the Smartsheet Application Programming Interface (API) key.

5. Select **Create**.

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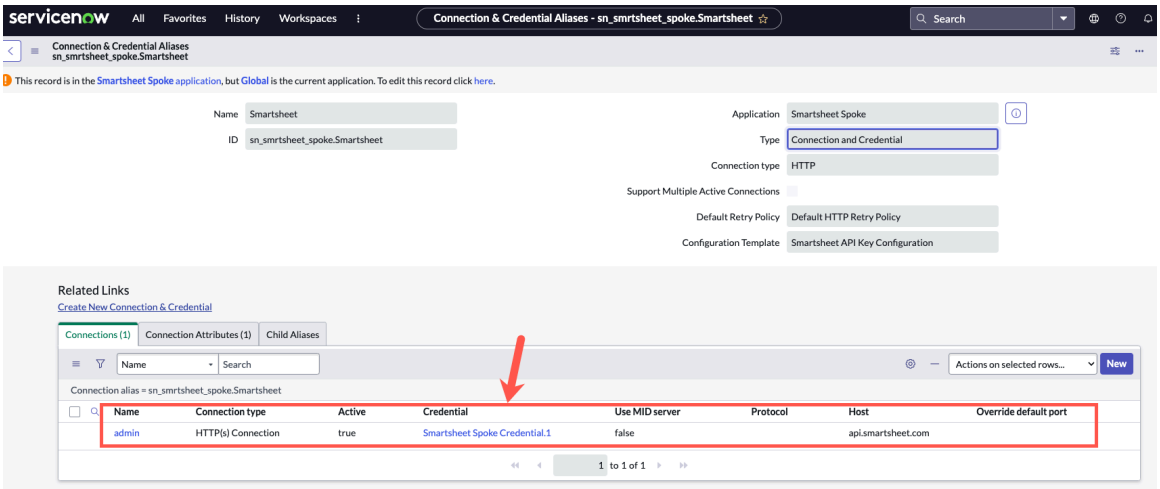
A new connection and credential record is created in the **Connections** tab. This record is the default record unless you create another record and set that one as the default.

The following example shows that a connection and credential record is created and available under the **Connections** tab.



Snowflake Spoke

Manage data warehousing capabilities of Snowflake directly from your ServiceNow instance. You can create, delete, search, records, execute queries, and perform other data manipulation tasks in Snowflake from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Snowflake spoke v1.0.3 is the latest version. For version history of the spoke, see Snowflake Spoke release notes.

Supported versions

This spoke was built for Snowflake v2, but may be compatible with later versions.

Spoke requirements

Snowflake account

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

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- ServiceNow Workflow Studio - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Flow Designer - Flow Engine (com.glide.hub.flow_engine)
- Flow Designer Action Step - Payload Builder (com.glide.hub.action_step.payload)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Snowflake spoke provides actions to automate Snowflake data manipulation tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Record Management	Create Record	Creates a record in the Snowflake tables with the specified details using the INSERT statement.
	Delete Records	Deletes the specified records in the Snowflake tables using the DELETE statement.
	Execute Custom Query	Runs the custom query in the Snowflake database using a custom statement and retrieves the result.
	Look up Columns	Retrieves a list of columns from the Snowflake table. **Note:** Make sure that your Snowflake Service Account has access privilege to the columns that you want to fetch.
	Look up Records	Runs the SELECT statement and retrieves the matching records from Snowflake tables.
	Look up Tables	Retrieves a list of tables from the specified database and specified warehouse in Snowflake. **Note:** Make sure that your Snowflake Service Account has access privileges to the tables that you want to fetch.
	Update Records	Updates the specified records in the Snowflake tables using the UPDATE statement.

Set up the Snowflake spoke

Integrate the ServiceNow instance and Snowflake spoke by using the OAuth credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Snowflake spoke.
- Role required: admin.

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Configure a connection for Snowflake spoke

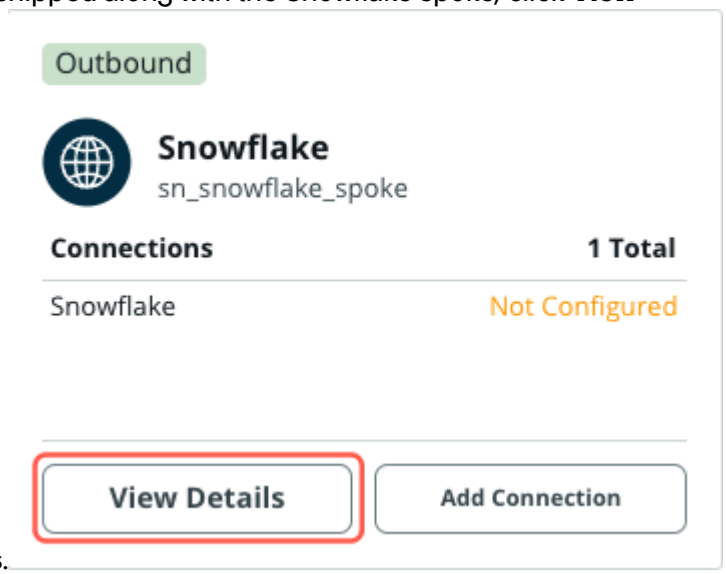
Add and configure a Snowflake connection to authenticate ServiceNow requests.

Before you begin

- Get the OAuth client ID and client secret for your Snowflake account. For more information, see Snowflake OAuth.
- Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab.
3. Under **Connections**, toggle and enable the **Outbound** connections.
4. Locate the alias for **Snowflake** and click **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Snowflake spoke, click **View Details**.



   - To manage more than one Snowflake connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, seeSupporting multiple connections.

   If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



5. On the **Configure Connection** form, fill in the fields:

Field	Description
Connection Name	Name to uniquely identify the connection.
Connection URL	URL to connect to Snowflake. Enter the URL in this format: `https://<your_domain>.snowflakecomputing.com`.
Application Registry Name	Name of the application registry.

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Field	Description
Credentials Name	Name to uniquely identify the credentials. For example, `Snowflake credential`.
OAuth Client ID	OAuth client ID of your Snowflake account.
OAuth Client Secret	OAuth client secret of your Snowflake account.
Authorization URL	Snowflake authorization URL. Enter the URL in this format: `https://<your_domain>.snowflakecomputing.com/oauth/authorize`
Token URL	URL from which the ServiceNow instance obtains the access token. Enter the URL in this format: `https://<your_domain>.snowflakecomputing.com/oauth/token-request`
Oauth Entity Profile Name	OAuth Entity Profile Name for your Snowflake account.
OAuth Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do` is auto-populated.

6. Click **Configure Configure and Get OAuth Token**.

Result
The spoke connection is configured and ready to be used.

Socure Spoke

Integrate ServiceNow instance with your Socure account to access information about scores, watchlists, and so on.

Request apps on Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription
This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Socure spoke v1.1.0 is the latest version. For version history of the spoke, see Socure spoke release notes.

Supported versions

This spoke was built for Socure V3.0, but may be compatible with later versions.

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Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Socure Spoke provides actions (under the ID Modules category) to automate tasks when events occur in your ServiceNow instance. Available actions include:

Action	Description
Look up Address Risk Score	Retrieves the address risk scores and reason codes.
Look up Fraud Score	Retrieves the fraud scores and reason codes.
Look up Email Risk Score	Retrieves the email risk scores and reason codes.
Look up KYC Score	Retrieves the KYC(Know your Customer) scores and reason codes.
Look up Reason Codes and Descriptions	Retrieves the reason codes and descriptions.
Look up Phone Risk Score	Retrieves the phone risk scores and reason codes.
Look up Watchlist	Retrieves the global watchlist matches.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Socure spoke.

Set up the Socure spoke

Integrate the ServiceNow instance and Socure account using an API key to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Socure spoke.
- Contact the Socure support team and obtain the connection URL to connect to Socure account.
- Role required: admin.

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Procedure

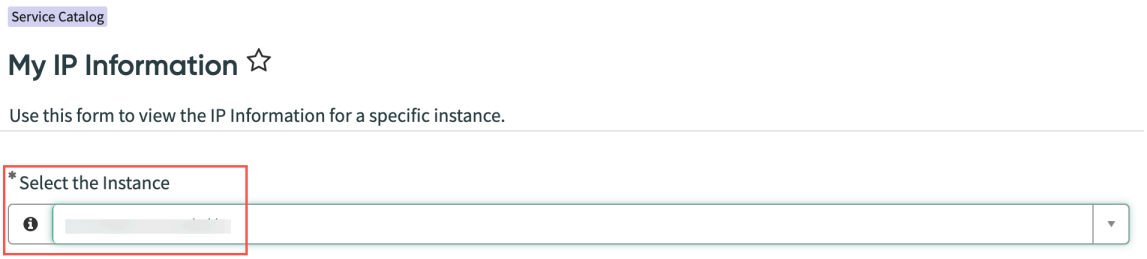
1. Obtain the IP addresses of your ServiceNow instance.

   a. Log in to ServiceNow - NOW Support.

   b. Search for the **My IP Information** service catalog item.

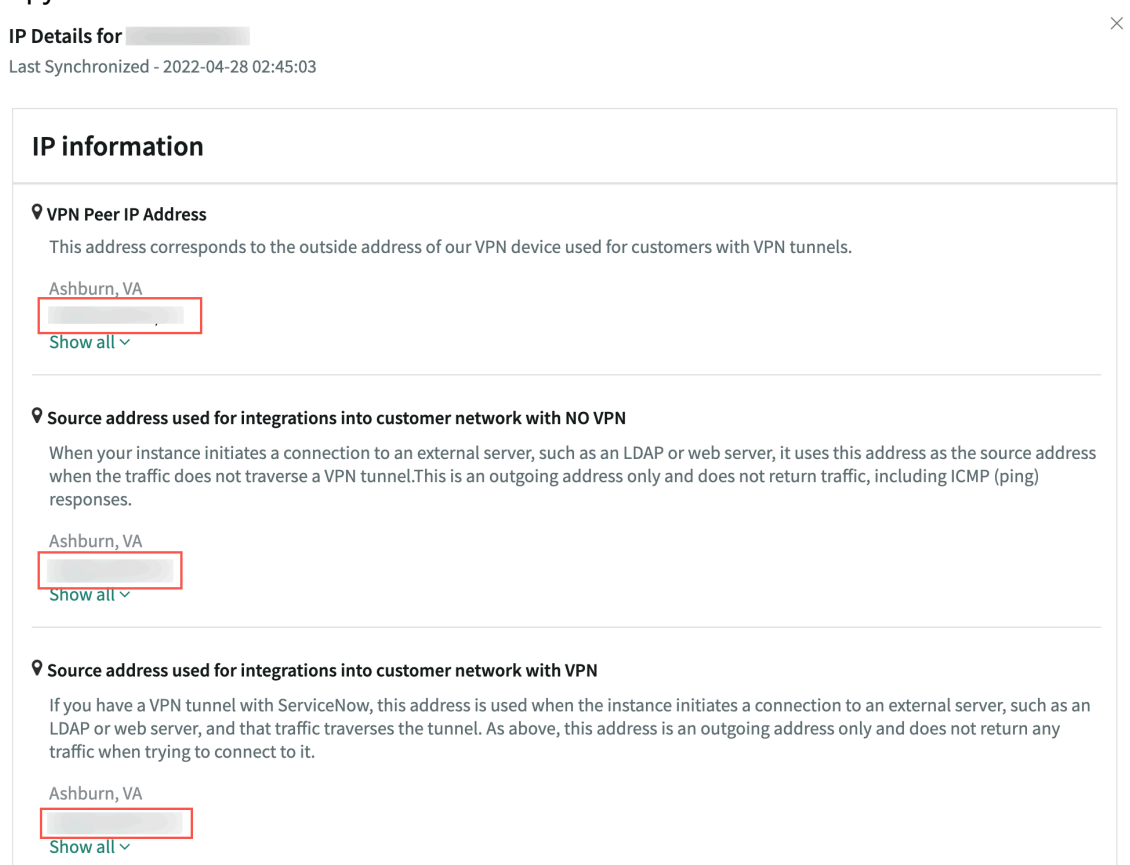
   c. Click the service catalog item.

   d. Provide your instance name in **Select the instance**.



   e. Click **Submit**.
   The IP addresses are displayed.

   f. Copy and record the IP addresses for later use.



2. Obtain the value of token from your Socure admin account.

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a. Log in to your Socure admin account with your admin credentials.

b. Click the **Settings** tab.

c. In the **Account Settings** tab, provide these values.

- Select **Production** from the **Environment** list.
- In **Allowed Domains**, specify the IP addresses of your ServiceNow instance. Separate multiple IP addresses using comma (,).
- Copy and record the value of **ID+key** for later use.

3. Create credential record for the Socure spoke in your ServiceNow instance.

a. Navigate to **Connections & Credentials** > **Credentials**.

b. Click **New**.
The system displays the message **What type of Credentials would you like to create?**.

c. Select **API Key Credentials**.
A blank API Key Credentials form displays.

d. Enter these values.

Field	Value required
Name	Name to uniquely identify the record. For example, enter `Socure Credentials`.
Active	Option to actively use the credential record.
API Key	Socure token in this format: `SocureApiKey <Value of ID+key>`.
Applies to	**Note:** This option is not applicable to this spoke.
Order	Order to apply this credential. For example, enter `100`.

e. Click **Submit**.

4. Create connection record for the Socure spoke in your ServiceNow instance.

a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

b. Open for the record for **Socure**.

c. From the **Connections** tab, click **New**.
The system displays a blank HTTP(s) Connection form.

d. Enter these values.

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Field	Value required
Name	Name to uniquely identify the connection record. For example, enter `Socure Connection`.
Credential	Select the Credential record you created for Socure. For example, select **Socure Credentials**.
Connection URL	Connection URL to connect to Socure account.

e. Click **Submit**.

SuccessFactors Learning Spoke

SuccessFactors Learning spoke can be used retrieve all learning-related information such as user data, course data, syncing user activity, retrieving assignments/enrollments, etc.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Spoke version

SuccessFactors Learning Spoke v1.0.0 is the latest version. For version history of the spoke, see SuccessFactors Learning Spoke release notes.

Supported versions

This spoke was built for version 1.5, but may be compatible with later versions.

Key features

SuccessFactors Learning enables a flow designer to:

- Retrieve learning information
- User data
- Course data
- Syncing user activity

Spoke requirements

SAP Successfactor LMS module subscription

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)

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- Complex Object (com.glide.cobject)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The SuccessFactors Learning does not provide any sample flows.

Spoke subflows

The SuccessFactors Learning provides sample subflows to demonstrate automating Learning tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Look up users	Retrieve user related information.
Look up courses	Retrieve course related information.

Spoke actions

The SuccessFactors Learning provides actions to automate Learning tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Meta data retrieval	Get access token	Retrieves access token from SuccessFactors Learning.
User management	Look up users	Retrieves user details from SuccessFactors Learning.
Course management	Look up courses	Retrieves courses details from SuccessFactors Learning.
	Look up user activities	Retrieves user activities from SuccessFactors Learning.
	Track approvals	Retrieves approvals from SuccessFactors Learning.
	Look up enrollment	: Retrieves enrollment details from SuccessFactors Learning.
	Create assignment enrollment	Create assignment enrollment into SuccessFactors Learning.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection

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information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

Set up the SuccessFactors Learning spoke

Integrate the ServiceNow instance and SuccessFactors Learning by using the SuccessFactors Learning REST credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the SuccessFactors Learning spoke.
- Role required: admin.

Create a connection record for the SuccessFactors Learning spoke

Create a connection record for your spoke. The SuccessFactors Learning connection and credential aliases use these connections to perform actions in SuccessFactors *Learning*.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record for *SuccessFactors* **Learning**.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `<Application-Name> Connection`.
Credential	Credential record created for *SuccessFactors* Learning. For example, `<Application-Name> Cred`.
Connection alias	Alias record associated with this connection.
Host	Fully qualified domain name of the target host where the *Learning* server is installed. For example, `<host>.<domain>.com`.
Connection URL	Base URL to connect to *Learning*. Enter: `https://scfpart001153.scdemo.successfactors.eu/learning`
Active	Option to actively use the connection record.
Domain	Domain that the action runs in.
Override default port	Target port used by the connection. If blank, the system uses the default port.
Use MID server	Option to use a MID Servers for this connection. If the check box is selected, define the fields in the Advanced MID Server Configuration related list.

5. Click **Submit**.

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Create a credential record for the SuccessFactors Learning spoke

Create a credential record for the spoke. The SuccessFactors Learning connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message `What type of Credentials would you like to create?`.
3. Select **SuccessFactors Learning REST Credentials**.
4. On the form, fill in the fields.

Field	Value required
Name	Name to uniquely identify the record. For example, `Local Credentials`.
Active	Option to actively use the credential record.
Username	Username to log in to the local ServiceNow instance.
Company ID	Company ID information provided by the client.
User type	Password to log in to the local ServiceNow instance.
Resource type	Resource type information provided by the client.
Client ID	A unique string representing the registration information provided by the client.
Client Secret	A secret code known only to the application and the authorization server.

5. Right-click the form header and click **Submit**.

SuccessFactors Spoke

The SuccessFactors spoke is built by Bristlecone, Inc. Manage data and entities in SuccessFactors from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes. Starting on March 1st 2022, all SAP spokes will be available only on the Store.

IntegrationHub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

SuccessFactors spoke v4.12.0 is the latest version. For version history of the spoke, see SuccessFactors spoke release notes.

Supported versions

This spoke was built for SuccessFactors v2.0, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Step - SOAP (com.glide.hub.action_step.soap)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - XML Parser (com.glide.hub.action_step.xmlparser)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- Remote Tables (com.glide.script.vtable)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke flows

The SuccessFactors spoke provides sample flows in the draft state to demonstrate automating the SuccessFactors tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Create Todo	Creates a to-do record in SuccessFactors.
Update Todo	Updates details of the specified to-do record in SuccessFactors.
Run SuccessFactors Integration Flow	Retrieves entire data or only updates made after the last refresh, for the selected entities, from SuccessFactors to your ServiceNow instance. By default, you can retrieves data from these entities in SuccessFactors: • Department • Location • Job Profile • Workers Profile • Effective Workers Profile

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Flow	Description
	• Job History Including Secondary Assignments • Todo

Note: The Create Todo and Update Todo flows demonstrate the to-do record management when events occur in ServiceNow. You can customize these flows according to your requirement to manage records of other entities from your ServiceNow instance.

Spoke subflows

The SuccessFactors spoke provides sample subflows in the draft state to demonstrate automating the SuccessFactors tasks. To customize a sample subflow, copy the sample subflow to a new application scope. Available sample subflows include:

Subflow	Description
Look up Departments	Retrieves the department data from SuccessFactors and stores it in SuccessFactors Departments Staging Table.
Look Up Employee Compensation Using Personal Authentication	Retrieves an employee's compensation details based on their Personal External ID.
Retrieve Effective Worker Profiles	Retrieves the Effective Worker Profiles data from SuccessFactors and stores it in SuccessFactors Worker Profiles Staging Table.
Retrieve Job History Including Secondary Assignments	Retrieves all primary and secondary job history data from SuccessFactors.
Retrieve Job Profiles	Retrieves the job profile data from SuccessFactors and stores it in SuccessFactors Job Profile Staging Table.
Retrieve Locations	Retrieves the location data from SuccessFactors and stores it in SuccessFactors Locations Staging Table.
Retrieve Todos	Retrieves the to-do data from SuccessFactors and stores it in SuccessFactors Inbound Todos Staging Table.
Retrieve Worker Profiles	Retrieves the Worker Profiles data from SuccessFactors and stores it in SuccessFactors Worker Profiles Staging Table.
Run SuccessFactors Service	Retrieves entire data or only updates made from the last successful runtime, for the selected entities.
Process SuccessFactors Webhooks	Processes the SAP SuccessFactors webhook event. For more information about setting up the webhooks, see Set up webhook for the SuccessFactors spoke.

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Subflow	Description
Retrieve Worker Profile by Company Territory Code	Retrieves the data of worker profile from SAP SuccessFactors based on company territory code, and stores it in the 'SuccessFactors Worker Profiles Staging Table'. **Note:** Worker profiles without employment or job information will not be retrieved, as the subflow fetches data based on the company territory code, which is assigned only after employment is assigned to the worker.

Spoke actions

The SuccessFactors spoke provides sample actions in the draft state to demonstrate automating the SuccessFactors tasks when events occur in ServiceNow. To customize a sample action, copy it to a new application scope. Available sample actions include:

Note:

- To help prevent unauthorized users from accessing the sensitive data, the hasRole functionality has been implemented for the sensitive actions of the SuccessFactors spoke. As a result, users without the System Administrator role won't be able to run successfully the actions if they don't have the SuccessFactors Spoke Admin role. This rule is applicable from SuccessFactors spoke v3.1.5 and v4.0.3 of the spoke respectively. For more information, see the SuccessFactors Spoke hasRole fix details knowledge base article on NOW Support.
- To help prevent unauthorized users from generating reports for SuccessFactors spoke tables, report_view ACLs are incorporated with the spoke admin role. Thus, you must have the SuccessFactors Spoke's Admin role to generate a report.

Category	Action	Description
Employee Management	Employee Address Information	Retrieves the address information of the specified employee.
	Employee Annual Compensation	Retrieves the annual compensation details of the specified employee.
	Employee Compensation Details	Retrieves compensation details of the specified employee.
	Employee Documents	Retrieves all the viewable documents of the specified employee.
	Employee Payment Method Details	Retrieves the details about payment method of the specified employee.
	Employee Time Off	Retrieves the time offs taken by the specified employee.

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Category	Action	Description
	Employee Time Off Balances	Retrieves the time off-balance details of the specified employee.
	My TimeCard Details	Retrieves the time sheet details of the specified employee.
	Change User Roles	Adds user to the given permission group.
	Employee All Payment Methods Details	Retrieves details of all the payment methods of the specified employee.
	Employee Recurring Compensations	Manages the recurring component of a specified employee's compensation.
	Look up Employee Benefit Enrollments by User ID	Retrieves details of the benefit enrollments of the specified employee during a specific time period.
	Offboard an Employee	Triggers the termination process of the specified employee.
	Org Change	Changes the organization related information of the specified employee.
	Report No Shows	Reports no show for the specified employee.
	Reporting Structure	Retrieves the reporting structure of the specified employee.
	Request Time Off	Applies a time off request for the specified employee.
	Update Employee Address	Updates the address of the specified employee.
	Update Employee Recurring Compensations	Updates the recurring component of a specified employee's compensation.
	Update Employee DOB	Updates the date of birth of the specified employee.
	Update Employee Email	Updates the details of the email of the specified employee.
	Update Employee Phone	Updates the phone details of the specified employee.
	Update Employee Personal Information	Updates the personal information of the specified employee.

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Category	Action	Description
	Update Employee Personal Information - Global	Updates the global information of the specified employee.
	Update Employee Start Dates	Updates the start date of employment of the specified employee.
HR Foundational Data	Login into SuccessFactors	Logs in to SuccessFactors and retrieves the Session ID.
	Retrieve Current Employment Information	Retrieves the current employment information from SuccessFactors.
	Look up Departments	Retrieves the department data from SuccessFactors.
	Look up Addresses Stream	Retrieves address information from SuccessFactors.
	Look up Emails Stream	Retrieves emails information.
	Look up Person Biographical Stream	Retrieves person biographical information.
	Look up Personal Detailed Information Stream	Retrieves personal detailed information.
	Look up Employment Information Stream	Retrieves the employment information from SuccessFactors.
	Look up Phone Stream	Retrieves phone information from SuccessFactors.
	Look up Employee Global Assignments Stream	Retrieves all global assignment details from SAP SuccessFactors.
	Look up Secondary Assignments Stream	Retrieves all secondary assignments from SAP SuccessFactors.
	Retrieve Full Job History Including Secondary Assignments	Retrieves the complete job history data including secondary assignments from SuccessFactors.
	Retrieve Effective Worker IDs	Retrieves the effective Worker Profiles ID from SuccessFactors.
	Retrieve Profiles by Person ID	Retrieves the Worker Profiles data by Person ID from SuccessFactors.
	Retrieve Effective Worker Profiles	Retrieves the Effective Worker Profiles data from SuccessFactors.

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Category	Action	Description
	Retrieve Job History Including Secondary Assignments (Deprecated)	Retrieves the job history data including secondary assignments from SuccessFactors.
	Retrieve Job Profiles	Retrieves the job profile data from SuccessFactors.
	Retrieve Locations	Retrieves the location data from SuccessFactors.
	Retrieve Worker Profiles	Retrieves the Worker Profiles data from SuccessFactors.
	Get Holiday Calendar	Retrieves holiday calendar for a country.
Metadata Retrieval **Note:** To execute the creatable, deletable, updatable, and list metadata actions, create a system property with **Name** as *com.glide.attachment.max_get_size* in the Global scope and set its **Value** to 20000000.	Get Dynamic Output Fields	Creates a dynamic output structure for mapping of fields in response for the given entity.
	Get Entities - Creatable	Retrieves the entities for which the create operation is supported.
	Get Entities - Deletable	Retrieves the entities for which the delete operation is supported.
	Get Entities - Updatable	Retrieves entities for which the update operation is supported.
	Get Entities List	Retrieves the list of all entities.
	Get Fields - Creatable	Retrieves all the creatable non-navigation properties in an entity.
	Get Fields - Updatable	Retrieves all the updatable non-navigation fields in an entity.
	Get Key Fields	Retrieves all the key fields in the specified entity.
	Get Required Fields - Creatable	Retrieves all the required insertable fields in the specified entity.
	Get Updatable Todo Fields	Retrieves the list of updatable fields in the Outbound Todos Staging Table.
	Get Available Positions	Retrieves all the available positions for given company and location code.

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Category	Action	Description
	Get Business Units	Retrieves all the available business units in SuccessFactors.
	Get Companies	Retrieves all the available active companies in SuccessFactors.
	Get Countries	Retrieves all the available countries in SuccessFactors.
	Get Country Code	Retrieves country code of a country.
	Get Dynamic Permission Groups	Retrieves all the available dynamic permission groups.
	Get Event Reasons By Event ID	Retrieves all the event reasons for the specified Event ID.
	Get Global Information By Entity	Retrieves metadata of the entity specified to fetch the global information.
	Get Global Personal Information Supported Countries	Retrieves details of the countries that support the creation and modification of the personal global information.
	Get Locations By Company Code	Retrieves all the active locations from SuccessFactors for the specified company code.
	Get People Pools By Group ID	Retrieves all people pools with only user name category for the specified group.
	Get Pick List Options	Retrieves all the available pick list options for the specified pick list ID.
	Get Pick List Options By Country	Retrieves the pick list options of the specified country.
	Get Recurring Pay Components Defined for Employee	Retrieves recurring pay components and relevant information for the specified employee.
	Get Required Fields - Creatable	Retrieves all the required insertable fields in the specified entity.
	Get Time Types By User ID	Retrieves all the available time types of the specified employee in SAP SuccessFactors.

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Category	Action	Description
	Get Updatable Todo Fields	Retrieves the list of updatable fields in the SuccessFactors Outbound Todos Staging table.
	Look up Company Territory Code	Retrieves all available company territory codes from SAP SuccessFactors.
Record Management	Create Record	Creates a record in SuccessFactors. **Note:** The Create Record action displays non-navigable fields only in the creatable fields list.
	Delete Record	Deletes the specified record in SuccessFactors.
	Execute Entity By URL	Takes navigation URL as input and provides the response for that navigation URL.
	Get Record	Retrieves the record for the selected entity and for the given key fields.
	Update Record	Updates details of the specified record.
Todos	Create Todo	Create a to-do record in SuccessFactors.
	Get Todo By ID	Get details of a to-do from SuccessFactors.
	Retrieve Todos	Retrieves the to-do data from SuccessFactors, except those with Category ID as 57.
	Update Todo	Updates details of the specified to-do record.
User Management	Look up User Activity	Retrieves the last activity time of your SAP SuccessFactors users.
	Look up User Activity SFTP	Retrieves the last activity time of your SAP SuccessFactors users by fetching the report published on an SSH File Transfer Protocol (SFTP) location.
	Look up Users	Retrieves the list of SAP SuccessFactors users.

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Category	Action	Description
	Look up User by User ID	Retrieves the worker details of the SuccessFactors user.
	Look up User Personal Details	Retrieves user personal details of the specified employee.
	Suspend User	Suspends a user account.
Utility Category	Call A SuccessFactors Subflow	Executes the specified SuccessFactors spoke subflow synchronously.
	Call Run SuccessFactors Service Subflow	Executes the Run SuccessFactors Service subflow asynchronously.
	Check Flow Status	Checks if the context of flow is running.
	Get Last Run Date	Retrieves the last run date and time of the flow.
	Update Record In Outbound Todos Staging Table	Updates details of the specified to-do record in SuccessFactors Outbound Todos Staging Table. **Note:** Only an admin user can run this action.
Goal Management	Look up Goals by User ID	Retrieves goals information from SuccessFactors for the specified user ID. **Note:** Only an admin user can run this action.
Payroll Management	Look up Employee Payrolls	Retrieves payroll details of the specified employee.
Skill Management	Create or Update Skill Profile	Creates or updates skill profile and profile skill mappings for a particular employee.
	Look up Employee Skills Stream	Retrieves the skill information of required employee.
	Look up Skills Stream	Retrieves the skill information.
Job Management	Look up Attachment by ID	Retrieves attachment content and stores it in the SuccessFactors Attachments data source for the specified attachment ID. To access the attachments, navigate to **All** > **System Import Sets** > **Administration**

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Category	Action	Description
		> **Data Sources** and open the record **SuccessFactors Attachments**. The required files are attached to this data source record. **Note:** Only an admin user can run this action.
	Look up Candidate by ID	Retrieves candidate information from SuccessFactors for the specified candidate ID. **Note:** Only an admin user can run this action.
	Look up Job Applications Stream	Retrieves job application information from SuccessFactors. **Note:** Only an admin user can run this action.
	Look up Job Codes Stream	Retrieves job level, employment type, and job type information from SuccessFactors. **Note:** Only an admin user can run this action.
	Look up Job Requisition by ID	Retrieves job requisition details for the specified requisition ID.

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Category	Action	Description
		Note: • Create a copy of the Lookup Job Requisition by ID action, if the API attribute of Job Level ID and Employment Type ID is configured with other custom attributes except customString3 and customString4, and modify the post-processing script with the expected API attribute path. • Only an admin user can run this action.
	Look up Job Requisition Postings Stream	Retrieves job posting information from SuccessFactors. **Note:** Only an admin user can run this action.
	Look up Employee Jobs Stream	Retrieves All Employee Jobs information from SuccessFactors.
	Look up Job Profiles Stream	Retrieves job profiles information from SuccessFactors.

Note: If a spoke action requires date or time as an input, ensure that you provide the value in GMT time zone only.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

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- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

AI agent	Description
SuccessFactors payroll management AI agent	Retrieves and manages payroll related information.
SuccessFactors user management AI agent	Retrieve detailed personal information of users.
SuccessFactors todos AI agent	Synchronizes, retrieves, manages, and creates todos.
SuccessFactors hr foundational data AI agent	Retrieves the holiday calendar.
SuccessFactors jobs management AI agent	Retrieves candidate information based on the ID.
SuccessFactors employee management AI agent	Retrieves and manages employee-related information such as, benefit information and time off details.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Available sample agentic workflows

Install Now Assist for Integration Hub and start using the available sample agentic workflows and AI agents. For more information, see Now Assist for Integration Hub.

In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. Use the available sample agentic workflow in AI Agent Studio so that AI agents can coordinate to solve complex problems. To modify the available sample agentic workflow as per your requirement, see Modify an agentic workflow.

Sample agentic workflow	Description	AI agents used	Always ON by default?
Fetch User Details and Time#Off Balance and Time#Off Details	Retrieves a worker's profile information along with their time#off balance and time#off details for a specified date. It is designed to help downstream processes access accurate HR and time#management data from SuccessFactors.	• SuccessFactors Employee Managem AI Agent • SuccessFa User Managem AI Agent	No **Note:** To activate the workflow, see Activate an agentic workflow template.

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Sample agentic workflow	Description	AI agents used	Always ON by default?
Fetch Employee Payrolls and Benefit Enrollments	Retrieves an employee's payroll information and benefit enrollment details from SuccessFactors. It is intended for use cases requiring payroll validation, compensation planning, and benefits#related decision support.	• SuccessFactors Payroll Managem AI Agent • SuccessFa Employee Managem AI Agent	No **Note:** To activate the workflow, see Activate an agentic workflow template.

Spoke modules

The SuccessFactors spoke provides sample modules in the draft state to demonstrate automating the SuccessFactors tasks when events occur in ServiceNow. To customize a module, copy it to a new application scope. Available sample modules include:

Module	Description
Department Staging Table	Displays the department data retrieved from SuccessFactors.
Locations Staging Table	Displays the location data retrieved from SuccessFactors.
Job Profile Staging Table	Displays the job profile data retrieved from SuccessFactors.
Worker Profiles Staging Table	Displays the worker profile data retrieved from SuccessFactors.
Inbound Todos Staging Table	Displays the to-do records retrieved from SuccessFactors.
Outbound Todos Staging Table	Displays the todo records created in ServiceNow. When a todo record is created or updated in ServiceNow, the Create Todo or Update Todo flow is triggered and the same record is created or updated in SuccessFactors. All the associated record details, are retrieved from SuccessFactors and saved in this staging table. If the flow fails to create or update record in SuccessFactors, the associated record or updates in ServiceNow is also deleted.
Employee Job Information And History	Displays the job information and job history of all users.

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Module	Description
View My Time Off Balance	Displays the time off balance of the logged-in user.
View My Time Off Details	Displays details of the time off requests of the logged-in user.
Webhook Registry	Displays the list of webhook registries. Admin must create webhook registry here. For more information, see Set up webhook for the SuccessFactors spoke.
View My Time Card Details For Past 1 Month	Displays time card details of the previous one month for the logged-in user.
View My Worker Profile	Displays the worker profile details of the logged-in user.
View My Holiday Calendar	Displays the holiday calendar applicable to the logged-in user.
View My Reporting Structure	Displays the reporting structure details of the logged-in user.
View My Direct Deposit Information	Displays the direct deposit details of the logged-in user.
View My Total Rewards	Displays the total rewards of the logged-in user.

To retrieve the data, run Run SuccessFactors Integration Flow. The data in the staging tables is available for seven days. During this time period, you must use transform maps to save this data in the required target ServiceNow tables according to your requirement.

Spoke transform maps

The SuccessFactors spoke provides sample transform maps in inactive state and associated sample target tables to demonstrate using transform maps to save SuccessFactors data in your ServiceNow tables. You can use these sample transform maps and target tables as reference to create transform maps according to your requirement.

For more information, see Transform maps.

Spoke user roles

These user roles are available along with the spoke:

- SuccessFactors Admin (sn_successfactors.SuccessFactors Admin): If you have this role, you can access all spoke modules and tables.
- SuccessFactors Private Data (sn_successfactors.SuccessFactors Private Data): If you have this role, you can access to data in these spoke modules:

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- View My Direct Deposit Information
- View My Total Rewards

- SuccessFactors Public Data (sn_successfactors.SuccessFactors Public Data): If you have this role, you can access to data in these spoke modules:
  - View My Time Off Balance
  - View My Time Off Details
  - View My Time Card Details For Past 1 Month
  - View My Worker Profile
  - View My Holiday Calendar
  - View My Reporting Structure

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Two connection and credential aliases are available with the SuccessFactors spoke. One for the SOAP API and the other for the OData API.

For information about setting up the spoke, see Set up the SuccessFactors spoke v4.x.x.

Set up the SuccessFactors spoke v4.x.x

Integrate the ServiceNow instance with your SuccessFactors instance using OAuth client application and API key.

Before you begin

- Request an Integration Hub subscription.
- Activate the SuccessFactors spoke.
- Enable these system properties:
  - *glide.pf.rest.response_payload_max_size*: The maximum value is, 10240.
  - *com.snc.process_flow.reporting.serialized.val_size_limit*: The maximum value is, 16384.
  - *com.glide.transform.json.max-partial-length*: The maximum value is, 65536.
- Role required: admin.

Note: This procedure is applicable if you are setting up the SuccessFactors spoke v4.12.0 for the first time. If you are using an earlier version of the SuccessFactors spoke, see Migrate to SuccessFactors spoke v4.12.0 for the migration procedure.

For more information about setting up the spoke, see SAP SuccessFactors Spoke - OAuth Setup & Migration - Pre-Tokyo, Tokyo and beyond in ServiceNow Community.

Register OAuth client application in SuccessFactors

Enable client certificate authentication for the outbound communication by generating the keystore.jks and keystore.cer files.

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Before you begin

- Generate a valid JKS certificate. For information about creating a JKS certificate, see Creating Java Keystore(JKS) with Private Key and Certificate Chain in SAP Help Portal, or, do the steps.

  1. Use the command `openssl genrsa -out private.key 2048` to generate the private.key file.
  2. Use the private.key to create x.509 certificate (.cer file) that contains your public key.

     Use the command `openssl req -new -x509 -key private.key -out publickey.cer -days 365`

- Convert the public and private key to a .p12 file.

  Use the command to do the above step `openssl pkcs12 -export -in publickey.cer -inkey private.key -out successfactors.p12 -name "<provide custom name>".`

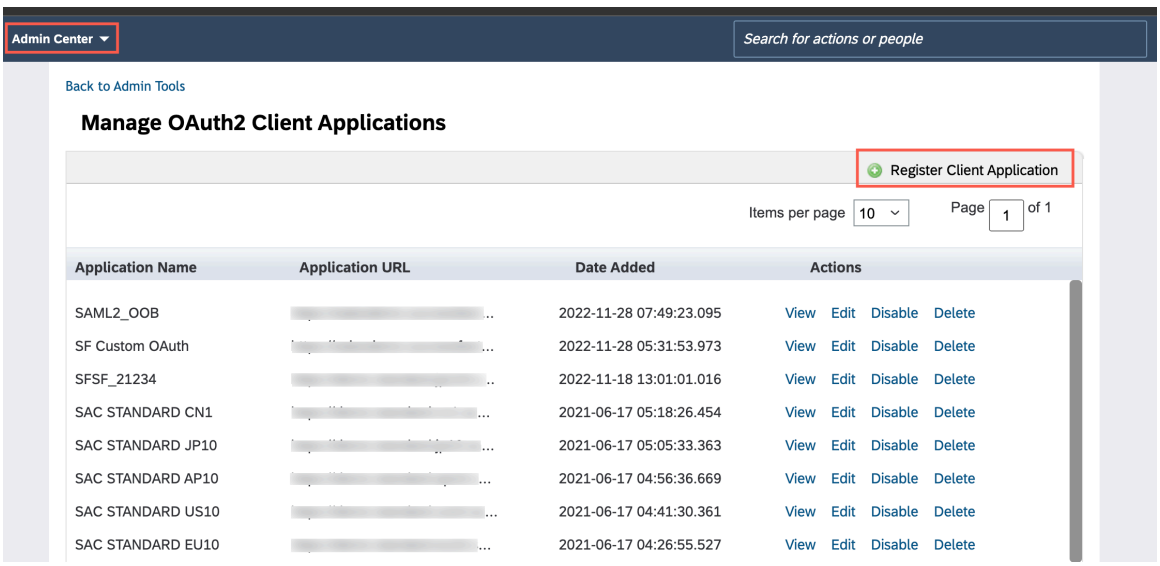
- Convert the .p12 file to .jks

  Use the command to do the above step `keytool -importkeystore -srckeystore successfactors.p12 -srcstoretype pkcs12 -destkeystore successfactors.jks`.

- Role required: admin.

Procedure

1. Log in to the SuccessFactors account as an admin.
2. Navigate to **Admin Centre** and click **Company Settings**.
3. Click **Manage OAuth2 Client Applications**.
4. Click **Register Client Application**.



5. Provide the required details on the form.
   In the **X.509 Certificate** field, provide contents of the cert.pem file (public key) without the headers.

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6. Click **Submit**.
   API Key is generated and displayed. Copy and record the value for later use.

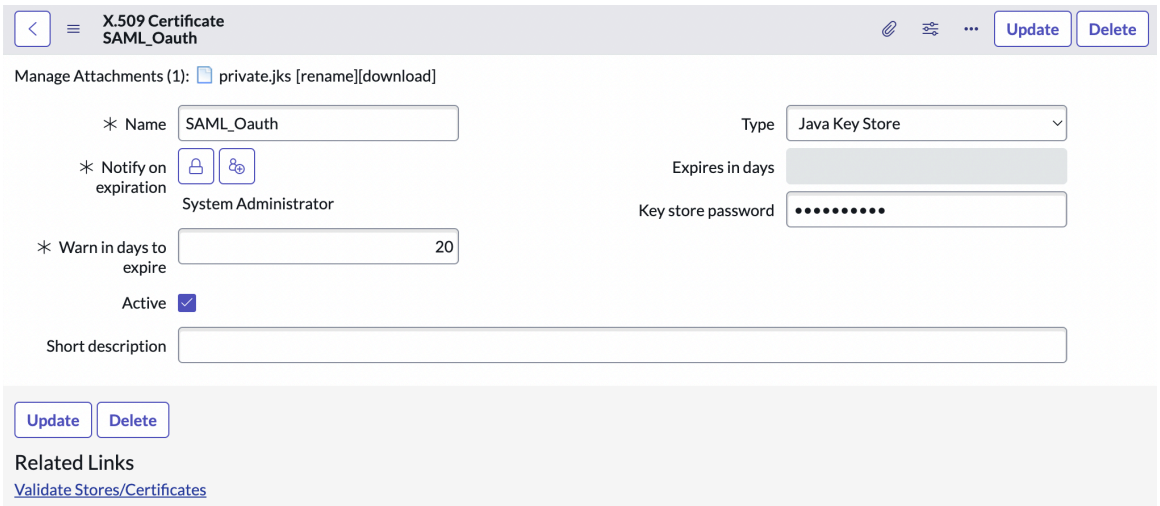
Upload the JKS certificate in your ServiceNow instance

Enable client certificate authentication for the outbound communication by uploading the JKS certificate in your ServiceNow instance.

Before you begin
Role required: admin

Procedure

1. Log in to your ServiceNow instance as an admin.
2. Upload the JKS certificate to your ServiceNow instance.
   For instructions to upload the JKS certificate, see Upload a certificate to an instance .



Register SuccessFactors as an OAuth provider

Use the API key generated during the client application configuration to register the application as an OAuth provider.

Before you begin
Role required: admin

Procedure

1. In your ServiceNow instance, navigate to **System OAuth** > **Application Registry**.
2. Click **New**.
3. In the form, fill in these fields.

Field	Description
Name	Unique name to identify the certificate. For example, `SuccessFactors SAML`.
Client ID	Value of the API key you had copied after registering the OAuth client application in SuccessFactors.

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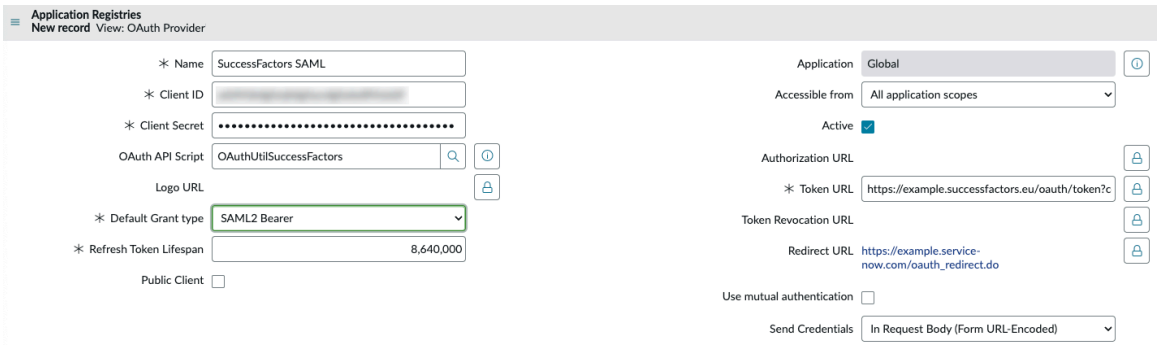
Field	Description
Client Secret	**Note:** Client secret is not needed to register the application as an OAuth provider. You can provide any value for this field.
OAuth API Script	Name of the OAuth API script. Search for `OAuthUtilSuccessFactors` and select it from the list.
Default Grant Type	Default grant type used to establish the token. Select **SAML2 Bearer**.
Token URL	SuccessFactors OAuth server endpoint URL that includes the Company ID in this format: `https://<SuccessFactors_Instance_Name>/oauth/token?company_id=<Company_ID>`. For example, `https://example.successfactors.eu/oauth/token?company_id=SFCPART123456`.



4. Click **Submit**.

Create the SAML2 assertion producer record

Create a SAML2 assertion record to generate the SAML2 assertion and exchange the assertion for the access tokens with the provider.

Before you begin

Role required: admin

Procedure

1. Create a SAML2 assertion producer record in your ServiceNow instance.

   a. Navigate to **All** > **System OAuth** > **SAML2 Assertion Producers**.

   b. Click **New**.

   c. On the form, fill these values.

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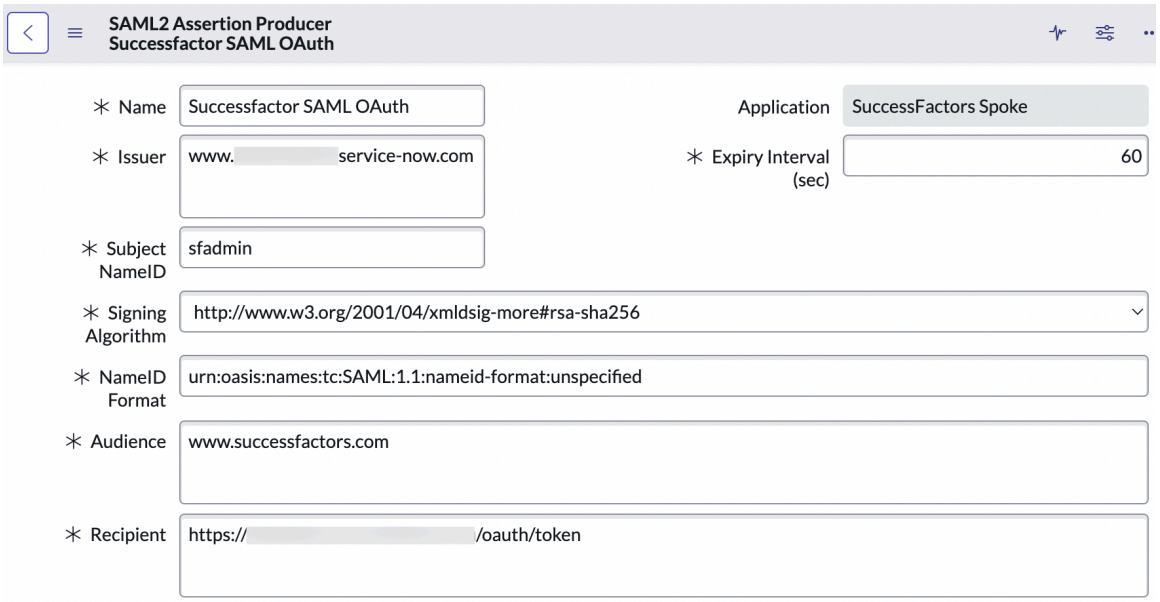
Field	Description
Name	Unique name to identify the SAML2 assertion producer record. For example, `Successfactor SAML OAuth`.
Issuer	Unique identifier for the assertion issuing entity. Provide the ServiceNow instance URL.
Subject NameID	User name to log in to the SuccessFactors instance. For example, `sfadmin`.
Audience	Intended audience for the assertion. Enter the value, `www.successfactors.com`.
Recipient	Intended recipient for the assertion. Enter URL in this format, `https://<SuccessFactors-Instance-Name>/oauth/token`.



d. Right-click the form header and click **Save**.

e. Under the **SAML2 Assertion Keystores** tab, click **New**.

f. On the form, fill these values.

Field	Description
Name	Unique name to identify the SAML2 assertion keystore record. For example, `sap_successfactor`.
Signing Key Alias	Alias of key entry stored in the Keystore used to sign the assertion. For example, `1`.
Signing Key Password	Password of the key entry stored in the keystore used to sign the assertion.

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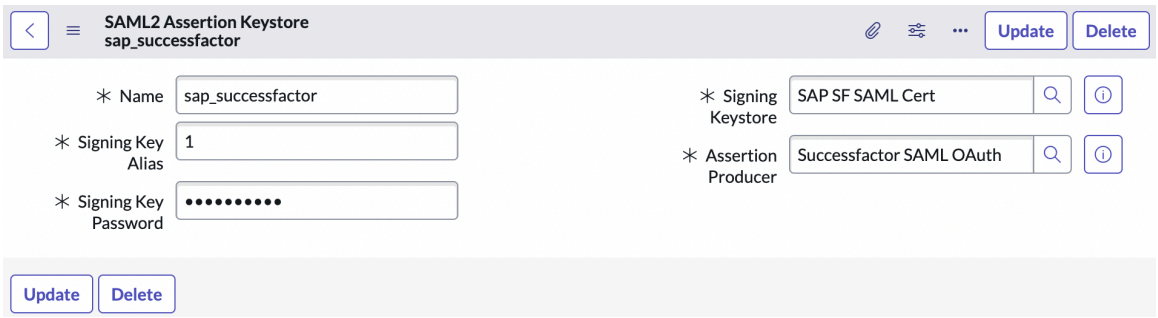
Field	Description
Signing Keystore	Required X.509 certificate record. Select the X.509 certificate record that you had earlier created. For more information, see Upload the JKS certificate in your ServiceNow instance.



g. Click **Submit**.

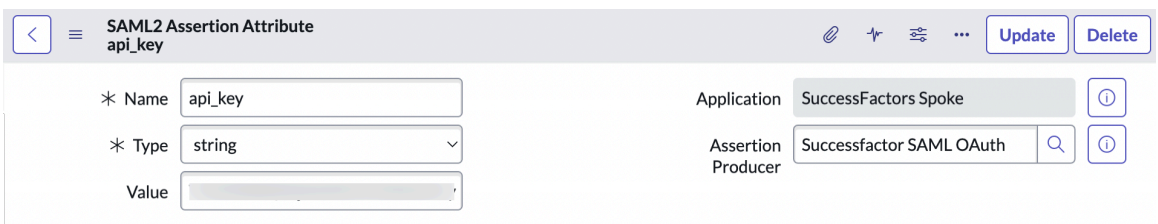
h. Navigate to **All** > **System OAuth** > **SAML2 Assertion Producers**.

i. Open the SAML2 assertion producer record that you had created. For example, **Successfactor SAML OAuth**.

j. Under the **SAML2 Assertion Attributes** tab, click **New**.

k. On the form, fill these values.

Field	Description
Name	Name to identify the SAML2 assertion attribute record. Enter `api_key`.
Type	Type of the **Value** field. Select **String**.
Value	API key generated after the OAuth client application is created in SuccessFactors.



l. Click **Submit**.

2. Associate the SAML2 assertion producer with the application registry record.

a. Navigate to **System OAuth** > **Application Registry**.

b. Open the application registry record that you had created.

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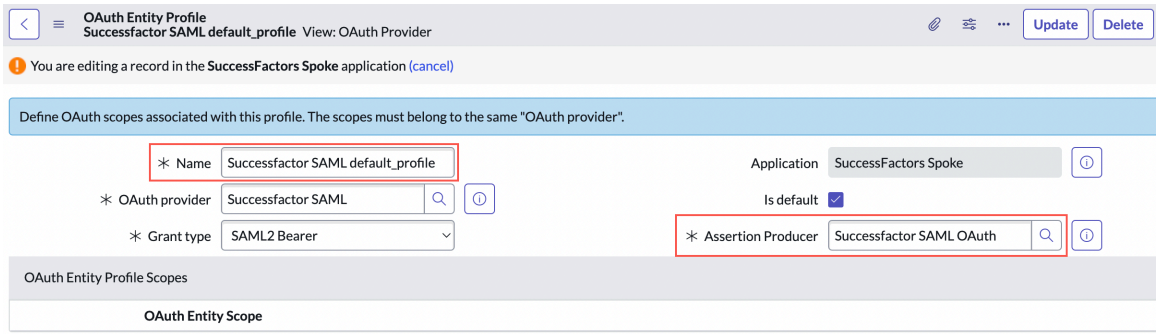
For example, **SuccessFactors OAuth Reg**. For more information about creating the application registry, see Register SuccessFactors as an OAuth provider.

c. Under the **OAuth Entity Profiles** tab, open the default OAuth entity profile record.
For example, **Successfactor SAML default_profile**.

d. For the **Assertion Producer** field, select the SAML2 assertion producer record you had created.
For example, **Successfactor SAML OAuth**.



e. Click **Update**.

Create Credential record for the OData API

Create Credential record for the OData APIs in SuccessFactors. The SuccessFactors spoke connection and credential alias uses these credentials to authorize actions using the OData API.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **OAuth 2.0 Credentials**.
   An empty OAuth 2.0 Credentials form is displayed.
4. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the record. For example, enter `SAML_SuccessFactors_OData_Cred`.
OAuth Entity Profile	OAuth entity profile record that is associated with the OAuth application registry you had created. For example, `Successfactor SAML default_profile`. For more information about creating the application registry, see Register SuccessFactors as an OAuth provider.
Active	Option to actively use the credential record.
Order	Order to apply this credential. For example, enter `100`.

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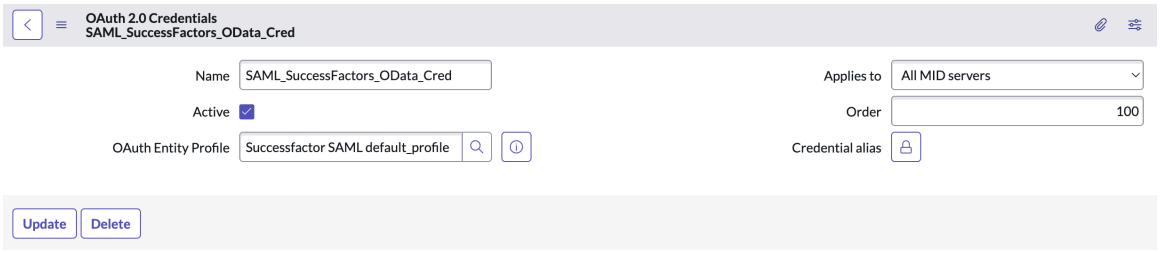


5. Click **Submit**.

Result

The credential record to authorize actions using the OData API is created.

Create Credential record for the SOAP API

Create Credential record for the SOAP APIs in SuccessFactors. The SuccessFactors spoke connection and credential alias uses these credentials to authorize actions using the SOAP APIs.

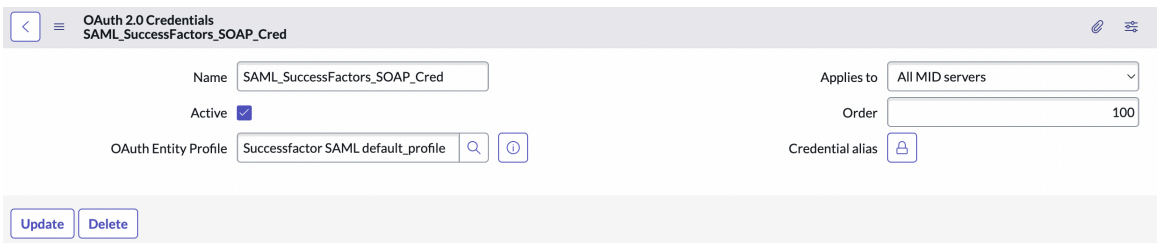
Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **OAuth 2.0 Credentials**.
   An empty OAuth 2.0 Credentials form is displayed.
4. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the record. For example, enter `SAML_SuccessFactors_SOAP_Cred`.
OAuth Entity Profile	OAuth entity profile record associated with the OAuth application registry you had created. For example, `Successfactor SAML default_profile`. For more information about creating the application registry, see Register SuccessFactors as an OAuth provider.
Active	Option to actively use the credential record.
Order	Order to apply this credential. For example, enter `100`.



5. Click **Submit**.

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Result
The credential record to authorize actions using the SOAP API is created.

Create Connection record for the OData API

Create a Connection record for the OData API in SuccessFactors. The SuccessFactors spoke connection and credential alias uses these connections to perform actions in SuccessFactors.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **SuccessFactors OData**.
   For example, **SuccessFactors_OData**.
3. From the **Connections** tab, click **New**.
   The system displays an empty HTTP(s) Connection form.
4. On the form, fill these values.

HTTP(s) Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `SAML_SuccessFactors_OData_Conn`.
Credential	Credential record you created for the REST API. For example, `SAML_SuccessFactors_OData_Cred`.
Connection URL	SuccessFactors service root URL in this format: `https://<SuccessFactors_Instance_Name>/odata/v2`. For example, `https://example.successfactors.eu/odata/v2`. **Note:** If you are using an SAP Cloud account, see List of SAP SuccessFactors API Servers in SAP Help Portal to select the correct endpoint that is needed to target the API server.
Active	Option to actively use the connection record.

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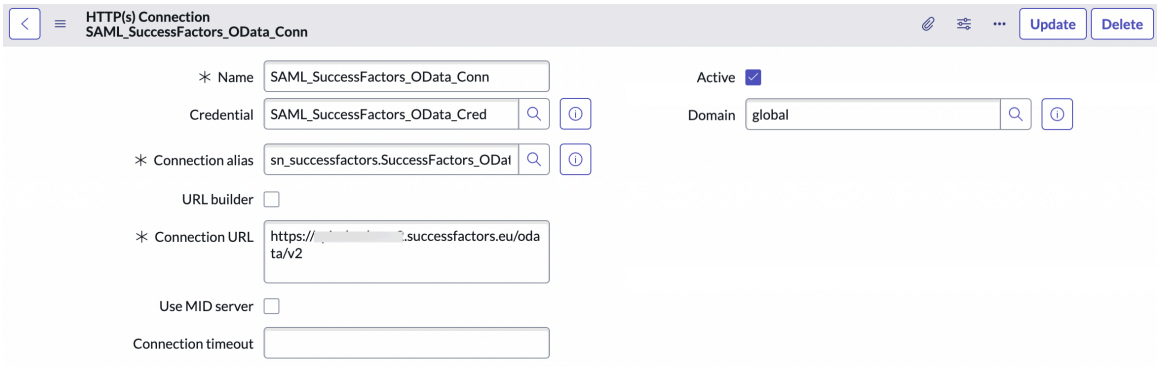

5. Click **Submit**.

Result
The connection record for the REST API in SuccessFactors is created.

Create Connection record for the SOAP API

Create a Connection record for the SOAP API in SuccessFactors. The SuccessFactors spoke connection and credential alias uses these connections to perform actions in SuccessFactors.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **SuccessFactors SOAP API**.
   For example, **SuccessFactors_Comp_Emp**.
3. From the **Connections** tab, click **New**.
   The system displays an empty HTTP(s) Connection form.
4. On the form, fill these values.

HTTP(s) Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `SAML_SuccessFactors_SOAP_Conn`.
Credential	Credential record you created for the SOAP API. For example, `SAML_SuccessFactors_SOAP_Cred`.
Connection URL	SuccessFactors connection URL. For example, `https://<SuccessFactors_Instance_Name>/sfapi/v1/soap`. For example, `https://example.successfactors.eu/sfapi/v1/soap`.

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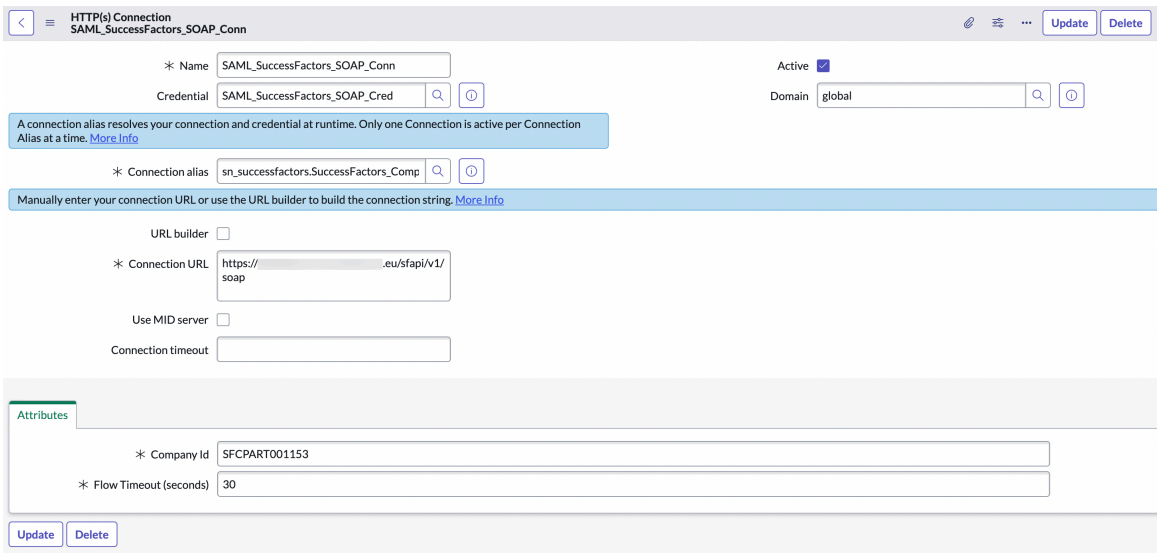
Field	Description
	Note: If you are using an SAP Cloud account, see List of SAP SuccessFactors API Servers in SAP Help Portal to select the correct endpoint that is needed to target the API server.
Active	Option to actively use the connection record.

5. In the **Attributes** tab, provide these fields.

Field	Description
Company Id	Immutable Company ID of your SuccessFactors instance.
Flow Timeout (seconds)	Maximum time in seconds up to which data can be received from SuccessFactors during the flow execution. If the time taken to retrieve data from SuccessFactors exceeds the timeout duration, the flow or subflow is cancelled. Default value is, 30.



6. Click **Submit**.

Result

The connection record for the SOAP API in SuccessFactors is created.

Synchronize data between SuccessFactors and ServiceNow

Customise the sample flows as per your requirement to synchronize data between your SuccessFactors and ServiceNow instances.

Todo entity

The SuccessFactors spoke provides sample flows to synchronize data bi-directionally for the todo entity. The sample flow, Run SuccessFactors Integration Flow can customised to retrieve data from SuccessFactors, while the Create Todo and Update Todo flows creates or updates

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the todo records in SuccessFactors when events occur in ServiceNow. While customising the sample flows, ensure that you provide appropriate triggers to retrieve and save future updates using transform maps.

Other default entities

For these entities, the sample flow, Run SuccessFactors Integration Flow, can be customised to retrieve data from SuccessFactors:

- Department
- Location
- Job Profile
- Workers Profile
- Effective Workers Profile
- Job History Including Secondary Assignments

To create or update records in SuccessFactors for these entities when events occur in ServiceNow:

- Create flows or subflows as per your choice or customise the sample flows and subflows.
- Use Metadata Retrieval and Record Management actions in your flows.
- Ensure that you provide appropriate triggers to retrieve and save future updates using transform maps.

Other SuccessFactors entities

Depending on the SuccessFactors permissions and configurations, you can also synchronize data of other entities as per your requirement.

Set up the SuccessFactors spoke v3.x.x

Integrate the ServiceNow instance with your SuccessFactors spoke instance using basic credentials.

Before you begin

- Request an Integration Hub subscription.
- Activate the SuccessFactors spoke.
- Enable these system properties:
  - *`glide.pf.rest.response_payload_max_size`*: The maximum value is, `10240`.
  - *`com.snc.process_flow.reporting.serialized.val_size_limit`*: The maximum value is, `16384`.
  - *`com.glide.transform.json.max-partial-length`*: The maximum value is, `65536`.
- Role required: admin.

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Note: SuccessFactors will be deprecating basic authentication by Nov 2026 and hence, everyone must use OAuth SAML, which SuccessFactors spoke v4.12.0 supports.

- If you are installing the SuccessFactors spoke for the first time, install SuccessFactors spoke v4.12.0. For more information about setting up SuccessFactors spoke v4.12.0, Set up the SuccessFactors spoke v4.x.x.
- If you are using an earlier version of the SuccessFactors spoke, migrate to SuccessFactors spoke v4.12.0. For more information, see Migrate to SuccessFactors spoke v4.12.0.

Create Credential record for the OData API

Create Credential record for the OData APIs in SuccessFactors. The SuccessFactors spoke connection and credential alias uses these credentials to authorize actions using the OData API.

Procedure

1. Navigate to **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **Basic Auth Credentials**.
   A blank Basic Auth Credentials form displays.
4. On the form, fill these values.

Field	Value required
Name	Name to uniquely identify the record. For example, enter `SAPSF OData Credentials`.
User name	User name with the OData API permission in this format: `<username>@<SAP-SuccessFactors-CompanyID>`.
Password	Associated password.
Active	Option to actively use the credential record.
Order	Order to apply this credential. For example, enter `100`.

5. Click **Submit**.

Result

The credential record to authorize actions using the OData API is created.

Create Credential record for the SOAP API

Create Credential record for the SOAP APIs in SuccessFactors. The SuccessFactors spoke connection and credential alias uses these credentials to authorize actions using the SOAP APIs.

Procedure

1. Navigate to **Connections & Credentials** > **Credentials**.
2. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.
3. Select **SuccessFactors SOAP Credentials**.
   A blank SuccessFactors SOAP Credentials form displays.
4. On the form, fill these values.

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Field	Value required
Name	Name to uniquely identify the record. For example, enter `SAPSF Comp Emp Credentials`.
User name	User name with the SOAP API permission.
Password	Associated password.
Active	Option to actively use the credential record.
Order	Order to apply this credential. For example, enter `100`.

5. Click **Submit**.

Result
The credential record to authorize actions using the SOAP API is created.

Create Connection record for the OData API

Create a Connection record for the OData API in SuccessFactors. The SuccessFactors spoke connection and credential alias uses these connections to perform actions in SuccessFactors.

Procedure

1. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **SuccessFactors OData API**, for example, **SuccessFactors_Odata**.
3. From the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.
4. On the form, fill these values.

HTTP(s) Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `SF_REST`.
Credential	Credential record you created for the OData API. For example, `SAPSF OData Credentials`.
Connection URL	SuccessFactors service root URL. For example, `https://apisalesdemo4.successfactors.com/odata/v2`. **Note:** If you are using an SAP Cloud account, see List of SAP SuccessFactors API Servers in SAP Help Portal to select the correct endpoint that is needed to target the API server.

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Field	Description
Active	Option to actively use the connection record.

5. Click **Submit**.

Result
The connection record for the OData API in SuccessFactors is created.

Create Connection record for the SOAP API

Create a Connection record for the SOAP API in SuccessFactors. The SuccessFactors spoke connection and credential alias uses these connections to perform actions in SuccessFactors.

Procedure

1. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record for **SuccessFactors SOAP API**, for example, **SuccessFactors_Comp_Emp**.
3. From the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.
4. On the form, fill these values.

HTTP(s) Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `SF_REST`.
Credential	Credential record you created for the SOAP API. For example, `SAPSF Comp Emp Credentials`.
Connection URL	SuccessFactors connection URL. For example, `https://salesdemo4.successfactors.com/sfapi/v1/soap`. **Note:** If you are using an SAP Cloud account, see List of SAP SuccessFactors API Servers in SAP Help Portal to select the correct endpoint that is needed to target the API server.
Active	Option to actively use the connection record.

5. In the **Attributes** tab, provide these fields.

Field	Description
Company Id	Immutable Company ID of your SuccessFactors instance.

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Field	Description
Flow Timeout (seconds)	Maximum time in seconds up to which data can be received from SuccessFactors during the flow execution. If the time taken to retrieve data from SuccessFactors exceeds the timeout duration, the flow or subflow is cancelled. Default value is, 30.

6. Click **Submit**.

Result
The connection record for the SOAP API in SuccessFactors is created.

Synchronize data between SuccessFactors and ServiceNow

Customise the sample flows as per your requirement to synchronize data between your SuccessFactors and ServiceNow instances.

Todo entity

The SuccessFactors spoke provides sample flows to synchronize data bi-directionally for the todo entity. The sample flow, Run SuccessFactors Integration Flow can customised to retrieve data from SuccessFactors, while the Create Todo and Update Todo flows creates or updates the todo records in SuccessFactors when events occur in ServiceNow. While customising the sample flows, ensure that you provide appropriate triggers to retrieve and save future updates using transform maps.

Other default entities

For these entities, the sample flow, Run SuccessFactors Integration Flow, can be customised to retrieve data from SuccessFactors:

- Department
- Location
- Job Profile
- Workers Profile
- Effective Workers Profile
- Job History Including Secondary Assignments

To create or update records in SuccessFactors for these entities when events occur in ServiceNow:

- Create flows or subflows as per your choice or customise the sample flows and subflows.
- Use Metadata Retrieval and Record Management actions in your flows.
- Ensure that you provide appropriate triggers to retrieve and save future updates using transform maps.

Other SuccessFactors entities

Depending on the SuccessFactors permissions and configurations, you can also synchronize data of other entities as per your requirement.

Set up webhook for the SuccessFactors spoke

Configure a webhook to subscribe to your SuccessFactors account with a ServiceNow callback URL.

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Before you begin

- Set up the SuccessFactors spoke v4.x.x
- Role required: admin

Procedure

1. Configure the default decision table.
   a. Navigate to **System Definition** > **Decision Tables**.
   b. Search for the record, `Successfactors Webhook` and open it.
   c. In the **Decision Inputs** tab, open the **Webhook Event** record.
   d. In the **Choices** tab, create record for the event for which you want to subscribe. For example, enter `Employee Time Off` in **Label** and **Name** to subscribe to the Employee Time Off events.
   e. Navigate back to the `Successfactors Webhook` record.
   f. In the **Decisions** tab, open the **Default Decision** record.
   g. Select the required webhook event in **Condition** and select the subflow in **Answer**.
   When the specified webhook event occurs, the associated subflow is triggered.

      Note: You can customise the default subflow or create a subflow as per your requirement.

2. Create a webhook registry.
   a. Navigate to **SuccessFactors Spoke** > **Webhook Registry**.
   b. Click **New**.
   c. On the form, enter `SuccessFactors Webhook Authentication` for **Name** and provide **Description**.

      Note: The **Name** of the webhook registry must be `SuccessFactors Webhook Authentication`.

   d. Click **Generate Username and Password**.
   Username and Password are generated and the values are displayed.
   e. Copy and record the values of the generated values for later use.

3. Copy and record the value of **Resource path**.
   a. Navigate to **System Web Services** > **Scripted REST APIs**.
   b. Search for the record, `SuccessfactorsWebhook` and open it.
   c. In the **Resources** tab, click the **processWebhook** record.
   d. Copy and record the value provided in **Resource path**.

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4. Configure events in your SuccessFactors instance.

   a. Log in to your SuccessFactors instance and navigate to **Admin Center** > **Event Notification Subscription**.

   b. In the **External Event** tab, provide these values:

Field	Description
Endpoint URL	ServiceNow instance endpoint URL in this format: `https://<servicenow-instance>.com/<resource-path>`
Authentication	Select **Basic**.
User	User name generated when the webhook registry is created.
Password	Password when the webhook registry is created.

   c. Configure the subscriber in the **Subscriber** tab as per your requirement.

   d. Select the required **Service Event Bus Topic** in the **SEB External Event** tab as per your requirement and select the events for which you want to receive notifications. For example, `Employee Time Off`.

Migrate to SuccessFactors spoke v4.12.0

Migrate from an earlier version of the SuccessFactors spoke to SuccessFactors spoke v4.12.0 by selecting the credential records that are associated with the SuccessFactors spoke v4.12.0.

Before you begin

- Perform these procedures to migrate to SuccessFactors spoke v4.12.0.
  - Register OAuth client application in SuccessFactors
  - Upload the JKS certificate in your ServiceNow instance
  - Register SuccessFactors as an OAuth provider
  - Create the SAML2 assertion producer record
  - Create Credential record for the OData API
  - Create Credential record for the SOAP API
- Role required: admin.

Note: This procedure is applicable if you are currently using an earlier version of the SuccessFactors spoke and intend to upgrade to SuccessFactors spoke v4.12.0.

If you are setting up the SuccessFactors spoke 4.12.0 for the first time, see Set up the SuccessFactors spoke v4.x.x.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Open for the record, **SuccessFactors_OData**.

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3. In the **Connections** tab, open the existing the connection record.
4. For **Credential**, select the credential record you had created for SuccessFactors spoke v4.12.0. For example, `SAML_SuccessFactors_OData_Cred`.
5. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
6. Open for the record, **SuccessFactors_Comp_Emp**.
7. In the **Connections** tab, open the existing the connection record.
8. For **Credential**, select the credential record you had created for SuccessFactors spoke v4.12.0. For example, `SAML_SuccessFactors_SOAP_Cred`.

SumTotal Spoke

Pull learning courses from SumTotal instance to ServiceNow instance to build an integrated learning content repository.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SumTotal spoke v1.0.2 is the latest version. For version history of the spoke, see SumTotal spoke release notes.

Supported versions

This spoke was built for SumTotal version v1, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke actions

Action	Description
Look up Activities Stream	Retrieves the main view to get activity or course data.
Look up Learning Status Stream	Retrieves the main view to get all user transcript-related data.
Look up Users Stream	Retrieves core data of the required employees in SumTotal.
Save Assignment	Creates or updates a standard assignment.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the SumTotal spoke.

Set up the SumTotal spoke

Integrate your ServiceNow instance with the SumTotal application host so the SumTotal spoke can perform actions on the SumTotal server.

Before you begin

- Request an Integration Hub subscription.
- Activate the SumTotal spoke.
- Ensure that the SumTotal configuration template is selected in the SumTotal alias page.
- Role required: admin.

About this task

This task enables you to set up a connection and credential record so that your ServiceNow instance can integrate with the SumTotal host. The connection and credential alias record is a form that contains the SumTotal spoke configuration template and the connection and credential details to connect to the SumTotal host.

Set up SumTotal spoke connection and credential record

Integrate your ServiceNow instance with the SumTotal host by setting up the connection and credential record.

Before you begin

- Role required: admin

About this task

The image provides the flow of creating a connection and credential record.



Procedure

1. Log in to the SumTotal host.
2. Navigate to **ADMINISTRATION** > **System** > **Configuration** > **Technical Configuration** > **OAuth Configuration** > **.**

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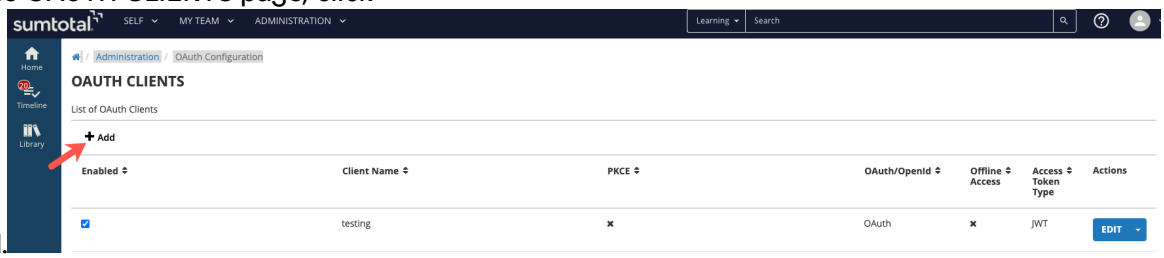
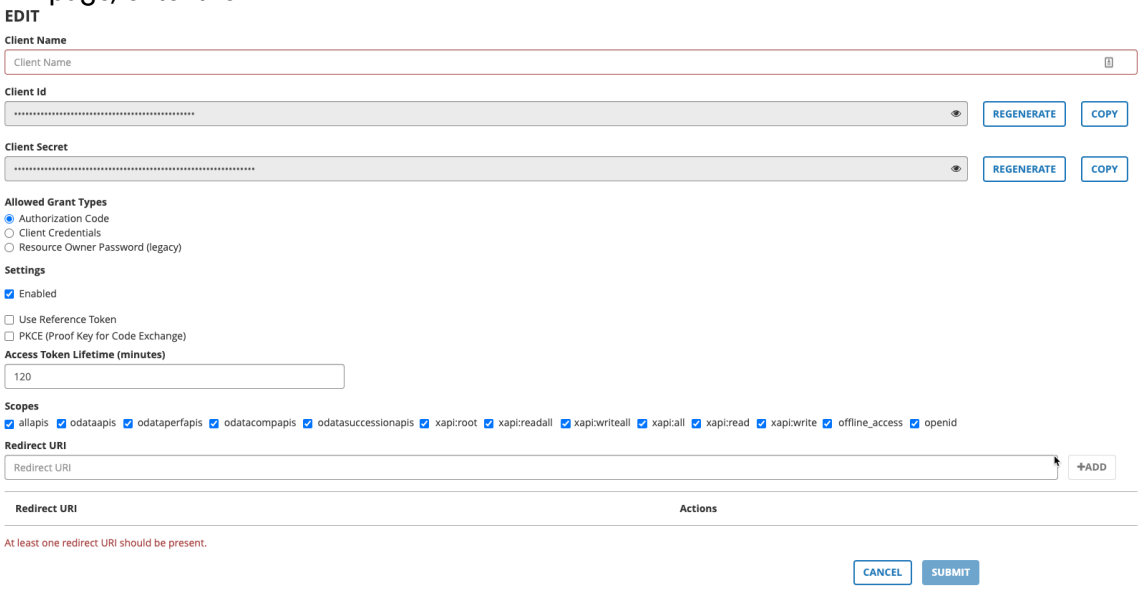
3. On the OAUTH CLIENTS page, click **+Add**.



4. In the EDIT page, enter the details.



SumTotal OAuth client setup form

Field	Description
Client Name	Custom name of the OAuth client.
Client Id	Unique ID of the OAuth client. You need it when setting up the connection and credential record in the ServiceNow instance. **Tip:** To copy the ID, click **COPY**.
Client Secret	Client secret to set up the connection and credential record in the ServiceNow instance. **Tip:** To copy the ID, click **COPY**.
Allowed Grant Types	Select **Client Credentials**.
Settings	Select **Enabled**.
Access Token Lifetime (minutes)	The duration of the access token.
Scopes	Select **allapis**.

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Field	Description
Redirect URI	URL of the location after the app is successfully authorized and granted an access token.

5. Select **Submit**.

Result
The SumTotal OAuth client is created.

SurveyMonkey Spoke

Manage surveys, responses, collectors, and so on in the SurveyMonkey account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

SurveyMonkey spoke v2.0.6 is the latest version. For version history of the spoke, see SurveyMonkey spoke release notes.

Supported versions

This spoke was built for SurveyMonkey API version v3, but may be compatible with later versions.

Spoke requirements

Admin access to SurveyMonkey API Developer Portal.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke actions

The SurveyMonkey spoke provides actions to automate SurveyMonkey tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Collector Management	Create Collector	Creates a collector for the given survey. Public app users need access to the Create/Modify Collectors scope.
	Delete Collector	Deletes the specified collector. Public app users need access to the Create/Modify Collectors scope.
	Get Collector Details	Retrieves details of the specified collector. Public app users need access to the View Collectors scope.
	Look up Collectors Stream	Retrieves details of collectors in the specified survey.
Contact Management	Add Contacts to Contact List	Creates multiple contacts in a contact list. Public app users need access to the Create/Modify Contacts scope.
	Create Contact List	Creates a contact list. Public app users need access to the Create/Modify Contacts scope.
	Delete Contact List	Deletes the specified contact list. Public app users need access to the Create/Modify Contacts scope.
	Look up Contact Lists	Retrieves all contact lists. Public app users need access to the View Contacts scope.
	Look up Contacts in Contact List	Retrieves all contacts in a contact list. Public app users need access to the View Contacts scope.
	Update Contact List	Modifies a contact list. Public app users need access to the Create/Modify Contacts scope.
Folder Management	Create Folder	Creates a folder.
	Look up Folders	Retrieves the available folders.
Response Management	Look up Survey Responses	Retrieves a list of responses. Public app users need access to the View Responses scope.
	Look up Survey Trends	Retrieves the answer counts within the specified time period. Public app users need access to the View Response Details scope.
Survey and Question Management	Create Question	Creates a question on the survey page. Public app users need access to the Create/Modify Surveys scope.
	Create Survey	Creates an empty survey. Public app users need access to the Create/Modify Surveys scope.
	Delete Question	Deletes the specified question. Public app users need access to the Create/Modify Surveys scope.

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Category	Action	Description
	Delete Survey	Deletes the specified survey. Public app users need access to the Create/Modify Surveys scope.
	Get Survey Details	Retrieves a list of full responses, including answers to all questions. Public app users need access to the View Response Details scope.
	Look up Questions	Retrieves all questions in the specified survey.
	Look up Survey Pages	Retrieves details of the page. Public app users need access to the View Surveys scope.
	Look up Surveys	Retrieves a list of surveys owned by or shared with the authenticated user. Public app users need access to the View Surveys scope.
	Update Question	Updates details of the specified question. Public app users need access to the Create/Modify Surveys scope
	Update Survey	Modifies title, nickname, or language of the specified survey. Public app users need access to the Create/Modify Surveys scope.
Team Management	Look up Team Activity Stream	Retrieves activity data for the specified team.
	Look up Team Member Details	Retrieves details of the specified team member.
	Look up Team Members Stream	Retrieves details of all members in the specified team.
	Look up Teams Stream	Retrieves details of all teams that the authenticated user account belongs to.
User Management	Get User Details	Retrieves the current user's account details including their plan. Public app users need access to the View Users scope.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the SurveyMonkey spoke.

Set up the SurveyMonkey spoke

Integrate the ServiceNow instance and SurveyMonkey account by creating a custom OAuth application in SurveyMonkey API Developer Portal to authenticate ServiceNow requests.

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Before you begin

- Request an Integration Hub subscription.
- Activate the SurveyMonkey spoke.
- Role required: admin.

Procedure

1. Log in to SurveyMonkey API Developer Portal as an admin and add an app.

   a. In **OAuth Redirect URL**, enter the ServiceNow instance URL in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`.

   b. Copy and record the values of **Client ID** and **Secret**.

   c. Provide these scopes for the app:
   - Create/Modify Surveys
   - Create/Modify Collectors
   - Create/Modify Responses
   - View Response Details
   - View Contacts
   - Create/Modify Webhooks
   - View Library Assets
   - View Surveys
   - View Collectors
   - View Responses
   - Create/Modify Contacts
   - View Users
   - View Webhook

   Note: If you provide any additional scopes, ensure that you add these scopes in the **OAuth Entity Scopes** tab of the default application registry available in your ServiceNow instance.

2. Configure the default application registry.

   a. Navigate to **System OAuth** > **Application Registry**.

   b. Open the record, **Survey Monkey**.

   c. On the form, fill these values:

Field	Description
Client ID	Client ID of the app created in SurveyMonkey API Developer Portal.

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Field	Description
Client Secret	Secret of the app created in SurveyMonkey API Developer Portal.
Redirect URL	ServiceNow instance URL in this format: `https://<instance-name>.service-now.com/oauth_redirect.do`. Replace `<instance-name>` with your instance name.

Note: If you have provided additional scopes, create records for those scopes in the **OAuth Entity Scopes** tab.

3. Create a credential record.

   a. Navigate to **Connections & Credentials** > **Credentials**.

   b. Click **New**.
   The system displays the message **What type of Credentials would you like to create?**.

   c. Select **OAuth 2.0 Credentials**.

   d. On the form, fill in the fields.

Field	Value required
Name	Name to uniquely identify the record. Enter `SurveyMonkey Credentials`.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth profile you created when you registered the SurveyMonkey app as an OAuth provider. Select **Survey Monkey default_profile**.
Applies to	MID Servers that can use this credential. Select **All MID Servers**.
Order	Order to apply this credential. Enter `100`.

   e. Right-click the form header and click **Save**.

4. Create a connection record.

   a. Navigate to **Connections & Credentials** > **Connection & Credential Aliases**.

   b. Open for the record for **SurveyMonkey**.

   c. From the **Connections** tab, click **New**.
   The system displays a blank HTTP(s) Connection form.

   d. On the form, fill these values.

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Field	Value required
Name	Name to uniquely identify the connection record. Enter`SurveyMonkey Connection`.
Credential	Credential record you created for Zoom. Select **SurveyMonkey Credentials**.
Connection alias	Alias record associated with this connection.
Connection URL	Base URL to connect to your SurveyMonkey account. Enter `https://api.surveymonkey.net`.
Active	Option to actively use the connection.
Domain	Domain that the action or activity runs in.

e. **Optional:** In the **Attributes** tab, provide your SurveyMonkey API version if it is different than the default value of v3.

f. Click **Submit**.

The ServiceNow instance and SurveyMonkey account are integrated.

Tableau spoke

The Tableau spoke provides actions to view and analyze meaningful usage data for software subscriptions so that you can reclaim stale licenses.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Supported versions

This spoke was built for Tableau API version v3.21, but might be compatible with later versions.

Spoke requirements

- Tableau Cloud account
- Tableau Cloud Role required: Site administrator
- JSON Web Token (JWT) Connected App or Personal access token (PAT) to authenticate the ServiceNow instance.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

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- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Workflow Studio - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Tableau spoke provides actions to automate Tableau tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
User Management	Look up Users Stream	Retrieves users from the Tableau Cloud application.
	Remove User	Revokes a user license in the Tableau Cloud application.
Organization Management	Get Access Token	Gets the access token to authenticate the API calls.

Spoke user roles

The Tableau spoke provides the following user role to control access to data:

User role	Description
Tableau Admin (sn_tableau_spoke.tableau_admin)	Creates connections for the Tableau Cloud application.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For more information about setting up the spoke, see Set up the Tableau spoke.

Set up the Tableau spoke

Integrate your ServiceNow instance and Tableau Cloud to automate flows and perform actions on the Tableau Cloud application.

Before you begin

- Request an Integration Hub subscription.
- Activate the Tableau spoke.
- Tableau Cloud Role required: Site administrator.

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Procedure

Use one of the following authentication types to validate ServiceNow instance requests with the Tableau spoke.

- Personal Access Token (PAT)
- JSON Web Token (JWT)

a. Validate ServiceNow instance requests with the Tableau spoke using the PAT authentication type.

i. Log in to the Tableau Cloud account using admin credentials.

ii. Select your profile icon.

iii. Select **My Account Settings**.

iv. Scroll down to the **Personal Access Tokens** section on your profile page.

v. In the text field, provide a token name.

For example, `Test 1`.

vi. Select **Create Token**.

The Personal Access Token is generated with a Token name and Secret.

vii. To copy the Personal Access Token Secret, select **Copy Secret**.

> **Important:**
>
> Keep the Personal Access Token Secret at a secure place. You would need it when you create a connection record for Tableau.

b. Validate ServiceNow instance requests with the Tableau spoke using the JWT authentication type.

i. Log in to the Tableau Cloud account using admin credentials.

ii. Select your profile icon.

iii. From the left-pane, select **Settings**.

iv. Select the **Connected Apps** tab.

v. On the Connected Apps page, select the **Direct Trust** option from the **New Connected Apps** drop-down list.

vi. In the **Create Connected App** dialog box, fill in the Connected app name, Access level, and Domain allow list details.

vii. Select **Create**.

The Connected App that you created gets displayed on the Connected Apps page. By default, the Connected App is inactive.

viii. To enable the Connected App, select the ellipsis icon (•••) in the Actions column and select **Enable**.

The status of the Connected App shows as enabled.

ix. Select the Connected App name.

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Keep the Secret ID and Secret value at a secure place. You would need it when you create a connection record for Tableau.

x. To copy the Client ID, select **Copy Client ID**.

Keep the Client ID at a secure place. You would need it when you create a connection record for Tableau.

What to do next

Create a connection and credential for the Tableau spoke

Create a connection and credential for the Tableau spoke

Create a connection and credential record for the Tableau Cloud application. The Tableau connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: ServiceNow admin or Tableau Cloud Site administrator

Register your Tableau Cloud application.

- If you're using the Personal Access Token (PAT) authentication type, record the Personal Access Token Secret.
- If you're using the JSON Web Token (JWT) authentication type, record the Client ID and Client Secret.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Select the **TableauCloud** record.
   The Connection & Credential Aliases page opens.
3. Under the Related Links section, select **Create New Connection & Credential**.
4. In the dialog box, fill in the fields.

Create Connection and Credential

Field	Description
Please Enter the Connection Information	
Connection Name	Name of the connection. This field is automatically set to *Tableau Cloud* Connection.
Connection URL	The URL used for connecting to the server on which Tableau Cloud is installed.
Content URL	The permanent name of the site to sign in to. The content URL appears in the URL path of Tableau content in your browser address bar after the Tableau Server URL. mySite is the content URL in the following example: `http://<server or cloud URL>/#/site/mySite/explore`.
Please Enter the Credential Information	

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Field	Description
Select the PAT or JWT authentication type. The fields change based on the authentication type that you select.	
Fields for the PAT authentication type	
Token Name	The Token name that you provided while setting up the Tableau spoke by using the PAT authentication type. For more information, see Set up the Tableau spoke
Token Secret	The Token secret that you copied while setting up the Tableau spoke by using the PAT authentication type. For more information, see Set up the Tableau spoke. .
Expiry Interval (sec)	Life span of the generated Personal Access Token (PAT). Default value: 14400 sec **Important:** You mustn't modify the value of this field.
Fields for the JWT authentication type	
Secret ID	The Secret ID that you copied while setting up the Tableau spoke by using the JWT authentication type. For more information, see Set up the Tableau spoke.
Secret Value	The Secret Value that you copied while setting up the Tableau spoke by using the JWT authentication type. For more information, see Set up the Tableau spoke.
Username	User name, that is, the email address of the authenticated Tableau Cloud user.
Client ID	The Client ID that you copied while setting up the Tableau spoke by using the JWT authentication type. For more information, see Set up the Tableau spoke.
Expiry Interval (sec)	Life span of the generated JSON Web Token (JWT).

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Field	Description
	Default value: 3600 sec **Important:** You mustn't modify the value of this field.

5. Select **Create and Get OAuth Token**.

Result
A connection and credential record is created in the ServiceNow instance.

Trello Spoke

Manage Trello Enterprise subscriptions using your ServiceNow instance. Analyze data usage for Trello enterprise and reclaim idle subscriptions.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Trello spoke v1.5.1 is the latest version. For version history of the spoke, see Trello spoke release notes.

Spoke requirements

- Trello Enterprise admin access
- Ensure that your Trello subscription is linked to Atlassian account.
- Ensure that your authorized account has both Trello Enterprise admin and Atlassian account admin access.

Spoke dependencies

If you’re having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

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Spoke flows

The Trello spoke provides the Upsert Trello Board flow to check if a new board has been created in the Trello Boards table, or if an existing board has been updated and accordingly synchronizes it in Trello. To customize the sample flow, copy it to the required application scope.

Spoke subflows

The Trello spoke provides the Process Trello Webhook subflow to retrieve data based on the changes happening in Trello. The subflow is executed when the webhook is triggered. To customize the sample flow, copy it to the required application scope.

Spoke actions

The Trello spoke provides actions to automate Trello tasks when events occur in your ServiceNow instance. Available actions include:

Category	Action	Description
Retrieve Actions	Look up Action by ID	Retrieves details of the required action.
	Look up Actions by Board ID	Retrieves details of actions from the specified board.
	Look up Actions by Card ID	Retrieves details of the actions from the specified card.
	Look up Actions by List ID	Retrieves details of the actions from the specified card.
	Look up Actions by Organization ID	Retrieves details of actions from the specified organization.
	Update Action	Updates content of a comment for an action.
Attachment Management	Create Attachment on Card	Attaches a file to the required card.
	Delete Attachment by ID	Deletes the specified attachment.
	Look up Attachment by ID	Retrieves details of the required attachment.
	Look up Attachments by Card ID	Retrieve attachments on card.
Board Management	Create Board	Creates a board with the provided details.
	Delete Board by ID	Deletes the specified board.
	Look up Board by ID	Retrieves details of the required board.
	Look up Boards by Organization ID	Retrieves details of boards from the specified organization.
	Update Board	Updates details of the specified board.
Card Management	Create Card	Creates a card with the provided details.
	Delete Card by ID	Deletes the specified card.
	Look up Card by ID	Retrieves details of the required card.

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Category	Action	Description
	Update Card	Updates details of the card.
Checklist Management	Create Checklist	Creates a checklist with the provided details.
	Look up Checklist by ID	Retrieves details of the required checklist.
Custom Field Management	Create Custom Field	Creates a custom field with the provided details.
	Look up Custom Field by ID	Retrieves details about the required custom field.
Label Management	Look up Label by ID	Retrieves details of the required label.
List Management	Create List	Creates a list with the provided details.
	Look up List by ID	Retrieves details of the specified list.
Organization Management	Look up Organization by ID	Retrieves details of the required organization.
Sticker Management	Add Sticker to Card	Adds a sticker to the required card.
	Delete Sticker by ID	Deletes the specified sticker.
	Look up Sticker by ID	Retrieves details of the required sticker.
	Look up Stickers by Card ID	Retrieves details of stickers on a card.
	Update Sticker	Updates details of the specific sticker.
User Management	Look up Enterprise ID	Retrieves the organization ID of the authenticated user account.
	Look up Enterprise Members Stream	Retrieves details of all members in an enterprise organization.
	Update Active Status of Enterprise Member	Updates the active status of the specified member in an enterprise.
	Update License Status of Enterprise Member	Updates whether the provided member should use one of the enterprise's available licenses or not.
Webhook Management	Create Webhook	Creates a webhook with the provided details.
	Delete Webhook by ID	Deletes the specified webhook.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Spoke modules

The Trello spoke adds the Trello Spoke application to ServiceNow instance. The Trello Spoke application includes these modules:

Module	Description
Boards	Enables you to create boards in Trello. When you create a record here, the Upsert Trello Board flow is triggered and creates or updates the board details in Trello.

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Module	Description
Remote Table	
Users	Enables you to access the Trello user details.
Webhook	
Routing Policies	Stores the routing policies of the Trello webhook. A default record is available along with the spoke. You can customize the default routing policy as per your requirement.
Webhook Registries	Stores the webhook registries. The webhook registry registers a Trello webhook in ServiceNow to notify ServiceNow when certain events occur in Trello. You can create a webhook for the required board. When any changes occur in the board, the webhook is triggered, the Process Trello Webhook subflow is executed, and the board changes can be viewed in the subflow logs.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Generate Trello API key and token and Create a Trello connection.

Set up the Trello spoke

Integrate the ServiceNow instance and Trello by creating an API key in Trello to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Trello spoke.
- Role required: admin.

Generate Trello API key and token

Generate a Trello API key and token to get access to the Trello portal.

Before you begin

Trello Role required: admin

Verify that you have a managed user account and Atlassian admin access.

Procedure

1. Go to Trello.
2. Log in as an enterprise admin.

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3. Go to Developer API Keys.
4. Copy the API key from Personal Key on the Developer API keys page.
5. In the following link, replace {YourAPIKey} with the API key that you copied in the last step and open the link.
   `https://trello.com/1/authorize?expiration=never&scope=read,write,account&response_type=token&name=ServerTo`

   For example, if your API key is 123xyz, then open the following link- `https://trello.com/1/authorize?expiration=never&scope=read,write,account&response_type=token&name=ServerTo`

   The MyPersonalToken page appears and asks if you want to give access to your account.
6. Select **Allow**.
   An API token is generated. Copy this API token and store it securely.

Create a Trello connection

Set up your ServiceNow instance to add the Trello API key and API token.

Before you begin

ServiceNow Role required: admin

Procedure

1. Log in to your ServiceNow instance.
2. Navigate to **Process Automation** > **Flow Designer**.
3. Select the **Connections** tab.
4. Locate the Trello Alias connection alias and select **View Details**.
5. Configure the Trello spoke.
   - If you're configuring the spoke for the first time, select **Configure**.
   - If you aren't configuring the spoke for the first time, select **Edit**.
6. On the form, fill in the fields.

Edit Connection form

Field	Description
Connection Name	Name to identify the connection record.
Connection URL	Enter the URL as `https://api.trello.com/`.
API Key	The API key that you copied from the Trello portal.
API Token	The API token that you copied from the Trello portal.

7. Select **Configure Connection**.

Set up a webhook

Configure a webhook to subscribe to Trello with a ServiceNow callback URL.

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Before you begin
Role required: admin

Procedure
1. Log in to your ServiceNow instance as an admin.
2. Copy the value of base API path.
   a. Navigate to **All** > **System Web Services** > **Scripted Web Services** > **Scripted REST APIs**.
   b. Locate the record, **Trello Webhooks**.
   c. Copy the value populated in **Base API path** and record it for later use.
3. Create a webhook registry for the Trello spoke.
   a. Navigate to **All** > **Trello Spoke** > **Webhook** > **Webhook Registries**.
   b. Click **New**.
   c. On the form, fill the values.

Field	Description
Name	Name to identify the webhook registry record.
Path	Base API path URL you had copied.
Token	Token record as per your requirement.

   d. Right-click the form header and click **Save**.
   e. Click **Callback URL**.

      The webhook callback URL is generated and displayed.

   f. Copy the webhook callback URL and record it for later use.

What to do next
Provide the webhook callback URL when you run the Create Webhook spoke action. For the required board the webhook is created.

Twilio Spoke

Use the Twilio spoke to send SMS, make voice calls, create conference calls, manage calls, manage short codes, notify services, and messaging services.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Twilio spoke v1.2.0 is the latest version. For version history of the spoke, see Twilio spoke release notes.

Supported versions

This spoke was built for Twilio Base version 2010-04-01, Twilio Messaging version v1, and Twilio Notify version v1, but may be compatible with later versions.

Spoke requirements

- Twilio account.
- **AccountSid** and **AuthToken** of the account to create a Basic Auth credential.
- The following plugins are installed when you install the Twilio spoke.
  - ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
  - ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
  - ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)

See Twilio documentation for instructions on creating an account.

Spoke actions

The Twilio spoke provides actions to automate sending SMS, making voice calls, and creating conference calls when events occur in ServiceNow. Available actions include:

Category	Action	Description
Account Management	Create Application	Creates an application resource in a Twilio account.
	Delete Application	Deletes an application resource from a Twilio account.
	Get Application	Retrieves the required application resource.
	Look Up Accounts	Retrieves the account resources in a Twilio account. The list includes the account and its sub-account resources.
	Look Up Applications	Retrieves the application resources in a Twilio account.
	Update Application	Updates properties of an application resource in a Twilio account.
Call Management	Dequeue Call	Removes a call from a queue.
	Get Call	Retrieves the required call resource.
	Get Incoming Phone Number	Retrieves the incoming phone number resource.
	Hang Up Call	Ends a call in progress.
	Look Up Incoming Phone Numbers	Retrieves the incoming phone number resources in a Twilio account.

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Category	Action	Description
	Make a Call With Recording	Places a call to a phone number and records the call.
	Make a Call Without Recording	Places a call to a phone number and doesn't record the call.
	Modify Call	Modifies a call in progress.
	Mute Or Unmute Participant	Mutes or unmutes a participant resource in a conference call.
	Remove Participant From Conference Call	Removes a participant resource from a conference call.
	Update Incoming Phone Number	Updates properties of an incoming phone number resource in a Twilio account.
Messaging Service Management	Add Phone Number To Messaging Service	Adds a phone number resource to the messaging service.
	Add Short Code To Messaging Service	Adds a short code resource to the messaging service.
	Create Messaging Service	Creates a new messaging service resource in a Twilio account.
	Delete Messaging Service	Deletes a messaging service resource from a Twilio account.
	Look Up Messaging Service Phone Numbers	Retrieves the phone number resources in a messaging service.
	Look Up Messaging Service Short Codes	Retrieves the short code resources associated with a messaging service.
	Look Up Messaging Services	Retrieves the messaging service resources in a Twilio account.
	Remove Phone Number From Messaging Service	Removes a phone number resource from a messaging service.
	Remove Short Code From Messaging Service	Removes a short code resource from a messaging service.
Notification Service Management	Create Notify Service	Creates a new notify service resource in a Twilio account.
	Delete Notify Service	Deletes a notify service resource from Twilio account.
	Look Up Notify Services	Retrieves the notify service resources in a Twilio account.
Short Code Management	Get Short Code	Retrieves a short code resource.
	Look Up Short Codes	Retrieves the short code resources of a Twilio account.
	Reset Short Code	Resets the short code resource.
	Update Short Code	Updates properties of a short code resource in a Twilio account.

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Category	Action	Description
Text Messaging	Send Bulk SMS	Sends an SMS to multiple phone numbers.
	Send SMS	Sends an SMS to a phone number.

Note: To receive information about Status Callbacks, you must configure webhooks in Twilio. See Twilio documentation for instructions on creating and configuring webhooks.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Note: Three connection and credential alias records are needed for the Twilio spoke. One each for Twilio Base, Twilio Notify, and Twilio Messaging. Each alias should be associated with the respective Twilio API.

For information about setting up the spoke, see Set up Twilio spoke.

Set up Twilio spoke

Integrate the ServiceNow instance and Twilio using basic authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Twilio spoke.
- Role required: admin.

Configure connection for Twilio spoke

Add and configure Twilio Base, Twilio Messaging, and Twilio Notify connections to authenticate ServiceNow requests in Twilio spoke.

Before you begin

Role required: admin

Procedure

1. Configure the **Twilio_Base** connection alias.
   a. Navigate to **All** > **Process Automation** > **Workflow Studio**.
   b. Click the **Integrations** tab.
   c. Under **Connections**, toggle and enable the **Outbound** connections.
   d. Locate the alias for **Twilio_Base** and click **View Details**.

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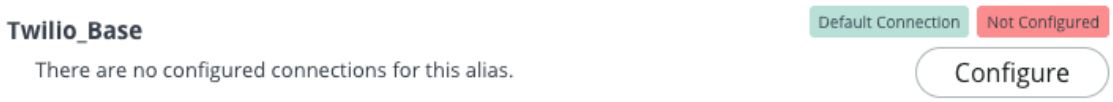
- To configure the default connection and credential alias record that is shipped along with the Twilio spoke, click **View Details**.



- To manage more than one Twilio Base spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



e. On the form, fill in the fields.

Connection form

Field	Description
Connection Name	Name to uniquely identify the connection record. For example, enter `Twilio_Base`.
Connection URL	Connection URL for Twilio Base. This field is automatically set to `https://api.twilio.com`.
Account SID	Account String Identifier (SID) of Twilio Base.
Page Size	Page size for data stream of Twilio Base.
Credential Name	Name to uniquely identify the Twilio Base credential record. For example, `Twilio Base Spoke Credential`.
User name	Account String Identifier (SID) of Twilio Base.
Password	Auth Token of the Twilio account.

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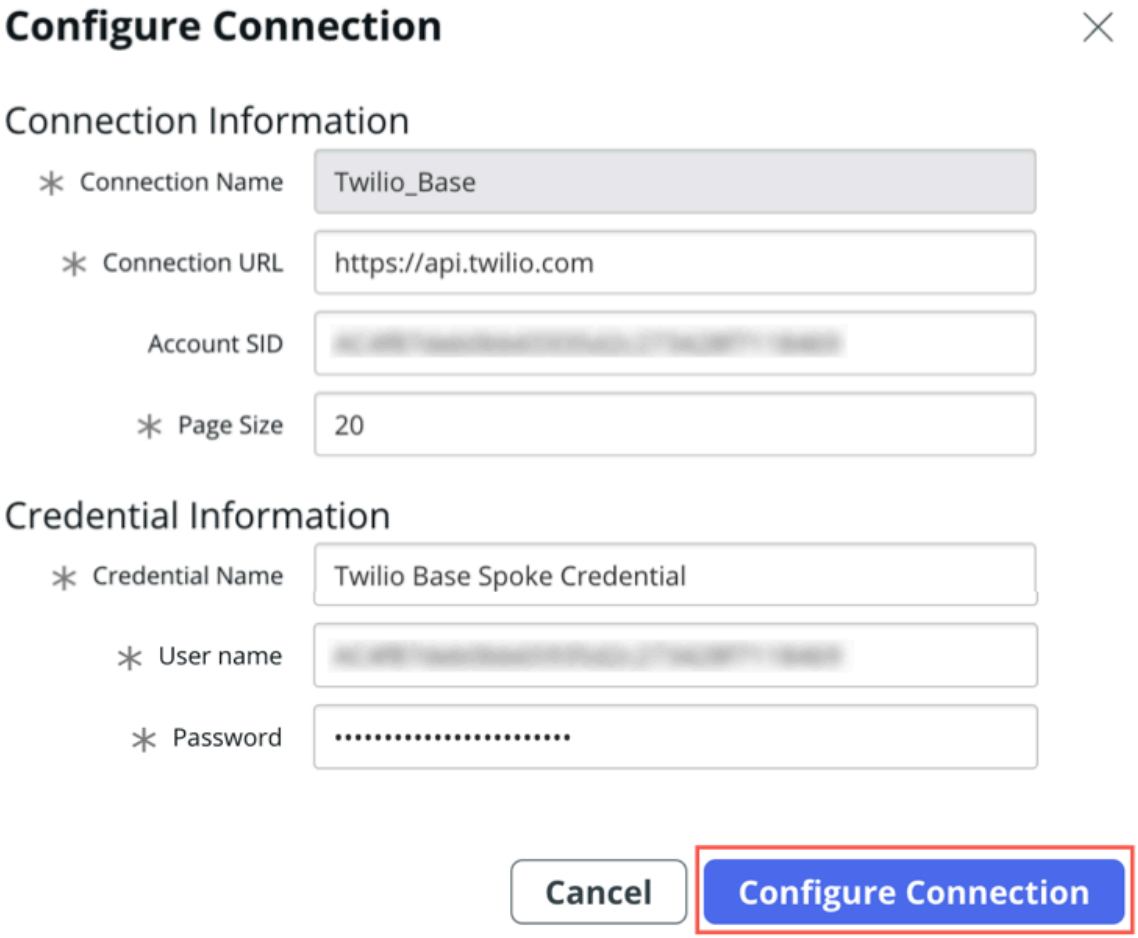

f. Click **Configure Connection**.

2. Configure the **Twilio_Messaging** connection alias.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Integrations** tab.

c. Under **Connections**, toggle and enable the **Outbound** connections.

d. Locate the alias for **Twilio_Messaging** and click **View Details**.

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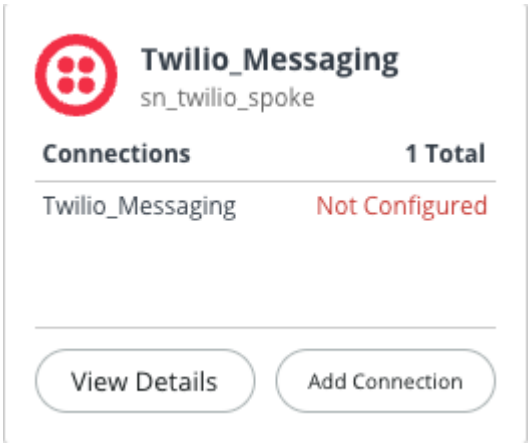
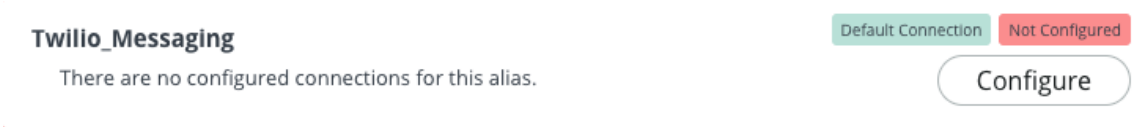
- To configure the default connection and credential alias record that is shipped along with the Twilio spoke, click **View Details**.



- To manage more than one Twilio Messaging spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



e. On the form, fill in the fields.

Connection form

Field	Description
Connection Name	Name to uniquely identify the connection record. For example, enter `Twilio_Messaging`.
Connection URL	Connection URL for Twilio Messaging. This field is automatically set to `https://messaging.twilio.com`.
Account SID	Account String Identifier (SID) of Twilio Messaging.
Page Size	Page size for data stream of Twilio Messaging.
Credential Name	Name to uniquely identify the Twilio Messaging credential record. For example, `Twilio Messaging Spoke Credential`.
User name	Account String Identifier (SID) of the Twilio Messaging account.
Password	Auth token of the Twilio account.

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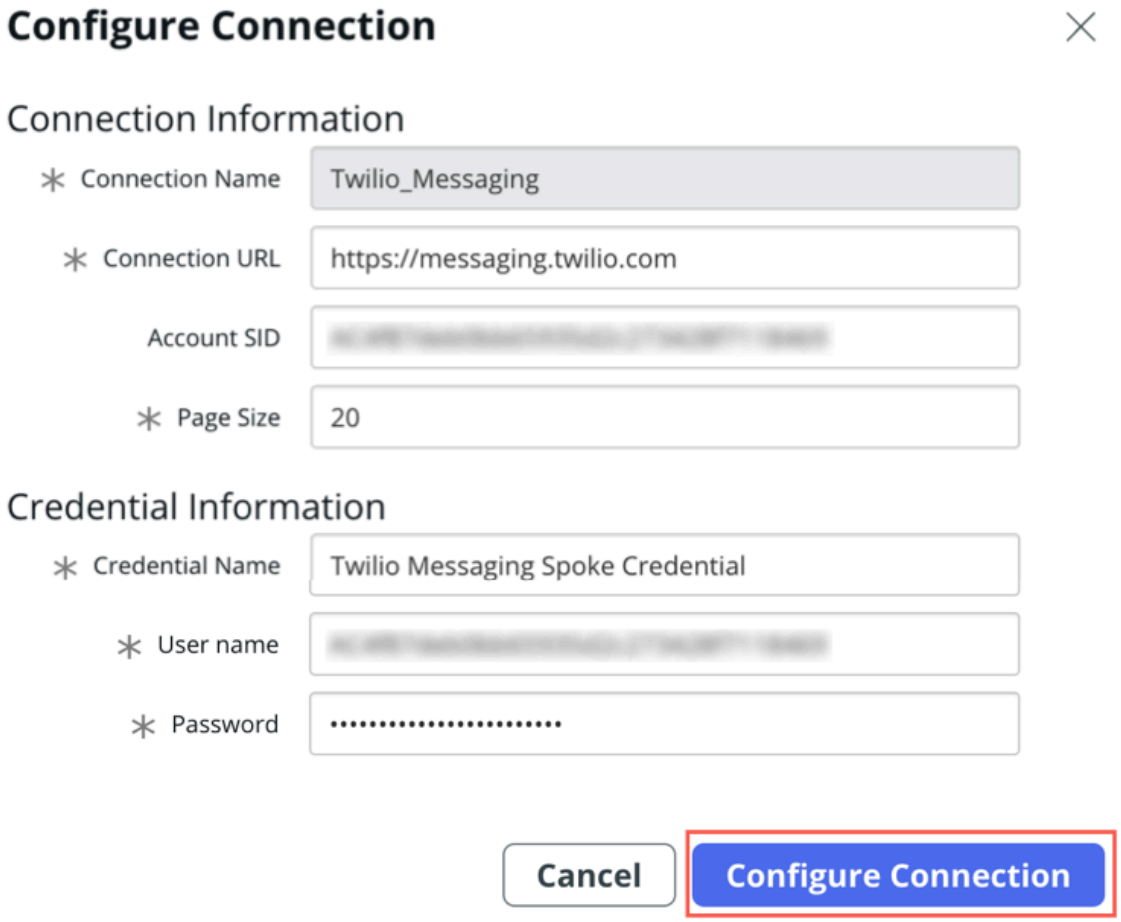

f. Click **Configure Connection**.

3. Configure the **Twilio_Notify** connection alias.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Integrations** tab.

c. Under **Connections**, toggle and enable the **Outbound** connections.

d. Locate the alias for **Twilio_Notify** and click **View Details**.

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- To configure the default connection and credential alias record that is shipped along with the Twilio spoke, click **View Details**.



- To manage more than one Twilio Notify spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you are configuring the spoke for the first time, click **Configure**. Otherwise, click **Edit**.



e. On the **Connection** form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection record. For example, enter `Twilio_Notify`.
Connection URL	Connection URL for Twilio Notify. This field is automatically set to `https://notify.twilio.com`.
Account SID	Account String Identifier (SID) of Twilio Notify.
Page Size	Page size for data stream of Twilio Notify.
Credential Name	Name to uniquely identify the Twilio Notify credential record. For example, `Twilio Notify Spoke Credential`.
User name	Account String Identifier (SID) of the Twilio Notify account.
Password	Auth token of the Twilio account.

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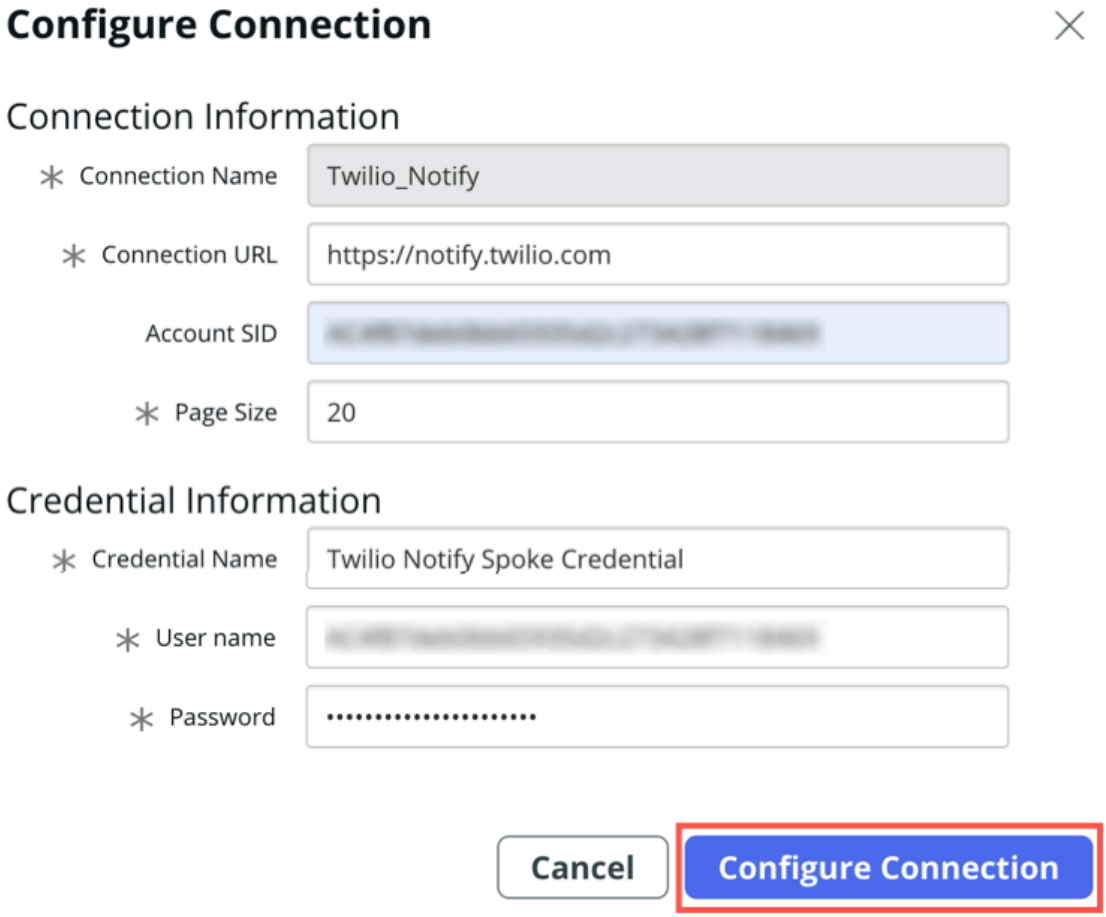

f. Click **Configure Connection**.

Result
The spoke connection is configured and ready to be used.

UCF Spoke

Manage processes to collect and coordinate the compliance requirements applicable to your organization from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

UCF spoke v1.1.0 is the latest version. For version history of the spoke, see UCF spoke release notes.

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Supported version

This spoke was built for UCF v2.0, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke requirements

- Common Control Hub (CCH) account
- CCH administrator credentials

Spoke actions

The UCF spoke provides actions to automate UCF tasks when events occur in ServiceNow. Available actions include:

Category	Action	Description
Content Record Management	Get Authority Documents	Retrieves authority documents that are downloaded from the UCF Common Controls Hub.
	Get Citation Control Objective Mapping	Retrieves the Citation and Control objective mapping information.
	Get Citation Documents	Retrieves the citations that are downloaded from the UCF Common Controls Hub.
	Get Control Objective Documents	Retrieves the citation to controls that are downloaded from the UCF Common Controls Hub.
Metadata Retrieval	Get Authority Document List	Retrieves the current user's authority document lists.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the UCF spoke.

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Set up the UCF spoke

Integrate the ServiceNow instance and UCF by creating a custom OAuth application in UCF to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the UCF spoke.
- Role required: admin.

Create an application in UCF

Create an application in Common Controls Hub (CCH) to enable OAuth 2.0 authentication with the UCF spoke.

Before you begin

Role required: CCH administrator

Procedure

1. Create an application in UCF.
   For a step-by-step procedure to create an application using your CCH account, see the CCH Support documentation.
2. While creating the application, ensure that you provide this information:
   - **Redirect URL**: ServiceNow instance URL in the format, `https://<Instance-Name>.service-now.com/oauth_redirect.do`
   - **Authorization URL**: Location on your website to which CCH redirects the interested users.
3. Copy and record the **Client ID** and **Client Secret** for later use.

Result

The application is created in CCH to enable OAuth 2.0 authentication with the UCF spoke.

Configure a connection for the UCF spoke

Add and configure a UCF connection to authenticate ServiceNow requests in the UCF spoke.

Before you begin

Role required: admin

Procedure

1. Navigate to **Process Automation** > **Flow Designer**.
2. Click the **Connections** tab.
3. Locate the **UCF** connection alias and click **View Details**.
4. Click **Edit** or if you are configuring the spoke for the first time, click **Configure**.
5. On the form, fill in the values.

Field	Description
Connection Name	Name to identify the connection record.
Connection URL	Enter `https://api.unifiedcompliance.com/`.

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Field	Description
OAuth Entity Name	Name to identify the OAuth entity record.
OAuth Client ID	Client ID created during the application configuration in CCH.
OAuth Client Secret	Client Secret created during the application configuration in CCH.
OAuth Redirect URL	OAuth callback endpoint. System generates the URL upon saving the application registry. This is the URL of the ServiceNow instance in this format: `https://<Instance-Name>/service-now.com/oauth_redirect.do`.

6. Click **Create and Get OAuth Token**.

Udemy Spoke

Manage the courses on the Udemy platform from your ServiceNow instance. For example, get the details of all the courses on Udemy by executing a spoke action from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Udemy spoke v1.0.2 is the latest version. For version history of the spoke, see Udemy spoke release notes.

Supported versions

This spoke was built for Udemy API version v2, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

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Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation. To get help on the licenses, contact your account manager.

Spoke actions

The Udemy spoke actions automate how you manage the courses on the Udemy platform. Available actions include:

Category	Action	Description
Default	Look up Courses Stream	Gets the details of the courses on Udemy. For example, course length, description, video duration, and the course title.
Learning Management	Look up Course Synchronization Stream	Retrieves details of the courses. For example, course title, description, and duration. If the action is successfully executed, the status is "Success", or else, the status is "Failure" and an appropriate error code is shown.
	Look up Course Synchronization Token	Retrieves the synchronization token to fetch the next set of updated or created course.
	Look up User Course Activity Stream	Retrieves the data on the progress made by the course subscriber.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Udemy spoke.

For information about setting up the spoke, see Set up the Udemy spoke

Set up the Udemy spoke

Create an Udemy API key and configure a Udemy spoke connection to enable your ServiceNow instance to authenticate with Udemy and access data.

Before you begin

- Request an Integration Hub subscription.
- Activate the Udemy spoke plugin.
- Ensure that you have the admin access to the Udemy instance.
- Role required: admin.

UiPath Spoke

Automate business processes in UiPath from your ServiceNow® instance.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

IntegrationHub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

UiPath spoke v2.6.0 is the latest version. For version history of the spoke, see UiPath spoke release notes.

Supported version

This spoke was built for these UiPath versions, but may be compatible with later versions.

- Platform version 2020.4.1
- Cloud Platform version 2022.7.14

Spoke requirements

Ensure that you have UiPath account information before you Set up the UiPath spoke.

- If you are using the UiPath Cloud Platform:
  - Token URL
  - Client Id
  - Account Logical Name
  - Tenant Logical Name
  - User Key
- If you are using the UiPath Platform installed on private or public cloud:
  - Tenant Name
  - Credentials to authenticate the UiPath Orchestrator API

See the UiPath documentation for more information about obtaining the required details.

Spoke subflows

The UiPath spoke provides subflows to retrieve information about jobs, processes, robots, and so on. Available subflows include:

Subflow	Description
Process UiPath Job Webhook	Retrieves information about the jobs in UiPath. This subflow is the answer for the default Flow: Process UiPath Job Webhook routing policy.
Process UiPath Process Webhook	Retrieves information about the processes in UiPath. This subflow is the answer for

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Subflow	Description
	the default Flow: Process UiPath Process Webhook routing policy.
Process UiPath Robot Webhook	Retrieves information about the robots in UiPath. This subflow is the answer for the default Flow: Process UiPath Robot Webhook routing policy.
Process UiPath Any Webhook	Retrieves information about any other required entity. To process information about the required entity, create a copy of this subflow and customize it as per your requirement.

Note: While customizing a new subflow, create a copy of one of the default subflows to ensure that all the default input payload items are present.

Spoke actions

The UiPath spoke provides actions to manage environments, jobs, machines, processes, robots, queue, and release, when events occur in ServiceNow. Available actions include:

Category	Action	Description
Environment Management **Note:** These actions work within classic folders only.	Look up Environment by ID	Retrieves the details of the required environment.
	Look up Environments	Retrieves the details of the required environments. The environments are retrieved based on the filter query.
	Look up Folders	Looks up folders under a tenant in UiPath and gets the folder name and ID.
Job Management	Look up Job By ID	Retrieves the details of the required job.
	Look up Jobs	Retrieves the details of the required jobs. The jobs are retrieved based on the filter query.
	Start Jobs	Starts the jobs to execute the required process. **Note:** When working with the modern folders, select either **Allocate Dynamically** from the **Execution Target** list.
Machine Management	Look up Machine By ID	Retrieves the details of the required machine.
	Look up Machines	Retrieves the details of the required machines. The machines are retrieved based on the filter query.
Process Management	Look up Processes	Retrieves the details of the required processes. The processes are retrieved based on the filter query.
Queue Management	Add Item to Queue	Adds a new item to the specified queue.

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Category	Action	Description
	Create Queue	Creates a queue with the specified configuration.
	Delete Queue	Deletes the specified queue.
	Delete Queue Item	Deletes the specified queue item.
	Look up Queue Items	Retrieves a list of queue item definition records.
	Look up Queues	Retrieves the details of the required queue definition records. The queues are retrieved based on the filter query.
Release Management	Look up Release By ID	Retrieves the details of the required release.
	Look up Releases	Retrieves the details of the required releases. The releases are retrieved based on the filter query.
Robot Management **Note:** These actions work within classic folders only.	Create Robot	Creates a robot in UiPath.
	Delete Robot	Deletes a robot in UiPath.
	Look up Robot By ID	Retrieves the details of the required robot.
	Look up Robots	Retrieves the details of the required robots. The robots are retrieved based on the filter query.
Session Management **Note:** These actions work within classic folders only.	Look up Sessions	Retrieves the details of the required sessions. The sessions are retrieved based on the filter query.

Spoke modules

The UiPath spoke adds the UiPath application to your ServiceNow instance. The UiPath application includes these modules:

Module	Description
UiPath Webhook Registries	Contains details about the webhook registry records.
UiPath Webhook Routing Policies	Contains details about the webhook routing policy records. Three routing policies are available with the spoke that retrieve information about jobs, robots, and processes.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when

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using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the UiPath spoke.

MID Server requirements

These actions use REST calls, which can run on an instance or MID Server. Use the connection record associated with the UiPath alias to configure where actions run as well as set MID Server selection attributes. For more information, see MID server.

Note: The MID Server users must have the sn_uipath_spoke.uipath_admin role.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Set up the UiPath spoke

Integrate the ServiceNow instance with your UiPath account to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the UiPath spoke.
- Role required: admin.

About this task

You can set up the UiPath spoke using OAuth authentication or API key as per your requirement.

- See Option 1: Using OAuth authentication to set up the UiPath spoke using OAuth authentication.
  - This authentication is available from UiPath spoke v2.2.1.
  - You can't use MID Server if you set up the spoke using OAuth authentication.
- See Option 2: Using API key to set up the UiPath spoke using API key.

Option 1: Using OAuth authentication

Integrate the ServiceNow instance with your UiPath account using OAuth to authenticate ServiceNow requests.

Before you begin

Role required: admin

Note:

- This authentication is available from UiPath spoke v2.2.1.
- You can't use MID Server if you set up the spoke using OAuth authentication.

Procedure

1. Register an application in your UiPath account.

   a. Log in to your UiPath account as an admin.

   b. Navigate to **Admin** > **External Applications**.

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c. Click **+ Add Application**.

d. On the form, fill these values.

Field	Description
Application Name	Name of the OAuth application.
Application Type	Type of OAuth application. Select **Confidential application**.
Resources	Required resource and scopes. i. Click **+ Add Scopes**. ii. Select **Orchestrator API Access** from the **Resource** list. iii. Select these application scopes: ▪ OR.Robots.Read ▪ OR.Robots.Write ▪ OR.Jobs.Read ▪ OR.Jobs.Write ▪ OR.Machines.Read ▪ OR.Execution.Read ▪ OR.Queues.Read ▪ OR.Queues.Write ▪ OR.Folders.Read iv. Click **Save**.
Redirect URL	ServiceNow instance redirect URL in this format: `https://<ServiceNow-instance>.service-now.com/oauth_redirect.do`

e. Click **Add**.
The application is registered and values of App ID and App Secret are displayed.

f. Copy and record the values of app ID and app secret.

2. In your ServiceNow instance, configure the required connection and credential alias.

a. Log in to your ServiceNow instance as an admin.

b. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.

c. Open the record for **UiPath**.

d. For **Configuration Template**, select **UiPath Configuration Template - OAuth Client Credentials**.

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e. Click the **Create New Connection & Credential** related link.

f. On the form, fill these fields.

Create Connection and Credential form

Field	Description
Connection information	
Name	Name to identify the OAuth application registry record.
Connection URL	Connection URL in this format: `https://{base_url}/{organization_name}/{tenant-name}/orchestrator_`. This URL depends on the type of UiPath deployment.
Credential information	
Name	Name to identify the credential record.
Token URL	Location of the token endpoint that the instance uses to retrieve and refresh tokens. This URL depends on the type of UiPath deployment.
OAuth Client ID	App ID you had copied after registering application in your UiPath account.
OAuth Client Secret	App secret you had copied after registering application in your UiPath account.
OAuth Redirect URL	ServiceNow instance redirect URL in this format: `https://<ServiceNow-instance>.service-now.com/oauth_redirect.do`.

g. Click **Create**.

h. Click **Submit**.
Connection and credential records are created.

i. Open the UiPath Connection record, from the **Connections** tab.

j. Select a value for the **Orchestrator Feature Enabled** field.

Result

The Connection and Credential alias is configured and the UiPath spoke is set up using OAuth authentication.

Option 2: Using API key

Integrate the ServiceNow instance with your UiPath account using API key to authenticate ServiceNow requests.

Before you begin

Role required: admin

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Procedure

1. From your UiPath cloud account, obtain the values of the required API refresh tokens.

   Note: These steps are applicable to UiPath cloud account.

   a. Log in to your UiPath account as an admin.

   b. Navigate to **Preferences** > **Privacy & Security**.

   c. For the required tenant, click **View API access**.
   The values of **User Key**, **Organization ID**, **Tenant Name**, and **Client ID** are displayed.

   d. Copy and record these values.

2. In your ServiceNow instance, configure the required connection and credential alias.

   a. Log in to your ServiceNow instance as an admin.

   b. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.

   c. Open the record for **UiPath**.

   d. For **Configuration Template**, select **UiPath Configuration Template - UiPath Cloud** or **UiPath Configuration Template - Private/Public Cloud** as per your requirement.

   e. Click the **Create New Connection & Credential** related link.

   f. On the form, fill these fields.

   - If you have selected **UiPath Configuration Template - UiPath Cloud** for **Configuration Template**, fill these fields.

     Note: This option is applicable if you are using UiPath cloud account.

     Create Connection and Credential form

Field	Description
Connection Name	Name to identify the connection record. For example, `UiPath Connection`.
Connection URL	Connection URL in this format: `https://platform.uipath.com/<account-logical-name>/<instance-logical-name>`
Credential Name	Name to identify the credential record. For example, `UiPath Credential`.
Token URL	Location of the token endpoint that the instance uses to retrieve and refresh tokens. For example, `https://account.uipath.com/oauth/token`.
Client Id	Value of client ID you had copied from the UiPath Orchestrator application.
Account Logical Name	Organization ID you had copied from the UiPath Orchestrator application.

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Field	Description
Tenant Logical Name	Tenant name you had copied from the UiPath Orchestrator application.
User Key	User key you had copied from the UiPath Orchestrator application.

- If you have selected **UiPath Configuration Template - Private/Public Cloud** for **Configuration Template**, fill these fields.

Create Connection and Credential form

Field	Description
Connection Name	Name to identify the connection record. For example, `UiPath Connection`.
Connection URL	UiPath instance URL.
Credential Name	Name to identify the credential record. For example, `UiPath Credential`.
Token URL	Location of the token endpoint that the instance uses to retrieve and refresh tokens in this format: `http://<instance-URL>/api/account/authenticate`
Tenant Name	Tenant logical name.
Username or email	Username or email address to authenticate the UiPath Orchestrator API.
Password	Associated password.

Note:

- You must enable **Use MID server** option in the connection record and create a SSL certificate from a trusted authority for on-prem support.
- The MID Server users must have the sn_uipath_spoke.uipath_admin role.

g. Click **Create**.

h. Click **Submit**.
Connection and credential records are created.

i. Open the UiPath Connection record, from the **Connections** tab.

j. Select a value for the **Orchestrator Feature Enabled** field.

Result
The Connection and Credential alias is configured and the UiPath spoke is set up using API key.

Set up the webhook

Configure a webhook to subscribe to events in the UiPath account with a ServiceNow callback URL.

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Before you begin

- Set up the UiPath spoke
- Role required: sn_uipath_spoke.uipath_webhook_registry_user and decision_table_writer, or admin

Procedure

1. Create webhook registry in your ServiceNow instance.

   a. Log in to your ServiceNow instance.

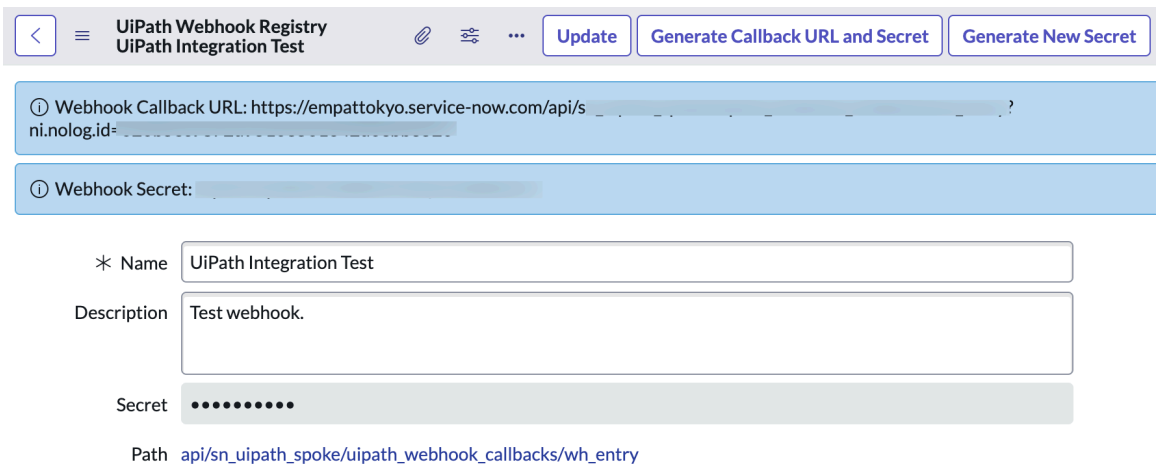
   b. Navigate to **UiPath** > **UiPath Webhook Registry**.

   c. Click **New**.

   d. On the form, fill these values.

Field	Description
Name	Name to identify the webhook registry record,
Description	Description of the webhook registry.

   e. Click **Generate Callback URL and Secret**.
   Webhook callback URL and secret are generated and displayed.



   f. Copy and record the values of webhook callback URL and secret.

   Note: You can change the webhook secret periodically by clicking **Generate New Secret**. After changing the secret, the value must be updated in the UiPath account.

2. Specify the webhook routing policies in your ServiceNow instance.

   a. Log in to your ServiceNow instance.

   b. Navigate to **UiPath** > **UiPath WebHook Routing Policies**.

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Three routing policies are available along with the spoke. You can configure these records and can also create more records as per your requirement.

c. Open the required record.

d. Specify **Condition** that must be met.

e. For **Answer**, select the required subflow that must be triggered when the specified condition is met.

f. Click **Update**.

3. Register the callback URL in the UiPath account.

a. Log in to your UiPath account as an admin.

b. Navigate to **Orchestrator** > **Tenant**.

c. Click the **Webhooks** tab.

d. Click **+ Add webhook**.

e. On the form, fill these values.

Field	Description
URL	Webhook callback URL you had copied from your ServiceNow instance.
Enabled	Select this check box.
Secret	Webhook secret you had copied from your ServiceNow instance.
Event Type	Events for which you want to subscribe.

f. Click **Save**.

UKG Spoke

Manage time off requests in UKG from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

UKG spoke v3.6.1 is the latest version. For version history of the spoke, see Kronos spoke release notes.

Supported versions

This spoke was built for UKG version v1, but may be compatible with later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke flows

The UKG spoke provides sample flows to demonstrate automating the UKG tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Kronos - Create Manager Time Off Request	Creates the time of request for a manager or employee.
Kronos - Get New Refresh And Access Token	Retrieves access token for UKG and generates a new refresh token periodically.
Kronos - Refresh The Access Token	Refreshes the access token for UKG.
Kronos - Retrieve And Update Manager Time Off Request Status	Retrieves status of the time off request status and updates the details of the associated request item.
Kronos - Time Off Details House Keeping	Deletes the time off requests based on the provided criteria. By default, the flow deletes time off requests that have been approved 7 days ago.

Every flow triggers an associated subflow.

Spoke subflows

The UKG spoke provides sample subflows to demonstrate automating Kronos tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

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Subflow	Description
Kronos - Get Kronos Token	Uses the details provided during spoke setup to retrieve a valid refresh token from UKG.
Kronos - Create Manager Time Off Request	Creates the time off request and saves the information in your ServiceNow instance.
Kronos - Manager Time Off Request	Creates the time off request for a manager or employee.
Kronos - Retrieve Manager Time Off Request Status Update	Retrieves status of the time off request status and updates the details of the associated request item.
Kronos - Time Off Request Housekeeping	Deletes the time off requests based on the provided criteria. By default, the subflow deletes time off requests that have been approved 7 days ago.
Kronos - Report Missed Punches as Employee	This subflow creates a task which allows the employee's manager to punch the employee's missing entry.

Spoke actions

The UKG spoke provides actions to automate UKG tasks when events occurs in ServiceNow. Available actions include:

Category	Action	Description
Authentication Management	Get Kronos Refresh Token	Retrieves the Refresh Token for UKG.
	Get Kronos Token	Retrieves the Token for UKG.
Persons	Create Persons	Creates records for one or more persons.
	Retrieve Person by ID	Retrieves the details of a person for the specified record ID.
	Retrieve Persons	Retries the record details of a list of persons based on the search criteria.
	Update Persons	Updates the records of one or more persons.
Scheduling	Retrieve Manager Schedule	Retrieves the schedule of a list of employees.
Default	Add Timestamp	Adds or records a timestamp for a punch transaction of an employee.
	Approve Timecard Employee	Approves the employee timecard for the specified range of dates.
	Approve Timecard Manager	Adds manager approval for the specified employee's timecard.

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Category	Action	Description
	Look up Shift Cover Requests as Manager	Retrieves one or more shift cover requests matching specified search criteria.
	Look up Open Shifts Requests Manager	Retrieves a list of Open Shift Requests based on the Employee ID or Person Number.
	Look up Self Schedule Requests Manager	Retrieves a list of Self Schedule requests based on the Employee ID or Person Number.
	Look up Shift Swap Requests Manager	Retrieves a list of swap requests based on the Employee ID or Person Number.
	Look up Manager Availability Requests	Retrieves all availability requests for the given criteria.
	Retrieve Employee Timecard Request	Retrieves the timecard details of the specified employee.
	Retrieve Employee Timecards Request	Retrieves the details of a list of timecards for the specified employees or for the specified Hyperfind details.
	Retrieve Manager Timecard	Retrieves the timecard of the specified manager.
	Retrieve Manager Timecards	Retrieves the details of a list of timecards for the specified mangers or the specified Hyperfind details.
	Retrieve Timecard Approvals Employee	Retrieves a list of employee timecard approvals for the specified date range.
	Retrieve Timecard Approvals Manager	Returns a list of manager timecard approvals for the specified date range.
	Update Timecard	Updates the timecard of the specified employee.
Metadata Retrieval	Get Accrual Codes	Retrieves a list of accrual code types according to the user's access rights.
	Look Up Cost Centers	Retrieves a list of available cost centers.
	Look Up Jobs	Retrieves a list of available jobs.

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Category	Action	Description
	Look Up Labor Categories	Retrieves a list of available categories.
	Look Up Labor Category Entries	Retrieves a list of available labor category entries.
	Look Up Work Rules	Retrieves a list of available work rules.
	Retrieve Hyperfind Queries	Retrieves a list of Hyperfind queries.
	Retrieve Licenses	Retrieves a list of licenses.
	Retrieve Pay Rules	Retrieves a list of pay rules.
	Retrieve Symbolic Period ID	Retrieves the specified symbolic period.
	Retrieve All Pay Codes	Retrieves all the play code in UKG.
	Retrieve Employee Request Subtype	Retrieves a list of request subtypes associated with the required Person Number.
	Retrieve Manager Request Subtype By Employee ID	Retrieves a list of request subtypes associated with the required Employee ID.
	Retrieve Manager Request Subtype By Person Number	Retrieves a list of request subtypes associated with the required Person Number. The action output is necessary for subsequent actions such as, the Retrieve Employee Accrual Balance action from manager's perspective.
	Retrieve Manager Symbolic Amount Qualifiers By Employee ID	Retrieves different types of Retrieve Manager Symbolic Amount Qualifiers By Employee ID, such as half day, full day, and so on, based on Employee ID.
	Retrieve Manager Symbolic Amount Qualifiers By Person Number	Retrieves different types of Retrieve Manager Symbolic Amount Qualifiers By Employee ID, such as half day, full day, and so on, based on Person Number.
	Retrieve Symbolic Periods	Retrieves all the symbolic periods.

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Category	Action	Description
Scheduling Management	Create Employee Time Off Request	Creates a time off request based on the provided inputs.
	Create Manager Time Off Requests	Creates a time off request based on the provided inputs.
	Look up Employee Schedule	Retrieves the schedule of the employee.
	Retrieve Employee Accrual Balance	Retrieves details of the different types of employee accrual balance, such as PTO, sick days, and so on.
	Retrieve Employee Time Off Requests	Retrieves details of the time off requests based on the specified search criteria.
	Retrieve Manager Accrual Balance By Employee ID	Retrieves details of the different types of manager accrual balance using Employee ID.
	Retrieve Manager Accrual Balance By Person Number	Retrieves details of the different types of manager accrual balance using Person Number.
	Retrieve Manager Time Off Requests By Employee ID	Retrieves details of the time off requests based on the specified search criteria and Employee ID.
	Retrieve Manager Time Off Requests By Person Number	Retrieves details of the time off requests based on the specified search criteria and Person Number.
	Update Employee TimeOff Request	Updates the state of an employee time off request.
	Update Manager Time Off Requests	Updates the state of a manager time off request.
Timekeeping	Get Employee Accruals by Person Number	Retrieves different types of employee accrual balances.
	Retrieve Timecard Approvals Manager	Retrieves a list of timecard approvals within the specified date range.

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Spoke module

The UKG spoke adds a UKG application to your ServiceNow instance. The UKG application has these modules.

Module	Description
Credentials	Details of the UKG users with permissions to perform the required actions.
Time Off Request Details	Details of the time off requests, along with the status.
Time Off Request Details Staging Tables	Details of the time off requests from the staging tables.

UKG spoke account requirements

The UKG spoke requires registering an OAuth 2.0 application in your UKG account to generate OAuth 2.0 tokens for the UKG spoke. Record the generated Client ID, Client Secret, and Application key for later use.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the UKG spoke.

Set up the UKG spoke

Integrate your Kronos application with your ServiceNow instance. Register an OAuth application in Kronos and authenticate requests from ServiceNow.

Before you begin

- Request an Integration Hub subscription.
- Activate the UKG spoke.
- Kronos manager user or superuser credentials.
- Role required: admin.

Note: Make sure that the application registry, connections, and credentials are within the application scope.

You can choose to set up the UKG spoke using the connection template or using connection and credentials records according to your requirement.

Configure a connection for the UKG spoke

Add and configure a connection using the UKG spoke connection template in Flow Designer to authenticate ServiceNow requests to your UKG instance.

Before you begin

Request an Integration Hub subscription.

Activate the UKG Spoke.

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Role required: admin

Note: If you're updating from a previous version (before version 3.3.0) of the spoke, first you must remove the current connection record, credentials record, and Kronos user credentials. Then, you can set up the connection.

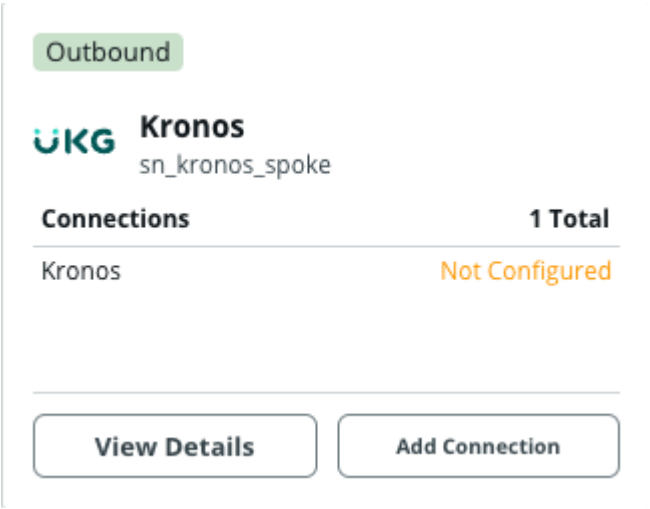
UKG has updated its authentication mechanism from legacy Auth to AuthN. If you're setting up the spoke for the first time, use AuthN to configure the spoke. If you have previously configured the spoke using the legacy Auth, you can continue using your existing configuration or migrate to AuthN.

Note: Verify that the application registry, connections, and credentials are within the application scope.

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select the **Connections** tab.
3. Locate the **UKG connection** alias and select **View Details**.

   Note: Don't select **Add Connection**.



4. Select **Edit**.
   If you're configuring the spoke for the first time, select **Configure**.



5. On the form, fill in the fields.

Field	Description
Connection Name	Name to uniquely identify the connection record. For example, enter Kronos Conn.
Connection URL	URL of the Kronos instance.
Realm	Realm of the Kronos instance.

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Field	Description
Username	Username to log in to the user's account in Kronos.
Password	Password of the Kronos user account.
OAuth Entity Name	Unique name to identify the OAuth entity profile of the UKG spoke. For example, select `UKG OAuth entity` .
OAuth Client ID	Client ID created during the application configuration in Kronos.
OAuth Client Secret	Client Secret created during the application configuration in Kronos.
Token URL	OAuth server token endpoint. For example, `https://<Kronos-Instance>.com/api/authentication/access_token`. **Note:** If you're using the AuthN mechanism,enter `https://welcome-eval.ukg.net/oauth/token`.

6. Select **Configure and Get OAuth Token**.
   A modal page displays to enter your Kronos credentials.
7. Enter your Kronos username and password and select **Get OAuth Token**.
8. If you're using the legacy Auth mechanism, you must provide user credentials.
   For more information, see Provide Kronos user credentials.
9. If you're using the legacy Auth mechanism, you must set the refresh token lifespan.
   a. Navigate to **All** > **System OAuth** > **Application Registry**.
   b. Open the record for the Kronos spoke.
   c. On the form, navigate to the **Refresh Token Lifespan** field.
   d. Enter `28800`.

Result
Once your OAuth token has been successfully fetched, you can begin using your UKG spoke connection.

Provide Kronos user credentials

Create a record to provide details and credentials of the required Kronos user. The Kronos spoke uses these user credentials to perform actions in Kronos.

Before you begin
Role required: admin.

Verify that you provide credentials of a manager user or Kronos superuser. With these credentials, time off requests of both employee and manager can be managed.

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Procedure

1. Navigate to **All** > **Kronos** > **Credentials**.
2. Select **New**.
3. On the form, fill in the fields.

Kronos Credentials form

Field	Descriptions
Name	Name to uniquely identify the record.
Application Key	Application Key of the Kronos user.
User name	User name to log in to the user's account in Kronos.
Password	Password of the Kronos user account.
Connection & Credential Alias	Default alias record associated with the Kronos spoke.
Refresh Token Expires	Date and time by when the Kronos refresh token expires. The Kronos spoke generates a new refresh token periodically, before the current refresh token expires.

4. Select **Submit**.
5. To generate the Kronos token, select the **Get Kronos Token** related link.

Result

The Kronos - Get Kronos Token subflow is triggered. The subflow uses the details provided during spoke setup to retrieve a valid refresh token from Kronos. The subflow then updates the value of **Refresh Token Expires**.

Note: To access more details about the Kronos refresh token, navigate to **System OAuth** > **Manage Tokens.**. Here, a record is created for each refresh token.

Create request as manager using the Kronos catalog item

Trigger events in Kronos when an item is requested in the Service Catalog.

Before you begin

- Set up the UKG spoke
- Role required: admin

About this task

The Kronos spoke adds a catalog item for use with the Kronos spoke sample flows.

Procedure

1. Navigate to **All** > **Self-Service** > **Service Catalog**.
2. Click **Kronos**.
3. Click **Kronos - Create Time Off Request As Manager (Super Access)**.
4. Provide details of the time off request.

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Note: After you have provided a valid **Employee ID** or **Person Number(Qualifier)**, the system may take some time to populate the values in the **Subtype Name using Employee ID** and **Symbolic Amount Qualifier By Employee ID**, or **Subtype Name using Person Number** and **Symbolic Amount Qualifier By Person Number** lists.

5. Click **Order Now**.
   A request item is generated and its generated number is displayed.
6. Click the request number and change the value of **Approval** to **Requested**, **Approved**, or **Rejected**.
7. Click **Update**.

Result

- The Kronos - Create Manager Time Off Request flow is triggered.
- A record is created in the Time Off Request Details module. The status of the time off request is updated when the Kronos - Retrieve And Update Manager Time Off Status flow is triggered.

Utility Actions Spoke

Create file attachments and zip attachments in your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Utility Actions spoke v1.4.1 is the latest version. For version history of the spoke, see Utility Actions spoke release notes.

Supported versions

This spoke is compatible with ServiceNow instance of Brazil and later versions.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Utility Actions spoke provides actions to automate tasks when events occur in your ServiceNow instance. Available actions include:

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Category	Action	Description
Default	Add File to Zip	Adds the file to list of files to be zipped.
	Append to Delimited File	Creates a file line record, corresponding to a row in the delimited file.
	Append to File	Creates a file line record, corresponding to a line in the file to be created.
	Begin File	Creates a file record, to which the actual file would be attached.
	Begin Zip	Creates a file set record, to which the zip file would be attached.
	Build File	Generates the file and attaches it to the file record specified.
	Build Zip	Generates the zip file and attaches it to the file set record specified. **Note:** This action requires at least one MID Server with the IntegrationHub Utilities capability.
Spoke Util Actions	Convert Record to Object	Converts the specified record into an object.
	Convert Record to Array of Objects	Converts the given list of records to an array of objects. **Note:** Flow designers must have read access to the sys_dictionary and sys_db_object tables to use this action as the table schema is being populated from these tables.
	Generate Encoded Query	Generates encoded query with the provided name and value pairs. The output encoded query can be used with any field that is of the type, dynamic template. For example, the encoded query output of the Generated Encoded Query action, can be given as an input for Additional Fields in the Create Issue action.
	Look up Latest Comment on Record	Retrieves the latest comment from the required record in ServiceNow instance. The output comment is in the form of a string.

Spoke module and tables

The Utility Actions spoke includes these tables:

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Table	Description	Fields
File [sn_utility_spoke_file]	Information about every file that has been created. The associated file is attached to the record. **Note:** You must specify **Schema** if you specify **Delimited File** for **File Type**.	• File Name • File Type • Schema
File Line [sn_utility_spoke_file_line]	Information about each row in delimited file.	• File • Line Content
File Mapping [sn_utility_spoke_file_mapping]	Information about files mapped to a ZIP file. For example, if four files are zipped to a ZIP file, four records are created in this table for each file.	• File • File Set
File Schema [sn_utility_spoke_file_schema]	Information regarding the delimited files.	• Schema Name • Columns • Delimiter • Has Header • Quoted
File Set [sn_utility_spoke_file_set]	Information about the zip files. The associated ZIP file is attached to the record.	Zip File Name

The Utility Actions spoke adds the IntegrationHub Utilities application to your instance and includes the File Schemas module. The module displays records from the File Schema table.

Auto Flush data retention policies are available for the File and File Set tables. By default, the system retains data in the spoke tables, except the File Schema table, up to 7 days.

Note:

- Auto Flush data retention policies don't apply to records in the File Schema table.
- When the file records in the File table are deleted, the corresponding file line records in the File Line table are also deleted.
- When the file set records in the File Set table are deleted, the corresponding file mapping records in the File Mapping table are also deleted.

To modify the data retention policy, change the value of **Age in seconds** in the Auto Flush form of the required table. For more information, see Autoflush form.

Connection and credential alias requirements

This spoke doesn't require configuration of connection and credential alias. For information about setting up the spoke, see Create schema.

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MID Server requirements

These actions use REST calls that can run either on an instance or, optionally, through a MID Server. For more information, see MID server.

Note:

- The Build Zip action in the spoke requires at least one MID Server with the capability IntegrationHub Utilities or ALL. To set up and configure the MID Server, user must have the role sn_utility_spoke.utility_actions_admin role.
- Create a MID Server property with **Value** as `*.service-now.com`.

To set up the MID Server for this spoke, see Set up MID Server for a spoke.

Create schema

Create schema to create delimited files in your ServiceNow instance.

Before you begin

- Request an Integration Hub subscription.
- Activate the Utility Actions spoke.
- Role required: sn_utility_spoke.utility_actions_admin.

Procedure

1. Navigate to **All** > **IntegrationHub Utilities** > **File Builder** > **File Schemas**.
2. Click **New**.
3. On the form, fill these values.

File Schema form

Field	Description
Schema Name	Name to identify the schema record. For example, `Incident Schema`.
Delimiter	Delimiter in the file. For example, `,` and `\t`. The default value is value is comma.
Has Header	Option to specify if the schema has header.
Quoted	Option to escape the delimiters and surround all values with quotation marks.
Columns	Columns of the schema as a JSON array. For each column, specify column name and data type. For example,

```
[
    {
        "name" : "Number",
        "type" : "string"
    },
    {
        "name" : "Caller First Name",
        "type" : "string"
    },
    {
        "name" : "Caller Last Name",
        "type" : "string"
```

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Field	Description

```
    },
    {
        "name" : "Short Description",
        "type" : "string"
    },
    {
        "name" : "State",
        "type" : "choice",
        "choices" : [
            {
                "label" : "New",
                "value" : "New"
            },
            {
                "label" : "In Progress",
                "value" : "In Progress"
            },
           {
                "label" : "On Hold",
                "value" : "On Hold"
            },
            {
                "label" : "Resolved",
                "value" : "resolved"
            },
            {
                "label" : "Closed",
                "value" : "closed"
            }
        ]
    },
    {
        "name" : "Active",
        "type" : "boolean"
    }
]
```

. For more information, see Create a data gathering action for a dynamic template.

Note: Ensure that you surround the key and value with quotation marks.

4. Click **Submit**.

Build a flow using the Utility Actions spoke actions

Create a flow in Workflow Studio using the Utility Actions spoke actions to create two files; one for incident records and other for user records, and zip these two files.

Before you begin

Role required: admin.

About this task

This sample flow demonstrates using the Utility Actions spoke actions to create files. You can configure the flow as per your requirement.

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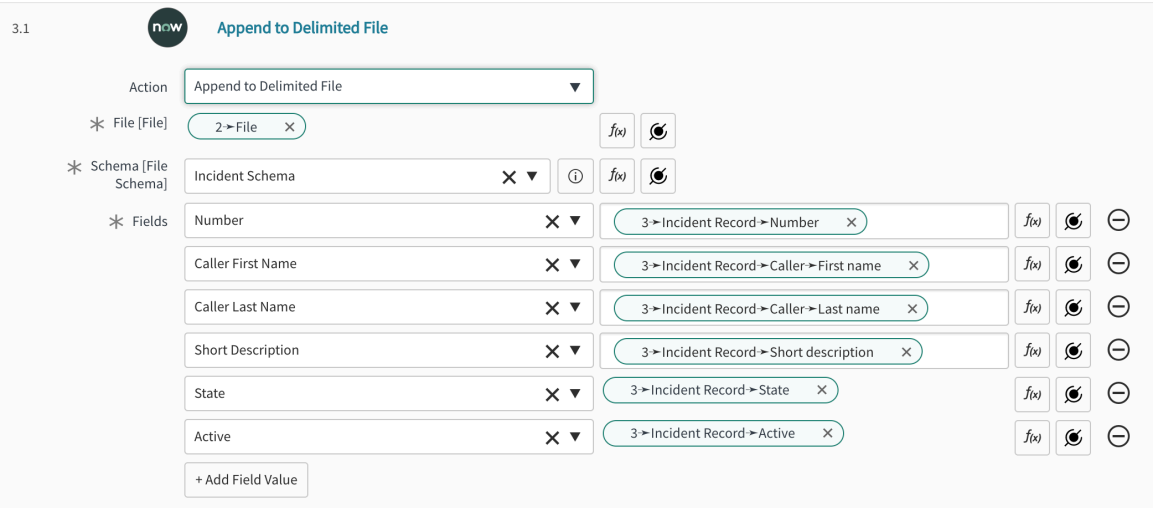
Procedure

1. Navigate to **All** > **Flow Designer** > **Designer**.
2. Create a flow.
   For more information, see Building flows.
3. In the flow, add these spoke actions or flow logics:

   a. Look Up Incident Records action to retrieve the incident records.

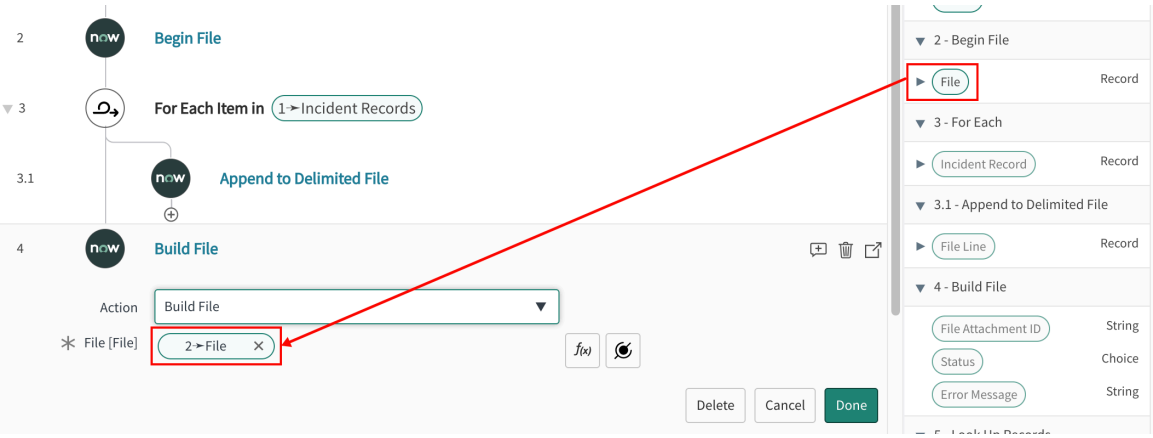
   b. Begin File action to create a file that will contain the incident records.

   c. For Each flow logic to apply the Append to Delimited File action to the list of incident records.



   d. Build File action to add rows.

   Each incident record is added as a row in the file.



   e. Perform similar steps to retrieve records from the User [sys_user] table.

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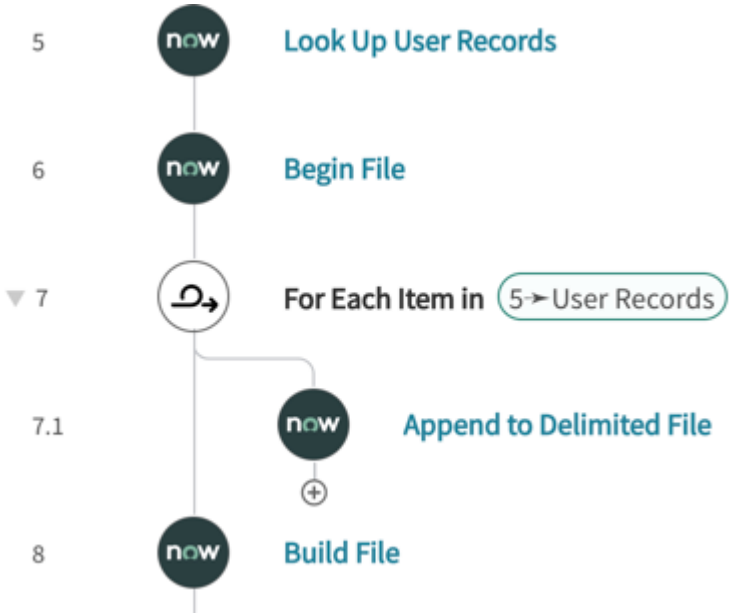
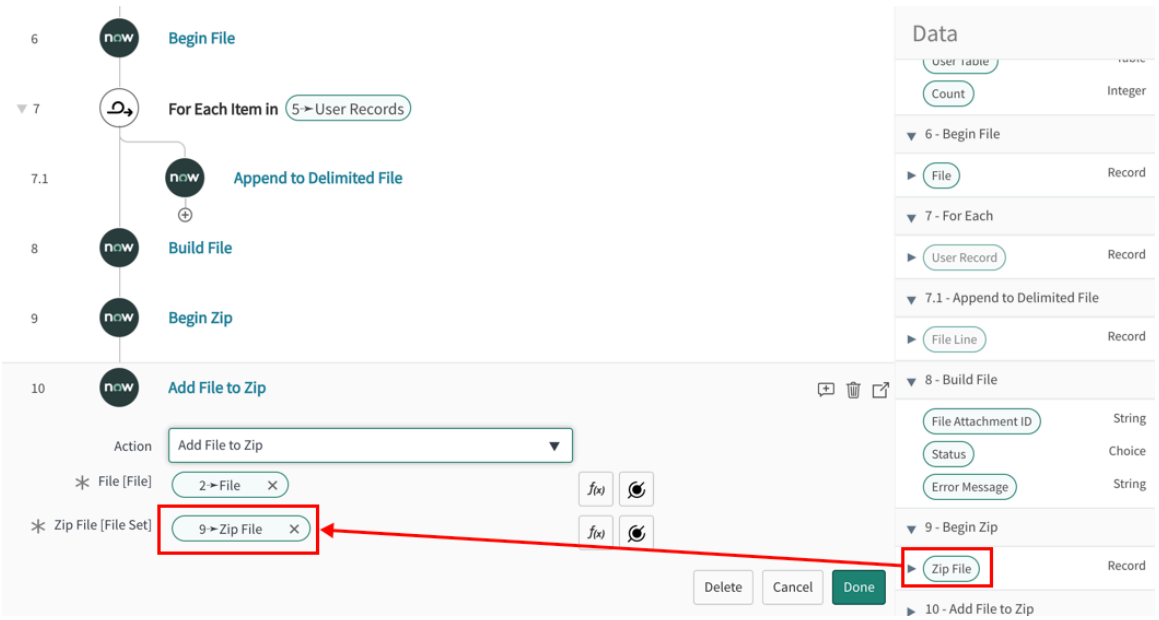


f. Begin Zip action to build the ZIP file for the incident and user records.

g. Add File To Zip action to add a file containing the incident records to the ZIP file.



h. Add File To Zip action to add file containing the user records to the ZIP file.

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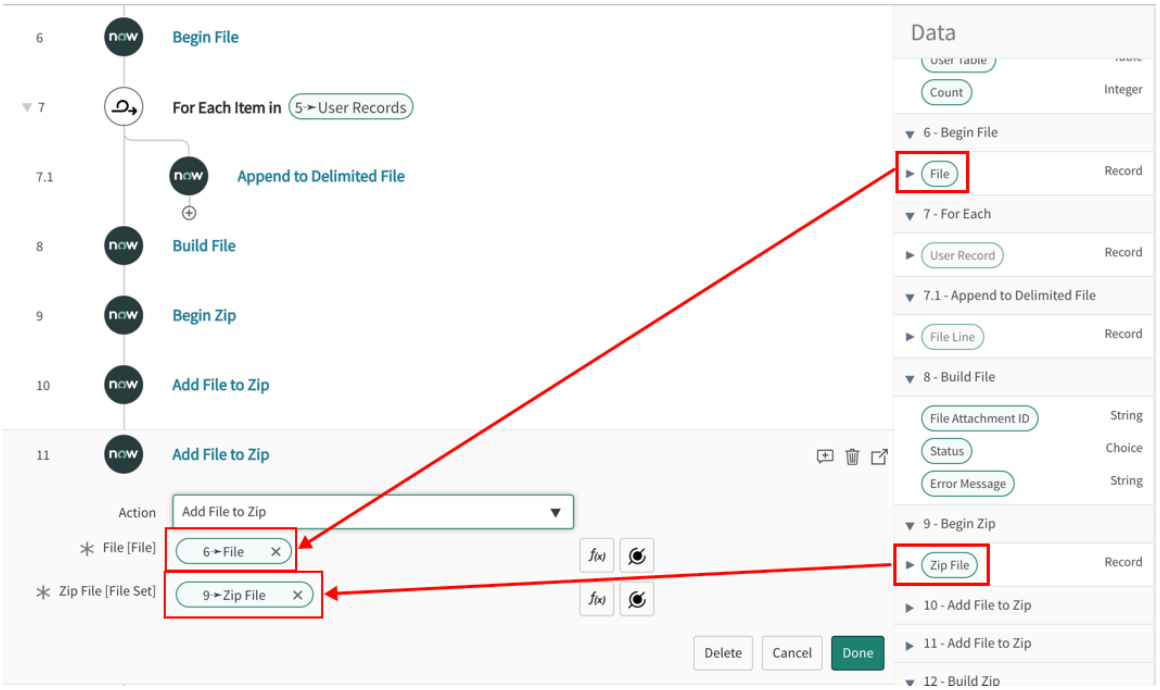
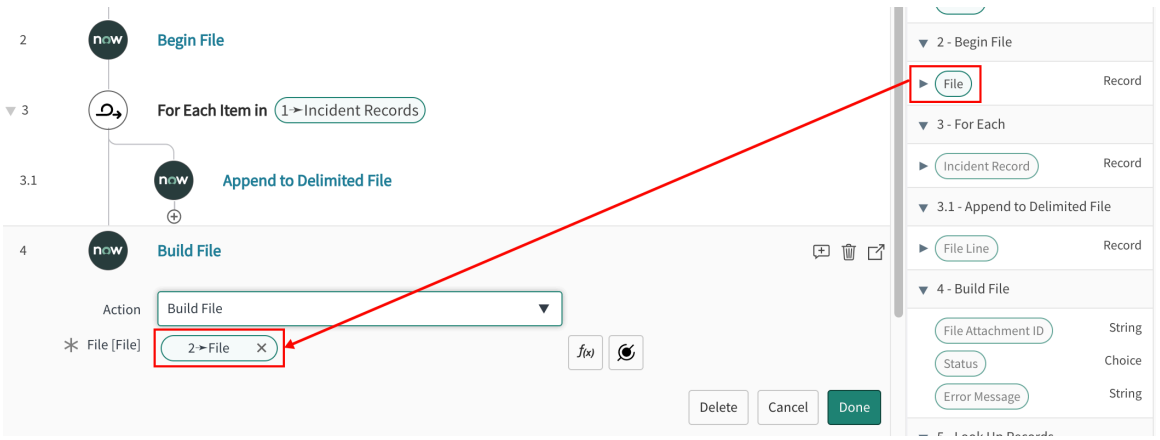


i. Build a Zip action to create the ZIP file containing the incident and user records.



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4. Save, test, and publish the flow to use it.

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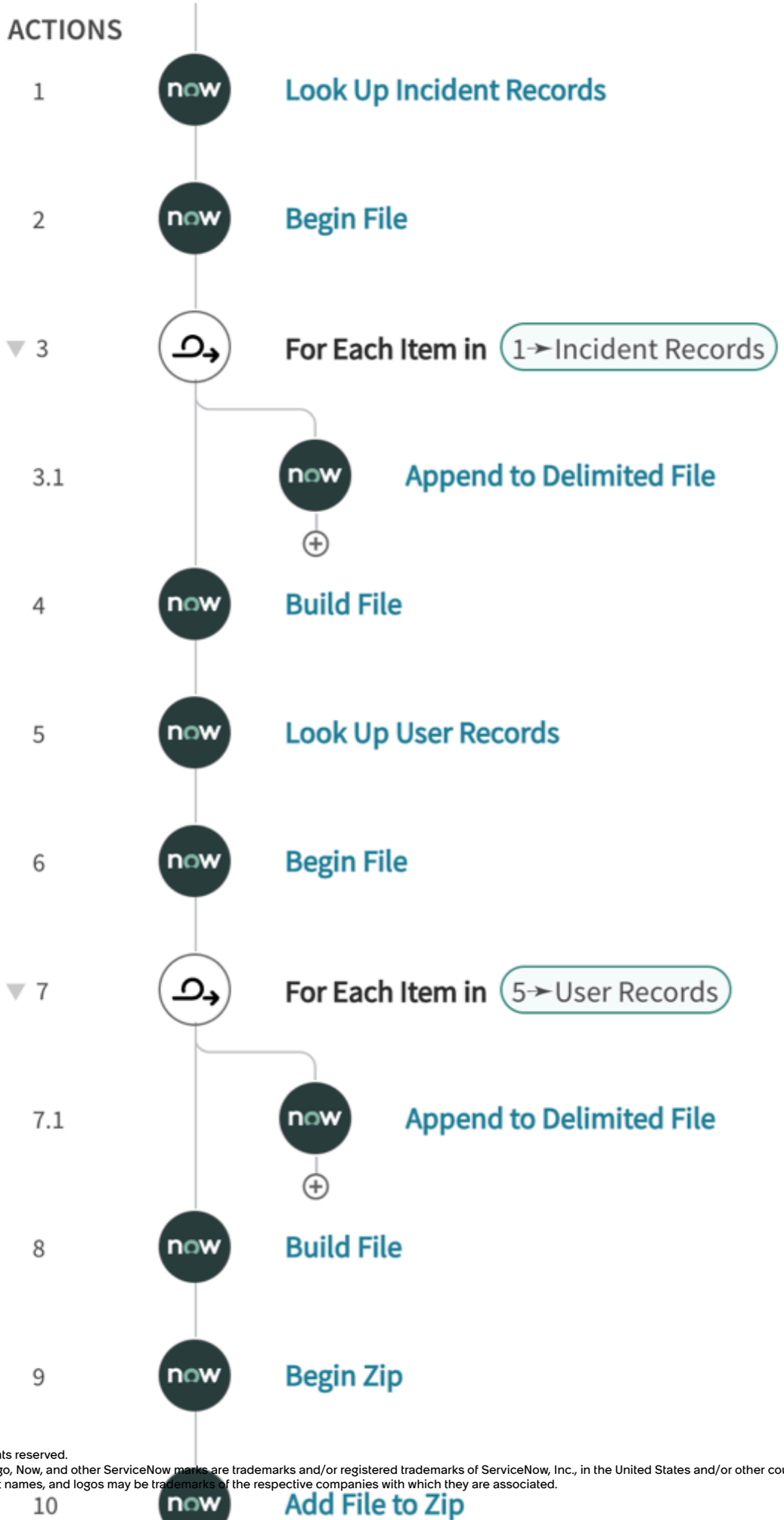

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Verifi Spoke

Integrate your ServiceNow instance with the Verifi Spoke to streamline the card dispute resolution process by using the Verifi APIs. This integration facilitates early connections between issuers and merchants in the dispute lifecycle, which simplifies conflict resolutions at the pre-dispute stage and minimizes chargebacks.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Verifi Spoke v1.0 is the latest version. For version history of the spoke, see Verifi Spoke release notes.

Supported versions

This spoke was built for Verifi API version 4.0 but may be compatible with later versions.

Key features

Verifi Spoke enables a flow designer to build workflows by using actions that invoke Verifi APIs. This integration enables you to do the following tasks:

- Address disputes with merchants to prevent escalation, which saves time and resources for both issuers and cardholders.
- Create, manage, and close dispute cases by using API actions to ensure smoother operations and enhanced collaboration among stakeholders.
- Resolve disputes early with direct merchant involvement to minimize chargebacks.
- Leverage streamlined processes and pre-dispute resolutions to reduce the effort required in managing disputes.
- Improve cooperation and communication between cardholders, issuers, and merchants.

Spoke requirements

- Integration Hub subscription
- Set up the JSON Web Token (JWT) Key with a shared key (HMAC) and connect a JWT provider to the signing configuration by using a JWT key reference.

Spoke dependencies

Ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)

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Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Verifi Spoke provides actions to resolve cardholder disputes efficiently.

The actions with sensitive information contain sensitive information in the request and response body. One action involves a request builder to securely create requests and a response parser to handle encrypted API responses. The following table lists the actions that have sensitive information.

Actions with sensitive information

Category	Action	Description
Verifi Case Management	Create Case Request Builder	Use the Request Builder and response parser of the Verifi Create Case API to create a case that represents the cardholder's dispute and submit it for merchant communication.
	Create Case Response Parser	
	Look up Case Request Builder	Use the Request Builder and response parser of the Look up Case API to retrieve the case details from Verifi API.
	Look up Case Response Parser	
	Look up Multiple Cases Request Builder	Use the Request Builder and response parser of the Look up Multiple Cases API to retrieve multiple case details from the Verifi API. The issuer can identify multiple case IDs in a single retrieve attempt.
	Look up Multiple Cases Response Parser	
	CDRN Eligibility Request Builder	Submit a real-time check for merchant eligibility on a case using the CDRN case inquiry-only call, which is facilitated by the request builder and response parser of the Verifi eligibility API.
	CDRN Eligibility Response Parser	
	Update Case Request Builder	Use the request builder and response parser of the Verifi patch API to update the case status to either CLOSED or REVOKED. This functionality enables issuers to efficiently manage case outcomes.

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Actions with sensitive information (continued)

Category	Action	Description
	Update Case Response Parser	

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up Verifi Spoke

Set up Verifi Spoke

Integrate the ServiceNow instance and Verifi account by using the JWT authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Verifi spoke.
- Role required: admin.

About this task

JSON Web Tokens (JWTs) enable the capability to configure server-to-server API interactions between ServiceNow and external API providers without requiring any user intervention.

Procedure

1. Generate a JSON Web Token (JWT).
   Create a JWT for your instance by using this link to enable JWT authentication. For Verifi Spoke, generate the authorization by using the *`VerifiAuthorizationTokenGenerator`* script. For more information, see Generate a JSON Web Token (JWT).
2. Create credential records for the Verifi Spoke.
   Create a connection and credential record for the Verifi Spoke application. The Verifi Spoke connection and credential alias uses these credentials to authorize actions. For more information, see Create a connection and a credential record for the Verifi Spoke.

Create a connection and a credential record for the Verifi Spoke

Create a connection and credential record for the Verifi Spoke application. The Verifi Spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

- A shared secret for signing the authentication token.
- Create a JSON Web Token (JWT) key. Associate a JWT provider with the signing configuration by referring to a JWT key.

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- An Issuer ID assigned by Verifi. The ID is included in the request headers and authentication token to identify the issuer making API calls.
- Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Select the **Verifi** record.
   The Connection & Credential Aliases page opens.
3. On the form, fill in the fields.

Connection & credential aliases

Field	Description
Name	Name of the alias. An alias can only contain the alpha, number, and underscore characters.
ID	Unique identifier for the Connections & Credentials alias, based on the format `sn_verifi_spoke.Verifi`.
Application	Application scope against which the Connection & Credentials alias is assigned. The current session scope that you last selected in the application picker appears. For example, **Verifi Spoke** appears if it is the current scope for this session.
Type	Alias type. Select **Connection and Credential**.
Connection type	Name of the connection type, either Basic, HTTP, JDBC, JMS, or Kafka. The default is HTTP.
Support Multiple Active Connections	Designator that indicates whether the alias supports multiple active connections. Add connections by using the Connections table and associate them to the alias by using the Connections related list.
Default Retry Policy	Retry policy for the alias. For more information, see Retry policy.
Configuration Template	Configuration template to use to create a connection and credential record.

4. Select **Save**.
   The Connections and Connection Attributes related list appears.

Related List	Description
Connections	Related connection records associated with this alias. After creating the alias, you can define the connection records and associate them with the alias. If **Support Multiple Active Connections** is selected, you can associate more than one connection with an alias.
Connection Attributes	Attributes for the connection. Define the data that is specific to a connection and use it in an Integration Hub integration step.
Child Aliases	Child aliases that are associated with the parent alias. After creating a connection and credential alias, you can create a child alias to configure multiple connections for the same application integration.

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5. **Optional:** If you want to create a new credential and connection associated with your credential alias, under *Related Links*, select **Create New Connection & Credential**. In the dialog box, fill in the fields.

Create Connection and Credential

Field	Description
Please Enter the Connection Information	
Connection Name	Name of the connection.
Connection URL	URL used for connecting to the server on which Verifi Spoke is installed.
Issuer	An Issuer ID that you copied while setting up the Verifi Spoke by using the JWT authentication type.
API Version	API version that the related spokes are built for. The default value is 4 . 0.
JWT Provider	JWT Provider that you provided while setting up the Verifi Spoke spoke by using the PAT authentication type.

6. **Optional:** If you want to create a child alias for your connection and credential alias, under the Child Aliases related list, select **New**.

   a. Enter a name for the child alias and select **Submit**.
   The child alias inherits the properties from the parent alias. You can then configure a child alias to contain its own set of connection and credential information.

Result
A connection and credential record is created in the ServiceNow instance.

Visa Spoke

Integrate the ServiceNow instance with the Visa spoke to seamlessly invoke Visa APIs under Visa Resolve Online (VROL) for Visa card dispute process and card-on-file payments using Visa Stop Payment Service (VSPS). You can use the spoke to search for transactions, collaborate with merchants, manage disputes and perform other functions with enhanced security.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Visa spoke v2.5.2 is the latest version. For version history of the spoke, see Visa Spoke release notes.

Key features

The feature includes creating actions to invoke Visa APIs through VROL and VSPS to manage the end-to-end card dispute process and card-on-file payments. This includes tasks such as:

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- Retrieve enriched transaction information
- Perform transaction searches
- Initiate the creation of dispute cases
- Submit Visa questionnaire
- Initiate pre-arbitration and arbitration on existing dispute cases

Spoke requirements

Integration Hub subscription

Spoke dependencies

Ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Visa spoke provides actions to invoke Visa APIs under VROL and VSPS to manage the entire card dispute process. Available actions include:

- **Actions with sensitive information** - These actions contain sensitive information in the request and response body. You should use a Tokenization solution when invoking these VROL and VSPS APIs.

Important: You should disable flow execution logs for Visa APIs that contain Personally Identifiable Information (PII) data. To do this, set the property `com.snc.process_flow.reporting.level` in System Properties to OFF.

VSPS spoke actions

Category	Action	Description
Visa Stop Payment Service	Cancel Multiple Stop Instructions Request Builder	Constructs the request payload for the Cancel API, enabling clients to cancel multiple stop instructions.
	Cancel Multiple Stop Instructions Response Parser	Parses the response of the Cancel API, which can be used to cancel multiple stop instructions.
	Create Stop Payment Instruction by Merchant Identifier Request Builder	Builds the request payload for the API that adds one or more merchant-level stop instructions, accepting a duration, merchant identifiers, PAN, and a start date, along with optional parameters.

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Category	Action	Description
	Create Stop Payment Instruction by Merchant Identifier Response Parser	Parses the response of the added merchant API, which issuers or acquirers can use to add one or more merchant-level stop instructions.
	Create Stop Payment Instruction by PAN Request Builder	Adds a PAN-level stop instruction for a specified duration and start date, with optional additional notes and payment frequency.
	Create Stop Payment Instruction by PAN Response Parser	Parses the response of the Add PAN Stop Instruction API, which enables issuers to place a stop instruction on a given PAN for a specified duration and start date.
	Create Stop Payment Instructions by Merchant Category Code Request Builder	Builds the request payload for the API that creates stop payment instructions based on merchant category codes (MCC), accepting PAN, start date, duration, merchant category codes, and optional additional details.
	Create Stop Payment Instructions by Merchant Category Code Response Parser	Parses the response of the create stop payment instruction by merchant category code API. This action can be used to verify the status and details of stop instructions processed based on merchant category codes.
	Look up All Linked Stop Payment Instructions by Stop Instruction ID Request Builder	Builds the request payload for the API that finds all stop instruction details linked to a given stop instruction, accepting a stop instruction ID and search type.
	Look up All Linked Stop Payment Instructions by Stop Instruction ID Response Parser	Parses the response of the linked API. Issuers or acquirers can use this API to find all stop instruction details linked to a given stop instruction.
	Look up Eligible Transactions for Stop Payment by PAN and Date Range Request Builder	Builds the request payload for the API that retrieves eligible transactions. This action accepts a PAN, a date range, a start date, and an optional filter for recurring and installment transactions.

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Category	Action	Description
	Look up Eligible Transactions for Stop Payment by PAN and Date Range Response Parser	Parses the response of the eligible transactions API. This action can be used to get a list of transactions that are eligible for placing a stop instruction based on a given PAN and date range.
	Look up Stop Instruction Details by Stop Instruction ID Request Builder	Constructs the request payload for the Retrieve API, which fetches stop instruction details using a provided stop instruction ID.
	Look up Stop Instruction Details by Stop Instruction ID Response Parser	Parses the response from the Retrieve API, which can be used to fetch stop instruction details based on the stop instruction ID.
	Look up Stop Payment Instructions by PAN Request Builder	Retrieves stop payment instructions associated with a given PAN, enabling you to search for both active and inactive instructions based on the provided parameters.
	Look up Stop Payment Instructions by PAN Response Parser	Parses the response received from the Lookup Stop Payment Instructions by PAN API.
	Look up Stopped Transactions by PAN Request Builder	Builds the request payload for the Stopped Transactions by PAN API, which enables clients to retrieve stopped transactions by PAN.
	Look up Stopped Transactions by PAN Response Parser	Parses the response of the Stopped Transactions by PAN API, which can be used to retrieve stopped transactions by PAN.
	Look up Stopped Transactions by Stop Instruction ID Request Builder	Builds the request payload for the API that enables you to retrieve a list of stopped transactions using a stop instruction ID.
	Look up Stopped Transactions by Stop Instruction ID Response Parser	Parses the response of the stopped transactions by stop ID API, which enables you to retrieve a list of stopped transactions using a stop instruction ID.s

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Category	Action	Description
	Update Stop Instructions Duration by Stop Instruction ID Request Builder	Builds the request payload for the API that extends the end date of multiple stop instructions. It accepts an array of stop instruction IDs and their corresponding durations.
	Update Stop Instructions Duration by Stop Instruction ID Response Parser	Parses the response of the extended API, which enables issuers or acquirers to extend the end date of multiple stop instructions.
	Update Stop Payment Instruction by Merchant Category Code Request Builder	Builds the request payload for the Update MCC API, which enables you to modify an existing stop instruction based on a Merchant Category Code (MCC).
	Update Stop Payment Instruction by Merchant Category Code Response Parser	Parses the response of the Update MCC API, which enables you to modify an existing stop instruction based on a Merchant Category Code (MCC).
	Update Stop Payment Instruction by Merchant Identifier Request Builder	Builds the request payload for the Update Merchant API, which updates a merchant-level stop instruction.
	Update Stop Payment Instruction by Merchant Identifier Response Parser	Parses the response of the Update Merchant API, which can be used to update a merchant-level stop instruction.

VROL spoke actions

Category	Action	Description
Order Insight Digital Management	Card Holder Purchase Inquiry Request Builder	Produces request payload for CardholderPurchaseInquiry. This API provides Real-Time Systems Interface (RTSI) users with the capability to request additional merchant information regarding a transaction. It can also be used to retrieve purchase information for non-VisaNet transactions.
	Card Holder Purchase Inquiry Response Parser	Parses response of CardholderPurchaseInquiry. This API provides Real-Time

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Category	Action	Description
		Systems Interface (RTSI) users with the capability to request additional merchant information regarding a transaction. It can also be used to retrieve purchase information for non-VisaNet transactions.
Transaction Inquiry Management	Look up All Transaction Details Request Builder	Enables you to retrieve details of all the scheduled reports for the organization or for a particular report that you want to know.
	Look up All Transaction Details Response Parser	Parses response of getAllTransDetails. Issuers can use this API an alternative method to retrieve complete Transaction Details for transactions using 1–10 VisaNet Transaction IDs as the search parameters.
	Look up Transaction Details from Case Request Builder	Produces request payload for the getTransactionsFromCase. Issuers can use this API to get the TI details for the selected transaction in the case; that is, the original transaction being disputed. Also, it returns summaries for the selected and non-selected transactions returned from the TI search that are also stored with the case.
	Look up Transaction Details from Case Response Parser	Parses response of getTransactionsFromCase. Issuers can use this API to get the TI details for the selected transaction in the case; that is, the original transaction being disputed. Also, it returns summaries for the selected and non-selected transactions returned from the TI search that are also stored with the case.
	Look up Transaction Details Request Builder	Produces request payload for the getTransDetails. Issuers can use this API to get detail-

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Category	Action	Description
		level data for the returned transaction.
	Look up Transaction Details Response Parser	Parses response of getTransDetails. Issuers can use this API to get detail-level data for the returned transaction.
	Look up Transaction Inquiry Results Request Builder	Produces request payload for the getTransInquiryResults. This will accepts a Transaction Inquiry (TI) Event ID and returns transaction summary information.
	Look up Transaction Inquiry Results Response Parser	Parses response of the getTransInquiryResults. This will accepts a Transaction Inquiry (TI) Event ID and returns transaction summary information.
	Submit Multiple Transaction Inquiry Request Builder	Produces request payload for the submitMultiTranInquiry. This provides an alternative method to search for transactions using 1–10 VisaNet Transaction IDs as the search parameters.
	Submit Multiple Transaction Inquiry Response Parser	Parses response of the submitMultiTranInquiry. This provides an alternative method to search for transactions using 1–10 VisaNet Transaction IDs as the search parameters.
	Submit Transaction Inquiry Request Builder	Produces request payload for the submitTranInquiry. This action is used to search for transactions using a set of search criteria.
	Submit Transaction Inquiry Response Parser	Produces request payload for the submitTranInquiry. This action is used to search for transactions using a set of search criteria.
Fraud Report Management	Submit Fraud Report Request Builder	Produces request payload for SubmitFraudReport. This API enables you to submit a fraud report to Visa Resolve Online (VROL), including all the required fraud data as

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Category	Action	Description
		listed in the Interface Element Spreadsheet (IES).
	Submit Fraud Report Response Parser	Parses response for SubmitFraudReport. This API enables you to submit a fraud report to Visa Resolve Online (VROL), including all the required fraud data as listed in the Interface Element Spreadsheet (IES).
	Look up Dispute Filing Details Request Builder	This action builds the input payload for the API getDisputeFiling Details.
	Look up Dispute Filing Details Response Parser	Parses response of the getDisputeFilingDetails. getDisputeFilingDetails is used to retrieve message with dispute case filing and the image details along with dispute filing item type.
	Look up Fraud Report Details Request Builder	Enables you to request additional information regarding a previously submitted fraud report in a real time.
	Look up Fraud Report Details Response Parser	This action parses the response body returned by VROL system after calling the API get fraud report details.
Dispute Financials Management	Look up Dispute Financial Advice Details Request Builder	Produces request payload for the GetDisputeFinancialAdviceDetails API. It enables Real-Time Systems Interface (RTSI) users to request the dispute financial advice data.
	Look up Dispute Financial Advice Details Response Parser	Parses response of the GetDisputeFinancialAdviceDetails API. It enables Real-Time Systems Interface (RTSI) users to request the dispute financial advice data.
	Look up Dispute Financial Details Request Builder	Produces request payload for the GetDisputeFinancialDetails API. This API retrieves disputed financial details in a case for acquirer or issuer.
	Look up Dispute Financial Details Response Parser	Parses response of the GetDisputeFinancialDetails

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Category	Action	Description
		API. This API retrieves dispute financial details in a case for acquirer or issuer.
Case Management	Submit Manual Case Creation Request Builder	Parses response for SubmitFraudReport. This API enables you to submit a fraud report to Visa Resolve Online (VROL), including all the required fraud data as listed in the Interface Element Spreadsheet (IES).
	Submit Manual Case Creation Response Parser	Produces request payload for the SubmitManualCaseCreation API. It enables a user to create a case without any transactions.
	Look up Case Details Request Builder	Produces request payload for GetCaseDetails. This API enables a user to request details of a specific VROL case, including transaction information, dispute jurisdiction, case type, and other case-related fields, when supplying the VisaCaseNumber and MemberRole. The information returned in the response depends on the role of the user making the request, and what stage and state the case is in.
	Look up Case Details Response Parser	Parses response for GetCaseDetails. This API enables a user to request details of a specific VROL case, including transaction information, dispute jurisdiction, case type, and other case-related fields, when supplying the VisaCaseNumber and MemberRole. The information returned in the response depends on the role of the user making the request, and what stage and state the case is in.
Questionnaire Management	Look up Acceptance Notification Details Request Builder	Produces request payload for GetAcceptanceNotificationDetails. This API provides Real-

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Category	Action	Description
		Time Systems Interface (RTSI) users with the capability to retrieve the acceptance notification details for disputes or dispute responses that were accepted and closed.
	Look up Acceptance Notification Details Response Parser	Parses response of GetAcceptanceNotificationDetails. This API provides Real-Time Systems Interface (RTSI) users with the capability to retrieve the acceptance notification details for disputes or dispute responses that were accepted and closed.
	Look up Dispute Details Request Builder	Produces request payload for the getDisputeDetails. Issuers can use this API to request for the dispute questionnaire data to be returned in image format, as well as in XML.
	Look up Dispute Details Response Parser	Parses response of getDisputeDetails. Issuers can use this API to request for the dispute questionnaire data to be returned in image format, as well as in XML.
	Look up Dispute Response Details Request Builder	Produces request payload for GetDisputePreArbResponseDetails. This API enables Real-Time Systems Interface (RTSI) users to request for the Pre-Arbitration Response questionnaire data to be returned in image format, as well as in XML
	Look up Dispute Response Details Response Parser	Produces request payload for GetDisputePreArbResponseDetails. This API enables Real-Time Systems Interface (RTSI) users to request for the Pre-Arbitration Response questionnaire data to be returned in image format, as well as in XML.
Queues Management	Look up Queue Request Builder	Produces request payload for GetQueue API. This API obtains information on any specified queue during the lifecycle of dispute such

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Category	Action	Description
		as incoming collaboration queue, and rejected dispute forms.
	Look up Queue Response Parser	Parses response of the GetQueue API. This API obtains information on any specified queue during the lifecycle of dispute such as incoming collaboration queue, and rejected dispute forms.
Case Filing Management	Look up Contact Message Details Request Builder	Produces request payload for GetContactMessageDetails. This API provides Real-Time Systems Interface (RTSI) users with the capability to request for the contact message questionnaire data to be returned in image format, as well as in XML.
	Look up Contact Message Details Response Parser	Parses response of GetContactMessageDetails. This API provides Real-Time Systems Interface (RTSI) users with the capability to request for the contact message questionnaire data to be returned in image format, as well as in XML. The returned image is in TIFF or PDF format. To retrieve the dispute as an image, you must set <IncludeDisputeAsImageInd>=true.
	Look up Contact Message Response Details Request Builder	Produces request payload for the getContactMessageResponseDetails. This action enables Real-Time Systems Interface (RTSI) users to retrieve the details of a contact message response.
	Look up Contact Message Response Details Response Parser	Parses response of the getContactMessageResponseDetails. This action enables Real-Time Systems Interface (RTSI) users to retrieve the details of a contact message response.
Hypersearch Request Management	Hypersearch Request Builder	Produces request payload for HyperSearch. This API accepts case matching parameters and returns

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Category	Action	Description
		information about all the cases found.
	Hypersearch Response Parser	Parses response of HyperSearch. This API accepts case matching parameters and returns information about all the cases found.
Batch Queues Management	Look up Batch Queue Request Builder	Produces request payload for GetBatchQueue API. This API retrieves transactions from given RTSI Batch Queue.
	Look up Batch Queue Response Parser	Parses response of the GetBatchQueue API. This API retrieves transactions from given RTSI Batch Queue.
Batch Queues Management	Look up Batch Queue Request Builder	Produces request payload for GetBatchQueue API. This API retrieves transactions from given RTSI Batch Queue.
	Look up Batch Queue Response Parser	Parses response of the GetBatchQueue API. This API retrieves transactions from given RTSI Batch Queue.
Dispute Pre-Arbitration Management	Look up Dispute Pre Arbitration Response Details Request Builder	Parses response for GetDisputePreArbResponseDetails. This API enables Real-Time Systems Interface (RTSI) users to request for the Pre-Arbitration Response questionnaire data to be returned in image format, as well as in XML. The returned image is in TIFF or PDF format. To retrieve the dispute as an image, you must set <IncludeDisputeAsImageInd>=true. The image data is returned in the <Image> group in the SIGetDisputePreArbResponseDetailsRespons
	Look up Dispute Pre Arbitration Response Details Response Parser	Produces request payload for GetDisputePreArbResponseDetails. This API enables Real-Time Systems Interface (RTSI) users to request for the Pre-Arbitration Response questionnaire data to be returned in image format, as well as in XML.

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Category	Action	Description
	Look up Dispute Pre Arbitration Details Request Builder	Produces request payload for the GetDisputePreArbDetails API. To request for the Pre-Arbitration questionnaire data to be returned in image format, as well as in XML
	Look up Dispute Pre Arbitration Details Response Parser	Parses response of the GetDisputePreArbDetails API. To request for the Pre-Arbitration questionnaire data to be returned in image format, as well as in XML.
Exception File Listing Management	Look up Inquiry Exception Request Builder	This action builds the request payload for the API that inquires about exception.
	Look up Inquiry Exception Response Parser	This action parses the response body returned by VROL system after calling the API Look up Inquiry Exception.
	Look up Exception Details Request Builder	This action builds the request payload for the API getExceptionDetails.
	Look up Exception Details Response Parser	This action parses the response body returned by VROL system after calling the getExceptionDetails API.
	Submit Exception Request Builder	Produces request payload for the submitException. Issuers can use submitExceptionRequest to add, update, or delete an exception file listing from a new or existing case. It's also used to repair a rejected exception file listing.
	Submit Exception Response Parser	Parses response of the submitException. Issuers can use submitExceptionRequest to add, update, or delete an exception file listing from a new or existing case. It's also used to repair a rejected exception file listing.
Miscellaneous Fees Management	Look up Miscellaneous Fee Details Request Builder	Produces request payload for the getMiscFeeDetails. GetMiscFeeDetailsRequest enables clients to request details for a miscellaneous fee.

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Category	Action	Description
	Look up Miscellaneous Fee Details Response Parser	Parses response of the getMiscFeeDetailsRequest. GetMiscFeeDetailsRequest enables clients to request details for a miscellaneous fee.
	Submit Miscellaneous Fee Request Builder	Produces request payload for the SubmitMiscFee API. It enables clients to request a miscellaneous fee with data.
	Submit Miscellaneous Fee Response Parser	Parses response of the SubmitMiscFee API. It enables clients to request a miscellaneous fee with data.
Fraud Monitoring Program Management	Look up GMFP Details Request Builder	This action builds the request payload for the API GetGMFPDetails
	Look up GMFP Details Response Parser	This action parses the response body returned by VROL system after calling the GMFP Details API.

- **Actions with non-sensitive information** - You can directly invoke these Visa APIs from your ServiceNow instance.

Actions with non-sensitive information

Category	Action	Description
Dispute Financials Management	Initiate Dispute from Transaction or Case	Enables you to initiate dispute from transaction or case.
	Change Dispute Status	Parses response of CardholderPurchaseInquiry. This API provides Real-Time Systems Interface (RTSI) users with the capability to request additional merchant information regarding a transaction. It can also be used to retrieve purchase information for non-VisaNet transactions
Case Management	Look up Image	Retrieves an image added to a newly created case.
	Upload Image	UploadImage is used to add an image to a case.
	Download and Attach Image	Downloads and attaches a Visa case image to a ServiceNow record.

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Category	Action	Description
	Update Case Resolution Status	Enables you to update the case resolution status of a case. This may close the case, depending on the status change made.
	Create Case from Transaction	Issuers use this API to create a case from a Transaction Inquiry request.
Questionnaire Management	Submit Dispute Questionnaire	This action enables Real-Time Systems Interface (RTSI) users to submit or save the dispute questionnaire.
	Look up Fraud Bundle Dispute Questionnaire Status	Provides Real-Time Systems Interface (RTSI) users with the capability to retrieve details of a submitted fraud bundle dispute.
	Submit Fraud Bundle Dispute Questionnaire	Provides Real-Time Systems Interface (RTSI) users with the capability to submit or save the fraud bundle dispute questionnaire. This request can include images.
Batch Queues Management	Mark Batch Queue Item as Read	Marks transactions as read to remove them from the Real-Time Systems Interface (RTSI) Batch Queue.
Queues Management	Ignore GMFP	Enables the issuer to change the status of the VFMP transaction to 'Ignored' by sending a request using the GMFPItemID, once they've reviewed each Visa Fraud Monitoring Program (VFMP) transaction in the queue.
	Close Miscellaneous Fee	Provides the functionality to remove miscellaneous fee transactions.
	Close Message	Provides the functionality to remove Request Proof of Posting (RPP) message transactions.
	Accept Dispute	Accepts the dispute liability or accepts the other side's decision, and removes the dispute transaction from the queue.
Transaction Inquiry Management	Close Transaction	This action is used to close certain transactions and

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Category	Action	Description
		remove them from their respective queues.
	Select Associated Transactions	AssociatedTranSelection enables you to confirm or refute the associations of some or all of the associated transactions within a group to a selected transaction in a case.
	Look up Associated Transaction List	Enables you to retrieve a list of associated transactions by supplying the associated transaction group ID.
	Look up Associated Transaction Selection	Enables you to confirm or refute the associations of some or all of the associated transactions within a group to a selected transaction in a case.
Dispute Pre-Arbitration Management	Create Dispute Pre Arbitration	Initiates the creation of a Pre-Arbitration using this API.
	Create Dispute Pre Arbitration Response	Provides Real-Time Systems Interface (RTSI) users with the capability to respond to a Pre-Arbitration.
Case Filing Management	Submit Contact Message Response	SubmitContactMessageResponse enables Real-Time Systems Interface (RTSI) users to submit a response to a contact message.
	Submit Dispute Filing	Submit a dispute case filing request, withdrawal, or appeal.
Report Distribution Management	Look up Report Output	Enables you to retrieve the report for a particular run date in CSV format.
	Look up Active Schedule	Enables you to retrieve details of all the scheduled reports for your organization or for a particular report that the user wants to know.
Batch Queue Management	Mark Batch Queue Item as Read	Marks transactions as read to remove them from the Real-Time Systems Interface (RTSI) Batch Queue.

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Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For more information about setting up the spoke, see Set up Visa Spoke.

Set up Visa Spoke

Integrate the ServiceNow instance and Visa Spoke using basic authentication to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Visa Spoke.
- Role required: admin.

Upload client certificate to your instance

Upload the client certificate to your ServiceNow instance to enable the creation of connections and credentials.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System LDAP** > **Certificates**.
2. Click **New**.
3. Complete the form.

X.509 Certificate form fields

Field	Description
Name	Enter a name to uniquely identify the record. For example, `Visa Client Certificate`.
Type	Select **PKCS12 Key Store**.
Notify on expiration	Define users to be notified when the certificate expires.
Warn in days to expire	Enter the number of days to send a notification before the certificate expires.
Active	Enable
Expires in days	Enter the number of days until the certificate expires.
Key store password	Enter a password associated with the certificate.
Short description	Enter a summary about the certificate.

4. Click the attachments icon and attach a client certificate(.p12) file.

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5. Click **Validate Stores/Certificates** to check if the certificate is correct.
   If the instance encounters any errors with the certificate or keystore, it displays an error message.

Upload a trusted server certificate

Generate a certificate for the Visa Resolve Online (VROL) endpoint and upload it to your ServiceNow instance as a TrustCertificate. By uploading the trusted server certificate, you ensure that your instance is connecting to a valid and secure service.

Before you begin
Role required: admin

About this task
The instance validates outbound Web Service calls by using the certificate provided by the service provider.

Procedure
1. Create a new Certificate record with the format **PEM** and type **Trust Store Cert**.
2. Do one of the following actions:
   - Attach the service provider's DER formatted certificate.
   - Copy and paste the service provider's PEM format certificate into the **PEM Certificate** field.

Create a protocol profile

You can create a custom HTTPS protocol profile to specify the credentials and certificates used for outbound web services. For example, you can create a custom HTTPS protocol profile to enable mutual authentication.

Before you begin
- Role required: admin
- Upload client certificate to your instance to authenticate the client certificate of the instance.
- Upload a trusted server certificate to authenticate the server certificate of the web service provider.

Procedure
1. Navigate to **All** > **System Security** > **Protocol Profiles**.
2. Click **New**.
3. Fill in the fields on the form, as appropriate.

Name of form

Field	Description
Protocol	Enter a unique name to identify this HTTPS protocol, such as `visahttps`. The protocol name allows you to differentiate between normal HTTPS connections and HTTPS connections that use this protocol profile. The name you enter becomes the protocol name in the URL. For example, `visahttps://endpoint.service.com`

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Field	Description
	Note: You cannot create a custom protocol whose name matches as an existing protocol name such as HTTPS.
Keystore	Select the Keystore certificate that you had created when uploading a client certificate. For example `Visa Client Certificate`
Default port	Enter the port number for connections that use this protocol.

Create basic auth server credentials

Create credentials to access a ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select **New**.
3. Select **Basic Auth Credential**.
4. On the form, fill in the fields.

Basic Auth Credentials form

Field	Description
Name	Enter a unique and descriptive name for this credential.
User name	Name to identify the user.
Password	Password to use this credential.
Active	Option to enable the use of this credential.
Order	The order (sequence) in which the platform tries this credential while it attempts to log in to devices. The smaller the number, the higher in the list this credential appears. Establish credential order when using large numbers of credentials or when security locks out users after three failed login attempts. If all the credentials have the same order number (or none), the instance tries the credentials in a random order. Default value: `100`

5. Select **Submit**.

Create a Connection & Credential alias for Visa

Create a custom credential record for the Visa Spoke account. The Visa Spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

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Procedure

1. Navigate to **All** > **Credentials & Connections** > **Connections**, click **New**, and select **HTTP(s) Connection**.
2. Add the following connection information and click **Submit**:

Field	Description
Name	Unique name of this HTTP(s) connection.
Credential	Select the credential record used to authorize the connection.
Connection Alias	Select the alias record to associate with this connection. Using an alias enables you to update the connection record without having to reconfigure any actions or activities that use the alias.
URL builder	Either manually enter the connection URL or use system to build the URL based on the inputs. Default is unchecked. If checked, the connection URL is calculated from the following fields: ○ Mutual authentication — Check box if mutual authentication is used. ○ Protocol profile — Select the protocol created. For example, `visahttps`. ○ Host - Enter the Visa Endpoint. For example, `xxx.visa.com` ○ Base path — Path of the connection string. **Note:** If mutual authentication is checked, connection URL is built: Protocol + :// + host:port +URL. If mutual authentication is unchecked, connection URL is built: Protocol profile + :// + host:port +URL
Connection URL	If URL builder is unchecked, enter the connection URL into this field. **Note:** If mutual authentication is checked, connection URL is built: Protocol + :// + host:port +URL. If mutual authentication is unchecked, connection URL is built: Protocol profile + :// + host:port +URL
Active	Check the box to make this connection active.
Domain	Determine the domain the action or activity runs in.

3. Click **Submit**.
   You are ready to create a custom HTTP(s) action or activity.

Vonage Spoke

Manage communications through calls, SMS, and WhatsApp by using the Vonage account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Spoke version

Vonage spoke v2.1.0 is the latest version. For version history of the spoke, see Vonage spoke release notes.

Supported versions

This spoke was built for Vonage for these versions, but may be compatible with later versions:

- Messages API version v1
- Voice API version v1

Spoke requirements

- Admin access to Vonage account and Vonage API Dashboard.
- Record the values of **API key** and **API Secret**. You can access these values from the Vonage API Dashboard. For more information, see the Authentication page in the Vonage API Developer documentation site.
- Record and save the value of the **Signature Secret**. You can access this value in the Account Settings in Vonage API Dashboard. For more information, see the Authentication page in the Vonage API Developer documentation site.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke subflows

The Vonage spoke provides sample subflows to demonstrate automating Vonage tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Vonage SMS Webhook	Processes the SMS requests from Vonage.
Vonage Voice Webhook	Processes the voice requests from Vonage.
Vonage WhatsApp Webhook	Processes the WhatsApp requests from Vonage.

To customize the default subflow, you must a create a copy of the sample subflow and customize the subflow as per your requirement. While customizing subflows, you must ensure that the subflows are configured to avoid infinite loops.

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Spoke triggers

Use triggers in the Vonage spoke to subscribe to the required events. The endpoint enables webhooks to connect with your ServiceNow instance. You can configure the flows to execute only when the specified trigger conditions are met. The supported events are:

Category	Trigger	Description
Call Management	Voice Ringing	Trigger is initiated when a call is made from Vonage and the number is Ringing.
	Voice Answered	Trigger is initiated when a call is made from Vonage and the call is Answered.
	Voice Completed	Trigger is initiated when a call is made from Vonage and the call is Completed.
SMS Management	SMS Delivered	Trigger is initiated when an SMS is sent from Vonage to a number.
	SMS Failed	Trigger is initiated when an SMS is sent from Vonage and it fails.
	SMS Accepted	Trigger is initiated when a message has been accepted for delivery, but has not yet delivered.

For information about setting up the triggers for the Vonage spoke, see Setup the trigger for vonage spoke.

Spoke actions

The Vonage spoke provides actions to automate Vonage tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Account Management	Get Account Balance	Retrieves the current balance of the Vonage account.
Call Management	Play DTMF tone into Call	Plays DTMF (Dual-tone multi-frequency) tones into an active call
	Attach Recording To ServiceNow Record	Attaches a call recording to the target ServiceNow record.
	Create Outbound Call	Creates an outbound call to a phone number.
	Generate NCCO	Constructs a Nexmo Call Control Objects (NCCO) that is used in Create an Outbound Call action.

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Category	Action	Description
	Generate Connect NCCO	Generates a Nexmo Call Control Object (NCCO) that defines how to connect an outbound call to endpoints such as a phone number or WebSocket.
	Generate Notify NCCO	Generates a Nexmo Call Control Object (NCCO) that defines a notify action for an outbound call.
	Generate Transfer NCCO	Generates a Nexmo Call Control Object (NCCO) that defines how to transfer an active call.
	Look Up Call Details	Retrieves the details of the specified call.
	Look up Calls	Retrieves details of the specified calls.
	Play Audio into Call	Plays an audio file into an active call.
	Play Text to Speech into Call	Plays text-to-speech into an active call.
	Stop Playing Audio into Call	Stops playing an audio file into an active call.
	Stop Text to Speech In Call	Stops text-to-speech into an active call.
	Update Call	Updates the status of an active call.
Number Management	Look up Numbers	Retrieves all the inbound numbers associated with the Vonage account.
RCS Management **Note:** If you are upgrading from an earlier version of the spoke, make sure to generate a new JWT token in your existing credential record before using this category actions.	Send RCS Card Message	Sends an RCS (Rich Communication Services) card message to a specified phone number.
	Send RCS Media Message	Sends an RCS (Rich Communication Services) media message to a specified phone number.
	Send RCS Text Message	Sends an RCS (Rich Communication Services) text message to a specified phone number.
SMS Management	Send SMS	Sends an SMS (Short Message Service) to a phone number.
WhatsApp Management	Send Contacts	Sends contacts to a WhatsApp number.
	Send Location	Sends geographic coordinates of a location to a WhatsApp number.

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Category	Action	Description
Note: If you are upgrading from an earlier version of the spoke, make sure to generate a new JWT token in your existing credential record before using this category actions.	Send Media Message	Sends a media message to a WhatsApp number.
	Send Text Message	Sends a text message to a WhatsApp number.
	Send Text Message Using Template	Sends a text message using the template to a WhatsApp number.

Spoke module

Bi-directional webhooks can be set up to be notified about the required events. Routing policy defines conditions that must be met to notify the ServiceNow instance. These conditions are based on the events in Vonage that you want to be notified about. When the conditions are met, routing policy triggers the associated subflow, which in turn automates the Vonage tasks. By default, the Vonage Spoke application is available and has the following modules:

- Vonage Webhook Registries
- Vonage WebHook Routing Policies

Use the Vonage Webhook Registries module to assign a token and provide the API path. You must generate a Callback URL here and provide this URL in Vonage. Default routing policies are provided as a reference in the Vonage WebHook Routing Policies module. Customize these routing policies as per your requirement. The routing policy supports these fields:

- Keywords
- Call Direction
- Call Status
- Event Type
- From
- SMS Status
- SMS Text
- To
- WhatsApp Message Status
- WhatsApp Text
- Show Related Fields

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Two connection and credential aliases are available along with the Vonage spoke:

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Vonage alias	Description
VonagePrimary	Required for the actions that manage SMS, number, and account.
Vonage	Required for the actions that manage calls and WhatsApp.

For information about setting up the spoke, see Set up the Vonage spoke.

Set up the Vonage spoke

Integrate your ServiceNow instance with the Vonage instance to enable communication between them. With this integration, your ServiceNow instance can automate actions on the Vonage instance, while the Vonage instance can send payloads to your ServiceNow instance.

Before you begin

- Request an Integration Hub subscription.
- Activate the Vonage spoke plugin on your ServiceNow instance.
- Role required: admin.
- Vonage developer instance account.

Configure the Vonage developer instance

Generate essential credentials, such as API keys, secrets, and signature secrets, to set up your Vonage developer instance. Your ServiceNow instance uses these credentials in the connection record to connect to the Vonage developer instance.

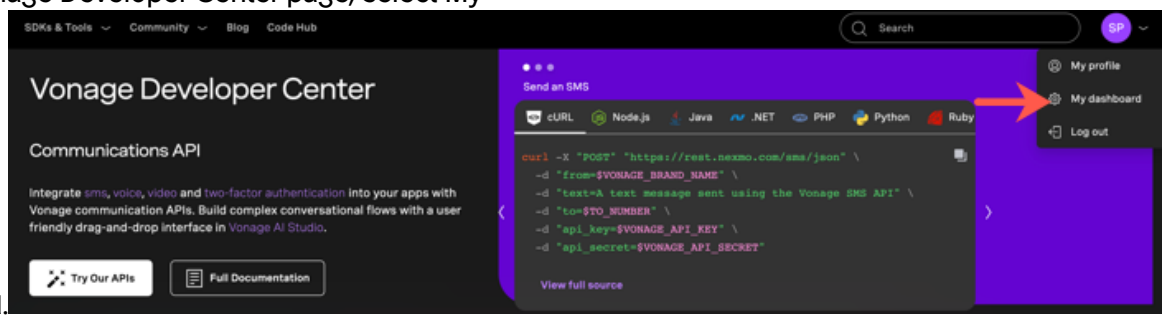
Before you begin

Role required: admin

Access to a Vonage developer account.

Procedure

1. Log in to https://developer.vonage.com/en/home.
2. On the Vonage Developer Center page, select My dashboard.



3. On the Vonage API Dashboard page, use the default API key and the API secret or create your custom API key and API secret.

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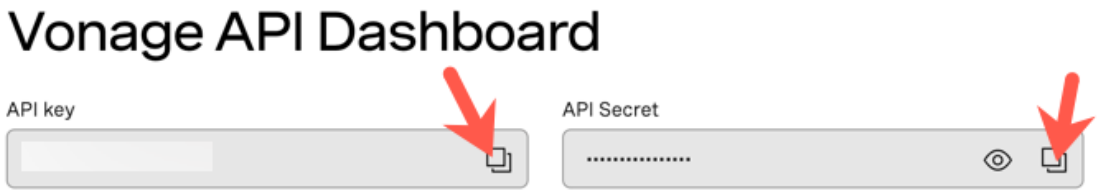
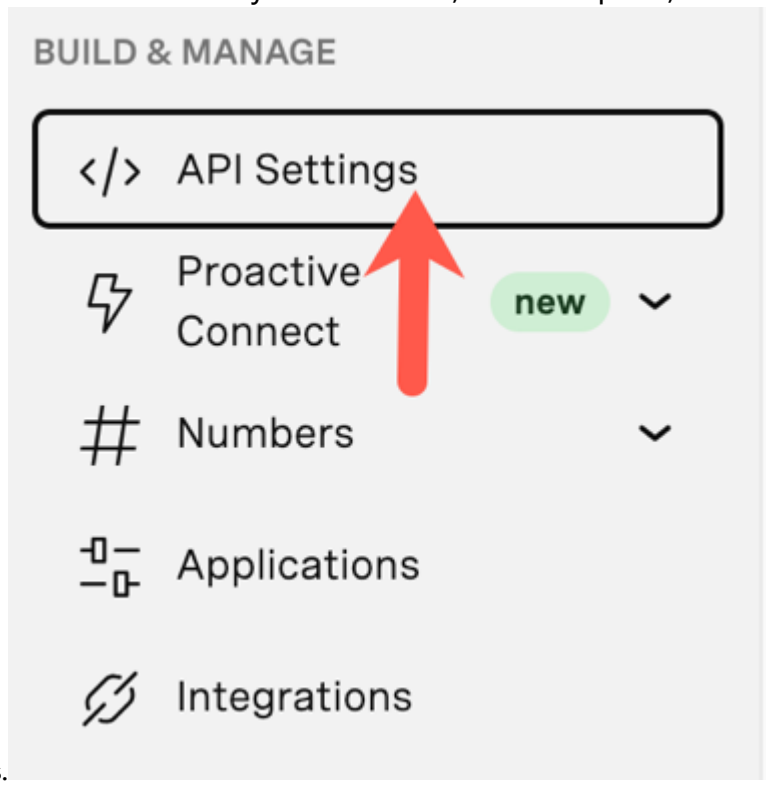
a. To use the default API key and the API secret, copy the default API key and the API secret



values.

b. To generate a custom API key and API secret, on the left panel, select API



Settings.

c. Select **Request more API keys**.

d. Fill and submit the form.

e. Select **Create new secret**.

f. In the Add a new secret window, enter your custom secret.

g. Select **Save**.

4. From the Signature secret field, copy the signature secret.

Configure connection record for Vonage connection and credential alias

Configure a connection record that enables your ServiceNow instance to connect with the Vonage instance and automate various actions on the Vonage instance. For example, create a flow on Workflow Studio that gets your Vonage account balance.

Before you begin
Role required: admin

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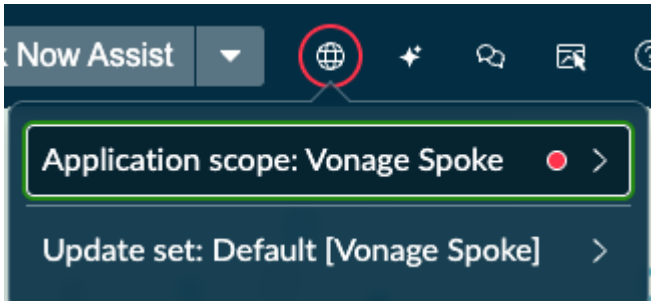
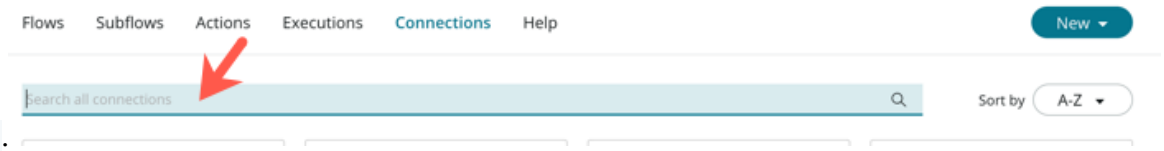
Note: Ensure that you are in the **Vonage spoke** scope.



Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select Connections.
3. In the Search all connections field, enter



`Vonage`.

4. On the Vonage card, select **View Details**.
5. Select **Configure**.
6. Fill the form.

Create Connection

Field	Description
Connection Name	The default and read-only name of the connection record. To provide a custom name to the connection record, create a connection record by selecting **Add Connection**.
Connection URL	The URL to connect to the Vonage API.
Messages API Version	The version of APIs the connection record requests for using the SMS feature in the Vonage instance.
Voice API Version	The version of APIs the connection record requests for using the Voice feature in the Vonage instance.
Credential Name	Name of the credential record. The default name os Vonage credential which you can update.

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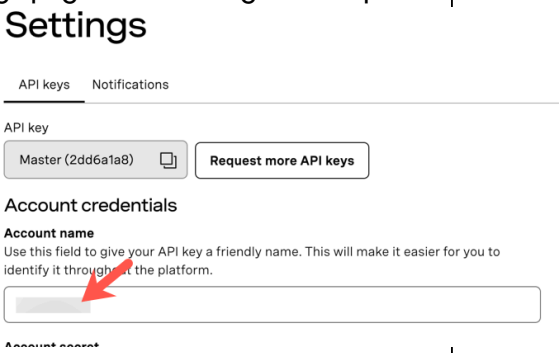
Field	Description
Application Name	Name of the account that you had entered in the Settings page of the Vonage developers account. 
API Key	API key you had acquired in the Vonage developer instance.
API Secret	API secret you had acquired in the Vonage developer instance.
Signature Secret	Signature secret key you had acquired in the Vonage developer instance.

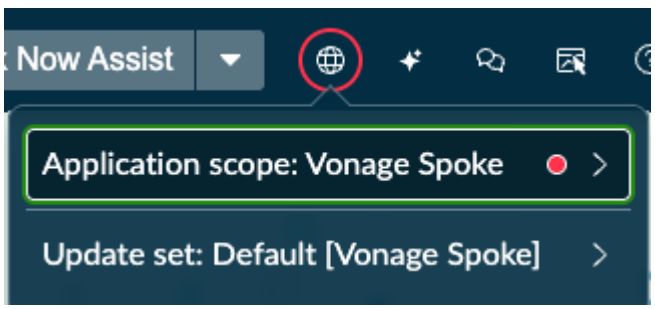
7. Select **Create Connection**.

Configure connection record for Vonage Primary alias

Configure a connection record that enables your ServiceNow instance to connect with the Vonage instance and automate various actions on the Vonage instance. For example, create a flow on Workflow Studio that gets your Vonage account balance.

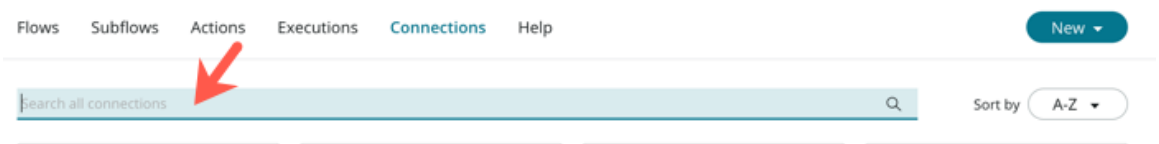
Before you begin
Role required: admin

Note: Ensure that you are in the **Vonage spoke** scope.



Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select Connections.
3. In the Search all connections field, enter `Vonage`.



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4. On the VonagePrimary card, select **View Details**.
5. Select **Configure**.
6. Fill the form.

Create Connection

Field	Description
Connection Name	The default and read-only name of the connection record. To provide a custom name to the connection record, create a connection record by selecting **Add Connection**.
Connection URL	The URL to connect to the Vonage API. Enter https://rest.nexmo.com.
API Key	API key you had acquired in the Vonage developer instance.
API Secret	API secret you had acquired in the Vonage developer instance.

7. Select **Create Connection**.

Create a webhook to receive data from Vonage

Set up webhooks for SMS to enable the Vonage API platform to send data to your ServiceNow instance. For instance, if a flow in your ServiceNow instance sends an API request for call details to the Vonage API but the request fails initially, the webhook ensures that the Vonage API sends the data later.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Vonage spoke** > **Vonage webhook Registries**.
2. Select **New**.
3. On the form, fill in these fields.

Vonage Webhook Registry form

Field	Description
Name	Name to uniquely identify the webhook record.
Description	Description of the webhook record.
Event Type	Type of event for which the webhook is set up. Select **SMS**.
Secret Key	Secret key to authenticate the webhook requests. Enter your custom secret key.

4. Right-click the form header and select **Save**.
5. Select **Callback URL**.
   The system displays the webhook callback URL.

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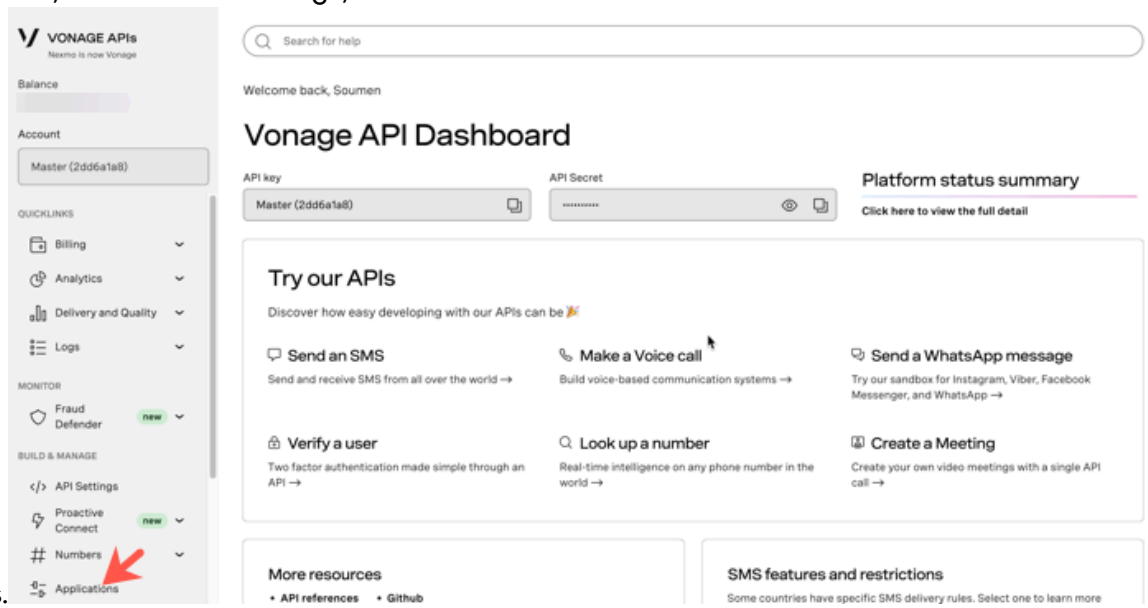
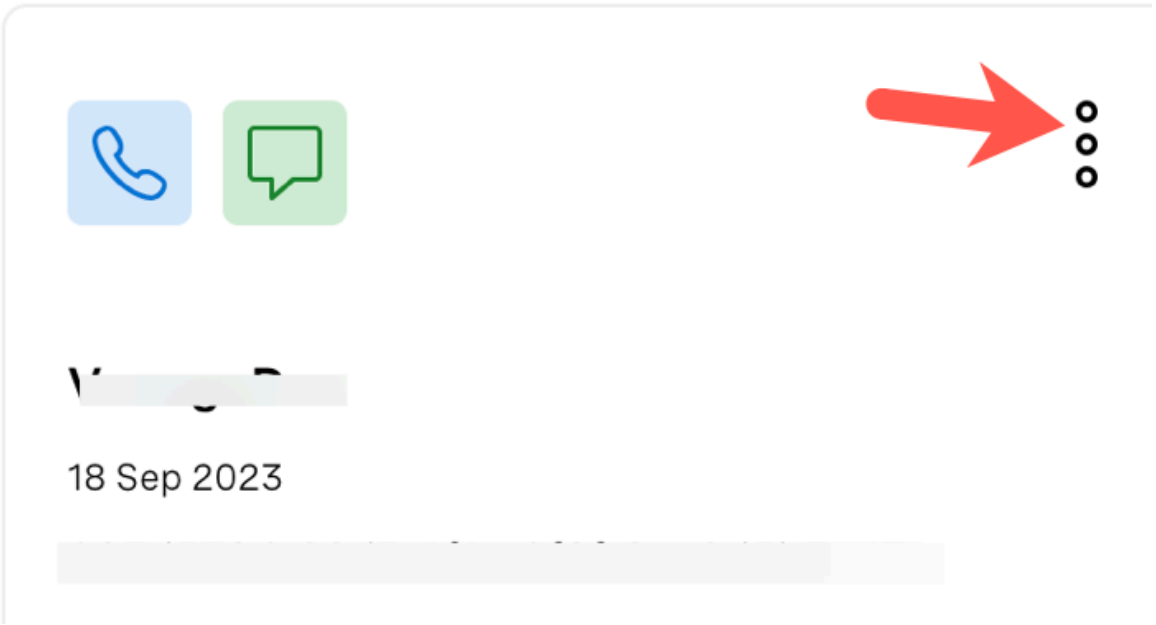
6. Copy and record the webhook callback URL.
7. Log in to https://developer.vonage.com/en/home.
8. On the left panel, under Build & Manage, select Applications.



9. On the Your applications page, select the menu icon (⋮) for your application.



10. Select **Edit**.

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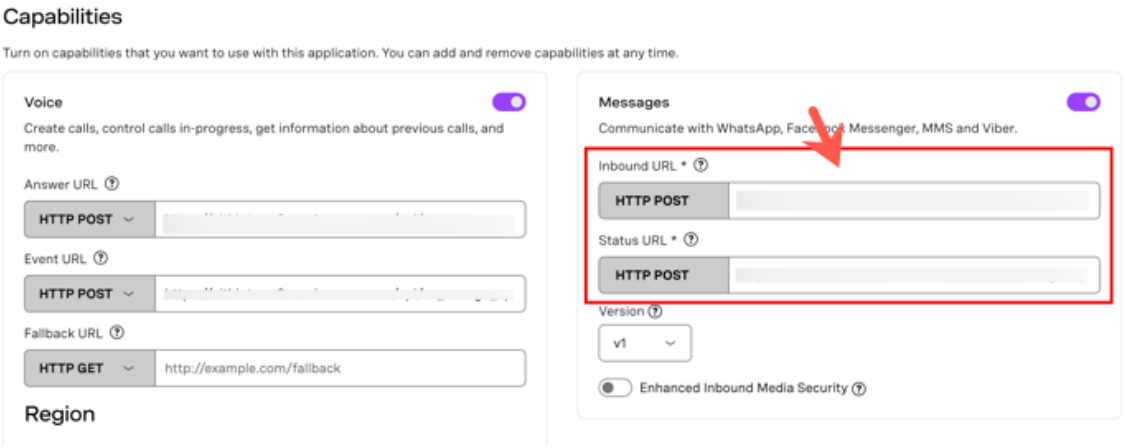
11. Under the Messages heading, enter the callback URL in the Inbound URL and the Status URL fields.



12. On the left panel, select API Settings.
13. On the Settings page, under SMS Settings heading, make sure that you've selected **SMS API**.
14. Fill the values.

Field	Value
Delivery receipts (DLR) webhooks	Webhook callback URL
Inbound SMS webhooks	Webhook callback URL

15. Select **Save changes**.
    SMS settings for the application are saved.

Customize webhooks and routing policies

Customise the webhook routing policy and subflow as per your requirement.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Flow Designer** > **Designer**.
2. Click **Subflows**.
3. Create a copy of the required default subflow.
4. Customize the subflow as per your requirement and publish it.
   See Building subflows for more information about creating and using subflows and Vonage Spoke for information about the fields that the default routing policy and subflows support.
5. Navigate to **Vonage Spoke** > **Vonage WebHook Routing Policy**.
6. Click **New**.
7. On the form, fill in the fields.

Decision form

Field	Description
Label	Unique label to identify the routing policy.

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Field	Description
Default answer	Option to specify if this is the default answer. The default answer is applicable when the conditions are not met. **a.** Click the lookup icon ( ). **b.** Select the required subflow from the Document list. **Note:** Ensure that the **Table name** is `Flow [sys_hub_flow]`.
Condition	Conditions to be met when the required events occur in Vonage. The supported Vonage fields are: ○ Keywords ○ Call Direction ○ Call Status ○ Event Type ○ From ○ SMS Status ○ SMS Text ○ To ○ WhatsApp Message Status ○ WhatsApp Text ○ Show Related Fields
Answer	Subflow that must be triggered when the specified conditions are met.

8. Click **Submit**.

Note: These routing policies are saved in the Decision tables. Users are cautioned against directly updating or modifying data in these tables.

Set up triggers for the Vonage spoke

Set up triggers for the Vonage spoke for the required events. The endpoint enables webhooks to connect with your ServiceNow instance.

Configure triggers in ServiceNow instance

Configure endpoint for webhooks in the Vonage that support the token authentication.

Before you begin

Role required: flow_designer and connection_admin

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Click the **Integrations** tab and select **Connections**.
3. Toggle and enable the **Inbound** connections
4. Locate the **Vonage Spoke** endpoint and click **View Details**.
5. Select either of the endpoints.

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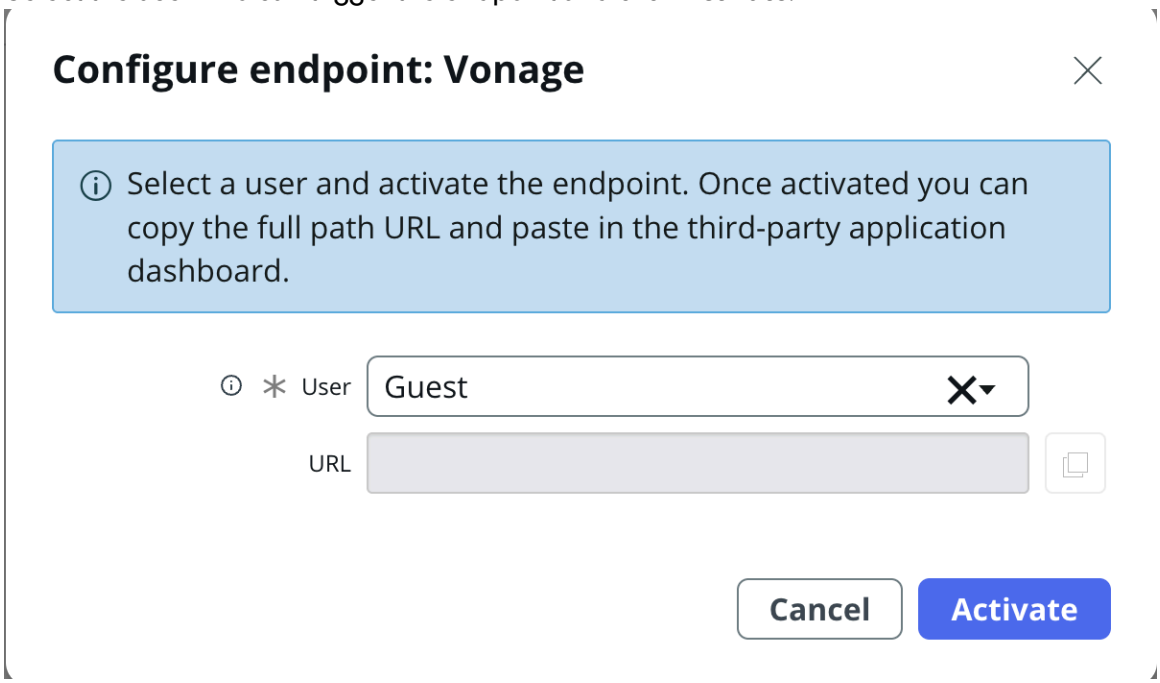
Endpoint	Description
Vonage External Trigger	External trigger event sources which use token based authentication. All voice and text based triggers are supported with this endpoint.
Vonage External Trigger (Hash)	External trigger event sources which use hash#based authentication. All RCS message and Whatsapp message triggers are supported with this endpoint.

a. If you select the **Vonage External Trigger** end point, click **Configure**.

b. Select the user who can trigger the endpoint and click **Activate**.



c. Copy the generated endpoint URL.

a. If you select the **Vonage External Trigger (Hash)** end point, click **Configure**.

b. Select the user who can trigger the endpoint and copy paste the Signature Secret in the Secret field.

c. Click **Activate**.

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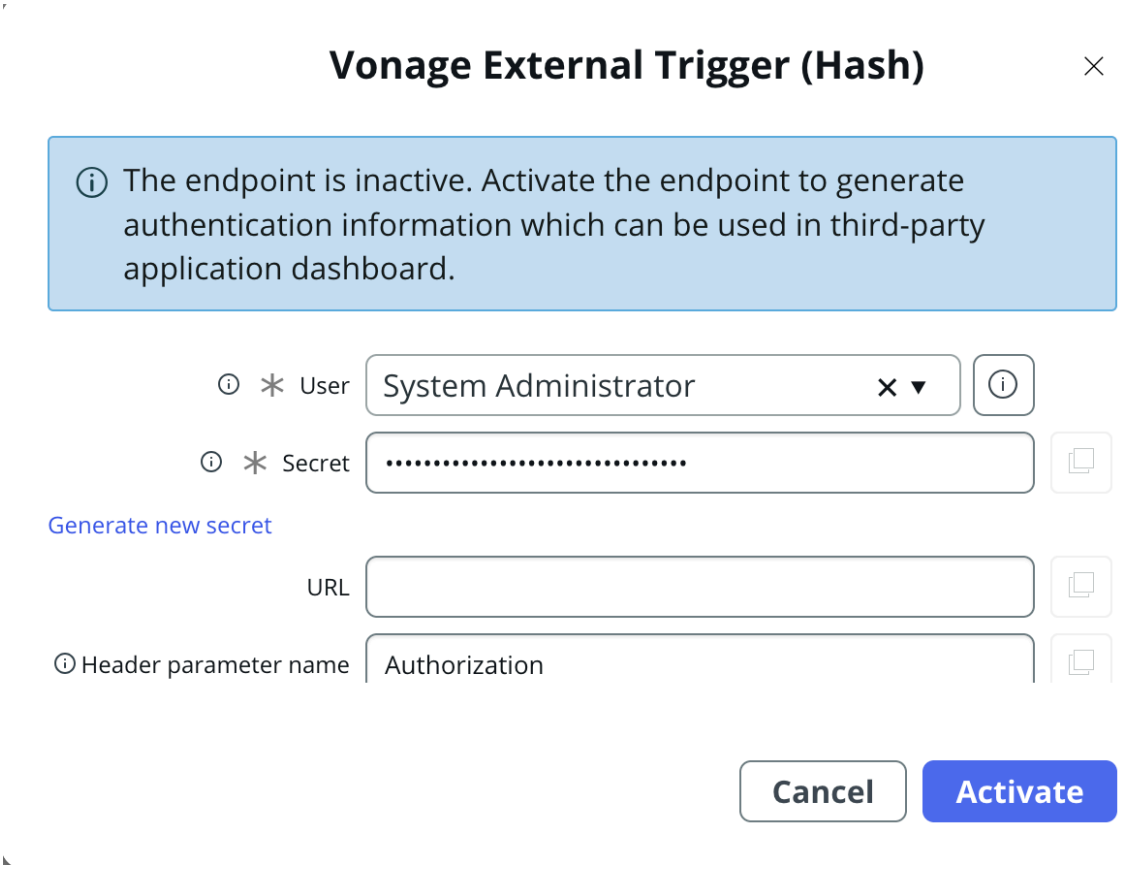


d. Copy the generated endpoint URL.

6. Verify that the selected endpoint is working.

Add the endpoint URL in Vonage

Add the endpoint URL that is generated in your ServiceNow instance in the Vonage API Dashboard to enable webhooks to connect with your ServiceNow instance.

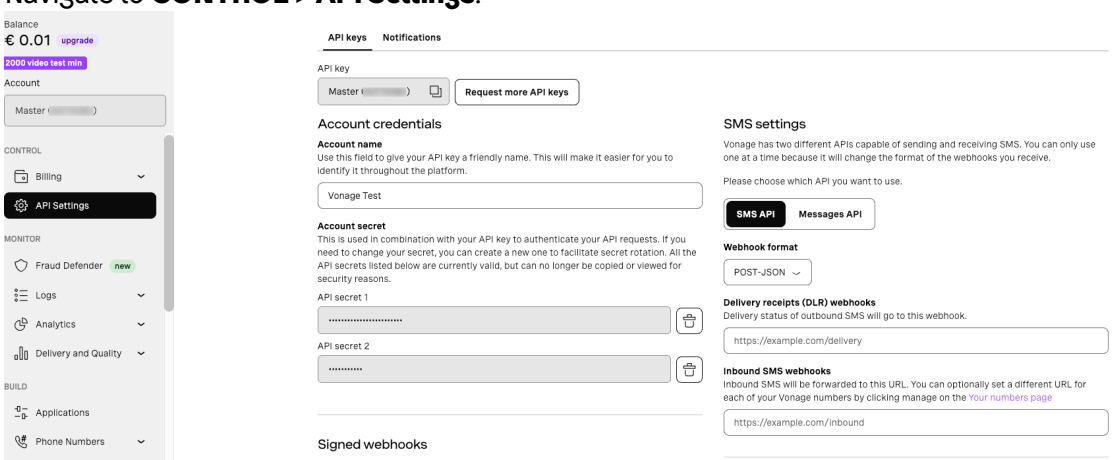
Before you begin

Role required: admin

Procedure

1. Log in to your Vonage API Dashboard.

2. Navigate to **CONTROL** > **API Settings**.



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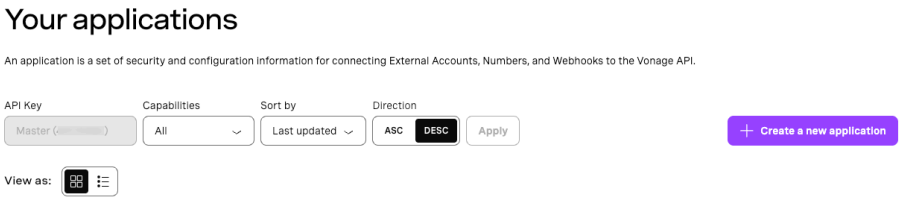
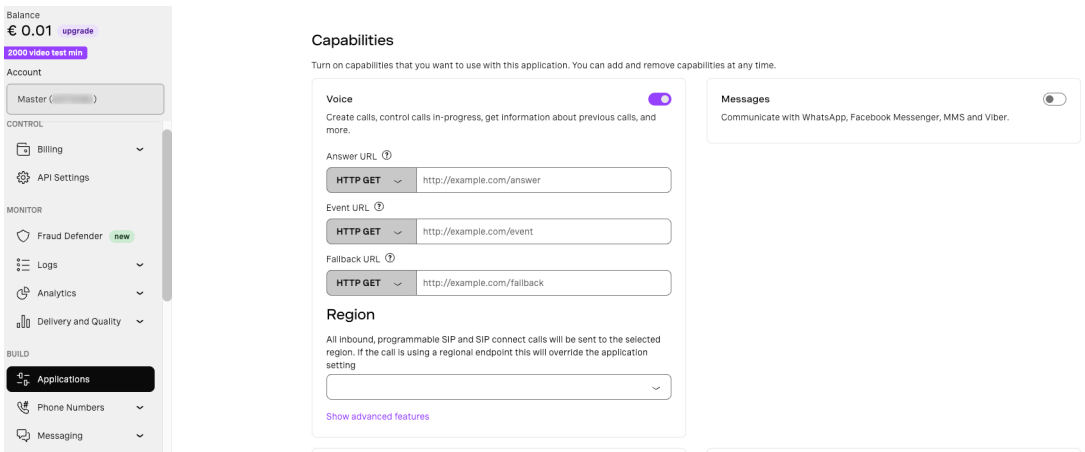
3. Under **Default SMS Setting**, locate the webhook URL fields.
4. In the webhook URL field, paste the generated endpoint URL.

Field	Description
Delivery receipts (DLR) webhooks	Endpoint URL that was generated after you Configure triggers in ServiceNow instance to receive delivery status updates.
Inbound SMS webhooksvo	Endpoint URL that was generated after you Configure triggers in ServiceNow instance to receive inbound messages.

5. Click **Save** to save the changes.
6. To configure webhooks for call management, navigate to **BUILD** > **Applications** > **Create a new application**.



7. While creating an application, toggle the Voice option under Capabilities.
8. Copy the URL generated in your ServiceNow instance and paste it as the Answer URL and Event URL and click **Save**.



Workday Financials Spoke

The Workday Financials spoke is built by Bristlecone, Inc. Manage resources, business units, journals, cost centers, and so on, in Workday Financials application from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

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Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Workday Financials spoke v2.2.0 is the latest version. For version history of the spoke, see Workday Financials spoke release notes.

Supported versions

This spoke was built for Workday Financials SOAP API version v39.0, but may be compatible with later versions.

Spoke requirements

To set up the integration, perform these:

1. Register Integration System User.

   Note: While filling account information details, ensure that you select the **Do Not Allow UI Sessions** check box.

2. Create a security group and assign it to the integration system user.
   a. In **Action**, navigate to **Security Group** > **Maintain Domain Permissions for Security Group** and provide these permissions:

Domain security policy permissions

Operation	Domain Security Policy	Domain Security Policies Inheriting Permission	Functional Areas
Get Only	Set Up: Worktags - Business Units		Common Financial Management Worktags
Get Only	Set Up: Ledger and Book		Common Financial Management
Get and Put	Process: Journals - Core		Financial Accounting
Get Only	Process: Journals - View		Financial Accounting
Get and Put	Process: Purchase Order - Cancel		Procurement
Get Only	Process: Advance Ship Notice - View		Procurement
Get Only	Process: Supplier Invoice - New		Supplier Accounts
Get Only	Process: Request for Quotes - View		Procurement
Get Only	Set Up: Accounts		Common Financial Management

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Operation	Domain Security Policy	Domain Security Policies Inheriting Permission	Functional Areas
Get Only	Create: Cost Center		Organizations and Roles
Get Only	Set Up: Currency Rates		Common Financial Management
Get Only	Set Up: Currency (Compensation functional area)		Core Compensation
Get Only	Integration Build		Integration
Get Only	Process: Business Assets		Business Asset Tracking
Get Only	Set Up: Expense Item		Expenses
Get Only	Set Up: Purchase Item		Procurement
Get Only	Reports: Supplier		Supplier
View Only	Process: Purchase Order - Reporting		Procurement
Get and Put	Integration Event		Integration
View Only	Integration Security		Integration

Note: Ensure that the domain security policies are activated for the security group.

b. Configure the business process policies of your security group and provide these permissions:

Business process security policy permissions

Operation	Business Process Type	Functional Area
Initiate (Register Asset (Web Service))	Asset Registration Event	▪ Business Asset Accounting ▪ Business Asset Tracking
Initiate (Submit Purchase Order Change Order (Web Service))	Change Order	Procurement
Initiate (Submit Purchase Order (Web Service))	Purchase Order Event	Procurement
Initiate (Submit Receipt (Web Service))	Receipt	Procurement
Initiate (Submit Supplier (Web Service))	Supplier Event	Supplier

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Operation	Business Process Type	Functional Area
Initiate (Submit Supplier Invoice (Web Service))	Supplier Invoice Event	Supplier Accounts

Note: Ensure that the business process security policies are activated for the security group.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - SOAP (com.glide.hub.action_step.soap)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- Complex Object (com.glide.cobject)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Authentication

Workday provides an open SOAP API for programmatic access to on-demand business management services. Workday SOAP APIs require basic authentication; that is, user name and password are required.

Note: This spokes doesn't require you to set up the connection and credential alias.

Spoke subflows

The Workday Financials spoke provides sample subflows to demonstrate automating Workday Financials tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Create PO	Creates a purchase order record in the Purchase Order table. To use the subflow, Set up webhook for your Workday Financials spoke.
Get Supplier Invoice Details	Retrieves details of the specified supplier invoice.

Spoke actions

The Workday Financials spoke provides actions to automate tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Approval Management	Approve Business Process	Approves the required business process.

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Category	Action	Description
	Cancel Business Process	Cancels the required business process.
	Deny Business Process	Denies the required business process.
	Look up Approvals	Retrieves the approvals records from Workday and saves the details as an attachment in the Data Source table. **Note:** To use this action, you must create and configure the To Do RaaS report. For instructions, see Configure the To Do report.
Invoice Management	Void or cancel Invoice	Cancels the required supplier invoice.
	Update Supplier Invoice	Updates details of the required supplier invoice.
Receipt Management	Void or Cancel Receipt	Cancels the required receipt.
	Look up Goods Receipts Stream	Retrieves details of the required receipts.
	Update Receipt	Updates details of the required receipt.
Requisition Management	Look up Requisitions Stream	Retrieves the requisition data.
	Update Requisition	Updates details of the required requisition records.
	Create Requisition	Creates requisition record with the provided details.
Purchase Order Management	Look up Purchase Orders and PO Lines Stream	Retrieves details of the required purchase orders and PO lines.
Primary Data Management	Look up Company Contact Information by ID	Retrieves details of the required company contact.
	Look up Organizations Stream	Retrieves the organization data.
	Look up Locations Stream	Retrieves details of the required locations.
Supplier Management	Look up Supplier Contracts Stream	Retrieves details of the supplier contracts.
	Deactivate Supplier	Deactivates the required supplier.
	Create Supplier Location	Creates a supplier location with the provided details.

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Category	Action	Description
	Update Supplier Location	Updates details of the required supplier location.
	Delete or Void Supplier Bank Account	Deletes the required supplier bank account or makes it void.
	Create Bank Account	Creates a supplier bank account with the provided details.
	Update Bank Account	Updates details of the required supplier bank account.
	Update Supplier	Updates details of the required supplier.
Financial Management	Get Account Set By ID	Retrieves details of the specified account set.
	Get Business Unit By ID	Retrieves details of the specified business unit.
	Get Cost Center By ID	Retrieves details of the specified cost center.
	Get Ledger By ID	Retrieves details of the specified ledger record.
	Look up Account Sets	Retrieves details of the required account sets, based on the provided filter criteria.
	Look up Business Units	Retrieves details of the required business units, based on the provided filter criteria.
	Look up Cost Centers	Retrieves details of the required cost centers, based on the provided filter criteria.
	Look up Fx Rates	Retrieves details of the required Fx rates, based on the provided filter criteria.
	Look up Ledger Accounts	Retrieves the ledger accounts from Workday and saves the details as an attachment in the Data Source table. **Note:** To use this action, you must create and configure the Ledger Account RaaS report. For instructions, see Configure the Ledger Account report.
	Look up Payments and Payment Status	Retrieves the payment and payment status details from Workday and saves the details as an attachment in the Data Source table. **Note:** To use this action, you must create and configure the Payment Status RaaS report. For instructions, see Configure the Payment Status report.
Journal Entry Management	Create Accounting Journal	Creates an accounting journal.
	Look up Journals	Retrieves details of the required journal records, based on the provided filter criteria.

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Category	Action	Description
	Post Accounting Journal	Posts an accounting journal record.
	Reverse Accounting Journal	Reverses the specified accounting journal.
Metadata Retrieval	Get Additional Fields For Workday Finance	Retrieves additional fields for each action.
	Get Reference ID List	Retrieves values of the Reference ID based on the specified reference type.
	Get Access Token	Retrieves the access tokens for authenticating SOAP based actions using OAuth 2.0.
Resource Management	Cancel Purchase Order	Cancels the specified purchase order.
	Create Fixed Asset Shell	Creates a fixed asset shell.
	Create Supplier	Creates a supplier with the provided details.
	Create Supplier Invoice	Creates a supplier invoice with the provided details.
	Get Advanced Shipment Notice By Number	Retrieves details of the specified advance shipment notice.
	Get Supplier By ID	Retrieves details of the specified supplier.
	Get Supplier Invoice By ID	Retrieves details of the specified supplier invoice.
	Look up Advanced Shipment Notices	Retrieves details of the required advance shipment notices, based on the provided filter criteria.
	Look up Expense Items	Retrieves details of the required expense items, based on the provided filter criteria.
	Look up Fixed Asset Details	Retrieves details of the required fixed assets, based on the provided filter criteria.
	Look up Material Groups Stream	Retrieves the catalog data.
	Look up Purchase Items	Retrieves details of the required purchase items, based on the provided filter criteria.
	Look up Request For Quotes	Retrieves details of the required request for quotes records, based on the provided filter criteria.
	Look up Supplier Invoices	Retrieves details of the required supplier invoices, based on the provided filter criteria.
	Look up Suppliers	Retrieves details of the required suppliers, based on the provided filter criteria.

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Category	Action	Description
	Submit Purchase Order	Submits the specified purchase order.
	Submit Purchase Order Change Order	Submits change order associated with the specified purchase order.
	Submit Receipt	Submits the specified receipt.

Spoke module

The Workday Financials spoke adds the Workday Finance application to your instance and includes these modules:

Module	Description
Connection Details	Contains information about the base URL of the Workday instance or tenant, and API version.
Get Business Units	Displays information about the business units. Admin should configure the sample remote table as per their requirement.
Purchase Orders	Displays information about the purchase orders whenever they are created in the Workday application. To retrieve this information to the ServiceNow instance, you must Set up webhook for your Workday Financials spoke.
Webhook Registries	Contains records of webhooks registries. Admin should create record here Set up webhook for your Workday Financials spoke for the required Workday event.

For information about setting up the spoke, see Set up the Workday Financials spoke and Set up webhook for your Workday Financials spoke.

Set up the Workday Financials spoke

Integrate the ServiceNow instance Workday instance by using the WS-Security Username Profile to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Workday Financials spoke.
- Role required: admin

Provide the Workday Financials base URL

Provide the base URL of your Workday Financials instance in the Connection Details [connection_details] table. Spoke actions based on the SOAP API, use these details for the action execution.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System Definition** > **Tables**.
2. Filter and search for the Connection Details table.

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3. Click the **Show List** related list.
4. Click **New**.
5. On the form, fill these values.

Connection Details form

Field	Description
Base URL	Base URL of the Workday instance or tenant name.
Version	Version of the API. For example, enter `v33.2`.

6. Click **Save**.

Create a WS-Security Username Profile for the Workday Financials spoke

Create a WS-Security Username Profile to provide your Workday credentials to authenticate requests from ServiceNow.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **SOAP Integrations** > **WS-Security Username Profiles**.
2. Click **New**.
3. On the form, fill these values.

Field	Description
Name	Name to uniquely identify this credential. For example, enter `WorkdayFinancials User`.
Application	Application in which the record is applicable. Select **Workday Financials Spoke**.
Username	Workday user who has integration rights using Workday Web Services.
Password	Password of the Workday user.

4. Click **Save**.

Configure the SOAP security policy for the Workday Financials spoke

Configure the SOAP security profile by adding the security user name profile you had created to authenticate requests from ServiceNow.

Before you begin

Role required: admin.

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Procedure

1. Navigate to **All** > **IntegrationHub** > **SOAP Integrations** > **SOAP Security Policies**.
2. Open the record, **WorkdayFinancials**.
3. For **WS-Security Username Profile**, select the security username profile you had created for the Workday Financials spoke.
   See Create a WS-Security Username Profile for the Workday Financials spoke for more information.
4. Do not provide value in **WS-Security X.509 Profile**.
5. Right-click the form header and click **Save**.

Generate client ID and client secret for Workday Financials spoke

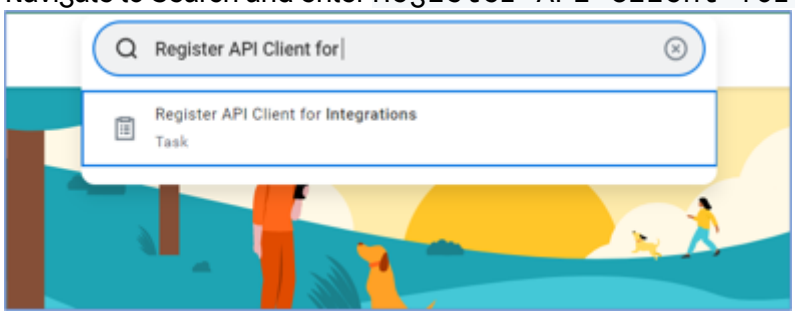
Register Workday Financial spoke as the API client in your Workday account and generate client ID, client secret.

Before you begin

Role required: admin

Procedure

1. Log into your Workday tenant.
2. Navigate to Search and enter `Register API Client for Integrations` task.



3. On the Register API Client for Integrations form, fill in the details.

Field	Description
Client Name	Client name of the app. For example, enter `Workday Financials spoke`.
Non-expiring Refresh Tokens	Option to enable refresh tokens that do not expire.
Scope (Functional Areas)	Select the required functional areas.
Include Workday Owned Scope	Option to select Workday owned scope.

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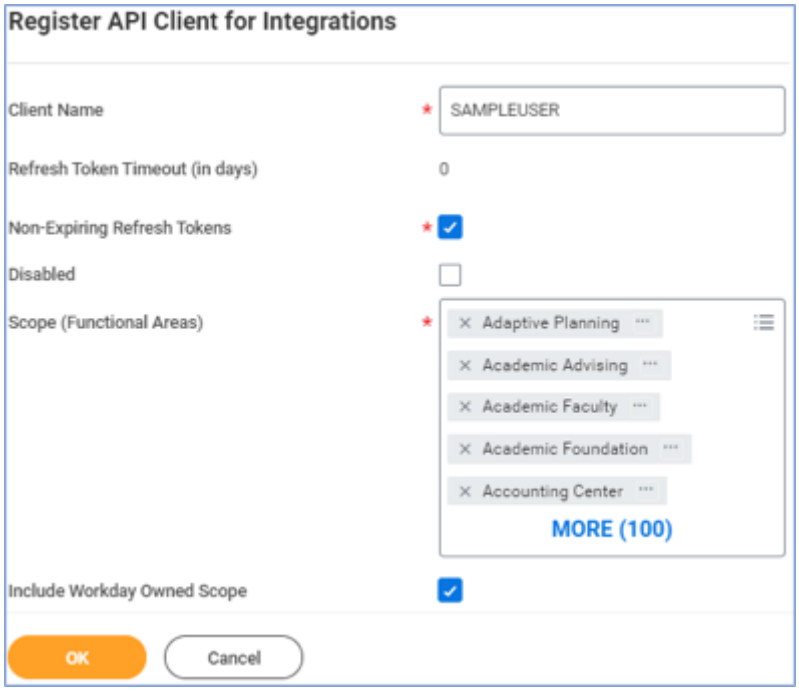
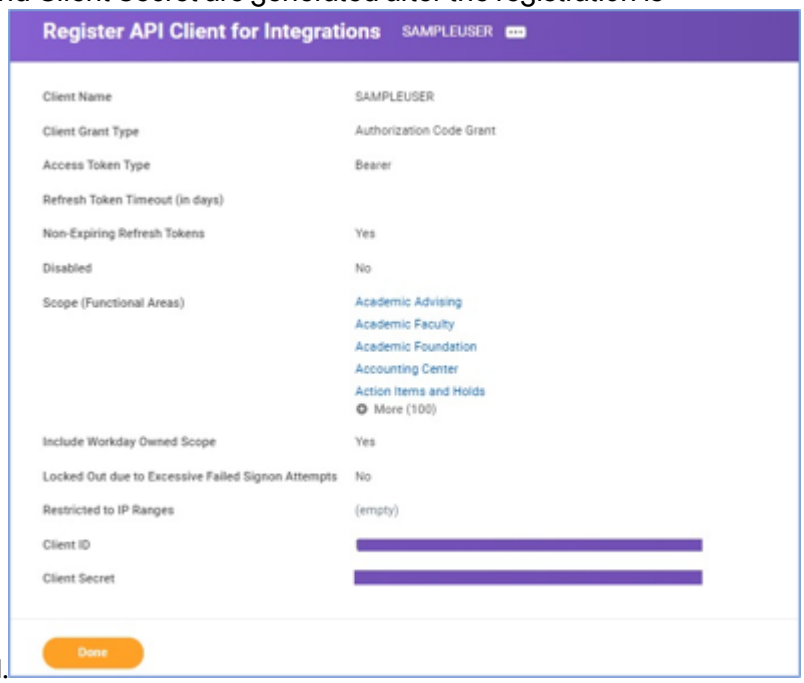
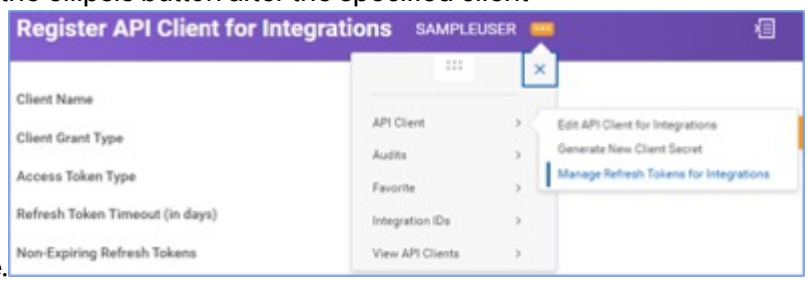


4. Click **OK**.
   Client ID and Client Secret are generated after the registration is successful.



5. Click the ellipsis button after the specified client name.



6. Select **API Client** >**Manage Refresh Tokens for Integrations**.
7. Select your Workday Account and click **OK**.

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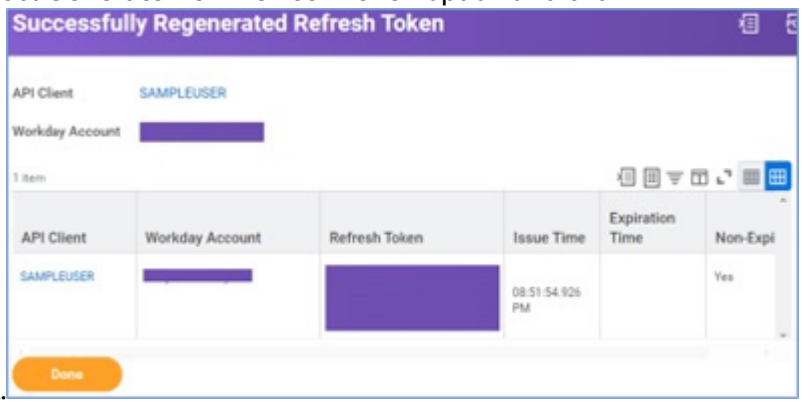
Delete or Regenerate Refresh Token screen displays.

8. Select **Generate New Refresh Token** option and click **OK**.



Result
A new refresh token is generated. Copy and store the refresh token for configuring system property.

Generate token URL for Workday Financials spoke

Register API client in your Workday account and generate a token URL for Workday Financials spoke.

Before you begin
Role required: admin

Procedure

1. Log into your Workday tenant.
2. Navigate to Search and enter `Register API Client` task.
3. On the Register API Client, fill in the details.

Field	Description
Client Name	Client name of the app. For example, `Workday Financials spoke`.
Client Grant Type	Select Authorisation Code Grant.
Access Token Type	Access Token Type: Select Bearer
Redirection URI	Enter your ServiceNow URL in this format: `https://<instance>.service-now.com/oauth_redirect.do`.
Non-Expiring Refresh tokens	Option to enable refresh tokens which do not expire.
Scope (Functional Areas)	Select the required functional areas.
Include Workday Owned Scope	Option to select scope that are owned by Workday.

4. Click **OK**.

Result
Copy and store the generated Token Endpoint value for configuring system property.

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Configure system properties for Workday Financials spoke

Configure the system properties to enable OAuth for SOAP APIs based actions for Workday Financials spoke.

Before you begin

- Generate client ID and client secret for Workday Financials spoke
- Generate token URL for Workday Financials spoke
- Role required: admin

Procedure

1. Navigate to **All** > **System Properties** > **All Properties**.
2. In the **Application** column, search for `Workday Financials Spoke`.
3. Open the *`sn_workdayfin_spke.glide.hub.clientid`* system property.
4. Enter the Client ID generated from the Workday account in the **Value** field and click **Update**.
5. Open the *`sn_workdayfin_spke.glide.hub.clientsecret`* system property.
6. Enter the Client secret generated from the Workday account in the **Value** field and click **Update**.
7. Open the *`sn_workdayfin.glide.hub.refreshtoken`* system property.
8. Enter the refresh token generated from the Workday account in the **Value** field and click **Update**.
9. Open the *`sn_workdayfin_spke.glide.hub.tokenurl`* system property.
10. Enter the token URL generated from the Workday account in the **Value** field and click **Update**.

Result

The required system properties are configured for the Workday Financials spoke.

Create a credential record

Create a Basic Auth credential record to use the RaaS-report based actions. The Workday Financials spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Select **New**.

   The system displays this message: `What type of Credentials would you like to create?`

3. Select **Basic Auth Credentials**.
4. On the form, fill these values.

Name	Name to identify the credential record. For example, `Workday Financials Cred`.

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User name	User name of the Workday user with access to the RaaS reports.
Password	Password of the Workday user with access to the RaaS reports.

5. Right-click the form header and select **Save**.

Configure a connection record

Create and configure a Workday Financials spoke connection to authenticate ServiceNow requests.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record, for example, **WorkdayFinancials**.
3. From the **Connections** tab, select **New**.
4. On the form, fill these values.

Field	Description
Name	Name to identify the connection record. For example, `Workday Financials Conn`.
Credential	Required credential record of the Basic Auth type. Select the credential record you had created for the Workday Financials spoke. For example, `Workday Financials Cred`. For more information, see Create a credential record.
Connection URL	Base URL to connect to your Workday instance.

5. For **tenant_name** in the **Attributes** tab, enter the value of your Workday tenant name.
6. Right-click the form header and select **Save**.

Configure the To Do report

Create and configure the To Do report to retrieve worker's finance related inbox items suc as, to-dos, action items, approval, and so on.

Before you begin

Role required: User with access to create report and the Business process event steps report data source.

Create all the required calculated fields.

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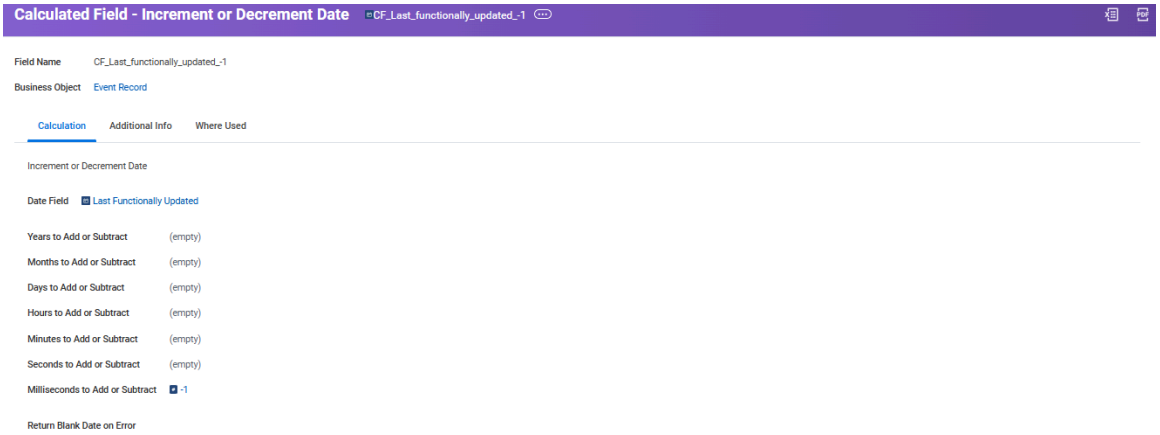
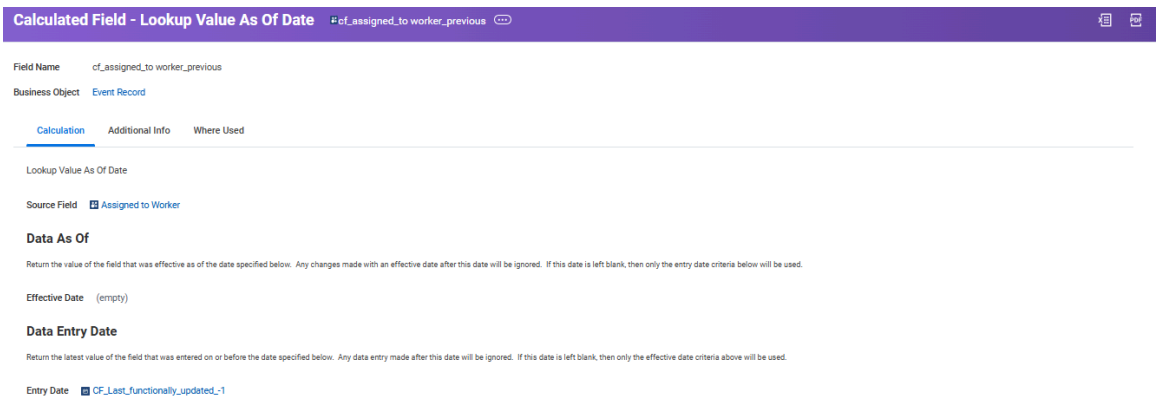
1. Calculated field 1:

   a. Create increment and decrement type calculated field named **CF_Last_functionally_updated_-1**.

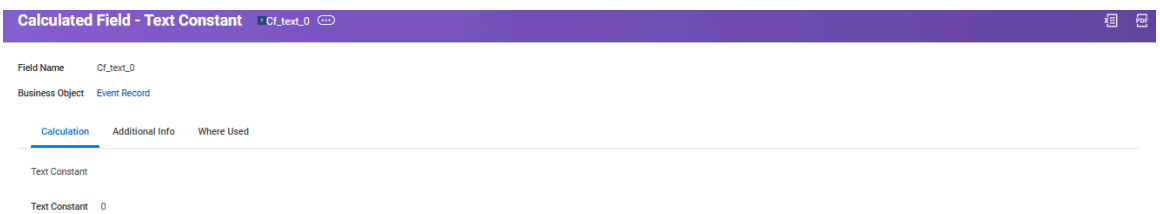


   b. Create Lookup Value As Of Date type calculated field named **cf_assigned_to_worker_previous** and use **CF_Last_functionally_updated_-1** in this field.

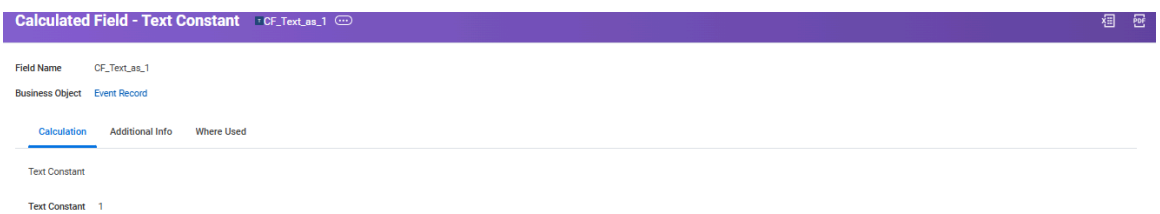


2. Calculated field 2:

   a. Create text constant type calculated field named **Cf_text_0**.



   b. Create text constant type calculated field named **CF_Text_as_1**.



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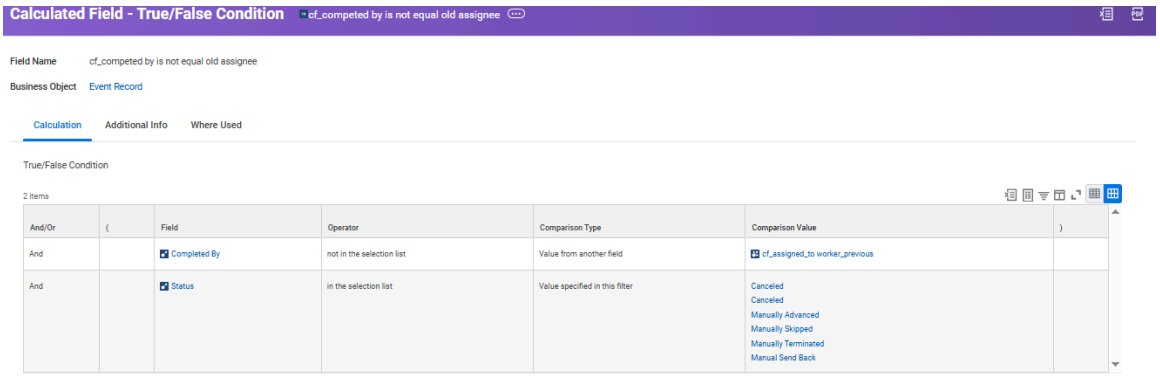
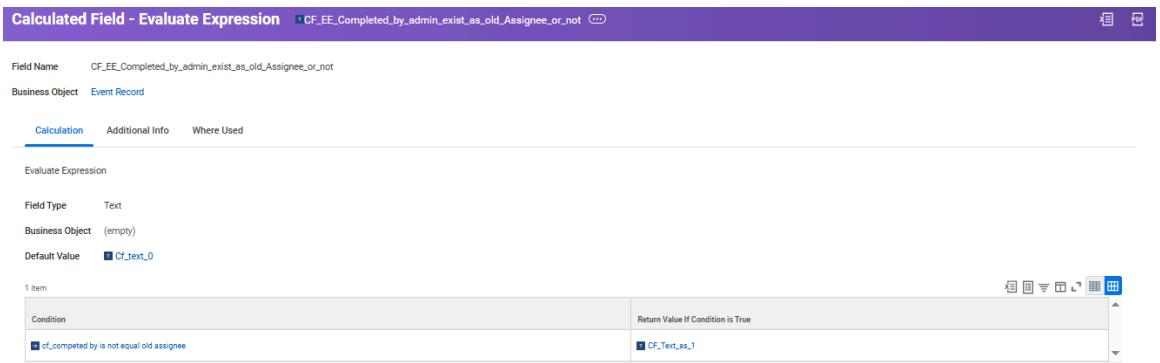
c. Create true/false condition type calculated field named **cf_competed_by_is_not_equal_old_assignee**.

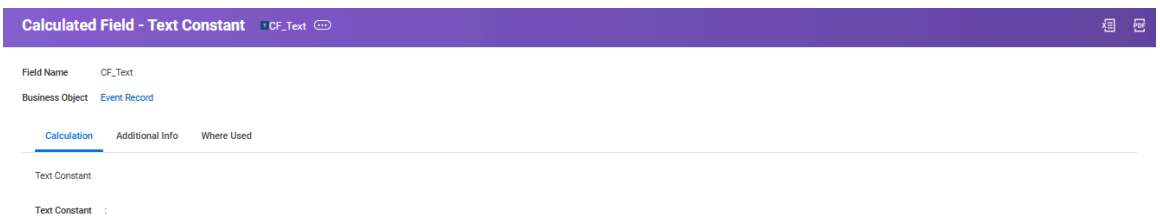


d. Create evaluate expression calculated field named **CF_EE_Completed_by_admin_exist_as_old_Assignee_or_not**.

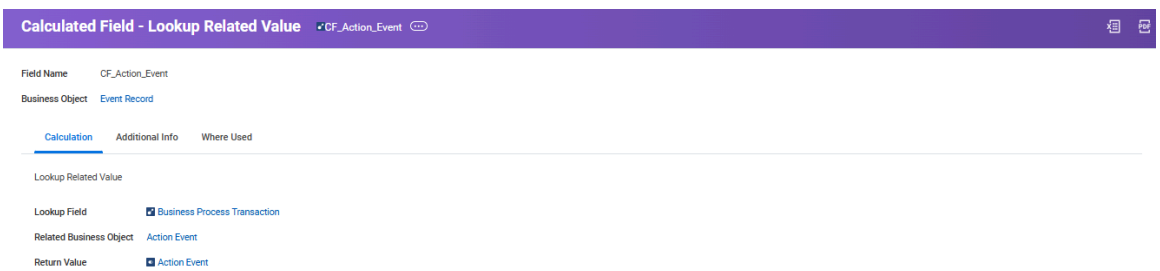


3. Calculated field 3:

a. Create text constant type calculated field named **CF_Text**.



b. Create Lookup related value type calculated field named **CF_Action_Event**.



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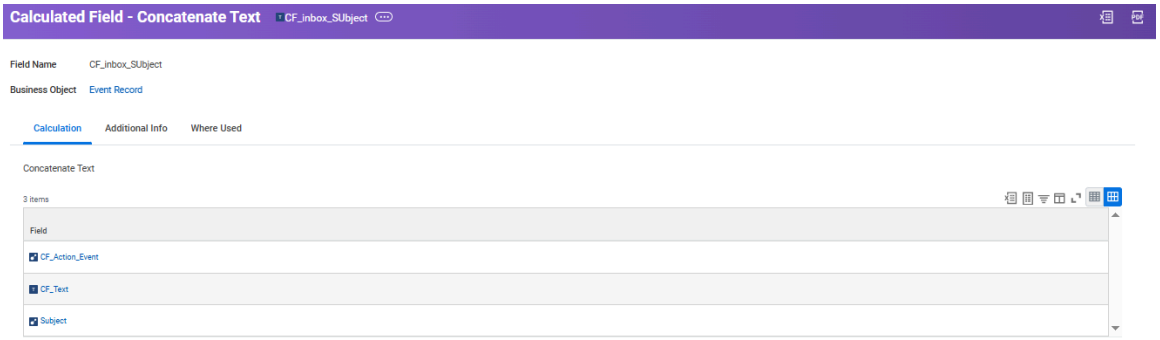
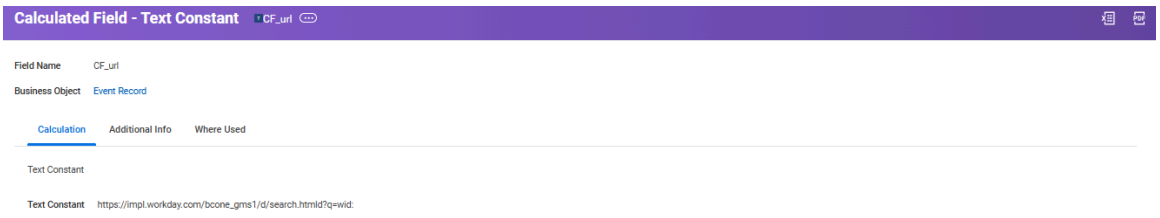
c. Create Concatenate text type calculated field named **CF_inbox_SUbject**.

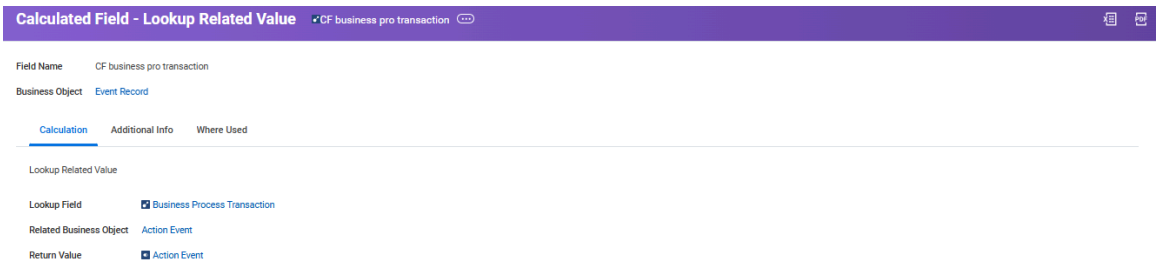


4. Calculated field 4:

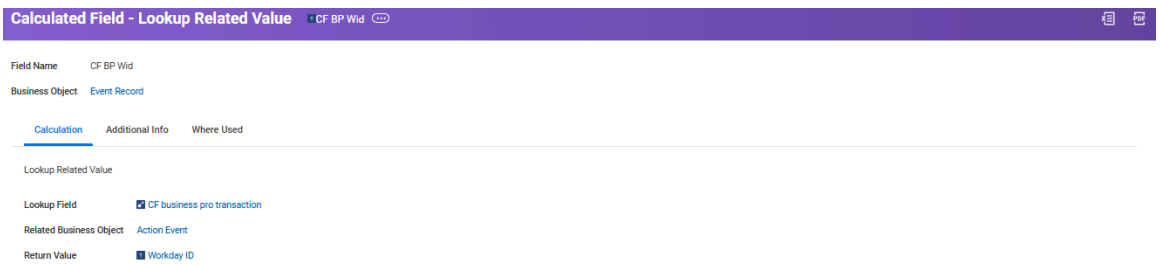
a. Create text constant type calculated field named **CF_url**.



b. Create Lookup related value type calculated field named **CF_business_pro_transaction**.



c. Create Lookup related value type calculated field named **CF_BP_Wid**.



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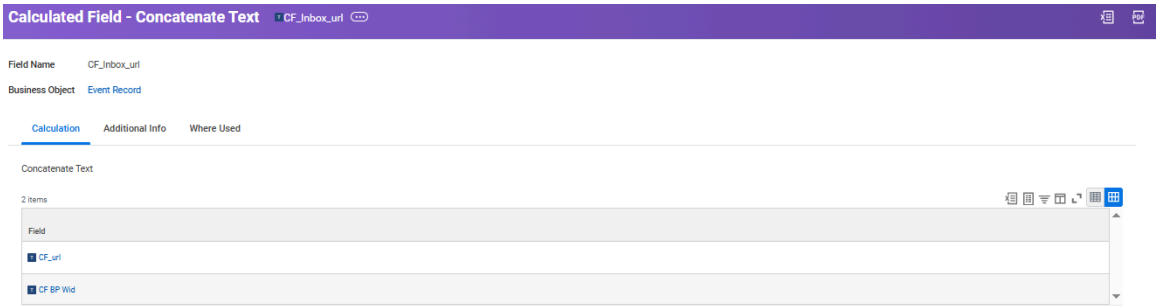
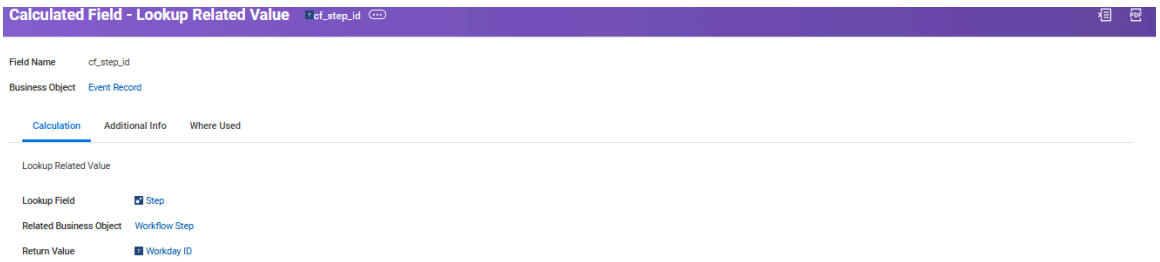
d. Create Concatenate text type calculated field named **CF_Inbox_url**.

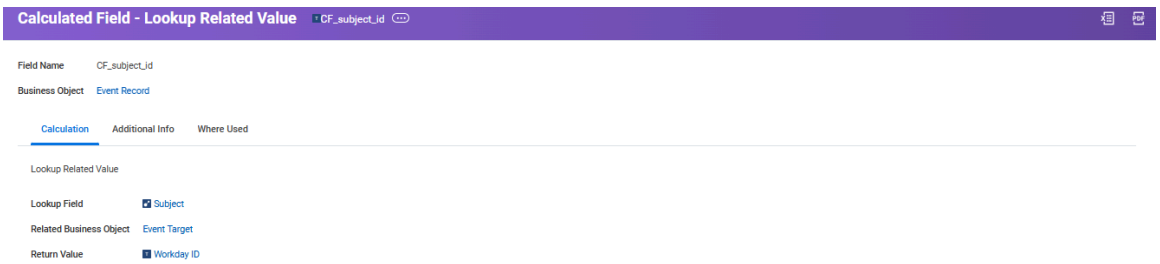


5. Calculated field 5:

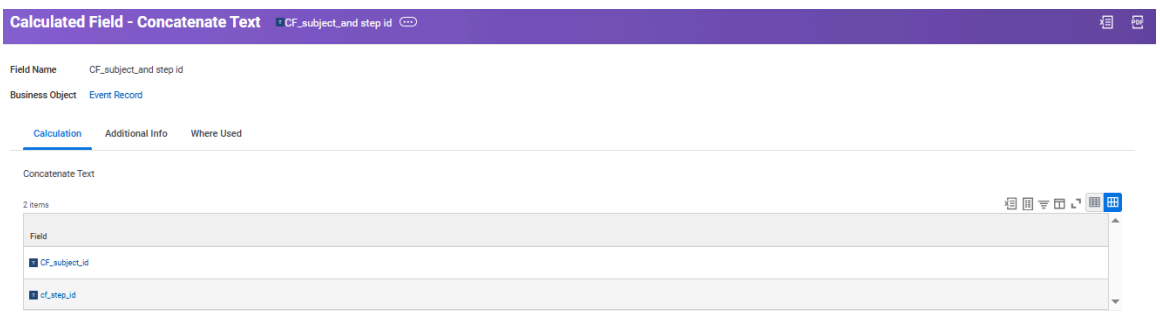
a. Create Lookup related value type calculated field named **cf_step_id**.



b. Create Lookup related value type calculated field named **CF_subject_id**.



c. Create Lookup related value type calculated field named **CF_subject_and_step_id**.



6. Calculated field 6: Create Lookup related value type calculated field named **CF_sent_back**.

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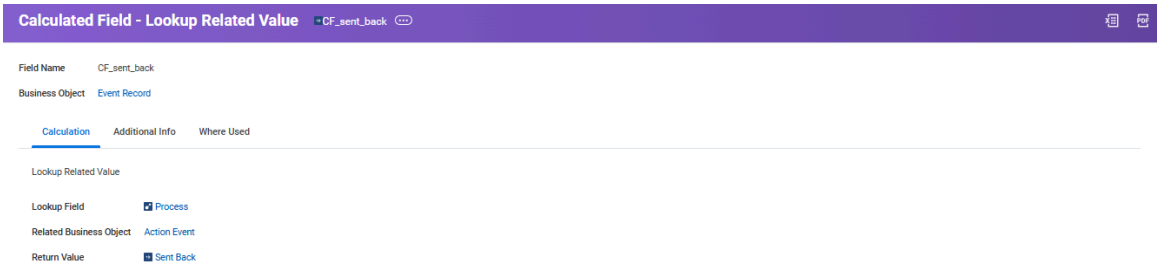
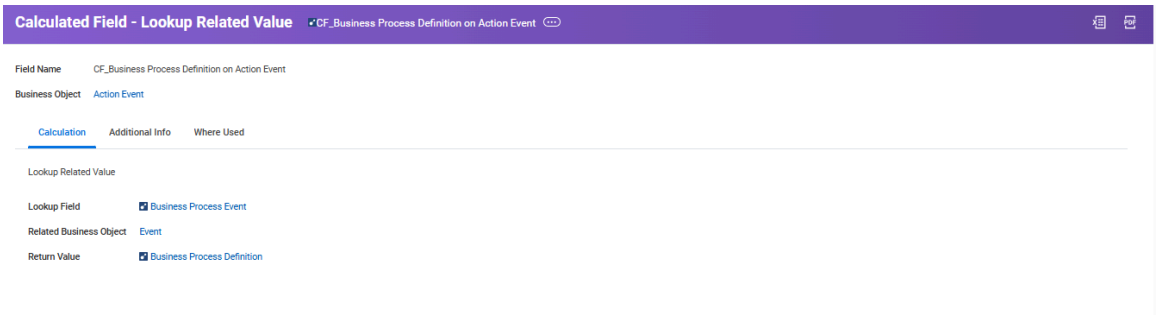
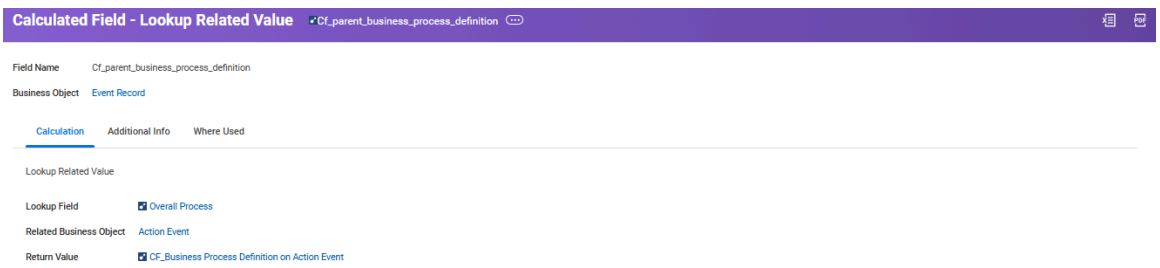


7. Calculated field 7:

   a. Create Lookup related value type calculated field named **CF_Business Process Definition on Action Event**.

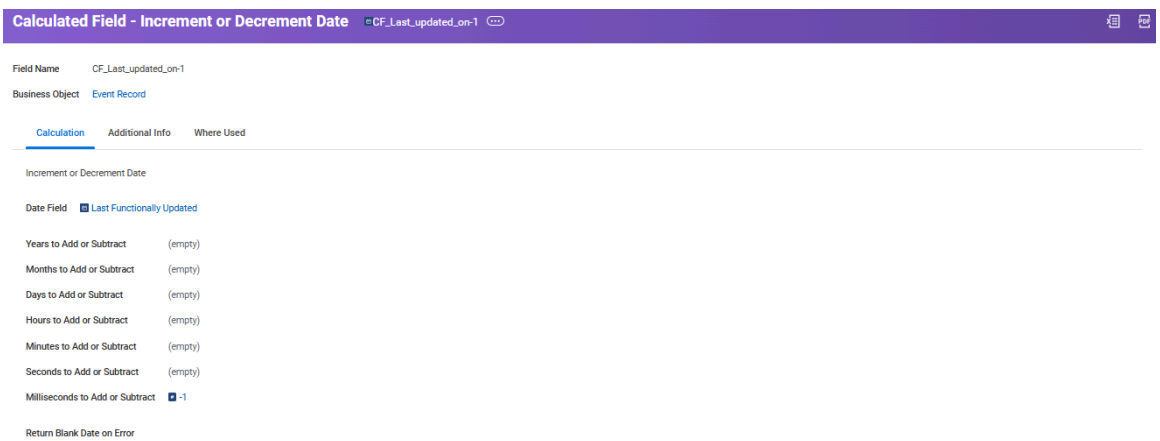


   b. Create Lookup related value type calculated field named **Cf_parent_business_process_definition** and use **CF_Business Process Definition on Action Event** in it.



8. Calculated field 8:

   a. Create increment and decrement type calculated field named **CF_Last_updated_on-1**.



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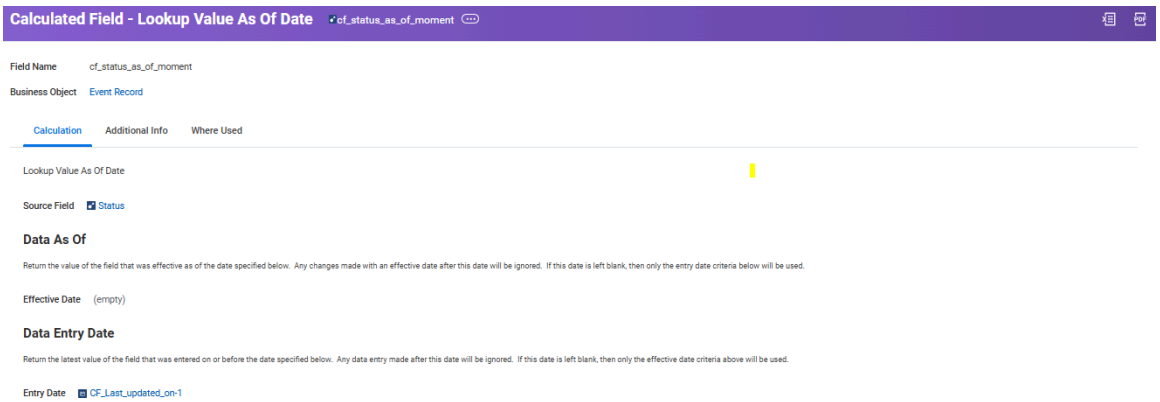
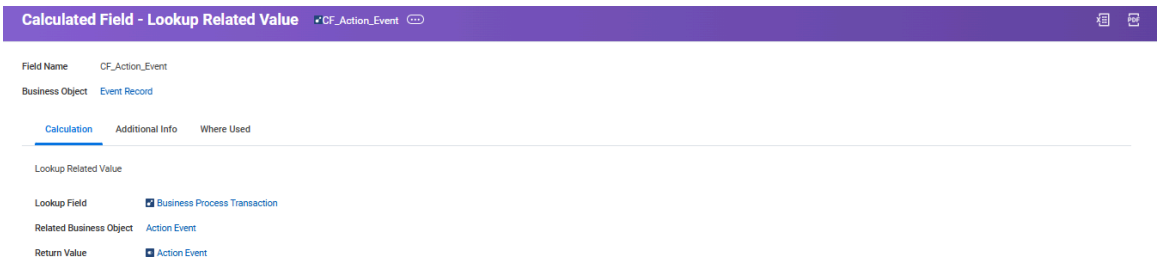
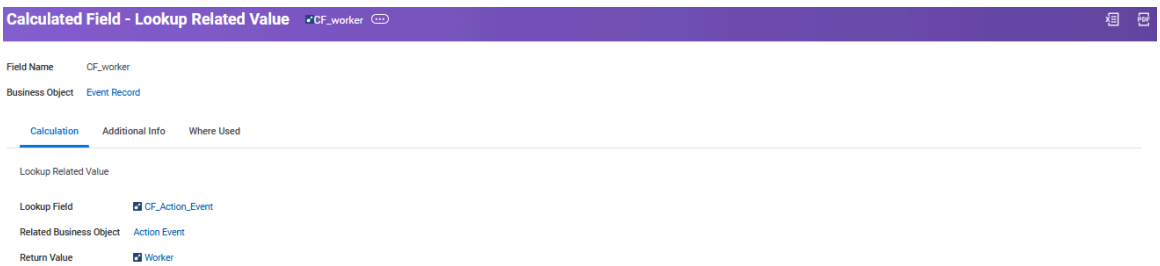
b. Create Lookup Value as of date type calculated field named **cf_status_as_of_moment** and use **CF_Last_updated_on-1** in this field.



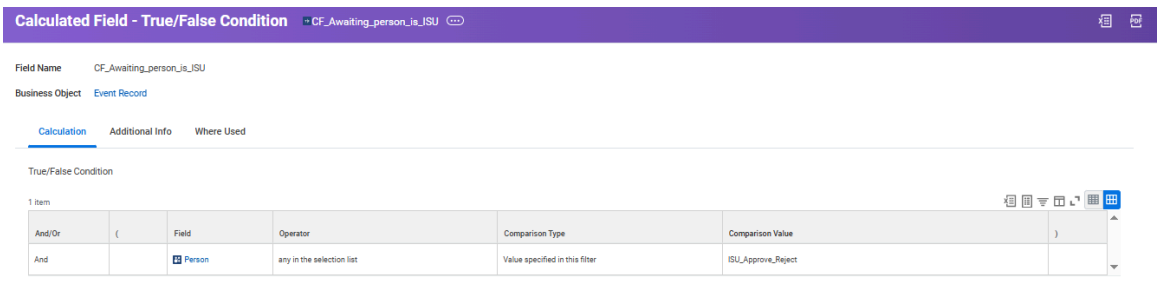
9. Calculated field 9: Create Lookup Value as of date type calculated field named **CF_Action_Event**.



10. Calculated field 10: Create Lookup Value as of date type calculated field named **CF_worker** and use **CF_Action_Event** as lookup field.



11. Calculated field 11: Create True/False condition type calculated field named **CF_Awaiting_person_is_ISU**.



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About this task

- For identification purpose, all calculated field names starts with CF.
- Create all calculated fields required for this report before developing the report to ensure that they are available while creating the report.
- While creating the report, you can select a different report name. However, ensure that the report field names or column heading override for the respective field (if given in the report document) should be same as it is in report document.

> **Important:** Report field label must be same as in report document. Else, the action fails.

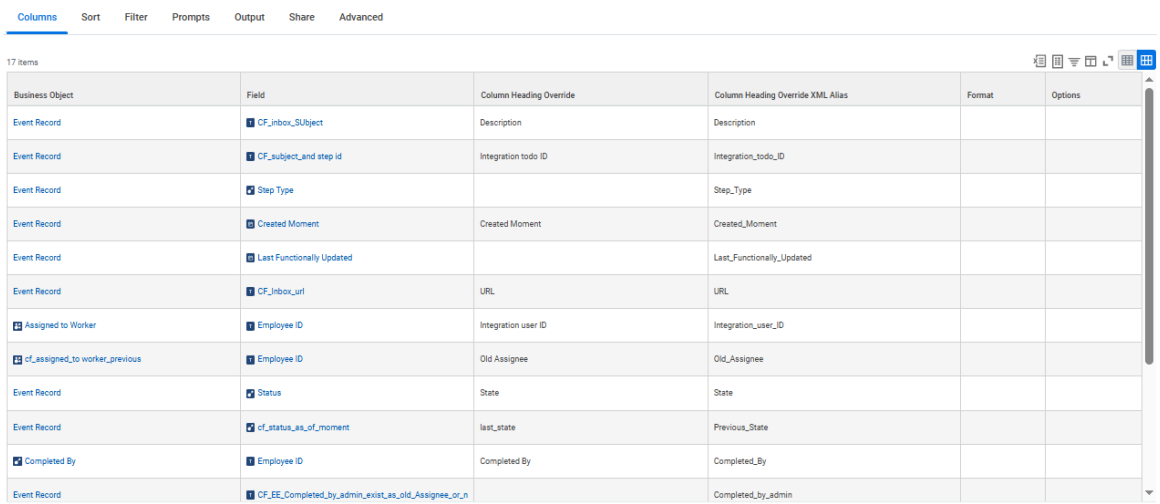
- **Group Column Heading** for each business object in the **Group Column Heading** section should be blank.
- While creating filter, ensure that you add parenthesis on filter.
- All reports must be shared or owned by ISU user which will be used for accessing these action on the ServiceNow platform.
- In the **Advanced** section, select the **Enable as webservice** option.

Procedure

1. Access the **Create Custom Report** task.
2. Provide the report name.
   For example, **SNIH_Inbox_Items- finance items**.
3. Select report type as **Advanced**.
4. Clear the **Optimized for performance** option.
5. Select Data Source as **Business Process Event steps**.
6. Ensure that the temporary report option is cleared and click **Ok**.



7. Select the report business object and report fields.



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Event Record	Due Date	Due date	Due_date		
CF_Action_Event	Business Process Type		Business_Process_Name		
CF_Action_Event	Worker		Requested_For		
CF_worker	Employee ID		Requested_For_Employee_ID		
CF_Action_Event	Workday ID		Workday_ID		

8. In Group column heading section, select all business objects.
   Group Column heading for each business object should be blank.

Group Column Headings 5 items

Business Object	Group Column Heading	Group Column Heading XML Alias
Assigned to Worker		assignedToWorkers_group
CF_Action_Event		CF_Action_Event_group
CF_worker		CF_worker_group
Completed By		completedBy_group
cf_assigned_to worker_previous		cf_assigned_to_worker_previous_group

9. In the **Filter** section, select the value as shown and ensure that you add parenthesis.

Columns | Sort | Filter | Prompts | Output | Share | Advanced

Filter on Instances

Filter conditions for filtering on instances 22 items

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)	Indexed
Or	(	Status	in the selection list	Value specified in this filter	Awaiting Action In Progress Saved for Later Saved for Later		
And	(	Assigned to Worker	is not empty				
Or		CF_Awaiting_person_is_ISU	equal to	Value specified in this filter	Yes	))	
Or	(	Status	in the selection list	Value specified in this filter	Approved Approvers Added Canceled Canceled Declined Declined Declined Denied Denied In Progress Manually Advanced Manually Terminated Manual Send Back Saved for Later Saved for Later Sent Back		
					Step Completed Submitted Submitted Less (14)		
And		Step Type	not in the selection list	Value specified in this filter	Initiation Integration Service		
And	(	Completed By	is not empty				
Or		CF_Awaiting_person_is_ISU	equal to	Value specified in this filter	Yes	))	
Or	(	Step Type	in the selection list	Value specified in this filter	Initiation		
And		CF_sent_back	equal to	Value specified in this filter	Yes	)	
Or	(	Step Type	in the selection list	Value specified in this filter	Initiation Integration Service		
And		cf_status_as_of_moment	in the selection list	Value specified in this filter	Saved for Later Saved for Later	)	

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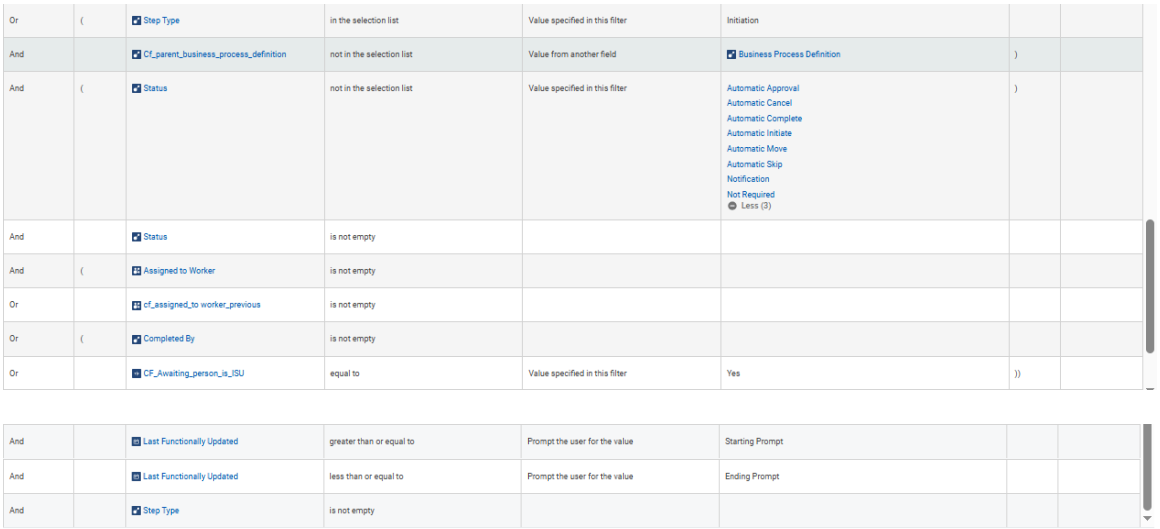
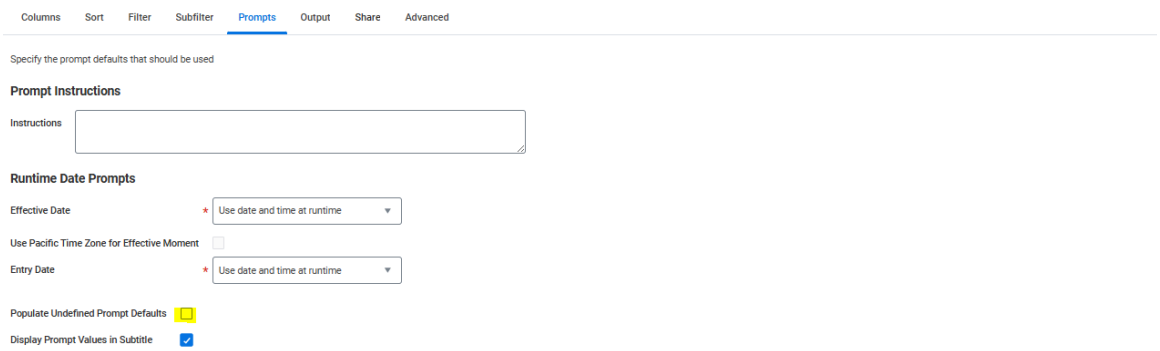


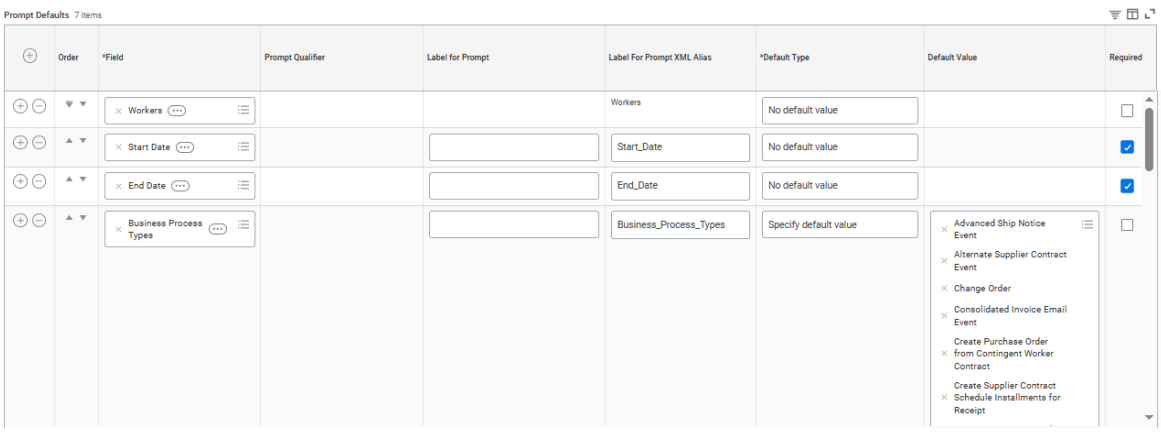
Or	(	Step Type	in the selection list	Value specified in this filter	Initiation		
And		Cf_parent_business_process_definition	not in the selection list	Value from another field	Business Process Definition	)	
And	(	Status	not in the selection list	Value specified in this filter	Automatic Approval Automatic Cancel Automatic Complete Automatic Initiate Automatic Move Automatic Skip Notification Not Required Less (3)	)	
And		Status	is not empty				
And	(	Assigned to Worker	is not empty				
Or		cf_assigned_to worker_previous	is not empty				
Or	(	Completed By	is not empty				
Or		CF_Awaiting_person_is_ISU	equal to	Value specified in this filter	Yes	))	

And		Last Functionally Updated	greater than or equal to	Prompt the user for the value	Starting Prompt		
And		Last Functionally Updated	less than or equal to	Prompt the user for the value	Ending Prompt		
And		Step Type	is not empty				

10. In prompt section, clear the **Populate Undefined Prompt Defaults** check box.



11. Select the value of prompts in the **Prompt Defaults** section.
Ensure that the **Label For Prompt XML Alias** of all prompt fields must be same as shown.



Note: In Business Process Types, few finance business process type in default value column are included here. You can add more finance business process types as per your requirement.

12. In the Advanced section, select **Enable as webservice** option and click **OK**.

13. After report configuration is done, click the three dots icon and navigate **Web Service** > **View URLs**.

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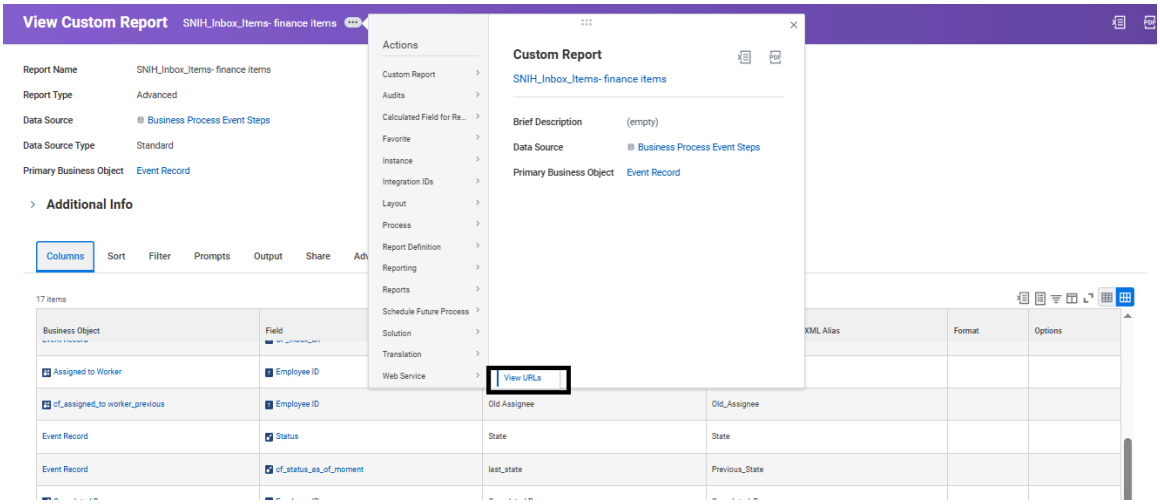
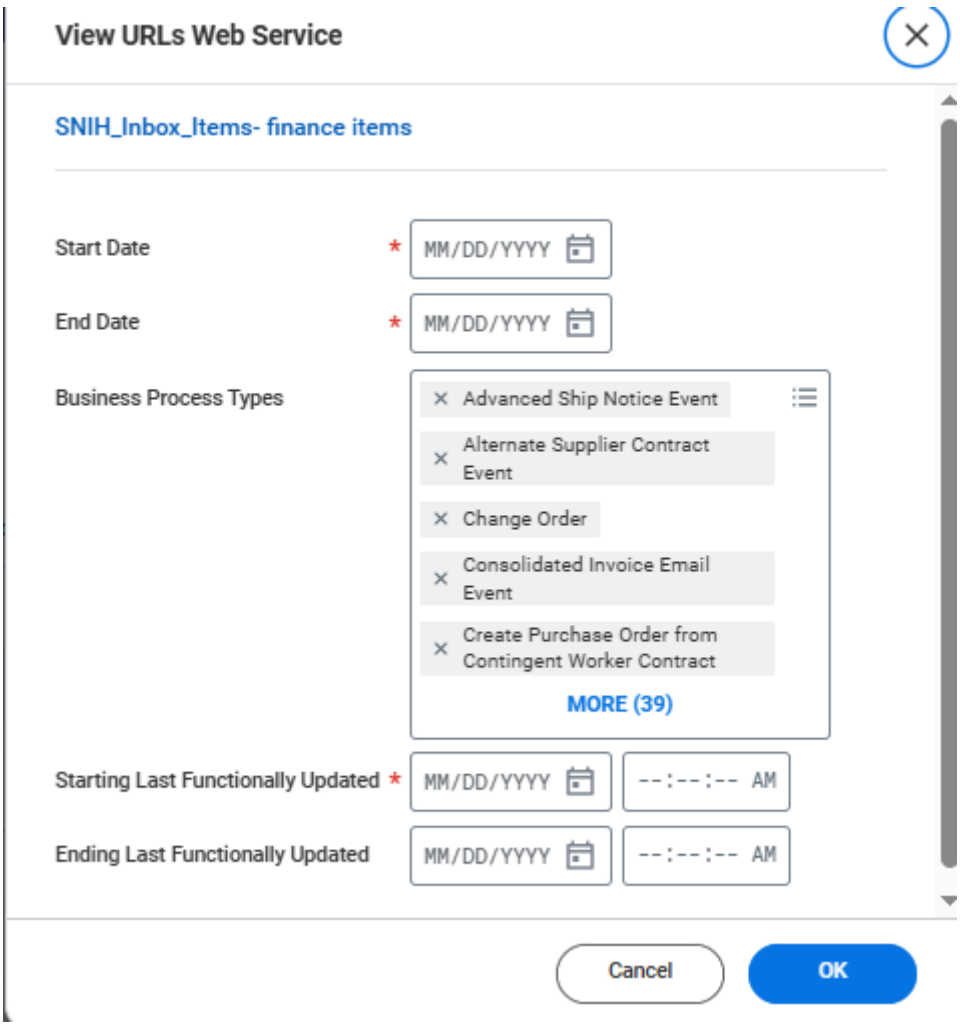


14. Select the required date time range in below parameters and click **OK**.



15. In View URLs Web Service page, click the marked icon under **CSV** section.

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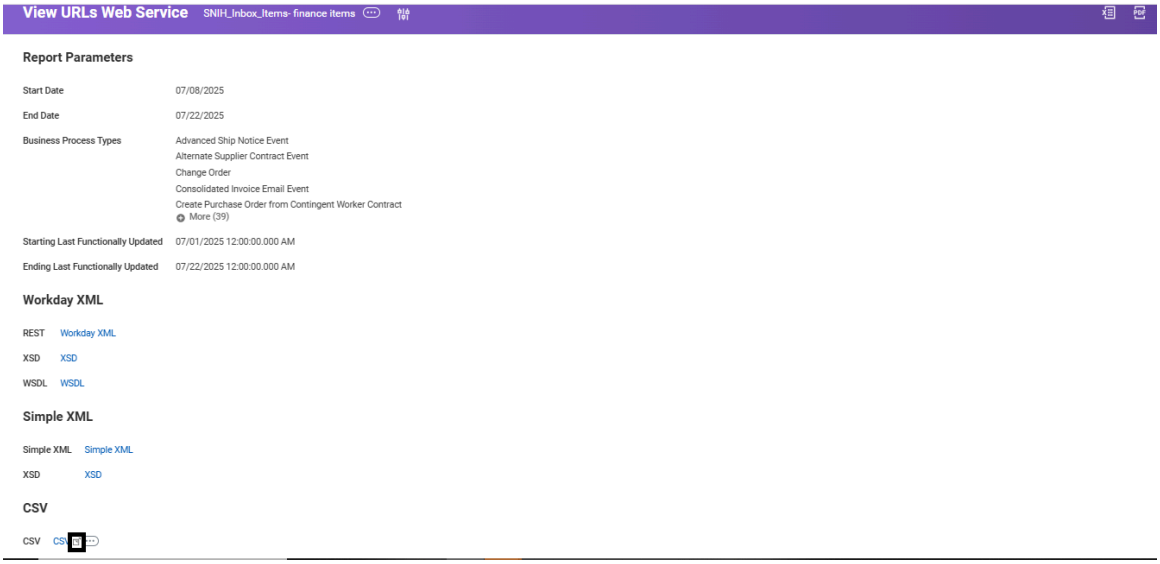
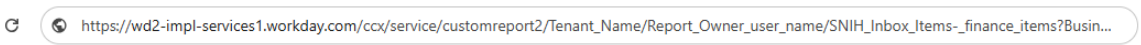


The report is displayed in a new browser tab. You can see the RaaS URL of the report in browser tab and can obtain these details from this link.

- **https://wd2-impl-services1.workday.com** is the base URL of customer's workday tenant.
- **Tenant_Name** is the customer's workday tenant.
- **Report_Owner_user_name** is the user name of the report's owner.
- **SNIH_Inbox_Items-_finance_items** is the report name.



Configure the Ledger Account report

Create and configure the Ledger Account report to retrieve the ledger account details.

Before you begin

Role required: User with access to create report and the Ledger Account report data source.

About this task

- For identification purpose, all calculated field names starts with CF.
- Create all calculated fields required for this report before developing the report to ensure that they are available while creating the report.
- While creating the report, you can select a different report name. However, ensure that the report field names or column heading override for the respective field (if given in the report document) should be same as it is in report document.

> **Important:** Report field label must be same as in report document. Else, the action fails.

- **Group Column Heading** for each business object in the **Group Column Heading** section should be blank.
- While creating filter, ensure that you add parenthesis on filter.
- All reports must be shared or owned by ISU user which will be used for accessing these action on the ServiceNow platform.
- In the **Advanced** section, select the **Enable as webservice** option.

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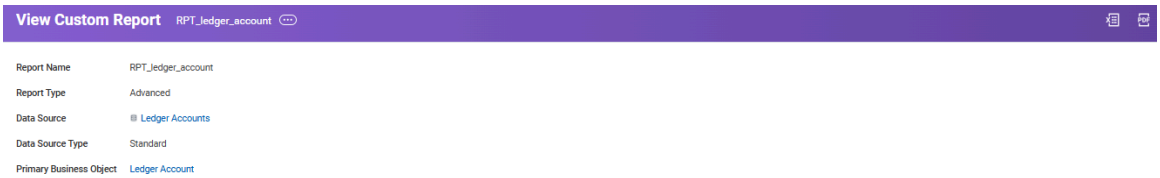
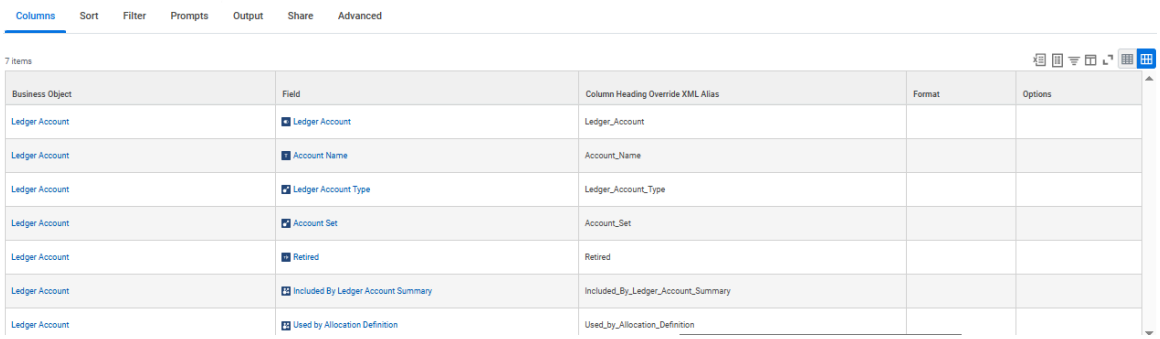
Procedure

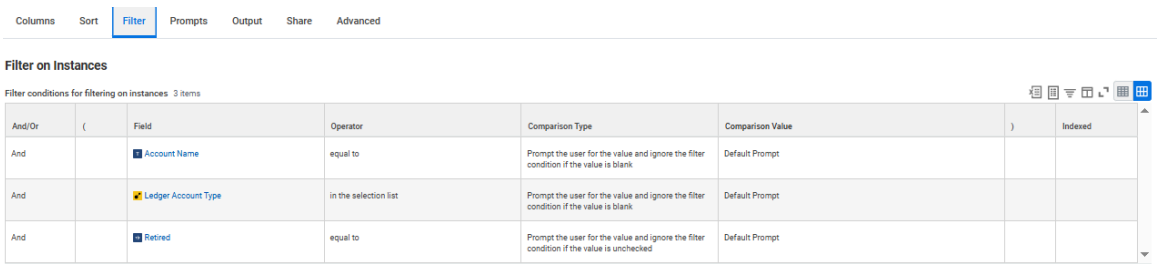
1. Access the **Create Custom Report** task.
2. Provide the report name.
   For example **RPT_ledger_account**.
3. Select report type as **Advanced**.
4. Clear the **Optimized for performance** check box.
5. Select **Data Source** as **Ledger Accounts**.
6. Clear the **Temporary Report** check box and click **OK**.



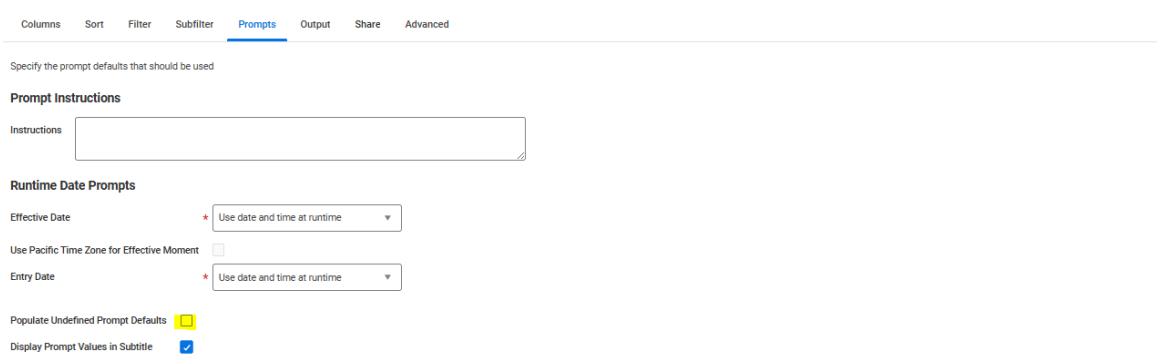
7. Select the report business object and report fields.



8. In **Filter** section, select the value as shown and ensure that you add parenthesis.



9. In prompt section, clear the **Populate Undefined Prompt Defaults** check box.



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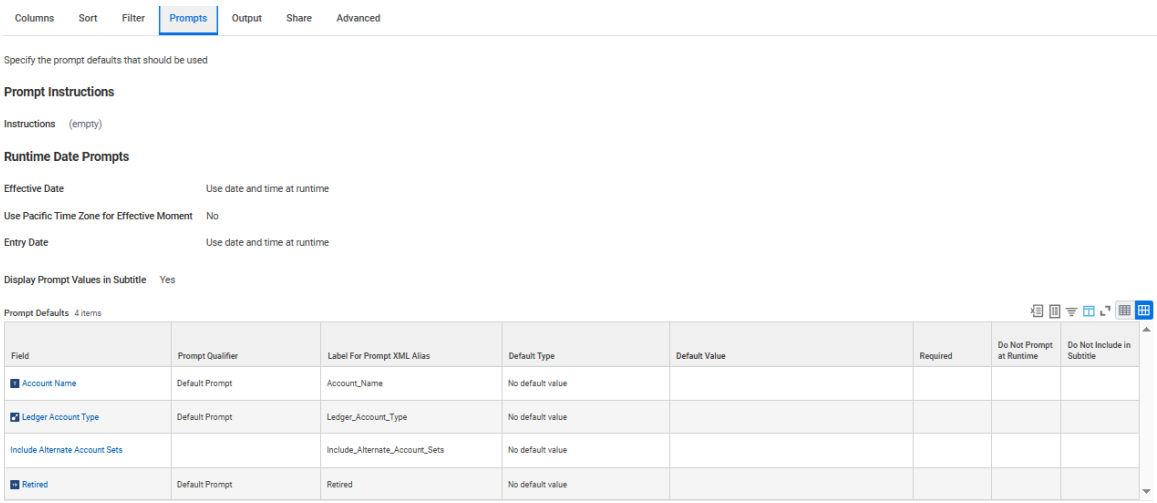
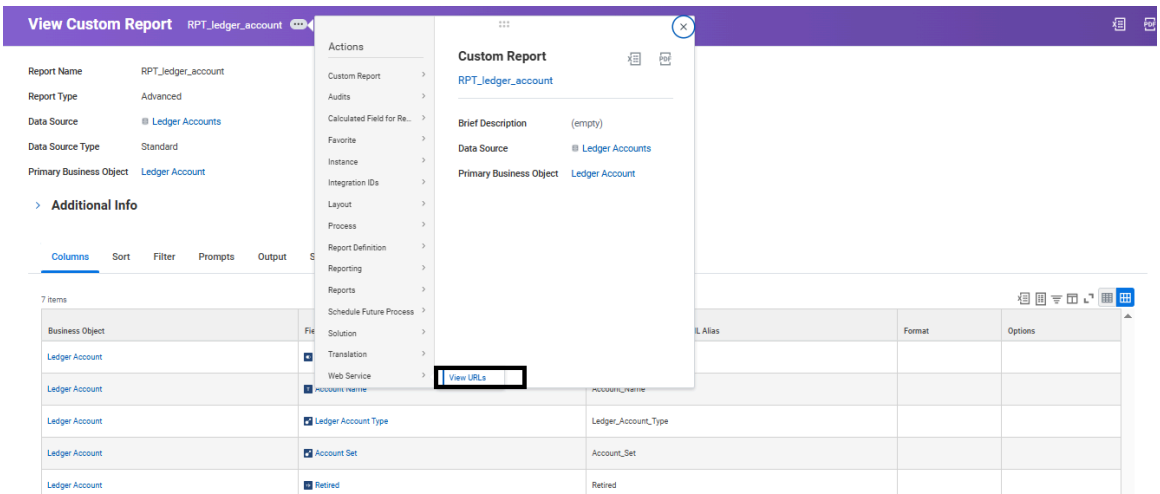
10. Select the value of prompts in the Prompt default section.
    Ensure that the **Label For Prompt XML Alias** of all prompt fields must be same as shown.



11. In the Advanced section, select **Enable as webservice** option and click **OK**.

12. After report configuration is done, click the three dots icon and navigate **Web Service** > **View URLs**.



13. Select the required date time range in below parameters and click **OK**.

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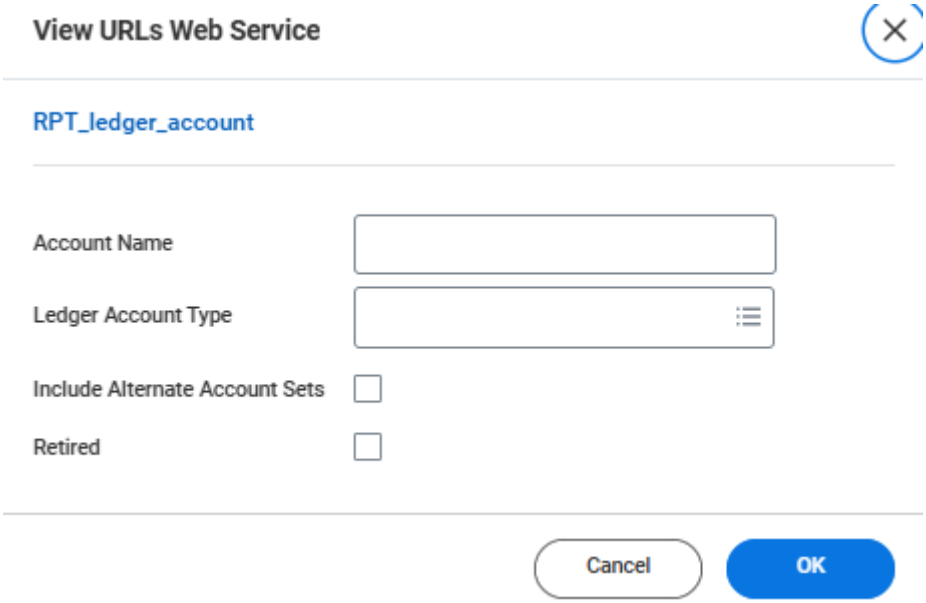
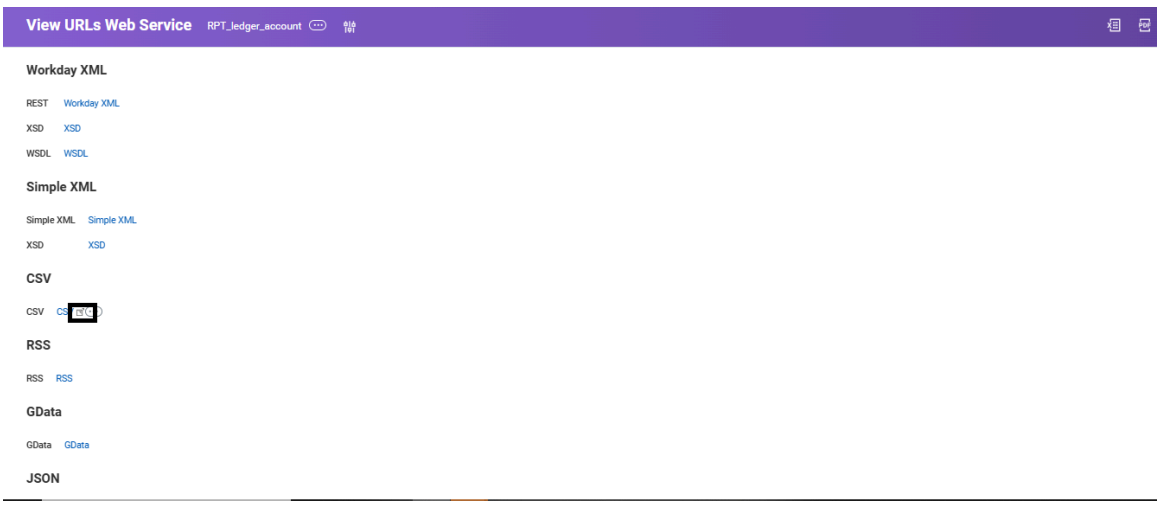


14. In View URLs Web Service page, click the marked icon under the **CSV** section.



The report is displayed in a new browser tab. You can see the RaaS URL of the report in browser tab and can obtain these details from this link.

- **https://wd2-impl-services1.workday.com** is the base URL of customer's workday tenant.
- **Tenant_Name** is the customer's workday tenant.
- **Report_Owner_user_name** is the user name of the report's owner.
- **RPT_ledger_account** is the report name.



Configure the Payment Status report

Create and configure the Payment Status report to retrieve the supplier payment information within the specified date range.

Before you begin

Role required: User with access to create report and the Supplier Payments report data source.

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About this task

- For identification purpose, all calculated field names starts with CF.
- Create all calculated fields required for this report before developing the report to ensure that they are available while creating the report.
- While creating the report, you can select a different report name. However, ensure that the report field names or column heading override for the respective field (if given in the report document) should be same as it is in report document.

> **Important:** Report field label must be same as in report document. Else, the action fails.

- **Group Column Heading** for each business object in the **Group Column Heading** section should be blank.
- While creating filter, ensure that you add parenthesis on filter.
- All reports must be shared or owned by ISU user which will be used for accessing these action on the ServiceNow platform.
- In the **Advanced** section, select the **Enable as webservice** option.

Procedure

1. Access the **Create Custom Report** task.
2. Provide the report name.
   For example **CR Payment status report**.
3. Select report type as **Advanced**.
4. Clear the **Optimized for performance** check box.
5. Select **Data Source** as **Supplier Payments**.
6. Clear the **Temporary Report** check box and click **OK**.



7. Select the report business object and report fields.

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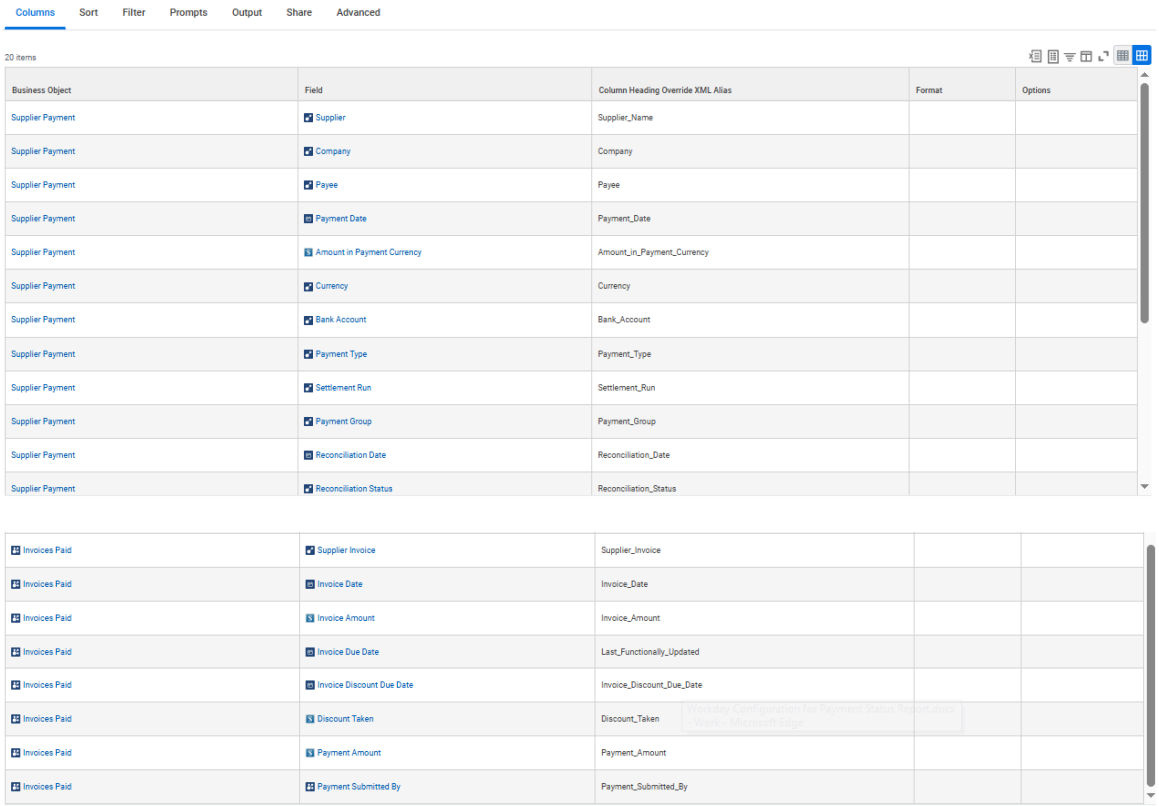
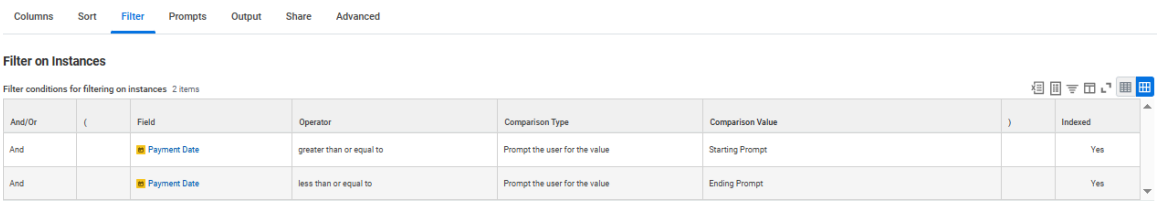


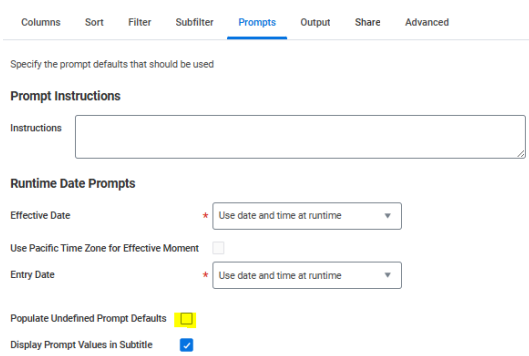
8. In Group column heading section, select all business objects.
   Group Column heading for each business object should be blank.



9. In **Filter** section, select the value as shown and ensure that you add parenthesis.



10. In prompt section, clear the **Populate Undefined Prompt Defaults** check box.



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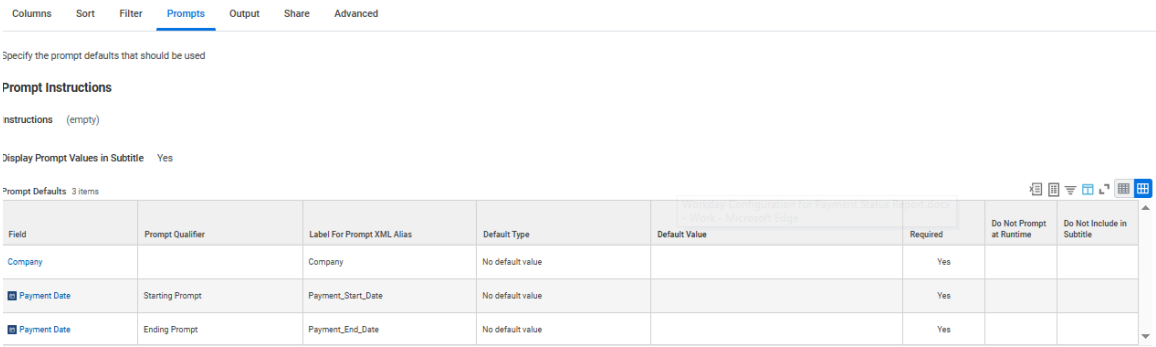
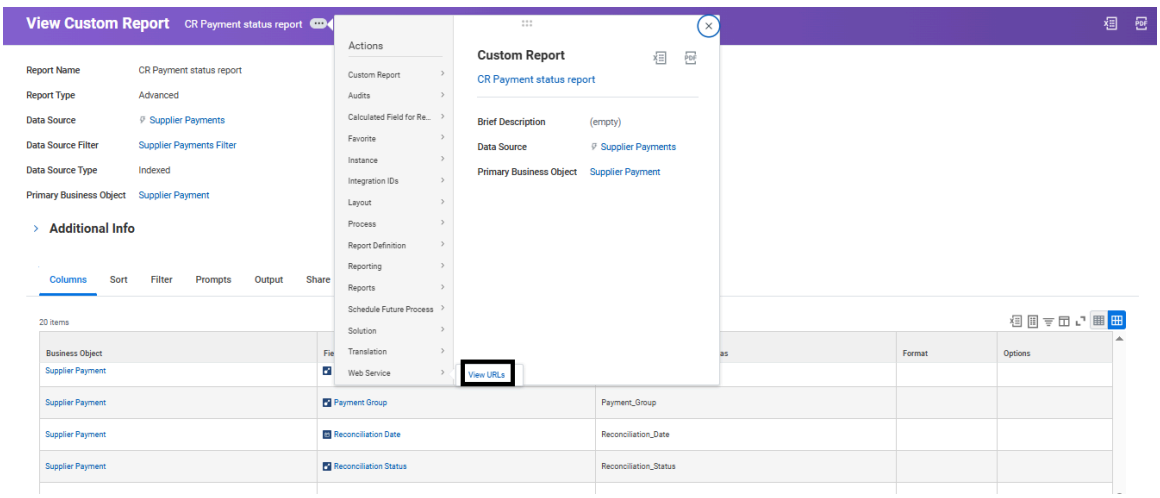
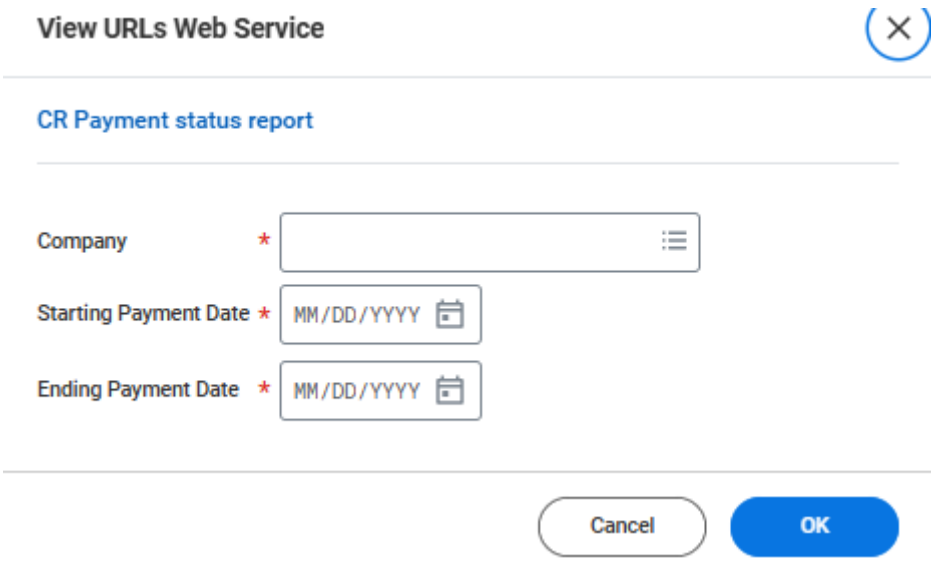
11. Select the value of prompts in the Prompt default section.
    Ensure that the **Label For Prompt XML Alias** of all prompt fields must be same as shown.



12. In the Advanced section, select **Enable as webservice** option and click **OK**.
13. After report configuration is done, click the three dots icon and navigate **Web Service** > **View URLs**.



14. Select the required date time range in below parameters and click **OK**.



15. In View URLs Web Service page, click the marked icon under **CSV** section.

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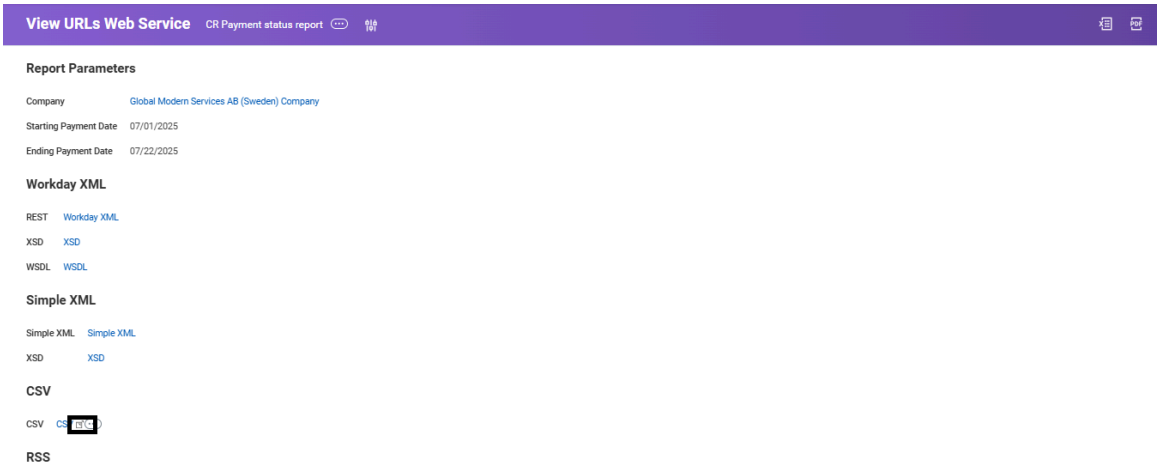
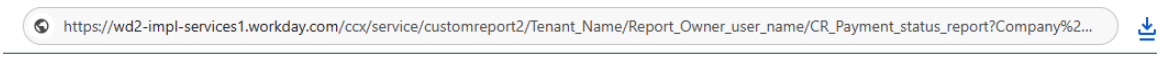


The report is displayed in a new browser tab. You can see the RaaS URL of the report in browser tab and can obtain these details from this link.

- **https://wd2-impl-services1.workday.com** is the base URL of customer's workday tenant.
- **Tenant_Name** is the customer's workday tenant.
- **Report_Owner_user_name** is the user name of the report's owner.
- **CR_Payment_status_report** is the report name.



Set up webhook for your Workday Financials spoke

Set up a webhook to get the data from the Workday Financials application to your ServiceNow instance when an event occurs.

Before you begin

- Set up the Workday Financials spoke
- Role required: admin

Generate user name and password in your ServiceNow instance

Generate user name and password in your ServiceNow instance to authenticate requests and retrieve the required data from the Workday application.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System Definition** > **Table**.
2. Filter and search for the Workday Financials spoke webhook registry table, for example, **Workday Financials Webhook Registry**.
3. Click the **Show List** related list.
4. Click **New**.
5. On the form, fill these values.

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Field	Description
Description	Description of the webhook registry record. Enter `Workday event and authentication for Create PO`.
UserName	Workday user who has integration rights using Workday Web Services.
Password	Password of the Workday user.
Workday Event	Event for which the webhook is set up. Enter `CreatePO`.
Workday Instance	Base URL of the Workday instance or tenant name.

6. Right-click the form header and click **Save**.
7. Click **Generate UserName And Password**.
   Copy and record the values of user name and password. These values must be specified in the Workday instance to authenticate the webhook requests.

Retrieve the resource path from your ServiceNow instance

Retrieve the resource path from your ServiceNow instance for later use to authenticate requests and retrieve the required data from the Workday application

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **System Web Services** > **Scripted Web Services** > **Scripted REST APIs**.
2. Open the record for the Workday Financials spoke.
3. In the **Resources** tab, click the **Callback** record.
4. Record and save the value of **Resource path** for later use.

Import CLAR file to your Workday instance

Import CLAR file available at ServiceNow Store to set up webhooks and authenticate requests from ServiceNow instance.

Before you begin

- Workday Studio should be installed.
- Access to custom report creation policy.

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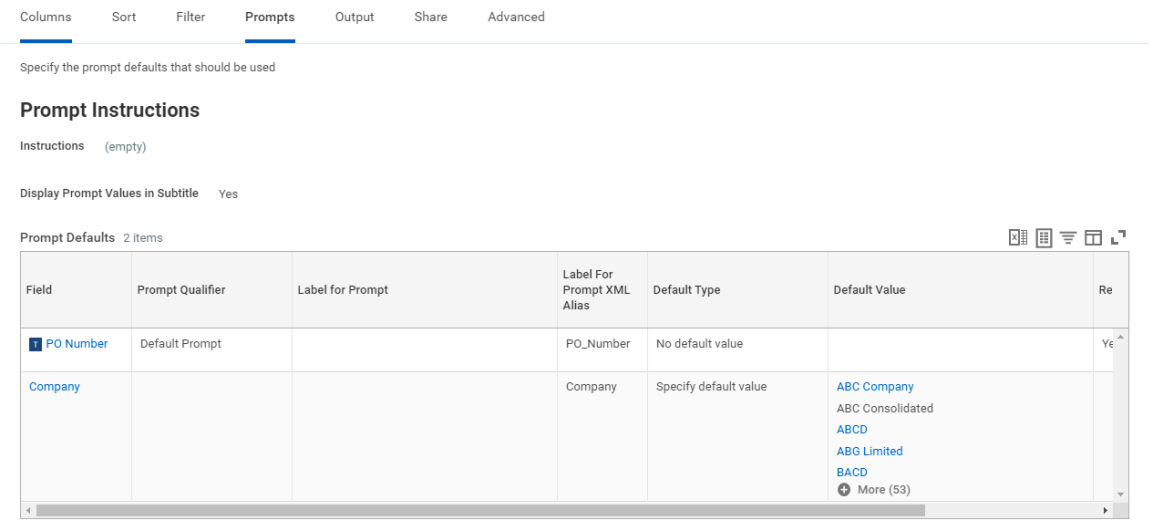
- Create custom report in Workday based on the Purchase_order_report structure and share the report with ISU user.
- Ensure that you select all companies in company prompt in report.

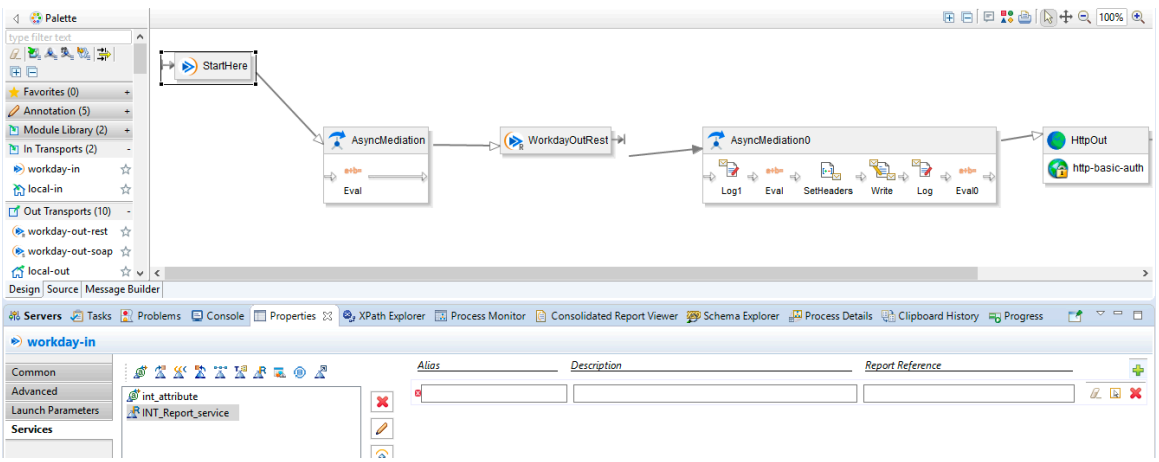


- Access to edit business process definition.
- Access to create and edit integration system.
- Role required: admin

Note: Except integration name, report field XPath (if required), and Workday instance header, users are cautioned against modifying the values of fields or properties in the CLAR file.

Procedure

1. From the Workday Financials spoke page on ServiceNow Store, download the `Workday-Finance-Webhook-Studio-Sample` file from **Supporting Links and Docs**.
2. Unzip the sample file to obtain the CLAR file.
3. Import the CLAR file to Workday Studio.
4. In the **Properties** tab of the **StartHere** component, navigate to **Services** and select the RAAS report created for this webhook.



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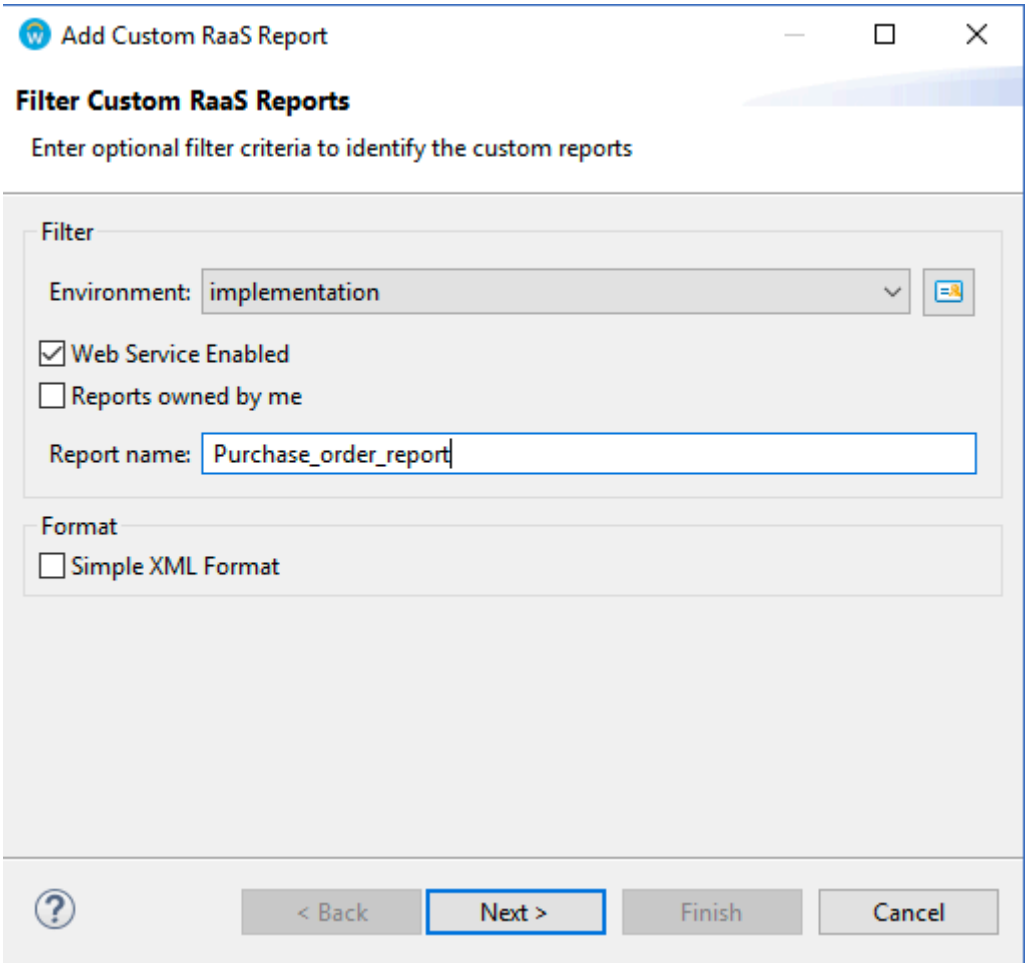
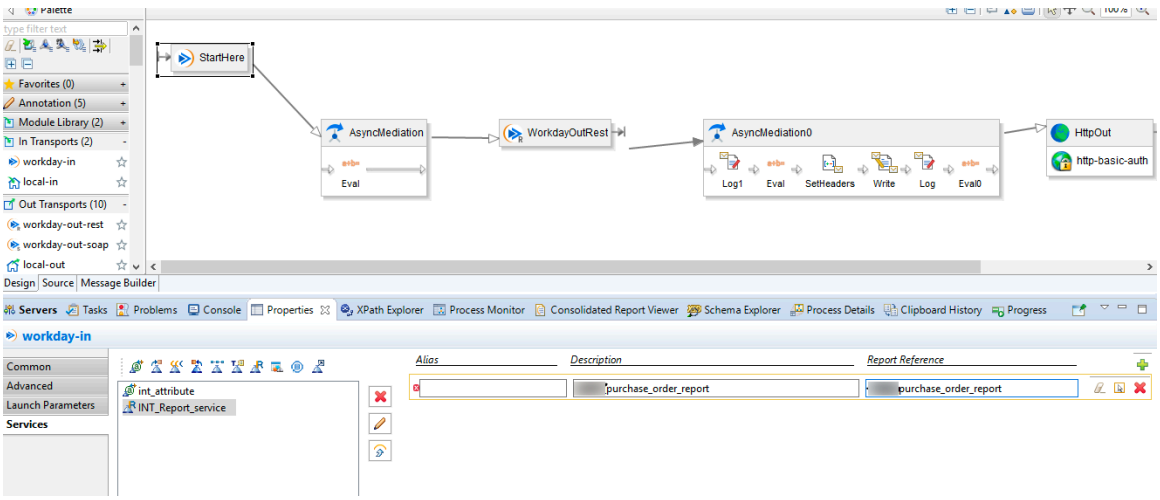
5. Choose the environment where your report exists such as, implementation or sandbox, and configure the report as per your requirement.
6. Provide a report name and select the required report.



7. Provide the alias name of the report.



8. After the report alias is added, add the selected path of report in **Extra Path** that is used to run the report based on prompt.

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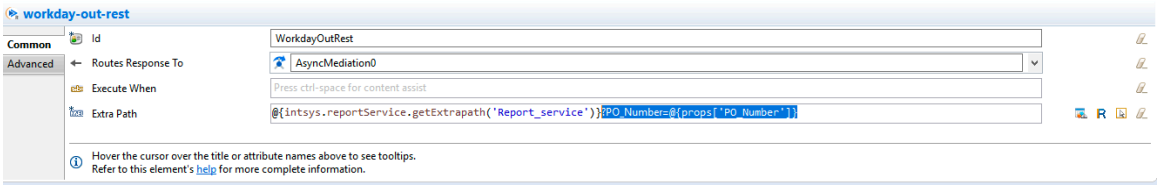
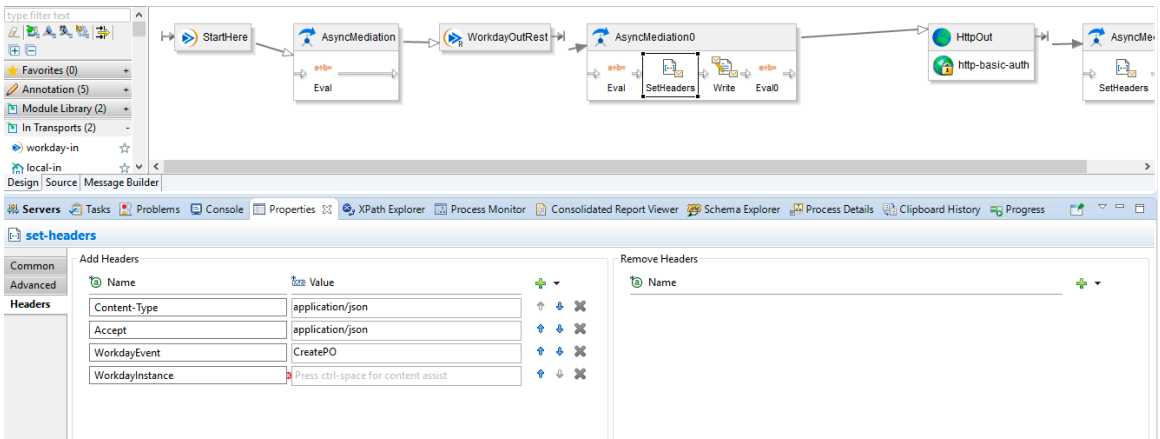
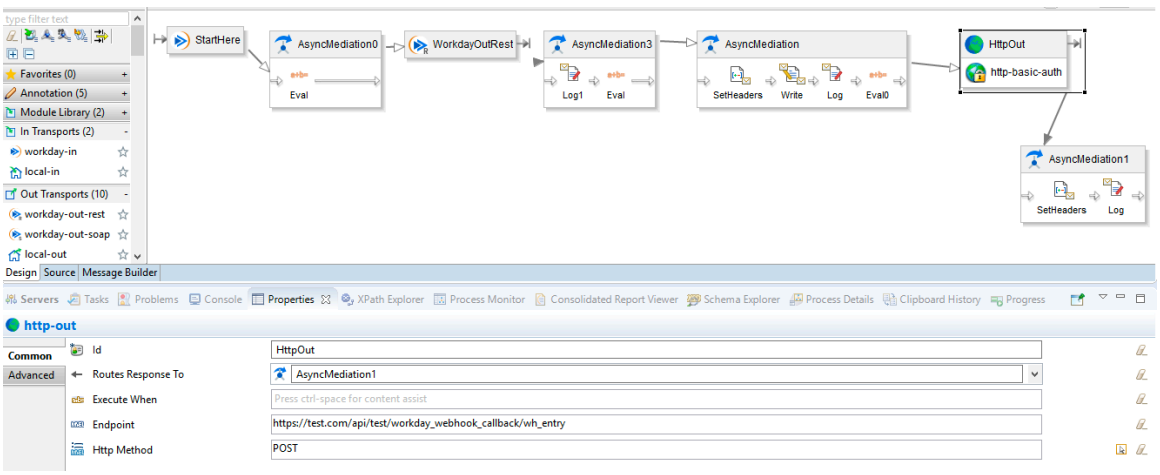


9. In the **Set Headers** component, provide your Workday instance for the **WorkdayInstance** header.



10. In the properties of **HttpOut**, fill in these values.

Field	Value
Endpoint	REST endpoint **Note:** See Retrieve the resource path from your ServiceNow instance for more information.
Http Method	POST



11. Save the changes.
12. In the project explorer, select the integration and deploy it in your Workday system.
13. Log in to your Workday instance and navigate to **Integration** > **Integration System** > **Configure Integration Attributes**.

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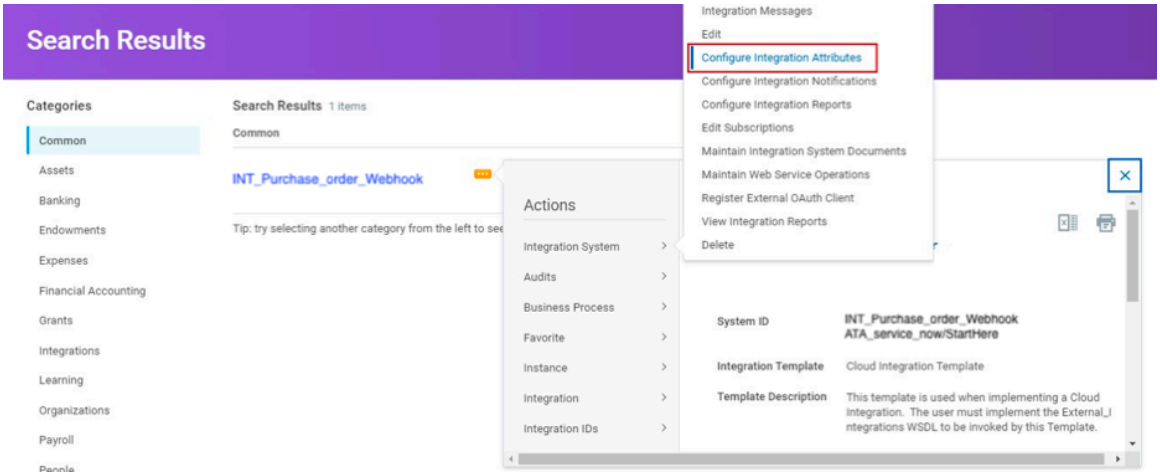
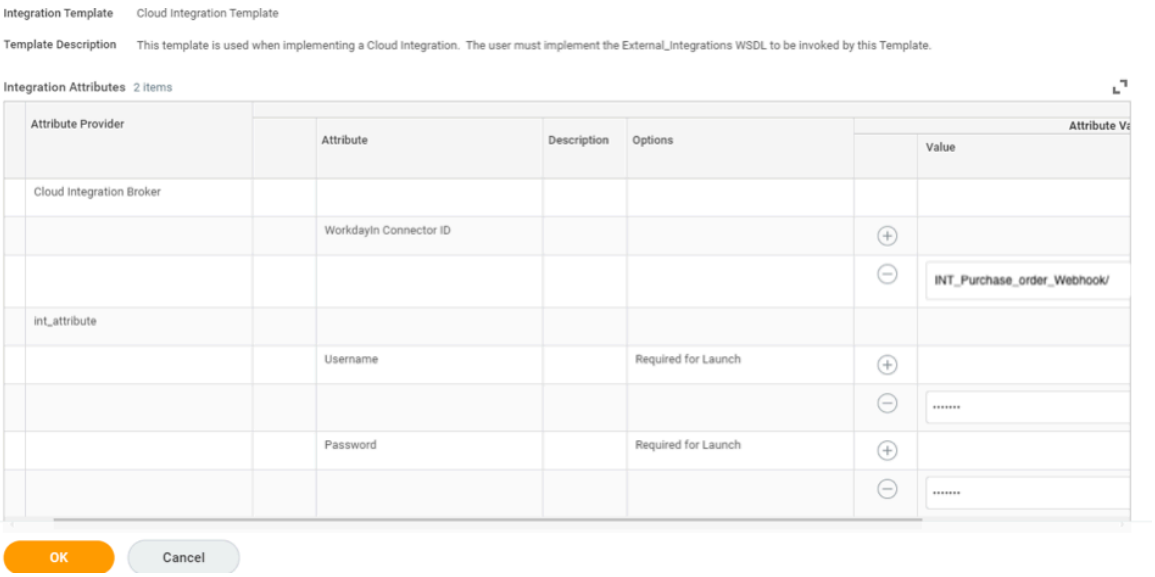


14. Provide user name and password in **Configure Integration Attributes** that you have generated in Generate user name and password in your ServiceNow instance.



15. Modify a business process and add this integration in your business process.

a. Edit definition of the business process.

b. Search for Purchase Order business process in Workday.
If within one customer environment there are more than one purchase order business processes, all the business processes should be configured to enable this webhook for all purchase orders

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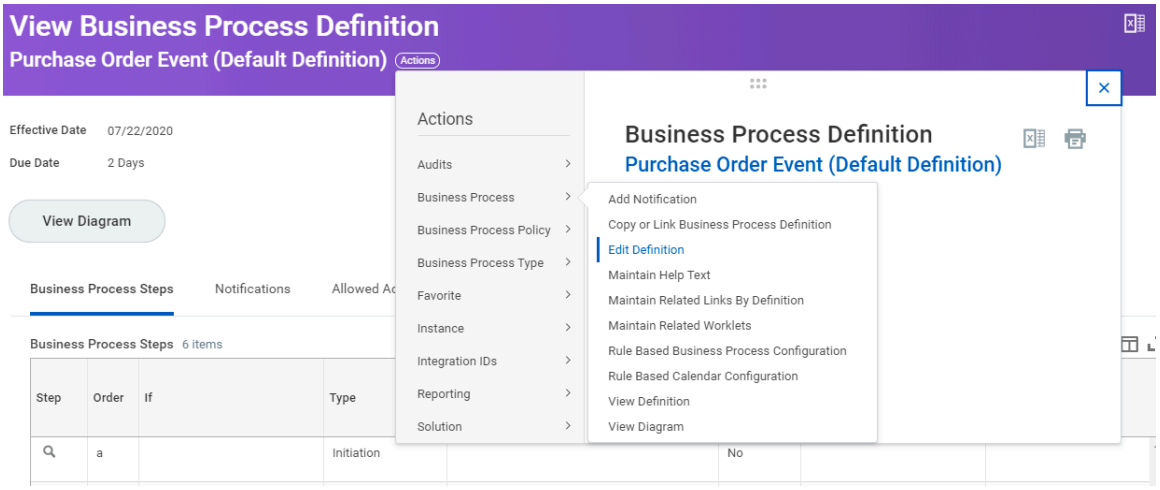
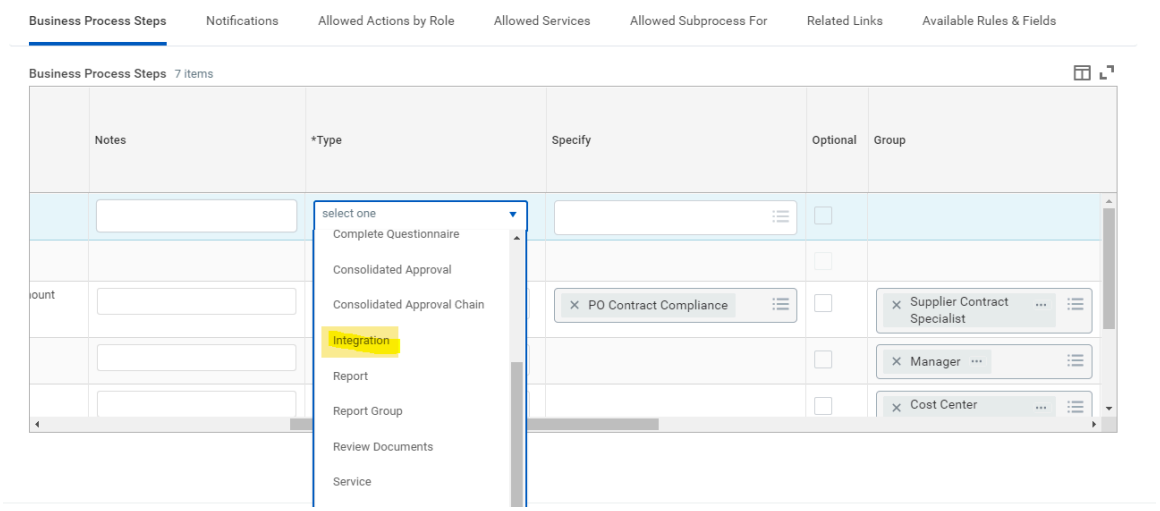


c. Select the effective date and click **Ok**.

d. Click the + sign and add a new business process step in BP.

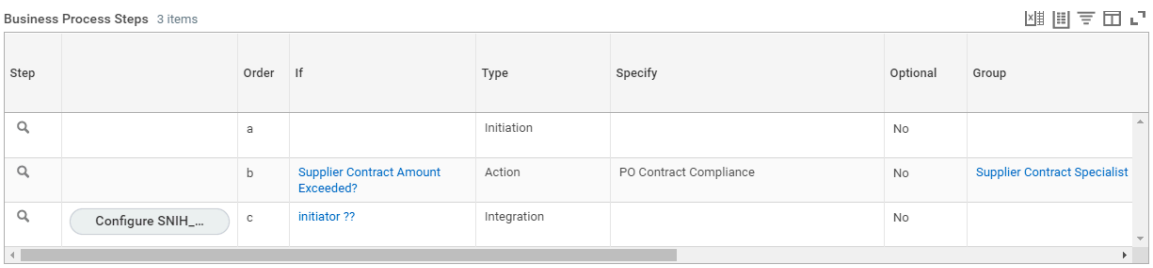
e. Select an order, which is after the completion step of business process.

f. Select **Type** as **Integration**.



g. Provide ISU username in **Run as User** and click **Ok**.

h. Click **Configure Integration** on the newly added business process step in hire BP.



i. On the Configuration Integration Step page, click **Ok**.

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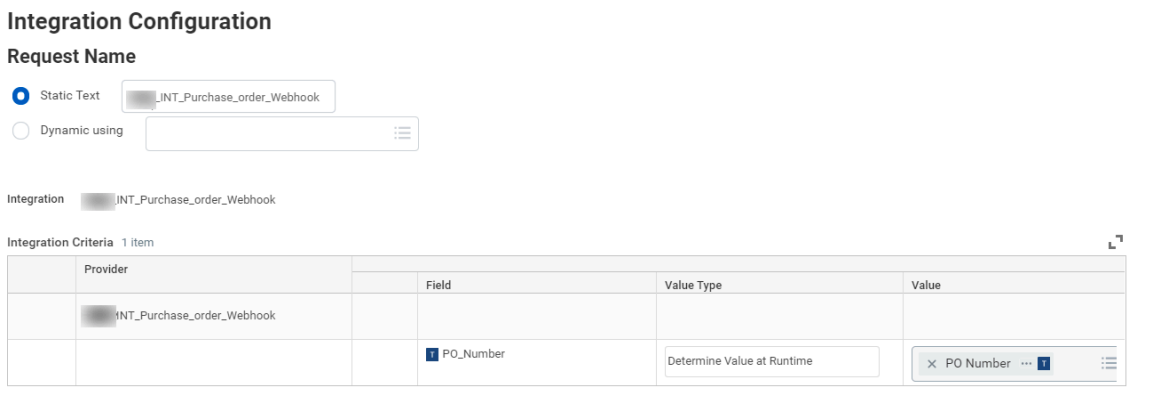
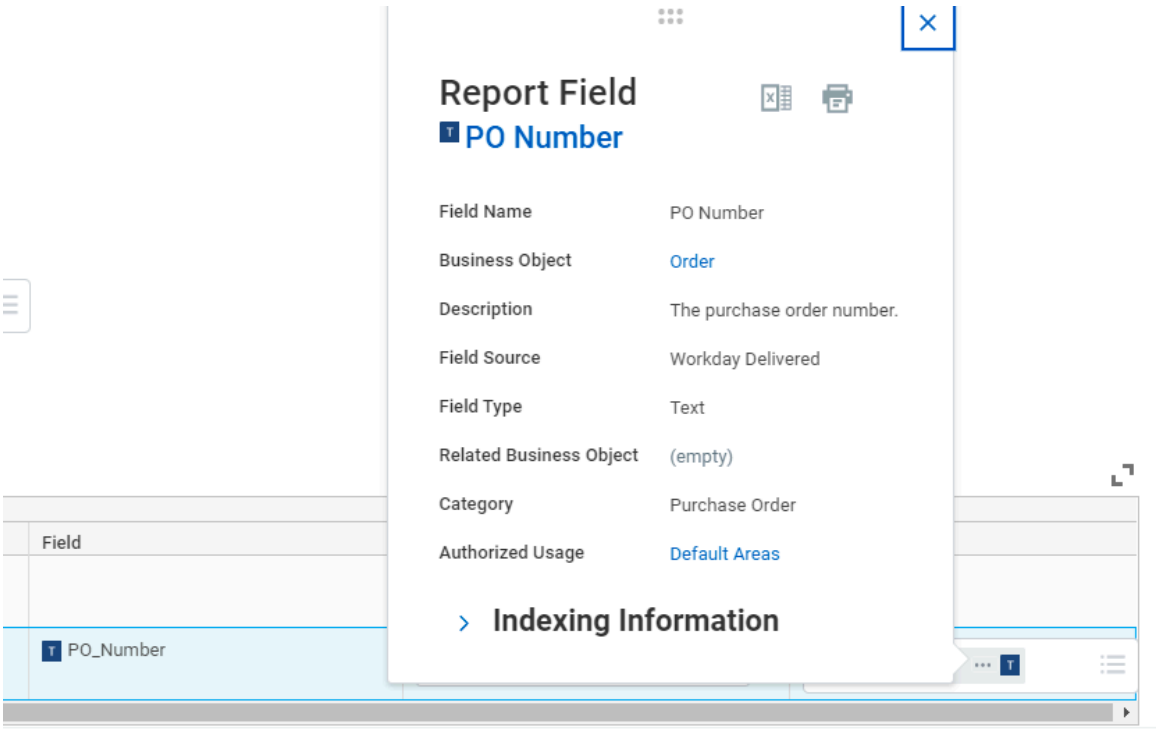
j. In integration criteria, select value type as **Determine value at runtime** and select value as **PO Number**.



Selected **PO Number** should be as shown below.



k. Click **Ok**.

l. Create a report for the webhook with these details:

Purchase Order report definition:

Report Definition	SNIH_purchase_order_report
Report Name	SNIH_purchase_order_report
Report Type	Advanced
Data Source	Purchase Orders
Data Source Filter	Purchase Orders Filter
Data Source Type	Indexed
Primary Business Object	Purchase Order

Column labels:

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Columns

Business Object	Field	Column Heading Override XML Alias	Format	Options
Purchase Order	PO Number	PO_Number		
Purchase Order	Company	Company		
Purchase Order	Created Moment	Created_Moment		
Purchase Order	Issued Date	Issued_Date		
Purchase Order	Payment Terms	Payment_Terms		

Filter:

Filter

Filter on Instances

Filter conditions for filtering on instances

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)	Indexed
And		PO Number	equal to	Prompt the user for the value and ignore the filter condition if the value is blank	Default Prompt		Yes

Condition as Text PO Number equal to from user input

Prompt default:

Prompt Defaults

Field	Prompt Qualifier	Label for Prompt	Label For Prompt XML Alias	Default Type	Default Value	Required	Do Not Prompt at Runtime	Do Not Include in Subtitle
PO Number	Default Prompt		PO_Number	No default value		Yes		
Company			Company	Specify default value	ABC Company ABC Consolidated ABCD ABG Limited BACD		Yes	

Workday HR Spoke

The Workday HR spoke is built by Bristlecone, Inc. Manage staffing, resources, payroll, benefits, and so on in the system from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see https://www.servicenow.com/content/dam/servicenow-assets/public/en-us/doc-type/legal/snc-addendum-integrationhub.pdf.

Spoke version

Workday HR spoke v3.1.1 is the latest version. For version history of the spoke, see Workday HR spoke release notes.

Supported versions

This spoke was built for Workday HR SOAP Application Programming Interface (API) version v33.2 and REST API version v1, and is compatible until Workday HR SOAP API version v39.0.

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Required configurations in Workday

To set up the integration, you must initially perform this procedure in Workday:

1. Register an Integration System User.

   Note: While filling account information details, confirm that you select the **Do Not Allow UI Sessions** check box.

2. Create a security group and assign it to the integration system user.
   a. In **Action**, navigate to **Security Group** > **Maintain Domain Permissions for Security Group** and provide these permissions:

Domain security policy permissions

Operation	Domain Security Policy	Domain Security Policies Inheriting Permission	Functional Areas
View and Modify	WQL for Workday Extend		System
View and Modify	Workday Query Language		System
View Only	Worker Data: Active and Terminated Workers		Staffing
Get Only	Worker Data: Workers		Staffing
View Only	Reports: Manager		Staffing
View Only	Reports: Matrix Manager		Staffing
View and Modify	Business Process Administration	Business Process Delegation	System
View Only	Worker Data: Benefits	▪ Worker Data: Beneficiaries and Dependents ▪ Worker Data: Benefit Annual Credit ▪ Worker Data: Benefit Eligibility ▪ Worker Data: Benefits Annual Rate ▪ Worker Data: Court Order Details ▪ Worker Data: Retirement Details ▪ Worker Data: Wellness	▪ Benefits ▪ Personal Data
View Only	Reports: Learning Record		Learning Core

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Operation	Domain Security Policy	Domain Security Policies Inheriting Permission	Functional Areas
View Only	Worker Data: Funded Plan Assignments		Advanced Compensation
View Only	Business Process Reporting		System
View Only	Workday Accounts		System
View Only	Person Data: Gender		Personal Data
View Only	Manage: Organization Roles		Organizations and Roles
View Only	Person Data: Work Address		Contact Information
View Only	Person Data: Home Phone		Contact Information
View Only	Person Data: Work Phone		Contact Information
Get and Put	Manage: Payment Election		Expenses
Get and Put	Person Data: Personal Data	▪ Person Data: Ethnicity Visual Survey ▪ Person Data: Licenses ▪ Person Data: Other IDs ▪ Person Data: Passports and Visas ▪ Worker Data: Tobacco Use	Personal Data
Get and Put	Worker Data: Payroll (Payment Elections)		Core Payroll
Get and Put	Worker Data: Payroll Interface (Payment Elections)		Payroll Interface
Get and Put	Worker Data: Beneficiaries	▪ Worker Data: Beneficiary Additional Address ▪ Worker Data: Beneficiary Additional email ▪ Worker Data: Beneficiary Additional Instant Messenger ▪ Worker Data: Beneficiary Additional Phone ▪ Worker Data: Beneficiary Additional Web Address	Benefits

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Operation	Domain Security Policy	Domain Security Policies Inheriting Permission	Functional Areas
		▪ Worker Data: Beneficiary Date of Birth ▪ Worker Data: Beneficiary Gender ▪ Worker Data: Beneficiary Government IDs ▪ Worker Data: Beneficiary National IDs ▪ Worker Data: Beneficiary Other IDs ▪ Worker Data: Beneficiary primary Address ▪ Worker Data: Beneficiary Primary email ▪ Worker Data: Beneficiary Primary Instant Messenger ▪ Worker Data: Beneficiary primary Phone ▪ Worker Data: Beneficiary Primary Web Address	
Get and Put	Process: Import Time Blocks		▪ Time Tracking ▪ Time Tracking Hub
Get Only	Worker Data: Current Staffing Information		Staffing
Get Only	Set Up: Calendar		System
Get Only	Job Information		Jobs & Profile
Get Only	Worker Data: Payroll (Income Withholding Orders)		Core Payroll
Get Only	Worker Data: Payroll (Income Withholding Orders) - CAN		CAN Payroll
Get Only	Worker Data: Payroll (Company Specific) - USA		USA Payroll
Get Only	Manage: Location	Location: View	Organizations and Roles

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Operation	Domain Security Policy	Domain Security Policies Inheriting Permission	Functional Areas
Get Only	Worker Data: Benefits	▪ Worker Data: Beneficiaries and Dependents ▪ Worker Data: Benefit Annual Credit ▪ Worker Data: Benefit Eligibility ▪ Worker Data: Benefits Annual Rate ▪ Worker Data: Court Order Details ▪ Worker Data: Retirement Savings ▪ Worker Data: Wellness	▪ Benefits ▪ Personal Data
Get Only	Worker Data: Project time sheet and Worksheet		Project Tracking
Get Only	Worker Data: Public Worker Reports		Staffing
Get Only	Payroll Interface		Payroll Interface
Get Only	Reports: Pay Calculation Results for Worker	▪ Reports: Pay Calculation Results for Worker (Audits) ▪ Reports: Pay Calculation Results for Worker (Payslips) ▪ Reports: Pay Calculation Results for Worker (Results)	Core Payroll
Get Only	Manage: Organization Integration		Organizations and Roles
Get Only	Worker Data: Benefit Elections		▪ Benefits ▪ Personal Data
Get Only	Person Data: Emergency Contacts		Contact Information
Get Only	Worker Data: Edit and Delete Worker Documents		Personal Data
Get Only	Worker Data: Compensation by Organization		Core Compensation

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Operation	Domain Security Policy	Domain Security Policies Inheriting Permission	Functional Areas
Get Only	Integration Build		Integration
Get Only	Worker Data: Time Off (Time-Off Balances)		Time Off and Leave
Get Only	Person Data: Personal Information		Personal Data
View Only	Worker Data: Public Worker Reports		Staffing
View Only	Integration Security		Integration
Get and Put	Integration Event		Integration

Note: Ensure that the domain security policies are activated for the security group.

b. Configure the business process policies of your security group and provide these permissions:

Business process security policy permissions

Operation	Business Process Type	Functional Area
Initiate (Assign Roles (web service))	Assign Roles	Organizations and Roles
Initiate (Change Organization Assignments (web service))	Change Organization Assignments for Worker	Organizations and Roles
Initiate (Maintain Contact Information (Web Service))	Contact Change	Contact Information
Initiate (Add Dependent (web service))	Dependent Event	▪ Benefits ▪ Personal Data
Initiate (Edit Worker Additional Data (Web Service))	Edit Worker Additional Data Event	Staffing
Initiate (Change Legal Name (Web Service))	Legal Name Change	Contact Information
Initiate (No Show (Web Service))	No Show	Staffing
Initiate (Change Personal Information (Web Service))	Personal Information Change	Personal Data
Initiate (Request Leave of Absence (Web Service))	Request Leave of Absence	Time Off and Leave
Initiate (Enter Time off (Web Service))	Request Time Off	Time Off and Leave

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Operation	Business Process Type	Functional Area
Initiate (Terminate Employee (Web Service))	Termination	Staffing

Note: Confirm that the business process security policies are activated for the security group.

Note: If you have installed spoke v1, uninstall it and install the spoke v1.1.

Spoke dependencies

If you're having trouble installing the app, confirm that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - SOAP (com.glide.hub.action_step.soap)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)
- Complex Object (com.glide.cobject)
- System Import Data Source (glide.system_import_data_source)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Workday HR spoke provides a sample flow, Verify User Sample Flow that demonstrates automating the Workday tasks. This flow calls the subflow with the same name to verify if the user who raised the request is a valid user in the Workday system. To customize a sample flow, copy it to a new application scope.

Spoke subflows

The Workday HR spoke provides sample subflows to demonstrate automating Workday HR tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Verify User Subflow	Verifies if the user who raised request is a valid user in Workday system.
Get WID For Worker	Retrieves WID details of the employee using the Look up Worker Profile action.
Create User	Creates a user in the ServiceNow when the user is onboarded in the Workday system. To use this subflow, you should Set up webhooks for your Workday HR spoke.
Leave of absence	Retrieves the leave of absence details of an employee from Workday using the LeaveofAbsence Webhook.

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Subflow	Description
Deactivate User	Deactivates an user in Workday using the Workday Deactivate User webhook.
Look up job Requisition	Retrieves all the existing job requisition information from Workday application into Job Requisition table.
Update Job Requisition	Retrieves the changes made to the existing job requisition in Workday using the UpdateJobRequisition webhook and stores the changes in the Job Requisition table.
Look up Using WQL Stream	Retrieves Workday HR data using a WQL (Workday Query Language) stream query.
Sample Sequences to Make a WQL Call	Constructs a Workday Query Language (WQL) query based on the specified inputs.

Spoke actions that use Workday SOAP APIs

Workday itself organizes its APIs into two major categories: SOAP Public API and REST API. Thus, the Workday HR spoke also reflects the same. You can use the spoke by using one of these two APIs, but not necessarily both, depending on the spoke actions you must use.

The Workday HR spoke provides actions to automate Workday tasks when events occur in your ServiceNow instance.

Note: The legacy SOAP actions are deprecated but remain fully functional with Basic Authentication and System Authentication.

Available actions include:

Note: The SOAP-based actions use the Workday SOAP web services and require you to perform the configurations mentioned in Configurations to use Workday SOAP Basic Auth with WS-Security.

Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
Default	Look up Skills	Retrieves the details of the skills from Workday.
Absence Management	Get Time off Balances By Employee ID	Retrieves details of the time off plan balance for the specified employee.
	Look up Time Off Balance	Retrieves details of the time off balance, based on the provided filter criteria.
	Request Leave Of Absence	Creates a long leave absence request or updates an existing request.
	Request Time Off	Creates a short-term leave request.
	Get Time off Balances By Employee ID (Deprecated)	Retrieves details of the time off plan balance for the specified employee. **Note:** This action uses WS-Security policy.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Look up Time Off Balance (Deprecated)	Retrieves details of the time off balance, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Request Leave Of Absence (Deprecated)	Creates a long leave absence request or updates an existing request. **Note:** This action uses WS-Security policy.
	Request Time Off (Deprecated)	Creates a short-term leave request. **Note:** This action uses WS-Security policy.
Approval Management	Approve Business Process	Approves the specified business process in Workday.
	Reject Business Process	Rejects the specified business process in Workday.
	Reject Business Process (Deprecated)	Rejects the specified business process in Workday. **Note:** This action uses WS-Security policy.
	Approve Business Process (Deprecated)	Approves the specified business process in Workday. **Note:** This action uses WS-Security policy.
Benefits Administration	Add Dependent	Adds a dependent to the specified worker.
	Change Beneficiaries	Updates beneficiary details of the specified worker.
	Add Dependent (Deprecated)	Adds a dependent to the specified worker. **Note:** This action uses WS-Security policy.
	Change Beneficiaries (Deprecated)	Updates beneficiary details of the specified worker. **Note:** This action uses WS-Security policy.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
Cash Management	Update Direct Deposit Information	Updates details of the current payment elections.
	Update Direct Deposit Information (Deprecated)	Updates details of the current payment elections. **Note:** This action uses WS-Security policy.
Metadata Retrieval	Get Additional Workday Fields	Retrieves all additional fields for each action.
	Get Custom Dynamic Input Fields	Retrieves all custom dynamic input fields.
	Get Custom Dynamic Output Fields	Retrieves all custom dynamic output fields.
	Get Object For Custom Dynamic Fields	Retrieves object for the specified custom dynamic field.
	Get Parent Object For Custom Dynamic Fields	Retrieves parent object for the specified custom dynamic field.
	Get Reference ID List	Retrieves values of the Reference ID, based on its reference type.
	Get References WID	Retrieves reference IDs for the specified reference type.
	Get Access Token	Retrieves the access tokens for authenticating SOAP-based actions using OAuth 2.0.
	Get Dynamic Response Schema	Retrieves the output schema for the specified query from Workday.
	Get Reference ID List (Deprecated)	Retrieves values of the Reference ID, based on its reference type. **Note:** This action uses WS-Security policy.
	Get References WID (Deprecated)	Retrieves reference IDs for the specified reference type. **Note:** This action uses WS-Security policy.
Payroll Management	Get My Tax Withholding Information	Retrieves all types of income withholding orders from Canada for the specified employee.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Canada By Employee ID	
	Get My Tax Withholding Information US By Employee ID	Retrieves all types of income withholding orders from US for the specified employee.
	Get Payroll Federal W4 Tax Elections By Employee ID	Retrieves federal W-4 tax election data for the specified employee.
	Get Payroll Payee FUTAs By Employee ID	Retrieves FUTA tax election data for the specified employee.
	Get Payroll USA And Local Tax Elections By Employee ID	Retrieves information about the tax elections for state and local tax authorities, for the specified employee.
	Look up Direct Deposit Information Details	Retrieves information about the specified payee, who belongs to an external pay group.
	Look up Payroll Federal W4 Tax Elections	Retrieves the federal W-4 tax election details for the required employees, based on the provided filter criteria.
	Look up Payroll Payee FUTAs Details	Retrieves the payroll payee FUTA details for the required employees, based on the provided filter criteria.
	Look up Payroll Results	Retrieves payroll results for the required employees, based on the provided filter criteria.
	Look up Payroll USA And Local Tax Elections	Retrieves details of worker tax elections for state and local tax authorities for the required employees, based on the provided filter criteria.
	Look up Tax Elections Ongoing Work Jurisdiction Details	Retrieves details of the ongoing work jurisdiction tax election for the required employees, based on the provided filter criteria.
	Look up Tax Withholding Information Details Canada	Retrieves all types of income withholding orders from Canada for the required employees, based on the provided filter criteria.
	Look up Tax Withholding Information Details US	Retrieves all types of income withholding orders from US for the required employees, based on the provided filter criteria.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Get My Tax Withholding Information Canada By Employee ID (Deprecated)	Retrieves all types of income withholding orders from Canada for the specified employee. **Note:** This action uses WS-Security policy.
	Get My Tax Withholding Information US By Employee ID (Deprecated)	Retrieves all types of income withholding orders from US for the specified employee. **Note:** This action uses WS-Security policy.
	Get Payroll Federal W4 Tax Elections By Employee ID (Deprecated)	Retrieves federal W-4 tax election data for the specified employee. **Note:** This action uses WS-Security policy.
	Get Payroll Payee FUTAs By Employee ID (Deprecated)	Retrieves FUTA tax election data for the specified employee. **Note:** This action uses WS-Security policy.
	Get Payroll USA And Local Tax Elections By Employee ID (Deprecated)	Retrieves information about the tax elections for state and local tax authorities, for the specified employee. **Note:** This action uses WS-Security policy.
	Look up Direct Deposit Information Details (Deprecated)	Retrieves information about the specified payee, who belongs to an external pay group. **Note:** This action uses WS-Security policy.
	Look up Payroll Federal W4 Tax Elections (Deprecated)	Retrieves the federal W-4 tax election details for the required employees, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Payroll Payee FUTAs Details (Deprecated)	Retrieves the payroll payee FUTA details for the required employees, based on the provided filter criteria.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
		Note: This action uses WS-Security policy.
	Look up Payroll Results (Deprecated)	Retrieves payroll results for the required employees, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Payroll USA And Local Tax Elections (Deprecated)	Retrieves details of worker tax elections for state and local tax authorities for the required employees, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Tax Elections Ongoing Work Jurisdiction Details (Deprecated)	Retrieves details of the ongoing work jurisdiction tax election for the required employees, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Tax Withholding Information Details Canada (Deprecated)	Retrieves all types of income withholding orders from Canada for the required employees, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Tax Withholding Information Details US (Deprecated)	Retrieves all types of income withholding orders from US for the required employees, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
Resource Management	Change Legal Name	Changes or sets the legal name for the specified employee.
	Change Personal Information	Changes the personal information of the specified employee.
	Get Employee Documents By Employee ID	Retrieves documents of the specified employee.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Get My Compensation Details By Employee ID	Retrieves the compensation details of the specified employee.
	Get My Contact Details By Employee ID	Retrieves contact information of the specified employee, such as address, phone number, email address, and beneficiaries.
	Get My Org Structure By Employee ID	Retrieves details of the org structure for the specified employee.
	Get Total Benefit Enrollments By Employee ID	Retrieves details of the benefit enrollments for the specified employee.
	Get Total Rewards By Employee ID	Retrieves details of the total rewards for the specified employee.
	Look up Compensation Details	Retrieves compensation details for the required employees, based on filter criteria.
	Look up Contact Details	Retrieves contact details for the required employees, such as address, phone number, email address, and beneficiaries, based on filter criteria.
	Look up Employee Documents	Retrieves documents of the required employees, based on the filter criteria.
	Look up Holiday Calendars	Retrieves the details of the holiday calendars.
	Look up Job Profiles	Retrieves details of the job profile, based on the specified criteria.
	Look up Location Details	Retrieves location details, based on the specified criteria.
	Look up Organizations	Retrieves details of the organizations, based on the provided filter criteria.
	Look up Timesheet Details	Retrieves details of the timesheets, based on the provided filter criteria.
	Look up Total Benefit Enrollments	Retrieves details of the benefit enrollments, based on the provided filter criteria.
	Look up Total Rewards	Retrieves details of the employee rewards, based on the provided filter criteria.
	Look up Work Schedule Calendars	Retrieves details of the work schedule calendars.
	Look up Worker Job History Report	Retrieves the job history of a worker.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Look up Worker Profile	Retrieves details of the employee profiles, based on worker type.
	Look up Workers	Retrieves details such as, first name, last name, address, phone number, email address, instant messenger, worker position, and management chain, based on the provided filter criteria.
	Look up Workers Employment Data	Retrieves details such as, position, position organizations, position management chains, and worker status, based on the provided filter criteria.
	Update My Contact Info	Updates employees details, such as address, phone number, email address, instant messenger, and web address.
	Update My Contact Info (Deprecated)	Updates employees details, such as address, phone number, email address, instant messenger, and web address. **Note:** This action uses WS-Security policy.
	Look up Workers And Employment Info	Retrieves worker profile information from Workday.
	Look up Professional Profiles Stream	Retrieves professional workers profile information from Workday.
	Change Legal Name (Deprecated)	Changes or sets the legal name for the specified employee. **Note:** This action uses WS-Security policy.
	Change Personal Information (Deprecated)	Changes the personal information of the specified employee. **Note:** This action uses WS-Security policy.
	Get Employee Documents By Employee ID (Deprecated)	Retrieves documents of the specified employee. **Note:** This action uses WS-Security policy.
	Get My Compensation Details By	Retrieves the compensation details of the specified employee.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Employee ID (Deprecated)	**Note:** This action uses WS-Security policy.
	Get My Contact Details By Employee ID (Deprecated)	Retrieves contact information of the specified employee, such as address, phone number, email address, and beneficiaries. **Note:** This action uses WS-Security policy.
	Get My Org Structure By Employee ID (Deprecated)	Retrieves details of the org structure for the specified employee. **Note:** This action uses WS-Security policy.
	Get Total Benefit Enrollments By Employee ID (Deprecated)	Retrieves details of the benefit enrollments for the specified employee. **Note:** This action uses WS-Security policy.
	Get Total Rewards By Employee ID (Deprecated)	Retrieves details of the total rewards for the specified employee. **Note:** This action uses WS-Security policy.
	Look up Compensation Details (Deprecated)	Retrieves compensation details for the required employees, based on filter criteria. **Note:** This action uses WS-Security policy.
	Look up Contact Details (Deprecated)	Retrieves contact details for the required employees, such as address, phone number, email address, and beneficiaries, based on filter criteria. **Note:** This action uses WS-Security policy.
	Look up Employee Documents (Deprecated)	Retrieves documents of the required employees, based on the filter criteria. **Note:** This action uses WS-Security policy.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Look up Holiday Calendars (Deprecated)	Retrieves the details of the holiday calendars. **Note:** This action uses WS-Security policy.
	Look up Job Profiles (Deprecated)	Retrieves details of the job profile, based on the specified criteria. **Note:** This action uses WS-Security policy.
	Look up Location Details (Deprecated)	Retrieves location details, based on the specified criteria. **Note:** This action uses WS-Security policy.
	Look up Organizations (Deprecated)	Retrieves details of the organizations, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Timesheet Details (Deprecated)	Retrieves details of the timesheets, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Total Benefit Enrollments (Deprecated)	Retrieves details of the benefit enrollments, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Total Rewards (Deprecated)	Retrieves details of the employee rewards, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Work Schedule Calendars (Deprecated)	Retrieves details of the work schedule calendars. **Note:** This action uses WS-Security policy.
	Look up Worker Profile (Deprecated)	Retrieves details of the employee profiles, based on worker type.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
		Note: This action uses WS-Security policy.
	Look up Workers (Deprecated)	Retrieves details such as, first name, last name, address, phone number, email address, instant messenger, worker position, and management chain, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Workers Employment Data (Deprecated)	Retrieves details such as, position, position organizations, position management chains, and worker status, based on the provided filter criteria. **Note:** This action uses WS-Security policy.
	Look up Workers And Employment Info (Deprecated)	Retrieves worker profile information from Workday. **Note:** This action uses WS-Security policy.
	Look up Professional Profiles Stream (Deprecated)	Retrieves professional workers profile information from Workday. **Note:** This action uses WS-Security policy.
Staffing	Change Organization	Assigns values for company, cost center, region, and so on that are configured for staffing usage to a filled position.
	Change Roles	Changes roles of the specified employee.
	No Show	Rescinds the hiring process if a hired employee doesn't show on joining date.
	Offboard Employee	Offboards the specified employee.
	Hire Employee	Hires a user as an employee to the specified job.
	Set Hiring Restrictions	Creates hiring restrictions for a job management supervisory organization.
	Create Position	Creates or opens a position for a supervisory organization using the position management staffing model.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Look up Positions	Retrieves position-related details based on the position ID from Workday.
	Edit Position	Edits a position that is already filled.
	Edit Hiring Restrictions	Edits the hiring restrictions for a job management supervisory organization.
	Change Job	Changes the job of an employee or a contingent worked. The types of changes include transfer, promotion, demotion, lateral moves, and any other change in the information on the job.
	Close Position	Closes a position.
	Contract Contingent Worker	Hires a user to a contingent position or job.
	Change Organization (Deprecated)	Assigns values for company, cost center, region, and so on that are configured for staffing usage to a filled position. **Note:** This action uses WS-Security policy.
	Change Roles (Deprecated)	Changes roles of the specified employee. **Note:** This action uses WS-Security policy.
	No Show (Deprecated)	Rescinds the hiring process if a hired employee doesn't show on joining date. **Note:** This action uses WS-Security policy.
	Offboard Employee (Deprecated)	Offboards the specified employee. **Note:** This action uses WS-Security policy.
	Hire Employee (Deprecated)	Hires a user as an employee to the specified job. **Note:** This action uses WS-Security policy.
	Set Hiring Restrictions (Deprecated)	Creates hiring restrictions for a job management supervisory organization. **Note:** This action uses WS-Security policy.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Create Position (Deprecated)	Creates or opens a position for a supervisory organization using the position management staffing model. **Note:** This action uses WS-Security policy.
	Look up Positions (Deprecated)	Retrieves position-related details based on the position ID from Workday. **Note:** This action uses WS-Security policy.
	Edit Position (Deprecated)	Edits a position that is already filled. **Note:** This action uses WS-Security policy.
	Edit Hiring Restrictions (Deprecated)	Edits the hiring restrictions for a job management supervisory organization. **Note:** This action uses WS-Security policy.
	Change Job (Deprecated)	Changes the job of an employee or a contingent worked. The types of changes include transfer, promotion, demotion, lateral moves, and any other change in the information on the job. **Note:** This action uses WS-Security policy.
	Close Position (Deprecated)	Closes a position. **Note:** This action uses WS-Security policy.
	Contract Contingent Worker (Deprecated)	Hires a user to a contingent position or job. **Note:** This action uses WS-Security policy.
Talent Management	Create External Skill	Creates a new external skill in Workday and associates it with the specified skill vendor.
	Look up External Skills Mapping Stream	Retrieves the external skill mapping records from Workday for the specified skill vendor or mapping criteria.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Look up User Skills Stream	Retrieves skill details for a specified employee from Workday, including associated skills and proficiency attributes.
	Manage External Skill Mapping	Manages external skill mapping records in Workday, including creating, updating, or removing skill associations.
	Update User Skill Proficiency	Updates the proficiency level of a specified user skill in Workday.
	Create External Skill (Deprecated)	Creates a new external skill in Workday and associates it with the specified skill vendor. **Note:** This action uses WS-Security policy.
	Look up External Skills Mapping Stream (Deprecated)	Retrieves the external skill mapping records from Workday for the specified skill vendor or mapping criteria. **Note:** This action uses WS-Security policy.
	Look up User Skills Stream (Deprecated)	Retrieves skill details for a specified employee from Workday, including associated skills and proficiency attributes. **Note:** This action uses WS-Security policy.
	Manage External Skill Mapping (Deprecated)	Manages external skill mapping records in Workday, including creating, updating, or removing skill associations. **Note:** This action uses WS-Security policy.
	Update User Skill Proficiency (Deprecated)	Updates the proficiency level of a specified user skill in Workday. **Note:** This action uses WS-Security policy.
Time Tracking	Update Reported Time Blocks	Updates details of reported time blocks.
	Update Reported Time Blocks (Deprecated)	Updates details of reported time blocks. **Note:** This action uses WS-Security policy.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
Skill Management	Manage Employee Skills	Adds or removes skills associated with an employee.
	Look up Employee Skills	Retrieves employees skills from Workday for the specified date range.
	Manage Employee Skills (Deprecated)	Adds or removes skills associated with an employee. **Note:** This action uses WS-Security policy.
Jobs Management	Create Job Requisition	Creates a job requisition in Workday.
	Look up Candidates Stream	Retrieves the candidates information like candidate data, social media account data and others from Workday.
	Look up Compensation Grades Stream	Retrieves compensation details like the default minimum and maximum of the compensation pay range and others from Workday.
	Look up Job Postings Stream	Retrieves job post details like job posting title, job posting description, education data, certification data, and others from Workday.
	Look up Job Requisitions Stream	Retrieves job requisition details like recruiting start date, target hire date and others from Workday.
	Update Job Requisition	Updates the specified job requisition.
	Create Job Requisition (Deprecated)	Creates a job requisition in Workday. **Note:** This action uses WS-Security policy.
	Look up Candidates Stream (Deprecated)	Retrieves the candidates information like candidate data, social media account data and others from Workday. **Note:** This action uses WS-Security policy.
	Look up Compensation Grades Stream (Deprecated)	Retrieves compensation details like the default minimum and maximum of the compensation pay range and others from Workday. **Note:** This action uses WS-Security policy.

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Actions that use the Workday SOAP APIs		
Category	**Action**	**Description**
	Look up Job Postings Stream (Deprecated)	Retrieves job post details like job posting title, job posting description, education data, certification data, and others from Workday. **Note:** This action uses WS-Security policy.
	Look up Job Requisitions Stream (Deprecated)	Retrieves job requisition details like recruiting start date, target hire date and others from Workday. **Note:** This action uses WS-Security policy.
	Update Job Requisition (Deprecated)	Updates the specified job requisition. **Note:** This action uses WS-Security policy.

Spoke actions that use Workday REST APIs

Workday itself organizes its APIs into two major categories: SOAP Public API and REST API. Thus, the Workday HR spoke also reflects the same. You can use the spoke by using one of these two APIs, but not necessarily both, depending on the spoke actions you must use.

The Workday HR spoke provides actions to automate Workday tasks when events occur in your ServiceNow instance. Available actions include:

Note: The REST-based actions use the Workday REST API and requires you to perform the configurations mentioned in Configurations to use Workday REST API.

Actions that use the Workday REST APIs		
Category	**Action**	**Description**
Absence Management	Look up Worker Time Off and Leave Of Absence Request	Retrieves the time off and leave of absence details of the worker using RaaS report. **Important:** Before executing this action, you must set up a report. When you execute the action, it calls the report and the data is sent from Workday HR to your ServiceNow instance. To set up the report, see .
Approval Management	Look up In-Progress Approval Requests	Retrieves the approval requests that are in progress from Workday for the specified date range.
Custom Actions	Look up Object Custom Fields	Retrieves data relevant to the specified custom object.

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Actions that use the Workday REST APIs		
Category	**Action**	**Description**
Note: To use these action, you must create a record in the Workday Custom Objects [x_snc_sn_workday_s_workday_custom_objects] table and provide these details: • Parent Object WS Alias • Extension Object WS Alias • Extension Object Fields • Extension Object Field Data Type • Field Type	Look up Custom Reports	Retrieves the custom reports.
	Update Object Custom Fields	Updates fields in the specified custom object.
Payroll Management	Look up Payslip	Retrieves payslip details of the specified employee.
	Look up Payslips Stream	Retrieves payslip details for an employee from Workday, including the payslip ID, descriptor, gross and net pay, payment date, and status.
Goals Management	Look up Employee Goals	Retrieves the employee goals from Workday.
Feedback Management	Look up Feedback Received	Retrieves the feedback requests from Workday.
Performance Management	Look up Employee Latest Performance Review	Pulls the latest performance review of the employee from Workday. **Important:** Before executing this action, you must set up a report. When you execute the action, it calls the report and the data is sent from Workday HR to your ServiceNow instance. To set up the report, see Configure the Employee Latest Performance Review report.
	Look up Employee Performance Review Historical Data	Pulls the historical data on the employee performance review Workday.

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Actions that use the Workday REST APIs		
Category	**Action**	**Description**
		Important: Before executing this action, you must set up a report. When you execute the action, it calls the report and the data is sent from Workday HR to your ServiceNow instance. To set up the report, see Configure the Worker's Historical Performance Review report.
	Look up Succession Planning	Pulls the succession planning from Workday. **Important:** Before executing this action, you must set up a report. When you execute the action, it calls the report and the data is sent from Workday HR to your ServiceNow instance. To set up the report, see Configure Succession Planning Report.
	Look up Succession Pool	Pulls the succession pool from Workday. **Important:** Before executing this action, you must set up a report. When you execute the action, it calls the report and the data is sent from Workday HR to your ServiceNow instance. To set up the report, see Configure Succession Pool report.
Skill Management	Look up Employee Skills	Retrieves employee skills from Workday for specified date range. **Important:** You must create report in Workday instance to use this action. • For more information about extracting workers skill with skill cloud, see Extract workers skill (with the skill cloud). • For more information about extracting workers skill without skill cloud, see Extract workers skill (without the skill cloud).
	Look up Skills	Retrieves skills from Workday.

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Actions that use the Workday REST APIs		
Category	**Action**	**Description**
		Important: You must create report in Workday instance to use this action. For more information, see Create report to extract skills.
Resource Management	Get My Reporting Structure	Retrieves details of the reporting structure for the specified employee.
	Look up Holiday Calendars Of An Employee	Retrieves details of the holiday calendar for the specified employee.
	Look up Holiday Calendars Reference WID Of An Employee	Retrieves details of the holiday calendar WID for the specified employee.
	Look up Inbox Items	Retrieves inbox items from Workday for the specified date range.
	Look up Merit And Benefit Plan Details Of An Employee	Retrieves details of merit and benefit plan for the required employees, based on the provided filter criteria.
	Look up Schedule Calendars Reference WID Of An Employee	Retrieves work schedule calendars for the required employees.
	Look up Total Rewards using Report	Retrieves the total rewards for the specified report owner and report.
	Look up Holiday Calendars Of An Employee (Deprecated)	Retrieves details of the holiday calendar for the specified employee.
	Look up Authenticated User and Reportees Information	Retrieves the authenticated worker's details and, if available, their direct reportees from Workday, including employee ID, worker ID, and worker name.
Metadata Retrieval	Look up Using WQL Stream	Retrieves Workday HR data using a WQL (Workday Query Language) stream query.
	Look up Data Source	Retrieves details for the specified Workday data source.
	Look up Data Source Field	Retrieves a specific field for the selected data source and includes the related business object information.
	Look up Data Source Fields Stream	Retrieves all fields for the specified data source, including their related business objects.

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Actions that use the Workday REST APIs		
Category	**Action**	**Description**
	Look up Data Source Filter	Retrieves details for a specific data source filter, including required and optional parameters.
	Look up Data Source Filters Stream	Retrieves all available filters for the specified Workday data source.
	Look up Data Sources Stream	Retrieves all available data sources from Workday.
Attachment Management	Download Workday RAAS CSV	Downloads a specified Workday RAAS report in CSV format and attaches it to the selected data source.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

AI Agent	Description
Workday HR Feedback Management AI Agent	Manages feedback retrieval and review workflows within Workday. This AI agent enables users to access employee feedback, support performance discussions, and streamline HR decision-making through seamless integration with Workday.
Workday HR Approval Management AI Agent	Manages approval workflows and business process decisions within Workday. This AI agent enables users to approve or reject requests, track approval statuses, and optimise HR operations through direct Workday integration.
Workday HR Goals Management AI Agent	Manages employee goal tracking and review processes within Workday. This AI agent enables users to look up goals, monitor

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AI Agent	Description
	progress, and support HR conversations through efficient Workday integration.
Workday HR Performance Management AI Agent	Manages performance review and succession planning workflows within Workday. This AI agent enables users to retrieve reviews, analyse historical data, and access succession pools for informed HR decision-making.
Workday HR Absence Management AI Agent	Manages absence and leave workflows within Workday. This AI agent enables users to look up time off balances, process leave requests, and manage absence data for streamlined HR operations.
Workday HR Payroll Management AI Agent	Manages payroll and tax information workflows within Workday. This AI agent enables users to retrieve payslips, access tax details, and manage payroll data for efficient HR and payroll operations.
Workday HR Resource Management AI Agent	Manages employee data and organisational resource workflows within Workday. This AI agent enables users to retrieve employee information and manage organisational details for effective HR resource management.

Available sample agentic workflows

Install Now Assist for Integration Hub and start using the available sample agentic workflows and AI agents. For more information, see Now Assist for Integration Hub.

In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. Use the available sample agentic workflow in AI Agent Studio so that AI agents can coordinate to solve complex problems. To modify the available sample agentic workflow as per your requirement, see Modify an agentic workflow.

Sample agentic workflow	Description	AI agents used	Always ON by default?
Fetch Employee Profile, Rewards Details, and Latest Performance Review	Retrieves an employee's profile information, rewards details, and latest performance review data from Workday. This workflow consolidates multiple reports and endpoints to provide a unified view of a worker's employment, rewards history,	• Workday HR performance management AI agent • Workday HR resource management AI agent	No **Note:** To activate the workflow, see Activate an agentic workflow template.

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Sample agentic workflow	Description	AI agents used	Always ON by default?
	and performance feedback.		
Fetch Employee Time Off and Holiday Calendar	Retrieves employee#specific time#off information along with the applicable holiday calendar. This workflow returns a summary of approved leave, pending time#off entries, and holidays relevant to the employee's assigned region or work schedule.	• Workday HR absence management AI agent • Workday HR resource management AI agent	No **Note:** To activate the workflow, see Activate an agentic workflow template.

Spoke modules

The Workday HR spoke adds the Workday application to your instance and includes these modules:

Important: The remote tables, View my Total rewards [sn_workday_hr_spke_st_get_payroll_results] and Get Payroll Results [sn_workday_hr_spke_st_view_my_total_rewards], store sensitive data. Hence, discretion is advised before you give users the permission to view data stored in these tables.

Module	Description
Connection Details	Contains information about the base URL of the Workday instance or tenant, and API version.
Custom Objects	To use the custom actions, create a record in the Custom Objects module and provide these details: • Parent Object WS Alias • Extension Object WS Alias • Extension Object Fields • Extension Object Field Data Type • Field Type
Get My Holiday Calendar	Sample remote table that you should customise to retrieve details of the holiday calendar for the logged in employee. From the Get My Holiday Calendar remote table definition, the Get My Holiday Calendar action is called to retrieve the data.
Get Payroll Results	Sample remote table that you should customise to retrieve the payroll information. From the Get Payroll Results remote table definition, the Look up Payroll Results action is called to retrieve the data.

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Module	Description
	Important: This remote table stores sensitive data. Hence, discretion is advised before you give users the permission to view data stored in these tables.
RAAS Report Access Details	To use actions based on Workday Report as a Service API, create a record in the RAAS Report Access Details module and provide details of the ServiceNow user along with the Workday report owner name and Workday report name. Confirm that the user is entitled to access these reports. Create a record and fill in these values: • **User ID**: User ID of the ServiceNow user, who is entitled to access the required reports. • **Report Name**: Name of the RAAS API while configuring it in Workday system. • **Report Owner Username**: Username of the RAAS owner.
Remote Table Configurations	An entry of column and table name that consists of Workday employee ID of the logged-in user should be made into this table. For example, Employee Number column of the User Table. That is, **Table Name** is `sys_user` and **Field Name** is `employee_number`. **Note:** Confirm that you provide the internal name of the table and field.
View My Direct Deposit Information	Sample remote table that you should customize to retrieve the direct deposit information. From the View My Direct Deposit Information remote table definition, the Look up Direct Deposit Information Details action is called to retrieve the data.
View My Total Rewards	Sample remote table that you should customise to retrieve the total rewards for a logged in employee. From the View My Total Rewards remote table definition, the Look up Total Rewards action is called to retrieve the data. **Important:** This remote table stores sensitive data. Hence, discretion is advised before you give users the permission to view data stored in these tables.
View Time Off Balance	Sample remote table that you should customize to retrieve the time off balance for a logged in employee. From the View Time Off Balance remote table definition, the Look up Time Off Balance action is called to retrieve the data.
Webhook Registry	Contains records of webhooks registries. Admin should create record here to Set up webhooks for your Workday HR spoke for the required Workday HR event.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when

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using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

Configurations to use Workday SOAP Basic Auth with WS-Security

Configure your ServiceNow instance to perform actions that use the Workday SOAP Basic Auth with WS-Security.

Before you begin
Role required: admin.

About this task
This is the most traditional Workday SOAP authentication setup.

Note: These configurations are needed to use the SOAP-based spoke actions. For information about the SOAP-based spoke actions, see the Spoke actions that use Workday SOAP APIs section in Workday HR Spoke.

Provide the Workday HR base URL

Provide the base URL of your Workday HR instance in the Connection Details [connection_details] table. Spoke actions based on the SOAP API, use these details for the action execution.

Before you begin
Role required: admin.

Procedure
1. Navigate to **All** > **Workday HR Spoke** > **Connection Details**.
2. Click the **Show List** related list.
3. Click **New**.
4. On the form, fill these values.

Connection Details form

Field	Description
Base URL	Base URL of the Workday instance or tenant name. Enter the base URL in this format `https://<workday_host_url>/ccx/service/<workday_tenant_name>`
Version	Version of the API. For example, enter `v33.2`.
Webservice Type	Type of web service. Select SOAP.

5. Click **Save**.

Create a WS-Security Username Profile for the Workday HR spoke

Create a WS-Security Username Profile to provide your Workday credentials to authenticate requests from ServiceNow.

Before you begin
Role required: admin.

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Procedure

1. Navigate to **All** > **IntegrationHub** > **SOAP Integrations** > **WS-Security Username Profiles**.
2. Click **New**.
3. On the form, fill these values.

Field	Description
Name	Name to uniquely identify this credential. For example, enter `WorkdayHR User`.
Application	Application in which the record is applicable. Select **Workday HR Spoke**.
Username	Workday user who has integration rights using Workday Web Services.
Password	Password of the Workday user.

4. Click **Save**.

Configure the SOAP security policy for the Workday HR spoke

Configure the SOAP security profile by adding the security user name profile you had created to authenticate requests from ServiceNow.

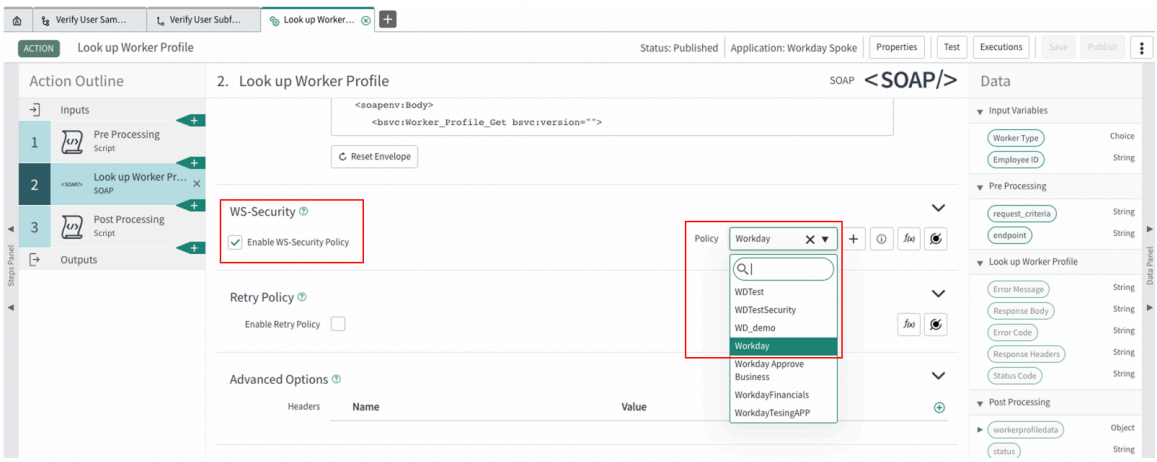
Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **IntegrationHub** > **SOAP Integrations** > **SOAP Security Policies**.
2. Open the record for the Workday HR spoke, for example, **WorkdayHR**.

> **Note:** If you intend to use another SOAP security policy record and not the default record, you must ensure that you select that record in all the actions that use Workday SOAP web services.



Except these listed actions, all other actions use Workday SOAP web services:

3. For **WS-Security Username Profile**, select the security username profile you had created for the Workday HR spoke.

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See Create a WS-Security Username Profile for the Workday HR spoke for more information.

4. Do not provide a value in **WS-Security X.509 Profile**.
5. Right-click the form header and click **Save**.

Configurations to use Workday HR SOAP OAuth

Configure your ServiceNow instance to perform Workday HR SOAP based actions with OAuth 2.0.

Note: If you are migrating from basic auth to OAuth 2.0 for SOAP based actions, ensure to remove the basic authentication configurations before the migration.

Generate client ID and client secret for Workday HR spoke

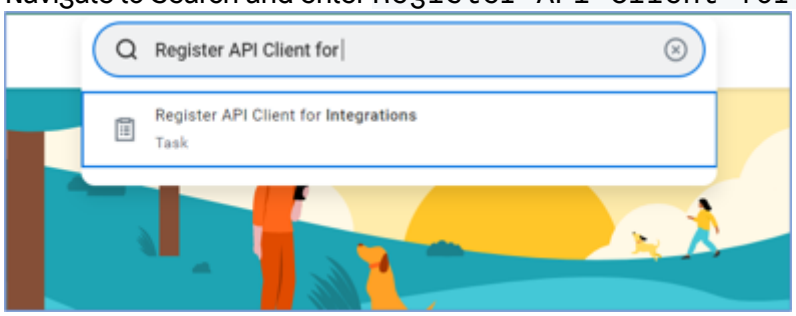
Register Workday HR spoke as the API client in your Workday account and generate client ID, client secret.

Before you begin

Role required: admin

Procedure

1. Log into your Workday tenant.
2. Navigate to Search and enter `Register API Client for Integrations` task.



3. On the Register API Client for Integrations form, fill in the details.

Field	Description
Client Name	Client name of the app. For example, enter `Workday HR spoke`.
Non-expiring Refresh Tokens	Option to enable refresh tokens that do not expire.
Scope (Functional Areas)	Select the required functional areas.
Include Workday Owned Scope	Option to select Workday owned scope.

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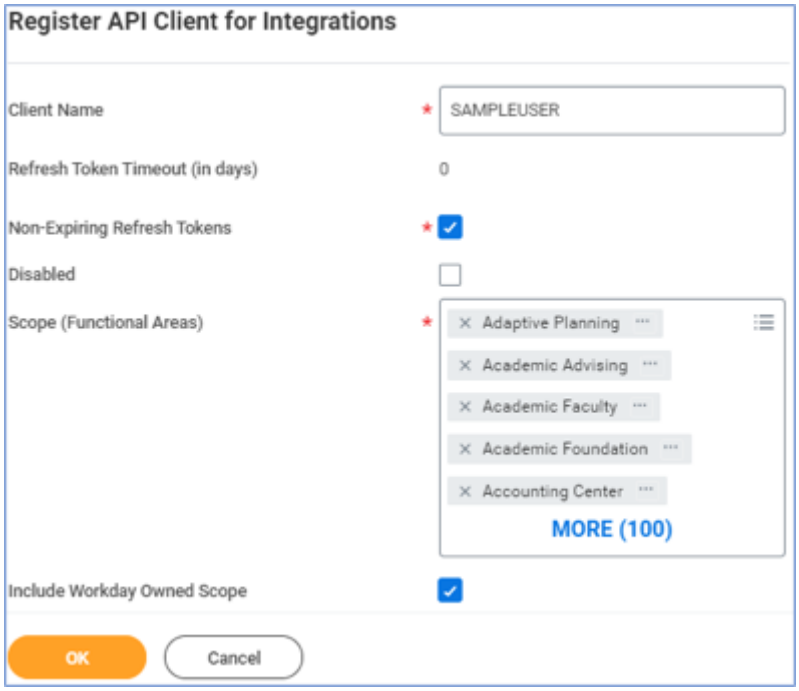
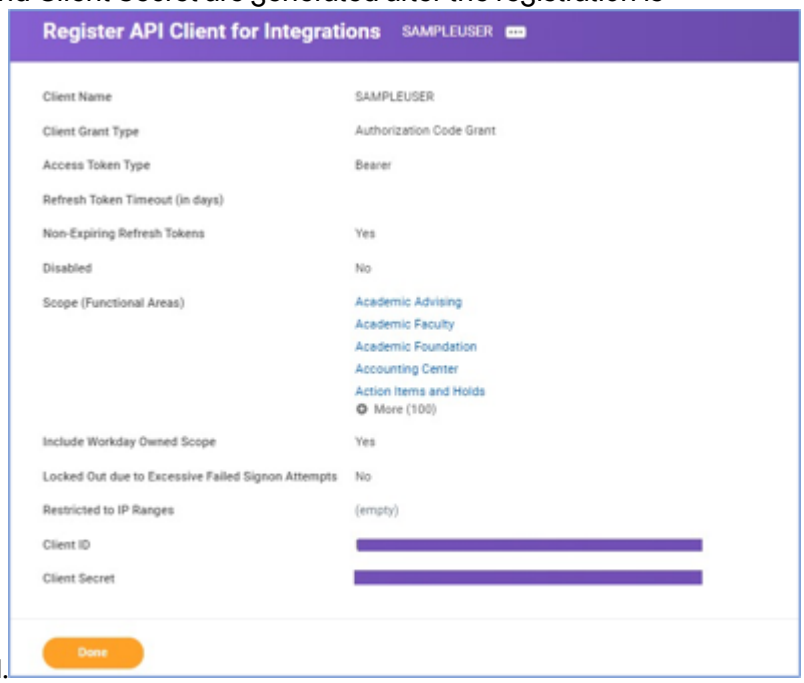
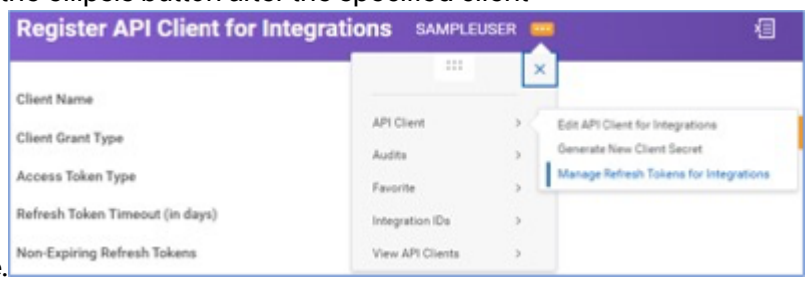


4. Click **OK**.
   Client ID and Client Secret are generated after the registration is successful.



5. Click the ellipsis button after the specified client name.



6. Select **API Client** >**Manage Refresh Tokens for Integrations**.
7. Select your Workday Account and click **OK**.

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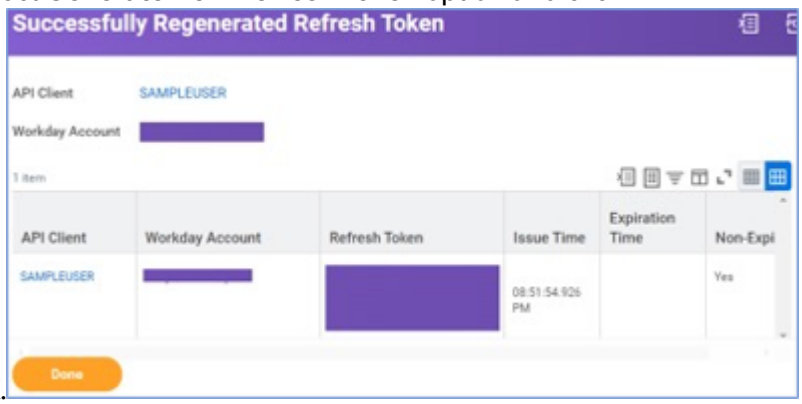
Delete or Regenerate Refresh Token screen displays.

8. Select **Generate New Refresh Token** option and click **OK**.



Result

A new refresh token is generated. Copy and store the refresh token for configuring system property.

Configure system properties for Workday HR spoke

Configure the system properties to enable OAuth 2.0 for SOAP APIs based actions for Workday HR spoke.

Before you begin

- Generate client ID and client secret for Workday HR spoke
- Role required: admin

Procedure

1. Navigate to **All** > **System Properties** > **All Properties**.
2. In the **Application** column, search for `Workday HR Spoke`.
3. Open the *`sn_workday_hr_spke.glide.hub.clientid`* system property.
4. Enter the Client ID generated from the Workday account in the **Value** field and click **Update**.
5. Open the *`sn_workday_hr_spke.glide.hub.clientsecret`* system property.
6. Enter the Client secret generated from the Workday account in the **Value** field and click **Update**.
7. Open the *`sn_workday_hr.glide.hub.refreshtoken`* system property.
8. Enter the refresh token generated from the Workday account in the **Value** field and click **Update**.
9. Open the *`sn_workday_hr_spke.glide.hub.tokenurl`* system property.
10. Enter the token URL generated from the Workday account in the **Value** field and click **Update**.

Result

The required system properties are configured for the Workday HR spoke.

Provide the Workday HR base URL

Provide the base URL of your Workday HR instance in the Connection Details [connection_details] table. Spoke actions based on the SOAP API, use these details for the action execution.

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Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Workday HR Spoke** > **Connection Details**.
2. Click the **Show List** related list.
3. Click **New**.
4. On the form, fill these values.

Connection Details form

Field	Description
Base URL	Base URL of the Workday instance or tenant name. Enter the base URL in this format `https://<workday_host_url>/ccx/service/<workday_tenant_name>`
Version	Version of the API. For example, enter `v33.2`.
Webservice Type	Type of web service. Select SOAP.

5. Click **Save**.

Configurations to use Workday SOAP Personal Auth

Configure your ServiceNow instance to perform Workday HR SOAP based actions with personal authentication.

Personal authentication grants access to individual users, instead of a shared system account, when your Workday HR SOAP based actions run.

Provide the Workday HR base URL

Provide the base URL of your Workday HR instance in the Connection Details [connection_details] table. Spoke actions based on the SOAP API, use these details for the action execution.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Workday HR Spoke** > **Connection Details**.
2. Click the **Show List** related list.
3. Click **New**.
4. On the form, fill these values.

Connection Details form

Field	Description
Base URL	Base URL of the Workday instance or tenant name. Enter the base URL in this format

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Field	Description
	`https://<workday_host_url>/ccx/service/<workday_tenant_name>`
Version	Version of the API. For example, enter `v33.2`.
Webservice Type	Type of web service. Select `SOAP`.

5. Click **Save**.

Configure the application registry for Workday HR SOAP API

Create an application registry so that the ServiceNow instance can request OAuth 2.0 tokens for personal authentication.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Open the record for **WorkdayHR**.
3. On the form, fill in these values.

Application Registries form

Field	Description
Name	Name to uniquely identify the record. For example, enter: `Workday HR OAuth`
Application	Application in which the record is applicable. Select **Workday HR Spoke**.
Client ID	Client ID created during the Workday HR API client configuration for personal authentication.
Client Secret	Client Secret created during the Workday HR API client configuration for personal authentication.
Authorization URL	OAuth authorization code endpoint from the Workday tenant.
Token URL	OAuth server token endpoint from the Workday tenant.
Redirect URL	Auth callback endpoint in this format:`https://<instance>.service-now.com/outh_redirect.do`
Default Grant Type	Grant type used to establish the token. Select **Authorization Code**.
Active	Option to actively use the application registry.

4. Right-click the form header, and click **Save**.

Result

The application registry for personal authentication is configured.

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Configure the connection and credential alias

Configure the connection and credential alias to authenticate ServiceNow requests to Workday HR using personal authentication.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Connection & Credential Aliases**.
2. Open the **WorkdayHR** record.
3. From the **Connections** tab, select **New**.
4. On the form, fill in these fields.

Connection form

Field	Description
Connection URL	URL to make a connection to Workday HR.

Attributes tab

Field	Description
tenant_name	Name of the Workday tenant.
version	Version of the Workday tenant.

5. Click **Save**.
6. Open the credential record and select the **Integration Type**.

Integration Type options

Option	Description
Personal	Grants access to individual users.
System	Grants access to a group of users who can access the system.

7. Select the **Get OAuth Token** link.
   You are redirected to the Workday HR portal for authentication. After your authentication is successful, an OAuth token is generated.

Result

The connection and credential alias for personal authentication is configured.

Configurations to use Workday REST API

Configure your ServiceNow instance to perform actions that use the Workday REST API.

Before you begin

- Request an Integration Hub subscription.
- Activate Workday HR spoke.
- From Workday, obtain these values and record them for later use. These values are need to register your client:

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  - Client ID
  - Client Secret
  - Workday REST API Endpoint
  - Token Endpoint
  - Authorization Endpoint
- Role required: admin

About this task

Workday REST and Report-as-a-Service (RAAS) API works with OAuth 2.0 to authorize access to resources in your Workday tenant. To use OAuth 2.0, you must register your client in the tenant, using the Register API Client task.

Configure your ServiceNow instance to use the Workday REST API if you need to use these REST-based spoke actions:

- Download Workday RAAS CSV
- Get Access Token (Metadata)
- Look up Data Source
- Look up Data Source Field
- Look up Data Source Filter
- Look up Employee Goals
- Look up Employee Latest Performance Review
- Look up Employee Performance Review Historical Data
- Look up Employee Skills
- Look up Feedback Received
- Look up In-Progress Approval Requests
- Look up Skills
- Look up Succession Planning
- Look up Succession Pool
- Look up Termination Details
- Look up Worker Job History Report
- Look up Worker Time Off And Leave Of Absence Request
- Look up Data Source Fields Stream
- Look up Data Source Filters Stream
- Look up Data Sources Stream
- Get My Reporting Structure
- Look up Object Custom Fields
- Update Object Custom Fields
- Look up Payslip
- Look up Total Rewards Using Report
- Look up Custom Reports
- Look up Inbox Items

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- Look up Merit And Benefit Plan Details Of An Employee
- Look up Holiday Calendars Reference WID Of An Employee
- Look up Schedule Calendars Reference WID Of An Employee
- Look up Holiday Calendars Of An Employee
- Look up using WQL Stream

Note: These configurations are needed to use the REST-based spoke actions.

Register Workday HR as an OAuth provider

Register the Workday HR instance as the OAuth provider so that the ServiceNow instance can request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Click **New**.
   The system displays this message: `What kind of OAuth application?`.
3. Select **Connect to a third party OAuth Provider**.
4. On the form, fill these values.

Application Registries form

Field	Description
Name	Name to uniquely identify the record. For example, enter: `Workday HR OAuth`
Application	Application in which the record is applicable. Select **Workday HR Spoke**.
Client ID	Client ID generated while registering your client.
Client Secret	Client secret generated while registering your client.
Authorization URL	Authorization endpoint generated while registering your client.
Token URL	Token endpoint generated while registering your client.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`
Default Grant Type	Grant type used to establish the token. Select **Authorization Code**.
Active	Option to actively use the application registry.

5. Right-click the form header, and click **Save**.
   An OAuth entity profile is created.

Generate token URL for Workday HR spoke

Register API client in your Workday account and generate a token URL for Workday HR spoke.

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Before you begin
Role required: admin

Procedure

1. Log into your Workday tenant.
2. Navigate to Search and enter `Register API Client` task.
3. On the Register API Client, fill in the details.

Field	Description
Client Name	Client name of the app. For example, `Workday HR spoke`.
Client Grant Type	Select Authorisation Code Grant.
Access Token Type	Access Token Type: Select Bearer
Redirection URI	Enter your ServiceNow URL in this format: `https://<instance>.service-now.com/oauth_redirect.do`.
Non-Expiring Refresh tokens	Option to enable refresh tokens which do not expire.
Scope (Functional Areas)	Select the required functional areas.
Include Workday Owned Scope	Option to select scope that are owned by Workday.

4. Click **OK**.

Result
Copy and store the generated Token Endpoint value for configuring system property.

Option 1: Configuration to use Workday HR REST API with a template

Configure your ServiceNow instance to perform actions that use the Workday HR REST API using an OAuth authorization template.

Before you begin
Role required: admin

Configure a connection for Workday HR REST API

Add and configure a Workday HR REST API connection to authenticate ServiceNow requests in Workday HR spoke.

Before you begin

- Role required: admin
- Register Workday HR as an OAuth provider

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select **Integrations**.
3. Select the **Connections** tab.

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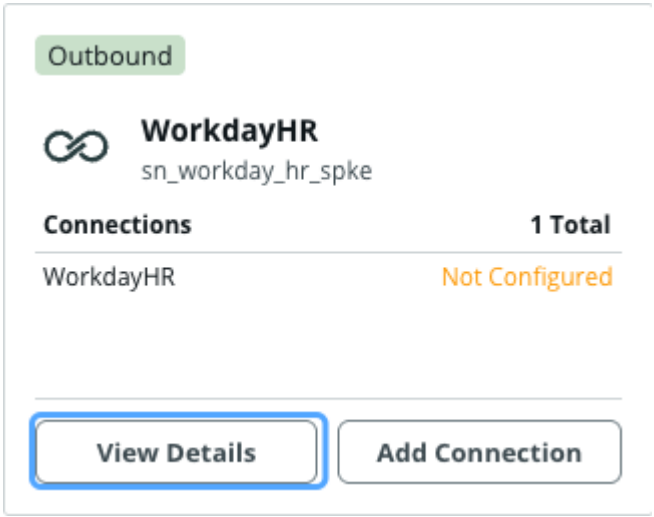
4. Use the search box to find the **WorkdayHR** connection alias.
5. Click **View Details**.



6. Configure a cloud connection.
   a. Add or edit a cloud connection.
      - To set up an existing connection, select **Configure** or **Edit**.



      - To create and configure a new connection, select **Add Connection**.
   b. On the configuration form, fill in the fields.

Configuration form

Field	Description
Name	Name to uniquely identify the connection. For example, `Workday HR spoke connection`.
Connection URL	URL to make a connection to Workday HR. Use this format: `https://<workday_host>/ccx/service/<tenant_name>`
Tenant Name	Name of the Workday tenant. For example, `bcone_gms1`.
API Version	Version of the Workday API to use for requests.
Client ID	Client ID generated in Workday for OAuth authentication.
Client Secret	Client Secret generated in Workday for OAuth authentication.
Authorization URL	URL used to authorize the OAuth connection. Use this format: `https://<workday_host>/authorize`

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Field	Description
Token URL	URL used to generate the OAuth token. Use this format: `https://<workday_host>/token`
OAuth Redirect URL	URL where Workday redirects after successful authentication. Use this format: `https://<instance_name>.service-now.com/oauth_redirect.do`

7. Click **Save and Get OAuth Token**.

Result
The spoke connection is configured and ready to be used.

Option 2: Configuration to use Workday HR REST API without a Template

Configure your ServiceNow instance to perform actions that use the Workday HR REST API by manually creating connection and credential records.

Before you begin
Role required: admin

Create a credential record for the Workday HR spoke

Create a credential record for the Workday HR instance. The Workday HR spoke connection and credential alias uses these credentials to authorize actions.

Before you begin
Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Credentials**.
2. Click **New**.

   The system displays this message: `What type of Credentials would you like to create?`
3. Select **OAuth 2.0 Credentials**.
4. On the form, fill these values.

OAuth 2.0 Credentials form

Field	Description
Name	Name to uniquely identify the record. For example, `Workday HR Cred`.
Active	Option to actively use the credential record.
OAuth Entity Profile	OAuth entity profile created during the registration of Workday HR as an OAuth provider. For example, OAuth Profile.

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5. Right-click the form header and click **Submit**.
6. To generate the OAuth token, click the **Get OAuth Token** related link.

Create a connection record for the Workday HR spoke

Create a connection record for your Workday HR instance. The Workday HR spoke connection and credential aliases use these connections to perform actions in Workday HR.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.
2. Open the alias record, **WorkdayHR**.
3. From the **Connections** tab, click **New**.
4. On the form, fill these fields.

> **Note:** Ensure that you create the connection record in the **Workday HR Spoke** application.

Connection form

Field	Description
Name	Name to uniquely identify the record. For example, `Workday HR Connection`.
Credential	Credential record created for Workday HR spoke. For example, `Workday HR Cred`.
Connection alias	Alias record associated with this connection.
Connection URL	URL to connect to your Workday HR instance.
Active	Option to actively use the connection record.

5. In the **Attributes** tab, fill in these values.

Field	Value
Tenant Name	Tenant name of your Workday application.
Version	v1

6. Click **Submit**.

Set up webhooks for your Workday HR spoke

Retrieve details the required employees in the Workday HR application to your ServiceNow instance by setting up the webhooks.

Before you begin

Role required: admin

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Configure ServiceNow Webhook API Client for OAuth 2.0 in Workday

Configure API client in Workday to authenticate webhook requests.

Before you begin

Role required: Workday admin role or the role with granted permission to setup OAuth 2.0 client in Workday.

About this task

You only need to configure this step if you want to use the ServiceNow platform as a listener endpoint, and receive event notifications from Workday. If you don't need to receive any event notifications from Workday, then you can skip the configurations mentioned in this section.

Note: These configurations must be performed in Workday.

Procedure

1. In Workday, access the Edit Tenant Setup - Security task.
2. Select the **OAuth 2.0 Clients Enabled** option from the **OAuth 2.0 Settings** section.
3. Access the Register API Client task.
4. Enter the **Client Name**.
5. Select the **Client Grant Type** as Authorization Code Grant.
6. Select **Access Token Type** as Bearer.
7. Enter a valid Redirection URI.

   Note: Make sure that the OAuth 2.0 Redirection URI is a valid HTTPS URL.

8. **Optional:** Select the Refresh Token Timeout in days.
9. **Optional:** Select the Non-Expiring Refresh Tokens option to prevent the refresh token from timing out.
10. Select the **Grant Administrative Consent** option to grant OAuth permission to a REST API Client tenant-wide.
    When you select this option, you don't have to grant client access explicitly to Workday functional areas.
11. From the Functional Areas prompt, select the functional areas to which your OAuth 2.0 client requires access.
12. **Optional:** If the OAuth 2.0 client requires access to core Workday domains that aren’t in any functional areas, select the **Include Workday Owned Scope** option.

Set up CreateUser Webhook for the Workday HR spoke

Use the CreateUser Webhook to get the details of the newly onboarded employee from Workday to your ServiceNow instance.

Generate user name and password in your ServiceNow instance for Create User webhook

Generate user name and password in your ServiceNow instance to authenticate requests for Create User webhook and retrieve the required data from the Workday application.

Before you begin

Role required: ServiceNow admin

Note: These configurations must be performed in your ServiceNow instance.

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Procedure

1. Log in to your ServiceNow instance as an admin.
2. Navigate to **All** > **System Definition** > **Table**.
3. Filter and search for the Workday HR spoke webhook registry table.
   For example, **Workday Webhook Registry**.
4. Click the **Show List** related list.
5. Click **New**.
6. On the form, fill these values.

Field	Description
Description	Description of the webhook registry record. Enter `Workday event and authentication for Create User`.
UserName	Workday user who has integration rights using Workday Web Services.
Password	Password of the Workday user.
Workday Event	Event for which the webhook is set up. Enter `CreateUser`.
Workday Instance	Workday host URL and tenant name. Enter the URL in this format:`https://<workday_host_url>/<workday_tenant_name>`

7. Right-click the form header and click **Save**.
8. Click **Generate UserName And Password**.
   Copy and record the values of username and password. These values must be specified in the Workday instance to authenticate the webhook requests.

> **Note:** If you have more than one HIRE BP in your environment, you must configure all the HIRE BPs to enable the Create User webhook for all HIRE employee transactions.

Retrieve the resource path from your ServiceNow instance for Create User webhook

Retrieve the resource path from your ServiceNow instance for later use to authenticate Create User webhook requests and retrieve the required data from the Workday application

Before you begin

Role required: ServiceNow admin.

> **Note:** These configurations must be performed in your ServiceNow instance.

Procedure

1. Log in to your ServiceNow instance as an admin.
2. Navigate to **All** > **System Web Services** > **Scripted Web Services** > **Scripted REST APIs**.
3. Open the record for the Workday HR spoke.
4. In the **Resources** tab, click the **Callback** record.
5. Record and save the value of **Resource path** for later use.

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Import CLAR file to your Workday instance for Create User webhook

Import CLAR file available at ServiceNow Store to set up Create User webhook and authenticate requests from ServiceNow instance.

Before you begin

- Workday Studio should be installed.
- Access to custom report creation policy.

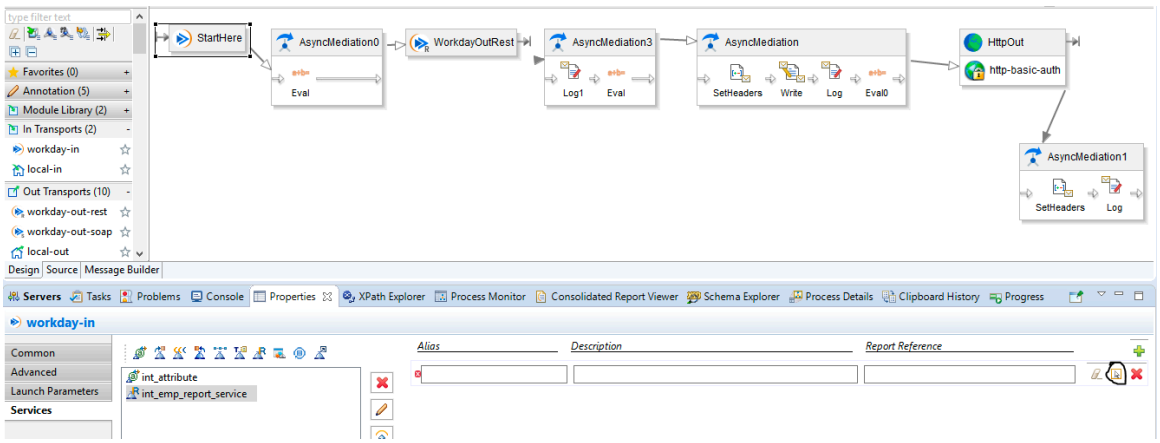
  Create custom report in workday based on the New_Hire_record report structure and share the report with ISU user.
- Access to edit business process definition.
- Access to create and edit integration system.
- Role required: admin

Note:

- Except integration name, report field XPath (if required), and Workday instance header, users are cautioned against modifying the values of fields or properties in the CLAR file.
- These configurations must be performed in Workday Studio.

Procedure

1. From the Workday HR spoke page on ServiceNow Store, download the `Workday-HR-Webhook-Studio-Sample` file from **Supporting Links and Docs**.
2. Unzip the sample file to obtain the CLAR file.
3. Import the CLAR file to Workday Studio.
4. In the **Properties** tab of the **StartHere** component, navigate to **Services** and select the RAAS report created for this webhook.



5. Choose the environment where your report exists such as, implementation or sandbox and configure the report as per your requirement.
6. Provide a report name and select the required report.

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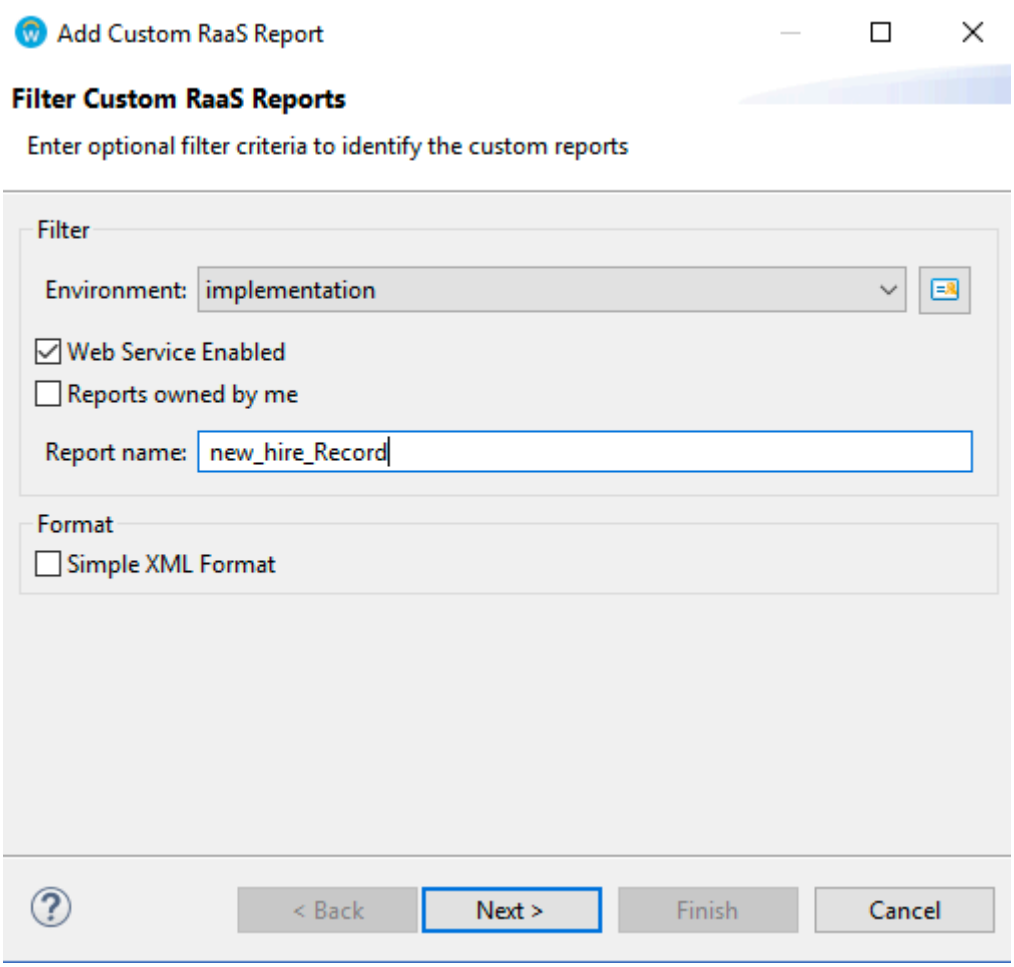
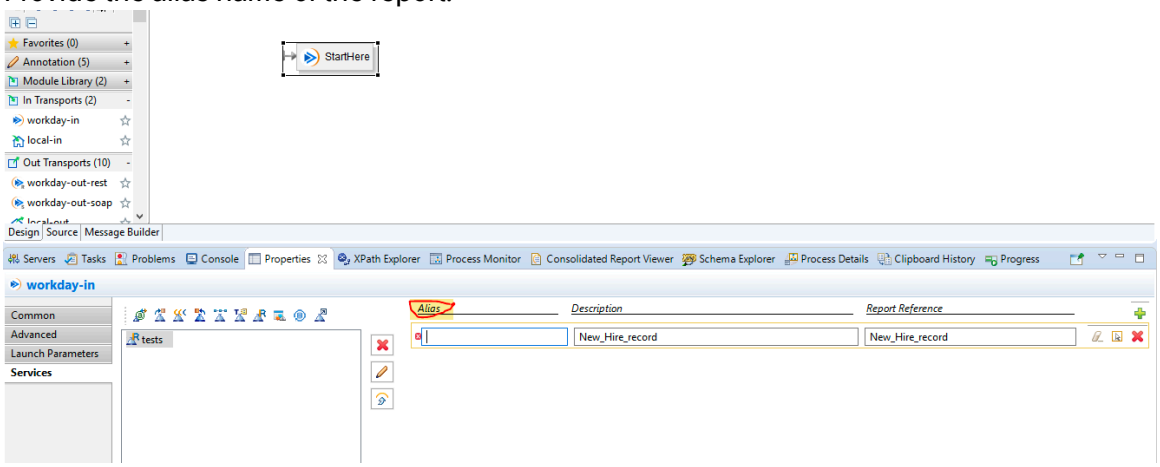


7. Provide the alias name of the report.



8. After the report alias is added, add the selected path of report in **Extra Path** that is used to run the report based on prompt.



9. In the **Set Headers** component, provide your Workday instance for the **WorkdayInstance** header.

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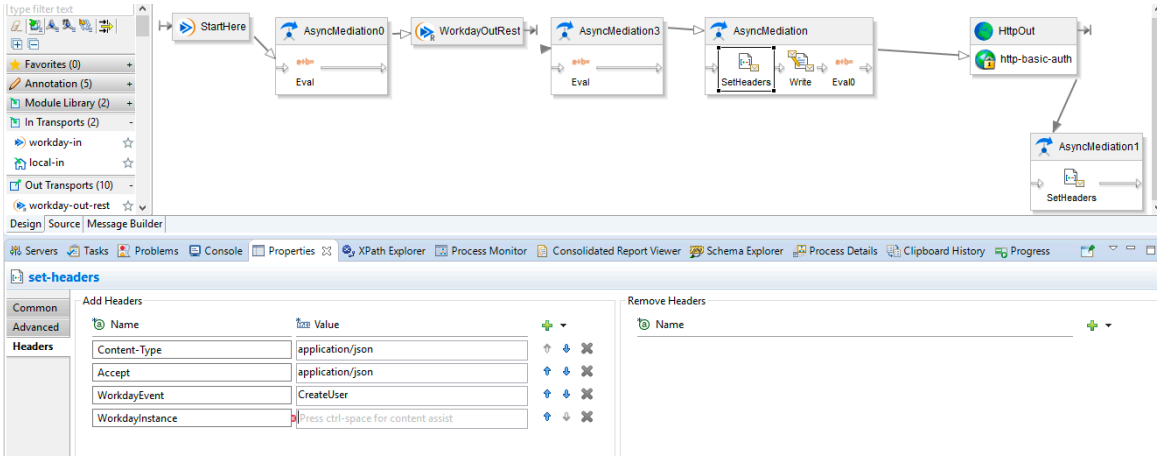
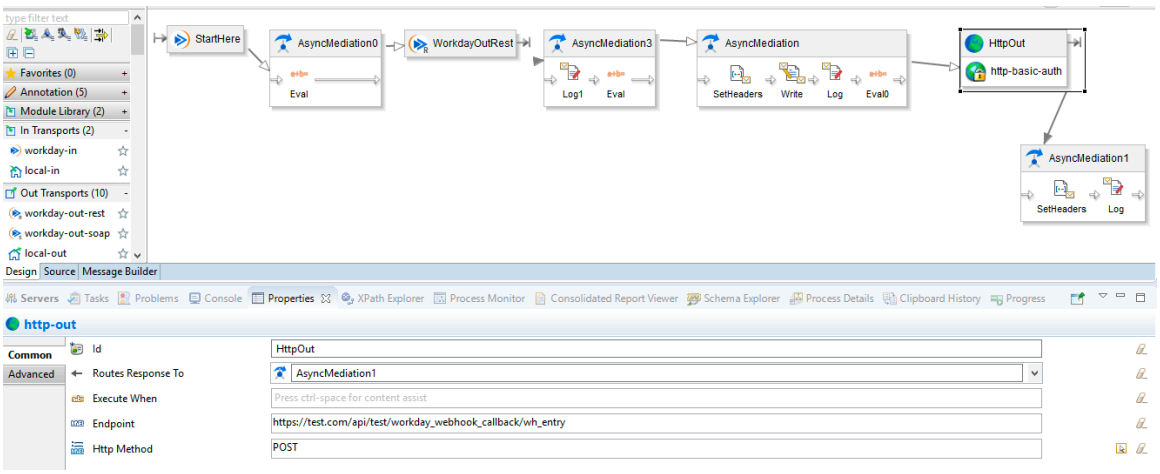


10. In the properties of **HttpOut**, fill in these values.

Field	Value
Endpoint	REST endpoint **Note:** See Retrieve the resource path from your ServiceNow instance for more information.
Http Method	POST



11. Save the changes.

12. In the project explorer, select the integration and deploy it in your Workday system.

13. Log in to your Workday instance and navigate to **Integration** > **Integration System** > **Configure Integration Attributes**.

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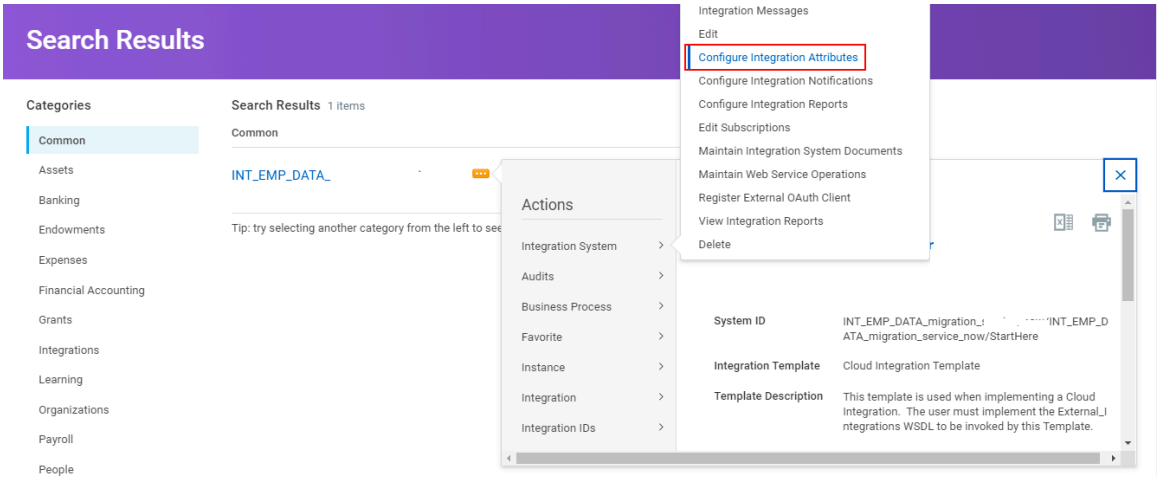
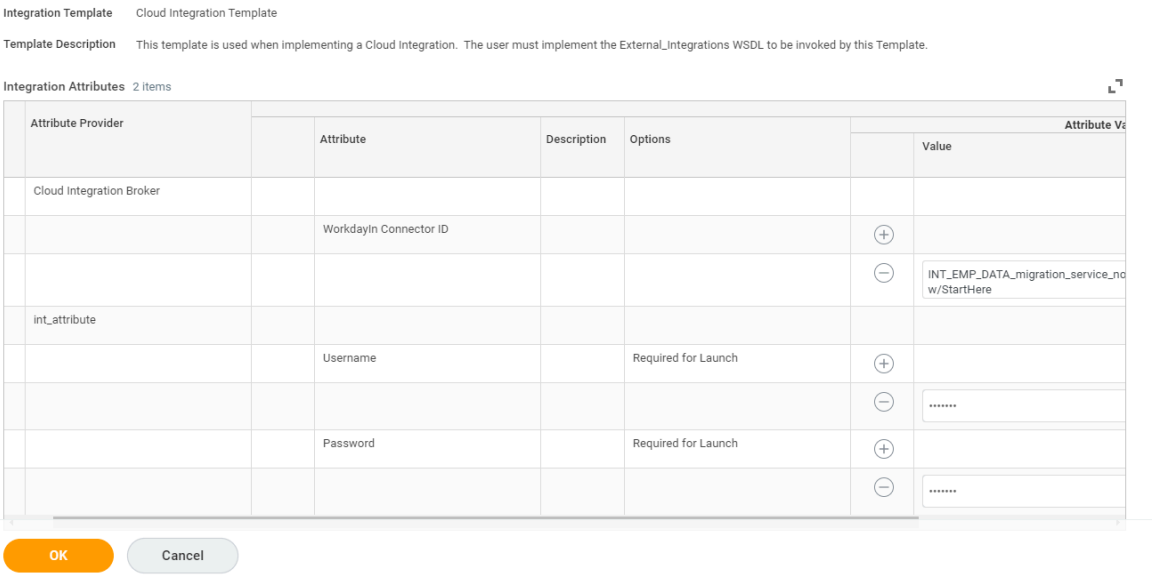


14. Provide user name and password in **Configure Integration Attributes** that you have generated in Generate user name and password in your ServiceNow instance.



15. Modify a business process and add this integration in your business process.

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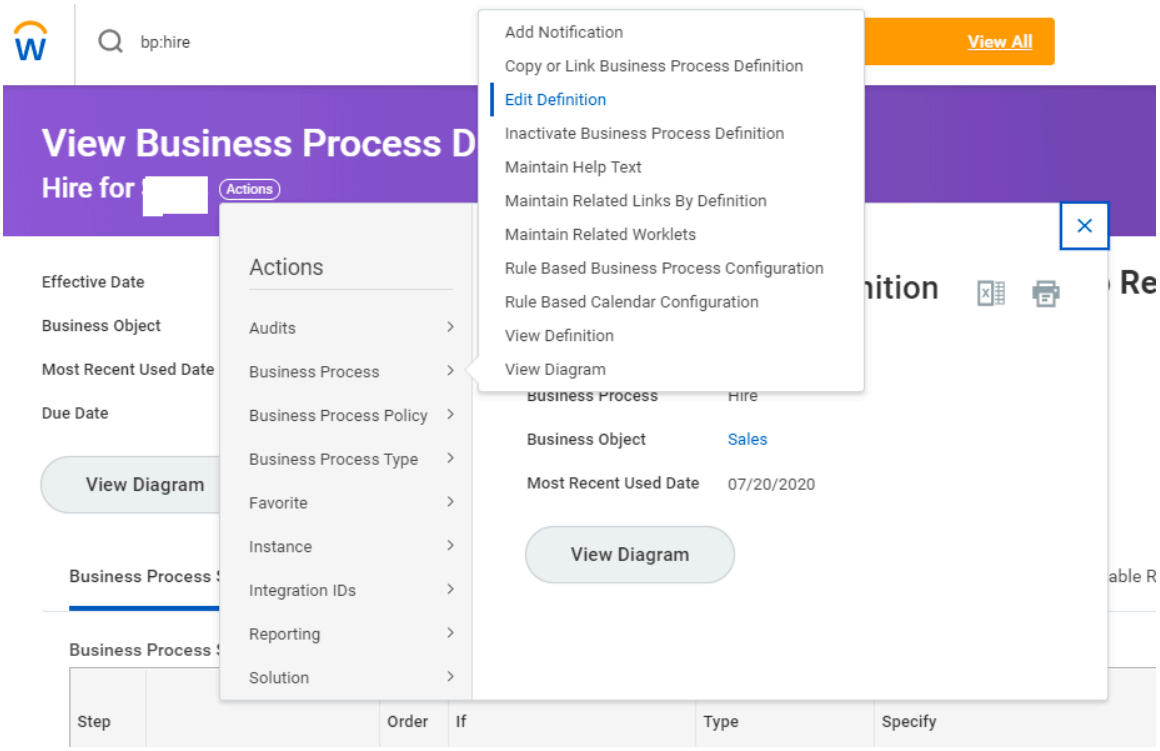
a. Edit definition of the business process.

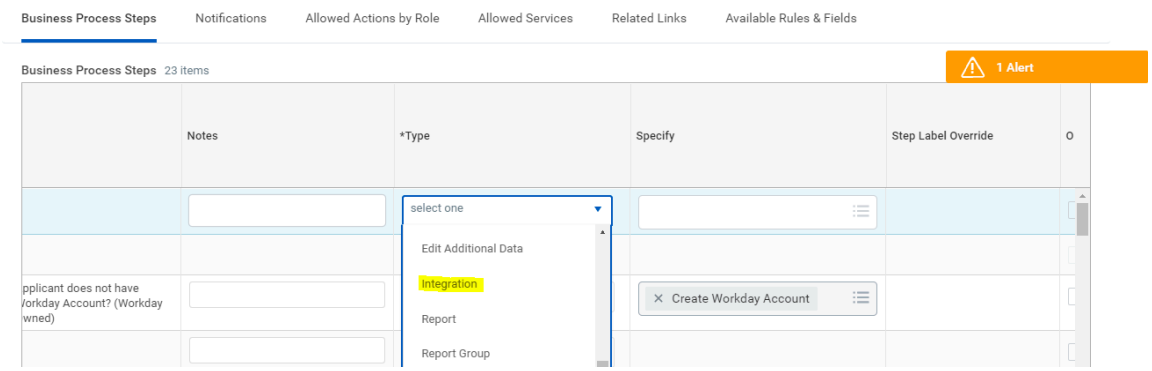


b. Select the effective date and click **Ok**.

c. Click the + sign and add a new business process step in BP.

d. Select an order, which is after the completion step of business process.

e. Add the business process and select **Type** as **Integration**.



f. Provide ISU username in **Run as User** and click **Ok**.

g. Click **Configure Integration** on the newly added business process step in Hire BP.

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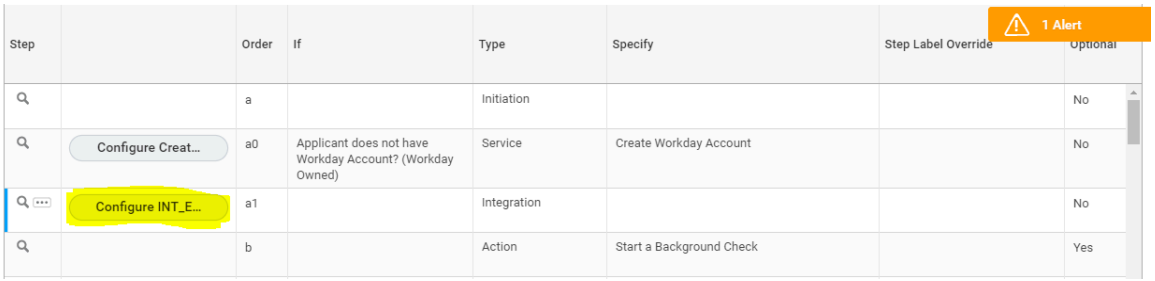
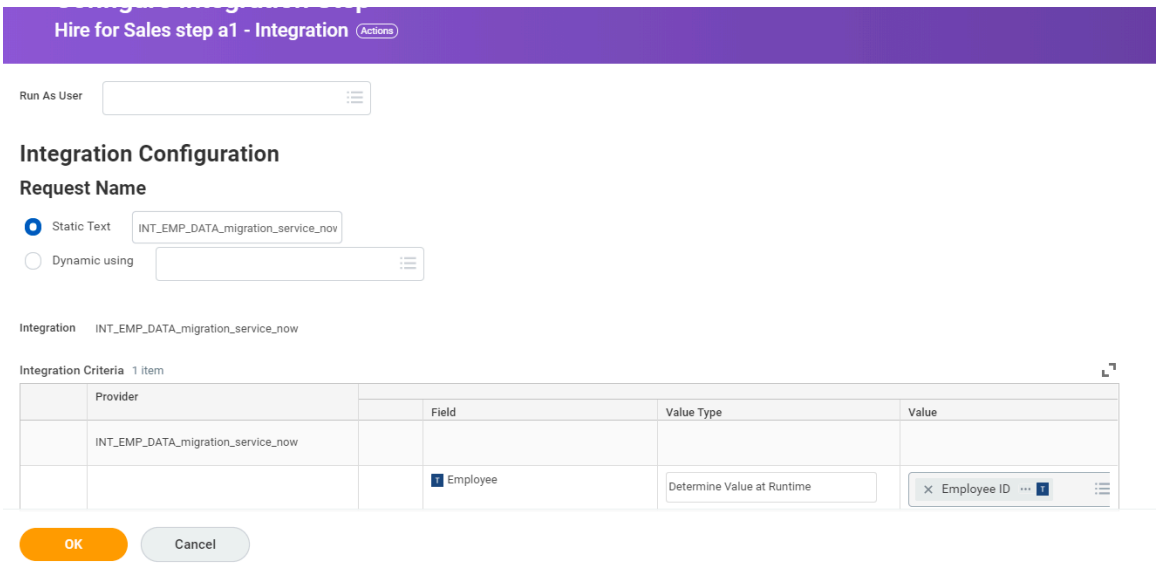
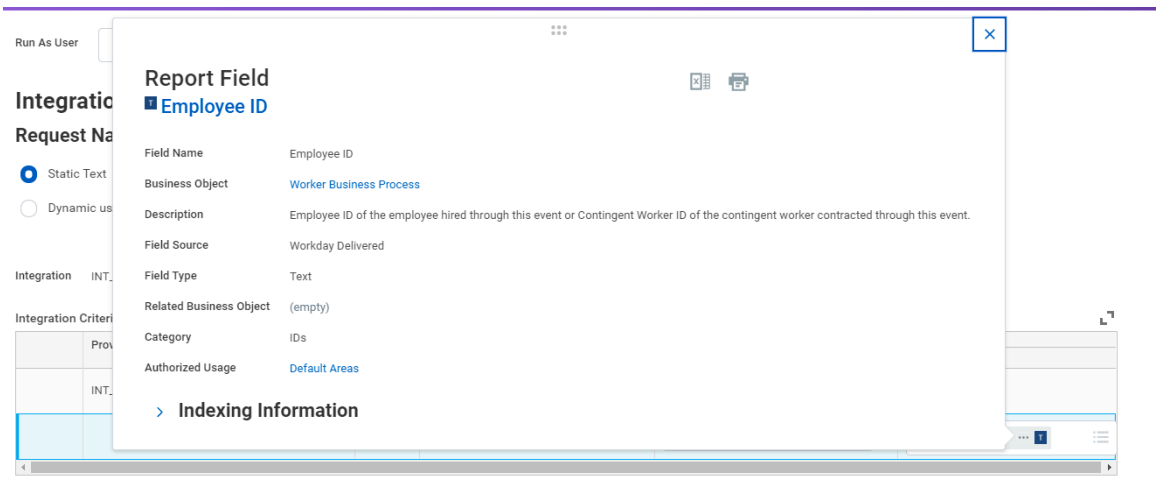


h. In integration criteria, select value type as **Determine value at runtime** and select value as **Employee ID**.



Selected **Employee ID** field in value is displayed.



i. Click **Ok**.

j. Create a report for the webhook with these details:

Report definition:

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Report Definition	New_Hire_record
Report Name	New_Hire_record
Report Type	Advanced
Data Source	All Workers
Data Source Type	Standard
Primary Business Object	Worker

Column labels:

Columns

Business Object	Field	Column Heading Override	Column Heading Override XML Alias	Format	Options
Worker	Employee ID		Employee_ID		
Worker	First Name	First Name	First_Name		
Worker	Middle Name		Middle_Name		
Worker	Last Name		lastName		
Worker	Gender	Gender	Gender		
Worker	Email - Work	Email	Email_Work		
Worker	Preferred Language	Language	Language		
Worker	Supervisory Organization	Department	Department		
Worker	Business Title		Business_Title		
Worker	Organization Roles		Organization_Roles		
Worker	Manager - Level 01	Manager	Manager		
Worker	Company		Company		
Worker	Location		Location		
Worker	Work Address - City	City	City		
Primary Work Address - Country	Alpha-3 Code	Country	Country		
Worker	CF_Street	Street	Street		
Location	Primary Address - State/Province	State	state		
Worker	Work Address - Postal Code	Postal Code	Work_Address_-_Postal_Code		
Worker	Mobile Phone Number		Mobile_Phone_Number		
Worker	Phone - Primary Work	Phone	Business_Phone		
Worker	User Name		User_Name		
Termination History - Approved	Effective Date		effective		

Group Column Headings

Business Object	Group Column Heading XML Alias
Location	location_group
Primary Work Address - Country	Primary_Work_Address_-_Country_group
Termination History - Approved	Termination_History_-_Approved_group

Calculated field details:

Field Name	CF_Street
Business Object	Worker

Calculation

Concatenates a series of text fields together.

Field
Work Address - Formatted Line 1
Work Address - Formatted Line 2

Additional Info

Description	
Category	Uncategorized
Authorized Usage	Default Areas
Intermediate Calculation	
Do Not Use	

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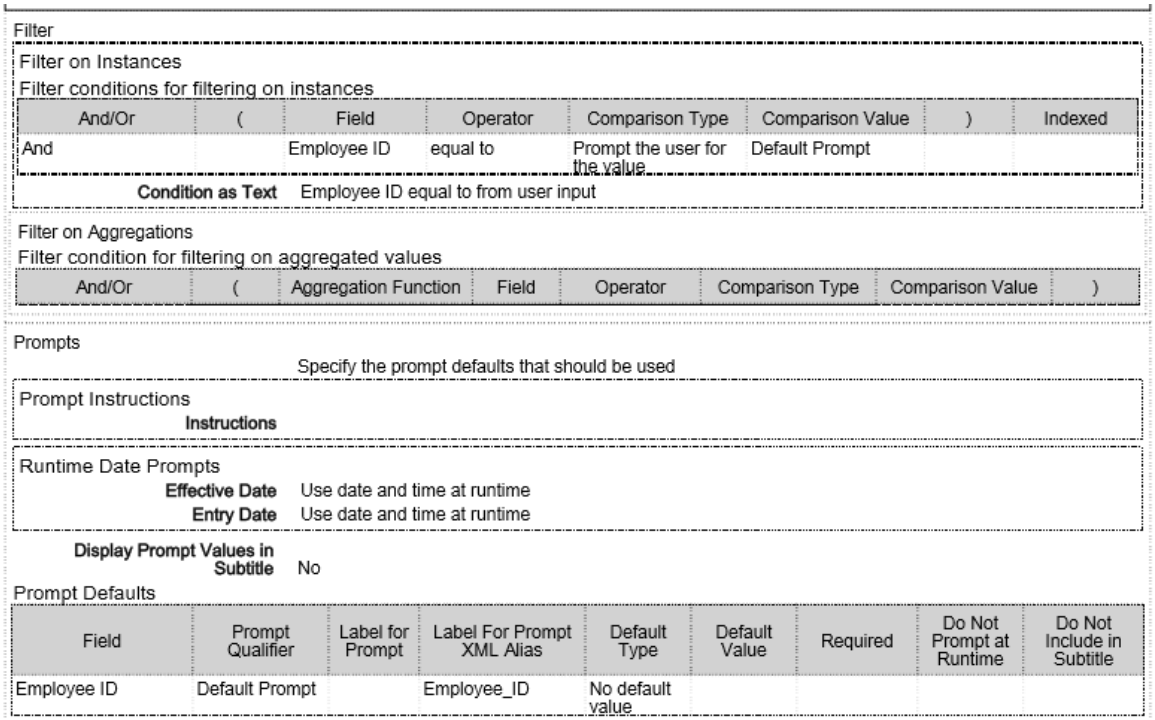
Filter and prompt details:



Filter

Filter on Instances

Filter conditions for filtering on instances

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)	Indexed
And		Employee ID	equal to	Prompt the user for the value	Default Prompt		

Condition as Text Employee ID equal to from user input

Filter on Aggregations

Filter condition for filtering on aggregated values

And/Or	(	Aggregation Function	Field	Operator	Comparison Type	Comparison Value	)

Prompts

Specify the prompt defaults that should be used

Prompt Instructions

Instructions

Runtime Date Prompts

Effective Date Use date and time at runtime

Entry Date Use date and time at runtime

Display Prompt Values in Subtitle No

Prompt Defaults

Field	Prompt Qualifier	Label for Prompt	Label For Prompt XML Alias	Default Type	Default Value	Required	Do Not Prompt at Runtime	Do Not Include in Subtitle
Employee ID	Default Prompt		Employee_ID	No default value				

Set up Offboarding Webhook for the Workday HR spoke

Use the Offboarding Webhook to get the details of the offboarded employee from Workday to your ServiceNow instance.

Generate user name and password in your ServiceNow instance for Offboarding webhook

Generate user name and password in your ServiceNow instance to authenticate requests for Offboarding webhook and retrieve the required data from the Workday application.

Before you begin

Role required: admin

Note: These configurations must be performed in your ServiceNow instance.

Procedure

1. Log in to your ServiceNow instance as an admin.
2. Navigate to **All** > **System Definition** > **Table**.
3. Filter and search for the Workday HR spoke webhook registry table.
   For example, **Workday Webhook Registry**.
4. Click the **Show List** related list.
5. Click **New**.
6. On the form, fill these values.

Field	Description
Description	Description of the webhook registry record. Enter `Workday event and authentication for Offboarding`.

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Field	Description
UserName	Workday user who has integration rights using Workday Web Services.
Password	Password of the Workday user.
Workday Event	Event for which the webhook is set up.
Workday Instance	Workday host URL and tenant name. Enter the URL in this format:`https://<workday_host_url>/<workday_tenant_name>`

7. Right-click the form header and click **Save**.
8. Click **Generate UserName And Password**.
   Copy and record the values of username and password. These values must be specified in the Workday instance to authenticate the webhook requests.

   Note: If you have more than one HIRE BP in your environment, you must configure all the HIRE BPs to enable the Create User webhook for all HIRE employee transactions.

Retrieve the resource path from your ServiceNow instance for Offboarding webhook

Retrieve the resource path from your ServiceNow instance for later use to authenticate Offboard webhook requests and retrieve the required data from the Workday application

Before you begin

Role required: admin.

Note: These configurations must be performed in your ServiceNow instance.

Procedure

1. Log in to your ServiceNow instance as an admin.
2. Navigate to **All** > **System Web Services** > **Scripted Web Services** > **Scripted REST APIs**.
3. Open the record for the Workday HR spoke.
4. In the **Resources** tab, click the **Callback** record.
5. Record and save the value of **Resource path** for later use.

Import CLAR file to your Workday instance for Offboarding webhook

Import CLAR file available at ServiceNow Store to set up Offboarding webhook and authenticate requests from ServiceNow instance.

Before you begin

- Workday Studio should be installed.
- Access to custom report creation policy.

  Create custom report in workday based on the New_terminated_record report structure and share the report with ISU user.

- Access to edit business process definition.
- Access to create and edit integration system.
- Role required: admin

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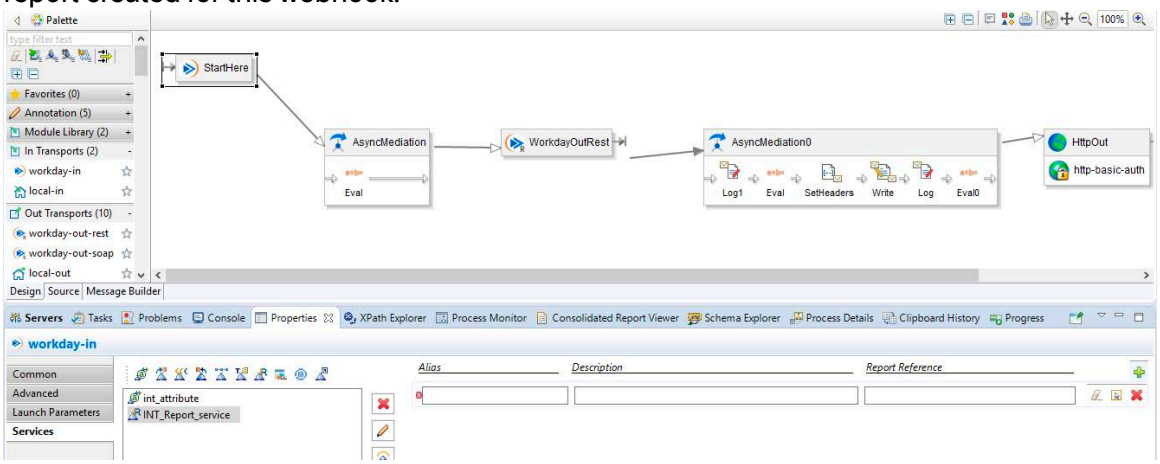
Note:

- Except integration name, report field XPath (if required), and Workday instance header, users are cautioned against modifying the values of fields or properties in the CLAR file.
- These configurations must be performed in Workday Studio.

Procedure

1. From the Workday HR spoke page on ServiceNow Store, download the `Workday-HR-Offboarding-Webhook-Studio-Sample` file from **Supporting Links and Docs**.
2. Unzip the sample file to obtain the CLAR file.
3. Import the CLAR file to Workday Studio.
4. In the **Properties** tab of the **StartHere** component, navigate to **Services** and select the RAAS report created for this webhook.



5. Choose the environment where your report exists such as, implementation or sandbox and configure the report as per your requirement.
6. Provide a report name and select the required report.

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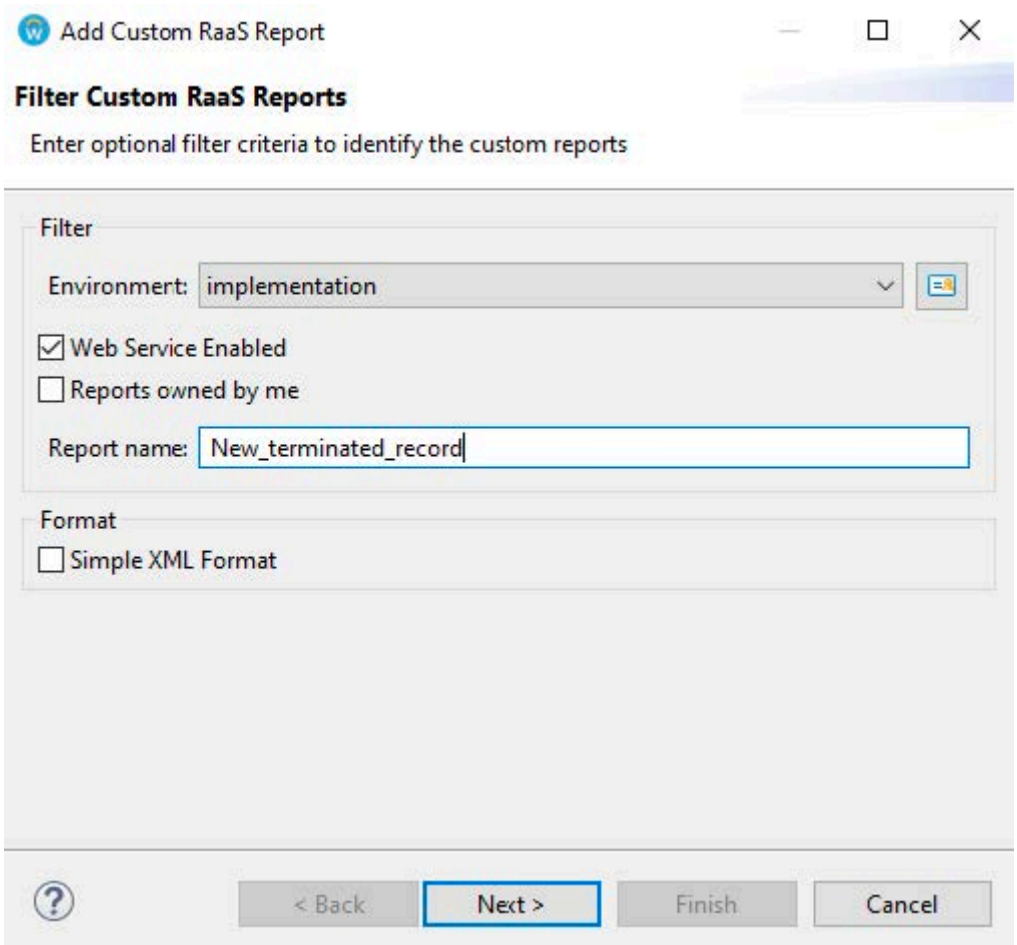
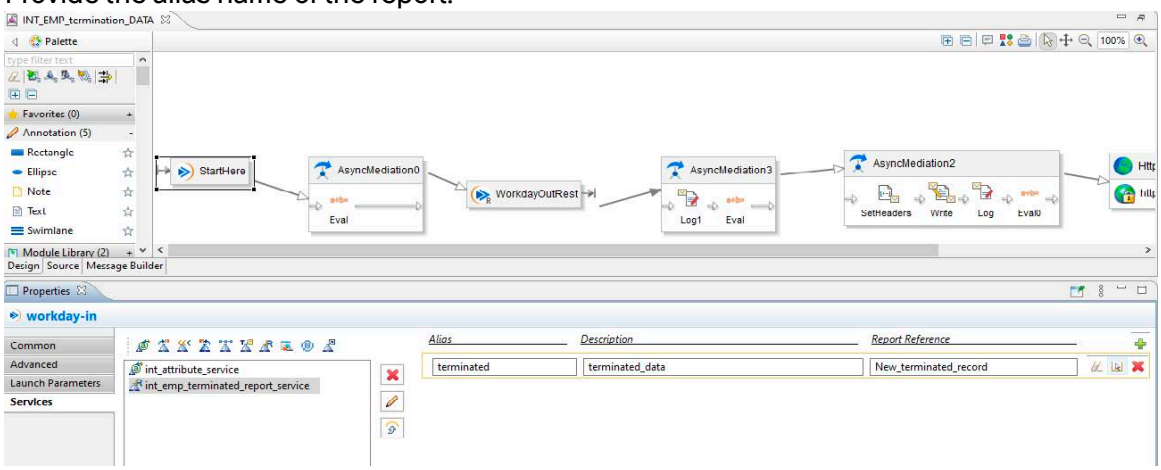
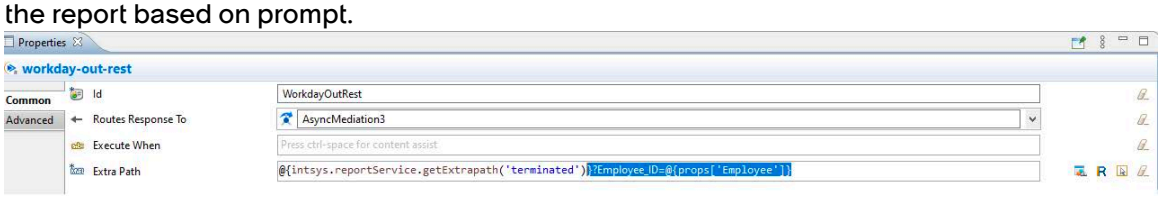


7. Provide the alias name of the report.



8. After the report alias is added, add the selected path of report in **Extra Path** that is used to run the report based on prompt.



9. Select the report alias.
10. In the **Set Headers** component, provide your Workday instance for the **WorkdayInstance** header.

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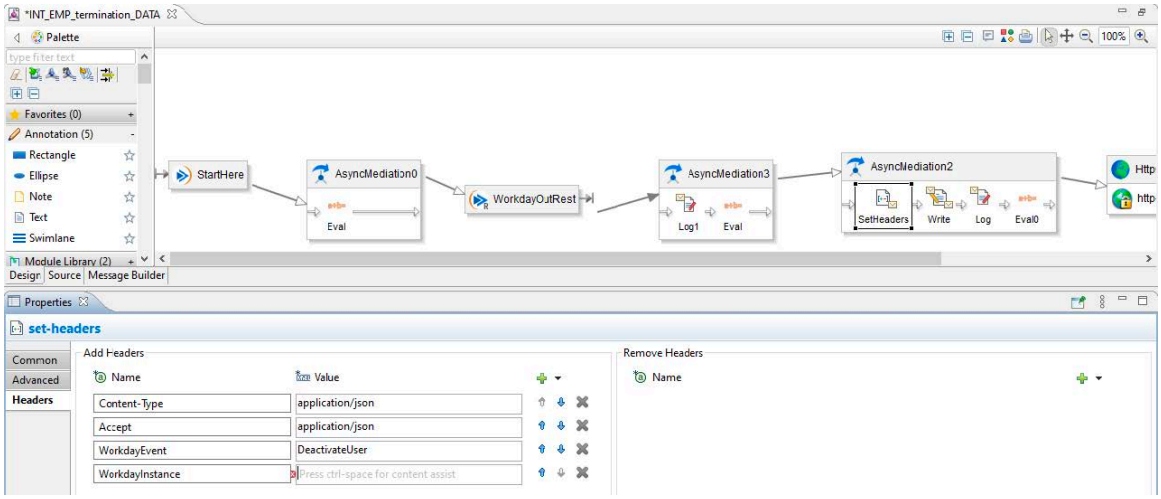
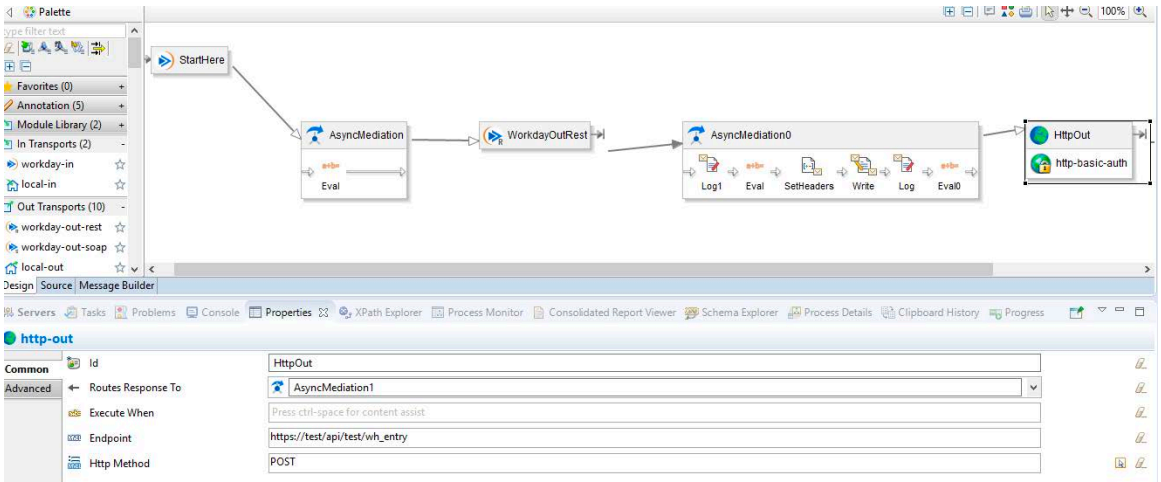


11. In the properties of **HttpOut**, fill in these values.

Field	Value
Endpoint	REST endpoint **Note:** See Retrieve the resource path from your ServiceNow instance for more information.
Http Method	POST



12. Save the changes.
13. In the project explorer, select the integration and deploy it in your Workday system.
14. Log in to your Workday instance and navigate to **Integration** > **Integration System** > **Configure Integration Attributes**.

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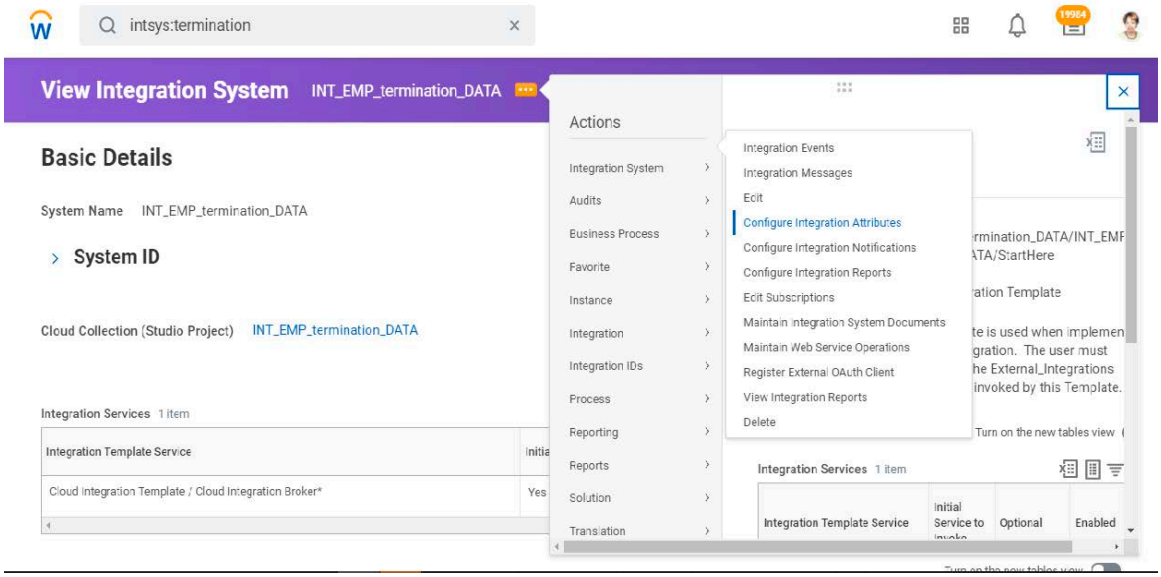
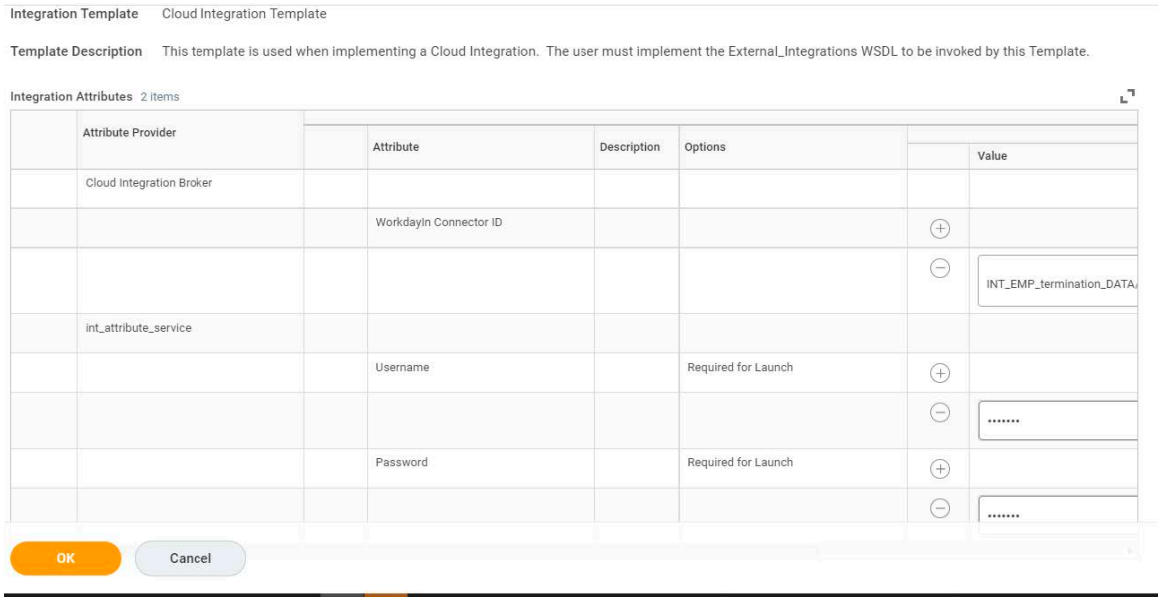
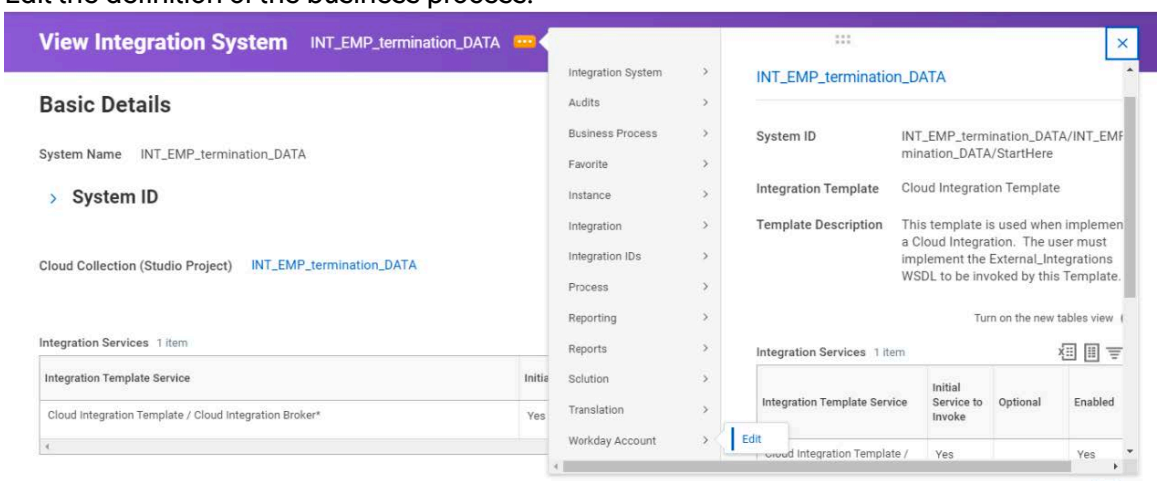


15. Provide user name and password in **Configure Integration Attributes** that you have generated in Generate user name and password in your ServiceNow instance for Offboarding webhook.



16. Modify a business process and add this integration in your business process.

a. Edit the definition of the business process.



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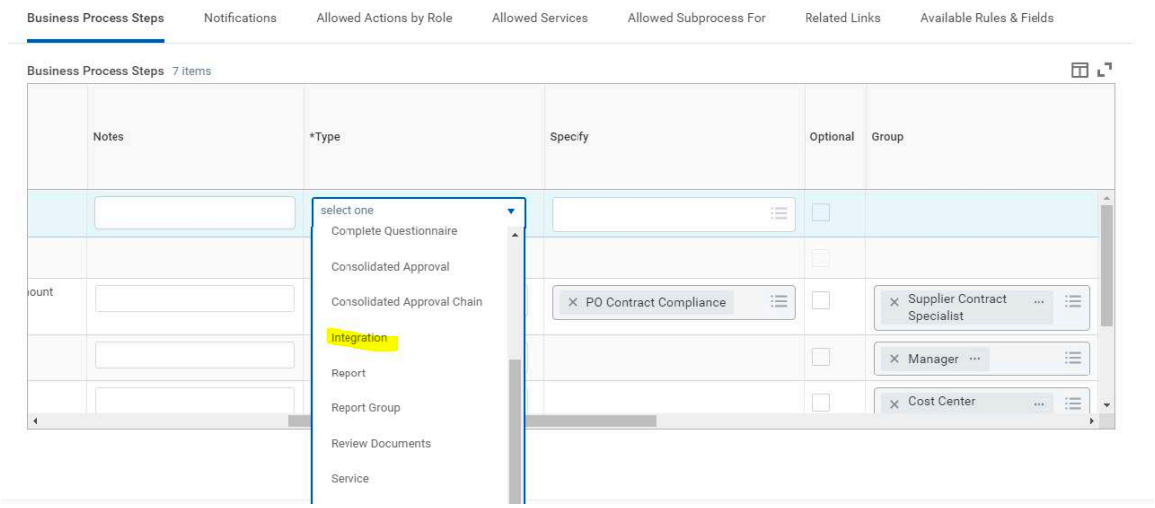
b. Select the ISU user in Workday Account box.

c. Select the effective date and click **Ok**.

d. Click the + sign and add a new business process step in BP.

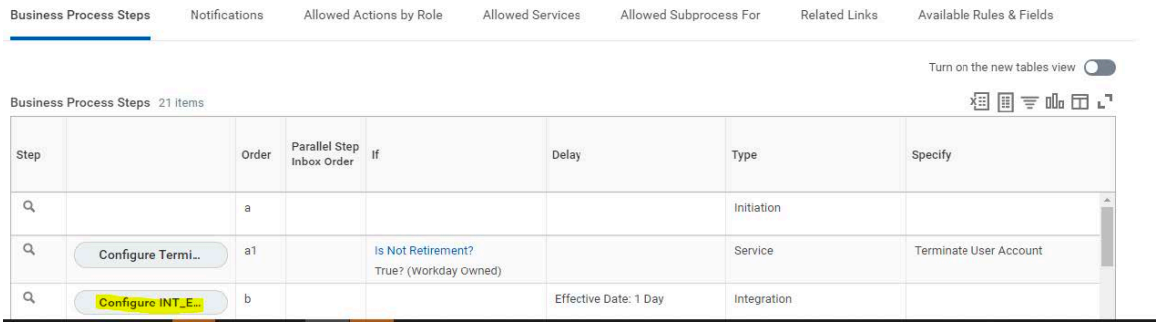
e. Select an order, which is after the completion step of business process.

f. Add the business process and select **Type** as **Integration**.



g. Provide ISU username in **Run as User** and click **Ok**.

h. Click **Configure Integration** on the newly added business process step in Hire BP.



i. In integration criteria, select value type as **Determine value at runtime** and select value as **Employee ID**.

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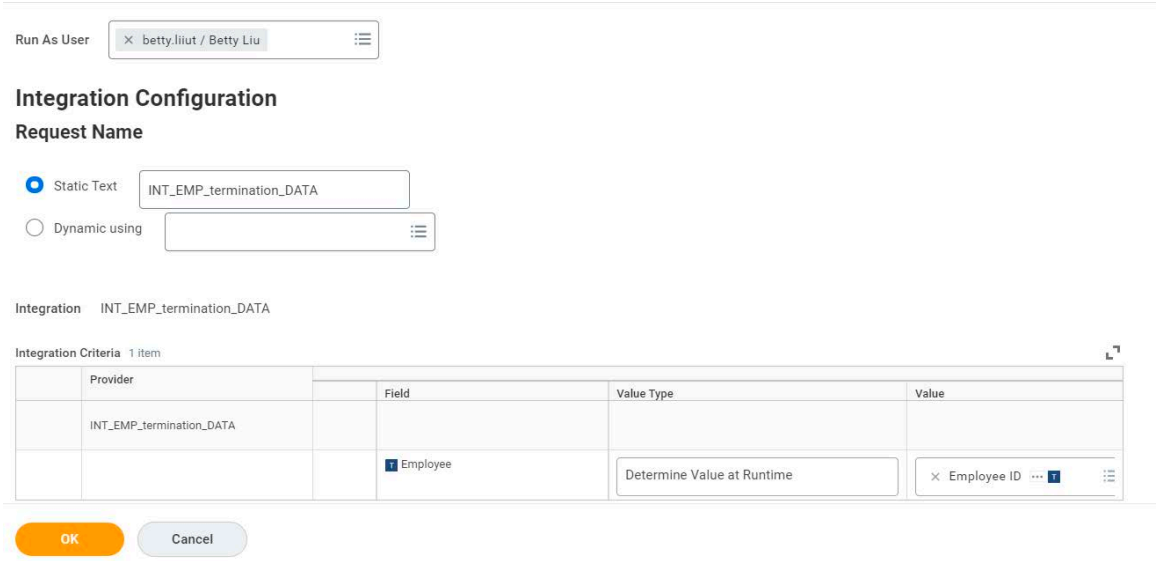
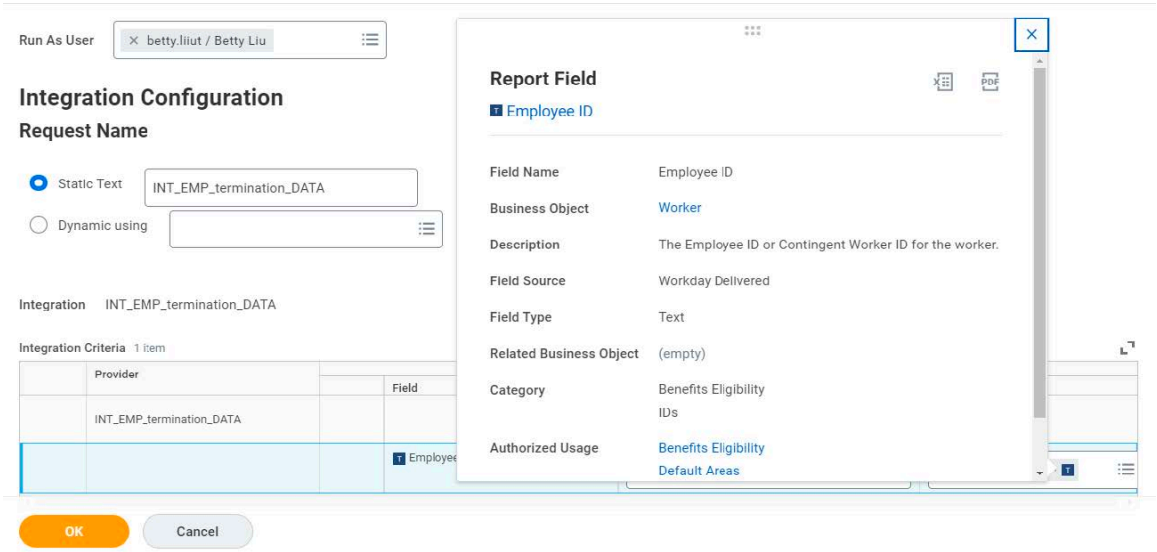


The selected **Employee ID** field in value is displayed.



j. Click **Ok**.

k. Open **Create Custom Report** task.

l. Enter the report name, for example, enter `New_terminated_record`.

m. Select **Report Type** as Advanced.

n. Uncheck the Optimized for performance option.

o. Select Data Source as All Workers.

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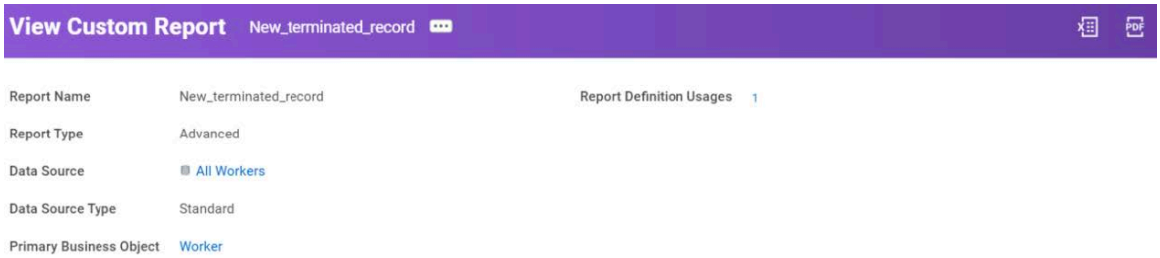
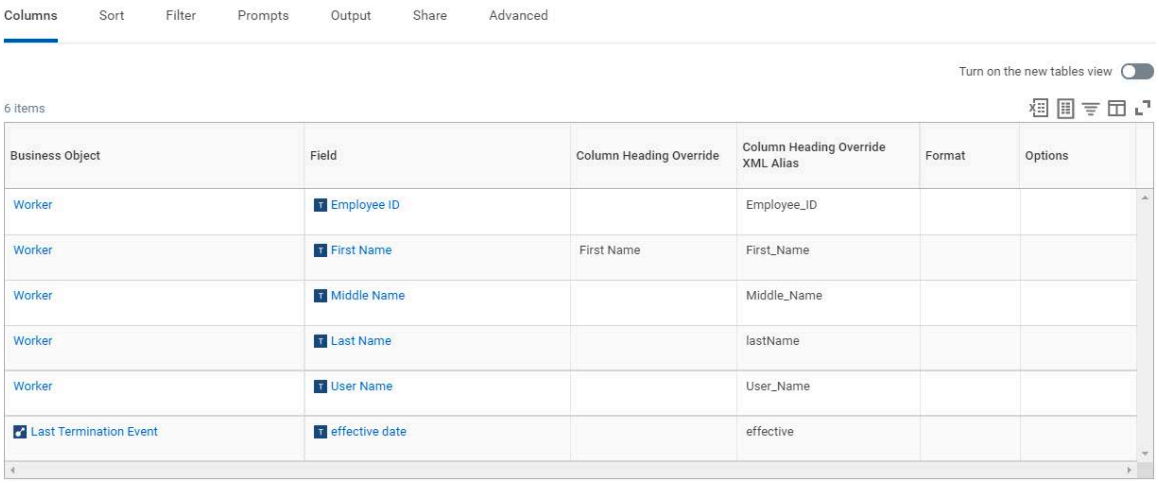


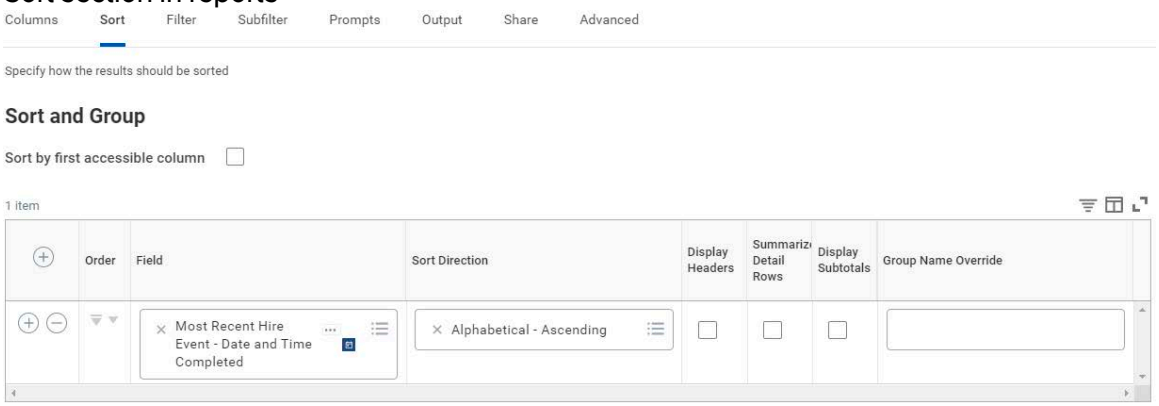
p. Create a report as shown below:



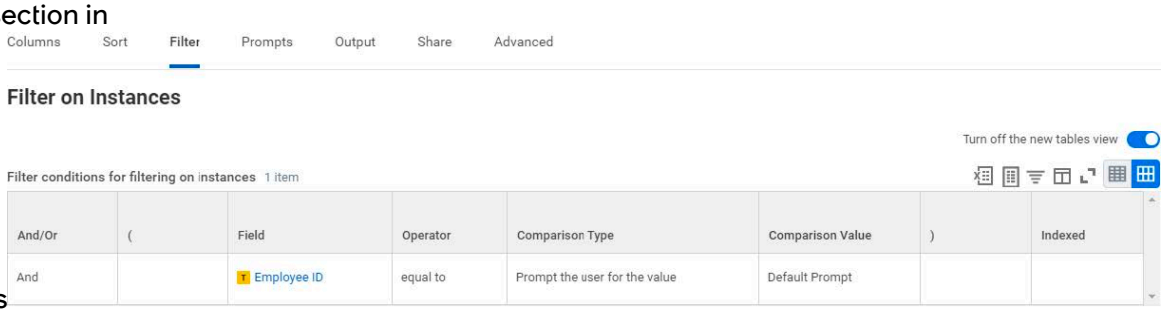
Group Column Headings in reports



Sort section in reports



Filter section in reports



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q. Select **Populate Undefined Prompt defaults** option from the **Prompts** tab.

r. Select **Enable as web service** option from the **Advanced** tab.

Set up LeaveofAbsence Webhook for the Workday HR spoke

Use the LeaveofAbsence Webhook to get leave of absence details of an employee from Workday to your ServiceNow instance.

Generate user name and password in your ServiceNow instance for LeaveofAbsence webhook

Generate user name and password in your ServiceNow instance to authenticate requests for LeaveofAbsence webhook and retrieve the required data from the Workday application.

Before you begin

Role required: admin

Note: These configurations must be performed in your ServiceNow instance.

Procedure

1. Log in to your ServiceNow instance as an admin.
2. Navigate to **All** > **System Definition** > **Table**.
3. Filter and search for the Workday HR spoke webhook registry table, for example, **Workday Webhook Registry**.
4. Click the **Show List** related list.
5. Click **New**.
6. On the form, fill these values.

Field	Description
Description	Description of the webhook registry record. Enter `Workday event and authentication for leave of absence`.
UserName	Workday user who has integration rights using Workday Web Services.
Password	Password of the Workday user.
Workday Event	Event for which the webhook is set up. Enter `LeaveofAbsence`.
Workday Instance	Workday host URL and tenant name. Enter the URL in this format:`https://<workday_host_url>/<workday_tenant_name>`

7. Right-click the form header and click **Save**.
8. Click **Generate UserName And Password**.

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Copy and record the values of username and password. These values must be specified in the Workday instance to authenticate the webhook requests.

Note: If you have more than one HIRE BP in your environment, you must configure all the HIRE BPs to enable the Create User webhook for all HIRE employee transactions.

Retrieve the resource path from your ServiceNow instance for LeaveofAbsence webhook

Retrieve the resource path from your ServiceNow instance for later use to authenticate Offboard webhook requests and retrieve the required data from the Workday application

Before you begin

Role required: admin.

Note: These configurations must be performed in your ServiceNow instance.

Procedure

1. Log in to your ServiceNow instance as an admin.
2. Navigate to **All** > **System Web Services** > **Scripted Web Services** > **Scripted REST APIs**.
3. Open the record for the Workday HR spoke.
4. In the **Resources** tab, click the **Callback** record.
5. Record and save the value of **Resource path** for later use.

Import CLAR file to your Workday instance for LeaveofAbsence webhook

Import CLAR file available at ServiceNow Store to set up LeaveofAbsence webhook and authenticate requests from ServiceNow instance.

Before you begin

- Workday Studio should be installed.
- Access to custom report creation policy.

  Create custom report in workday based on the Leave_of_absence_request report structure and share the report with ISU user.

- Access to edit business process definition.
- Access to create and edit integration system.
- Role required: admin

Note:

- Except integration name, report field XPath (if required), and Workday instance header, users are cautioned against modifying the values of fields or properties in the CLAR file.
- These configurations must be performed in Workday Studio.

Procedure

1. From the Workday HR spoke page on ServiceNow Store, download the `Workday-HR-Leave-of-Absence-Webhook-Studio-Sample` file from **Supporting Links and Docs**.
2. Unzip the sample file to obtain the CLAR file.
3. Import the CLAR file to Workday Studio.

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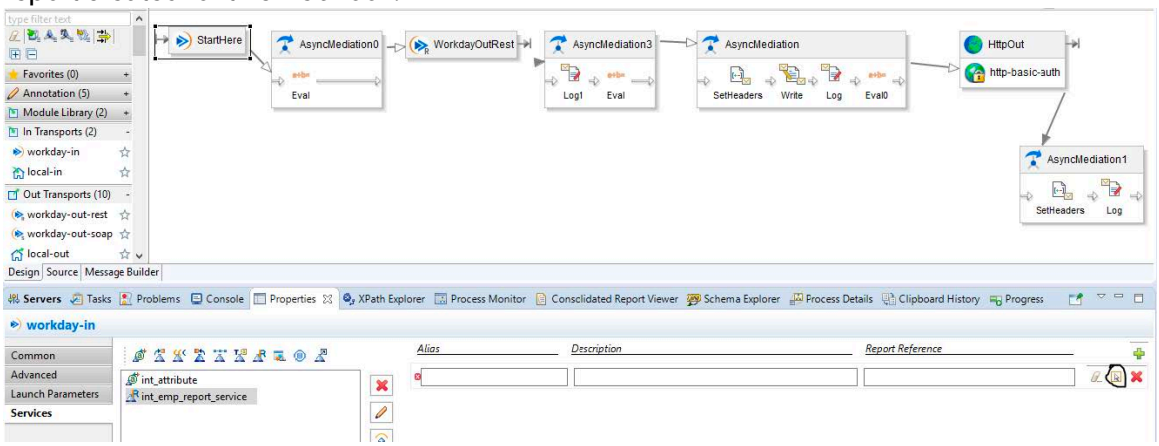
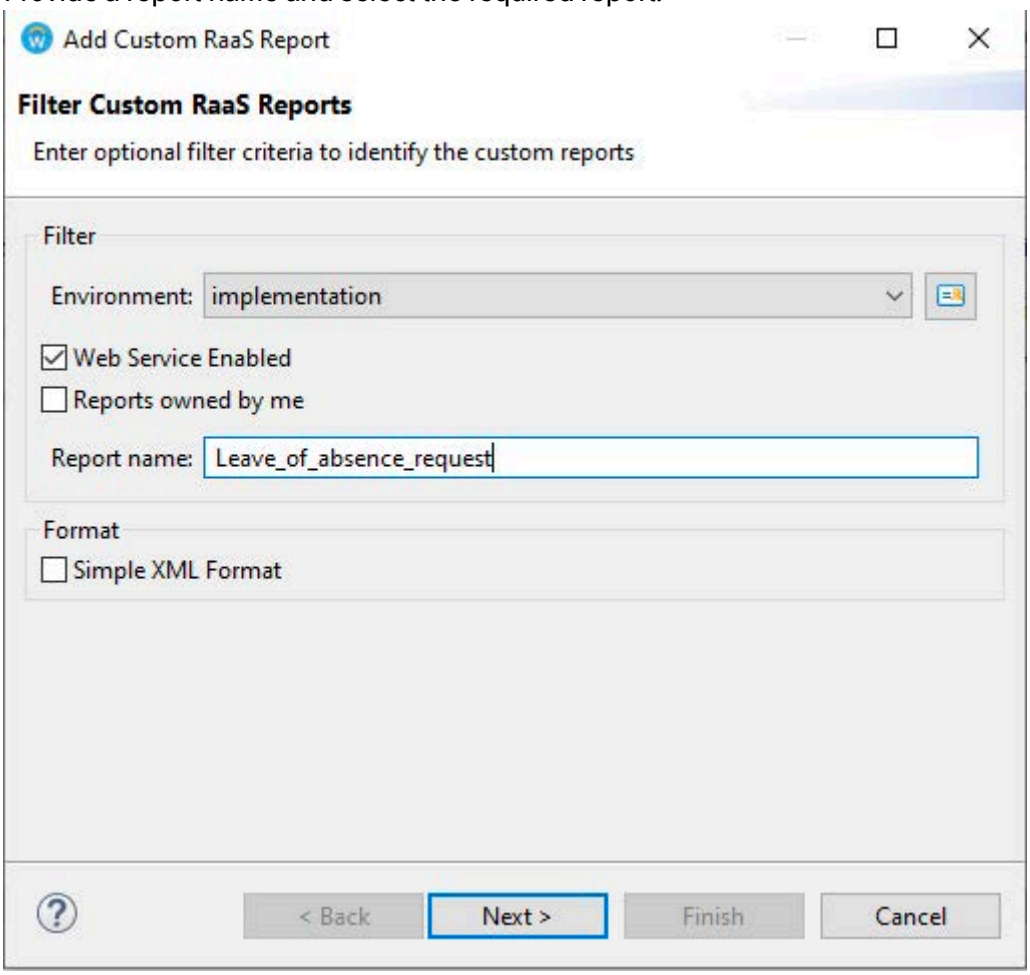
4. In the **Properties** tab of the **StartHere** component, navigate to **Services** and select the RAAS report created for this webhook.



5. Choose the environment where your report exists such as, implementation or sandbox and configure the report as per your requirement.

6. Provide a report name and select the required report.



7. Provide the alias name of the report.

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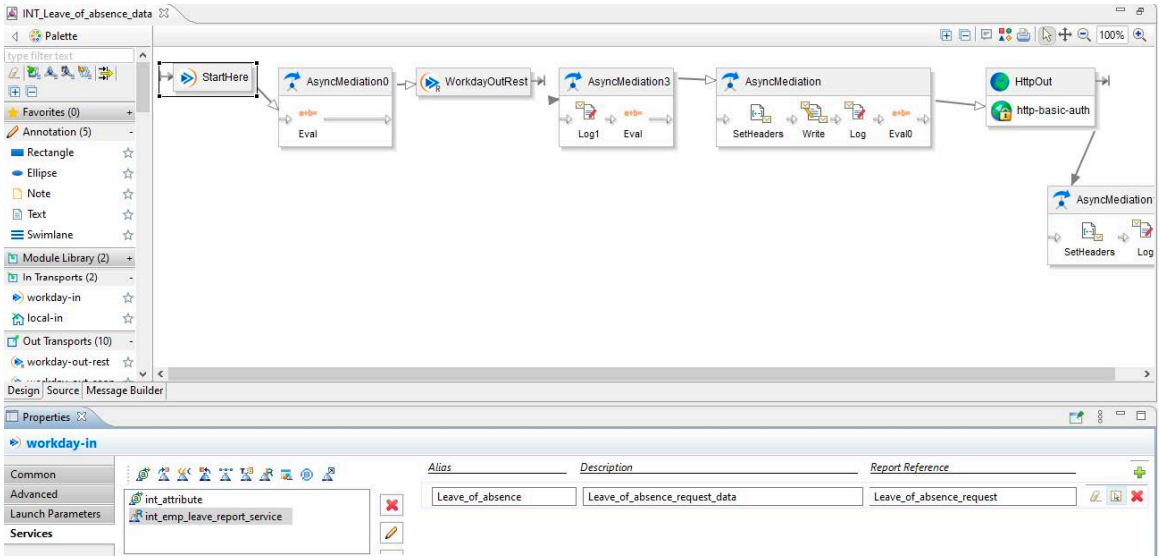
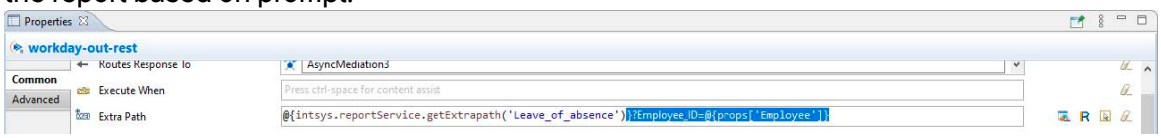
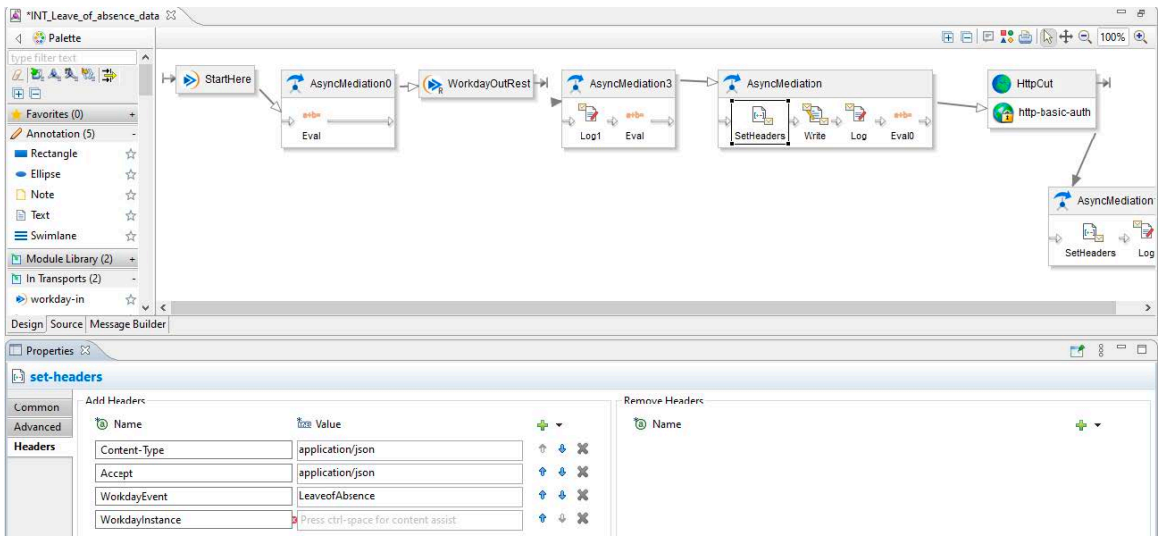


8. After the report alias is added, add the selected path of report in **Extra Path** that is used to run the report based on prompt.



9. Select the report alias.

10. In the **Set Headers** component, provide your Workday instance for the **WorkdayInstance** header.



11. In the properties of **HttpOut**, fill in these values.

Field	Value
Endpoint	REST endpoint **Note:** See Retrieve the resource path from your ServiceNow instance for more information.
Http Method	POST

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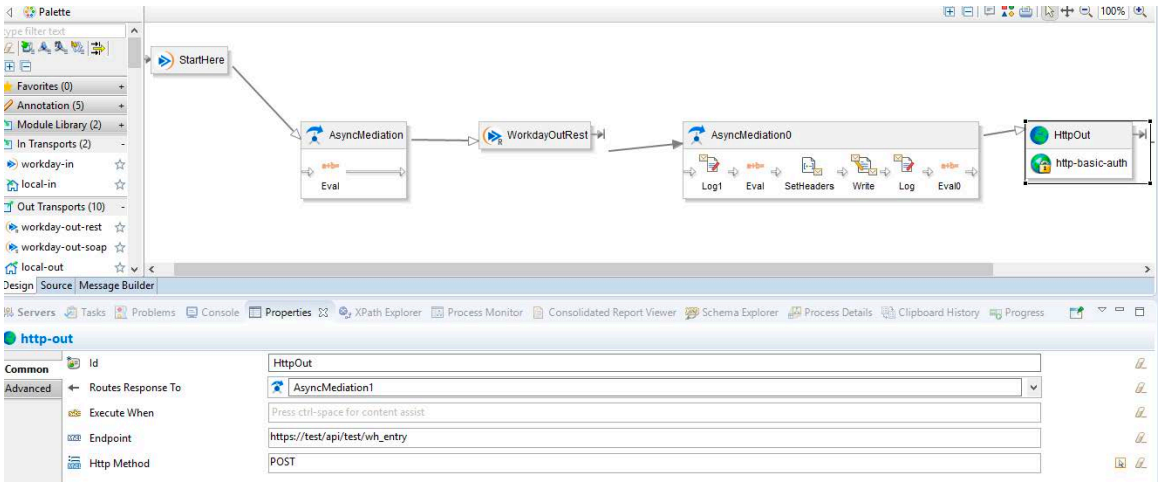
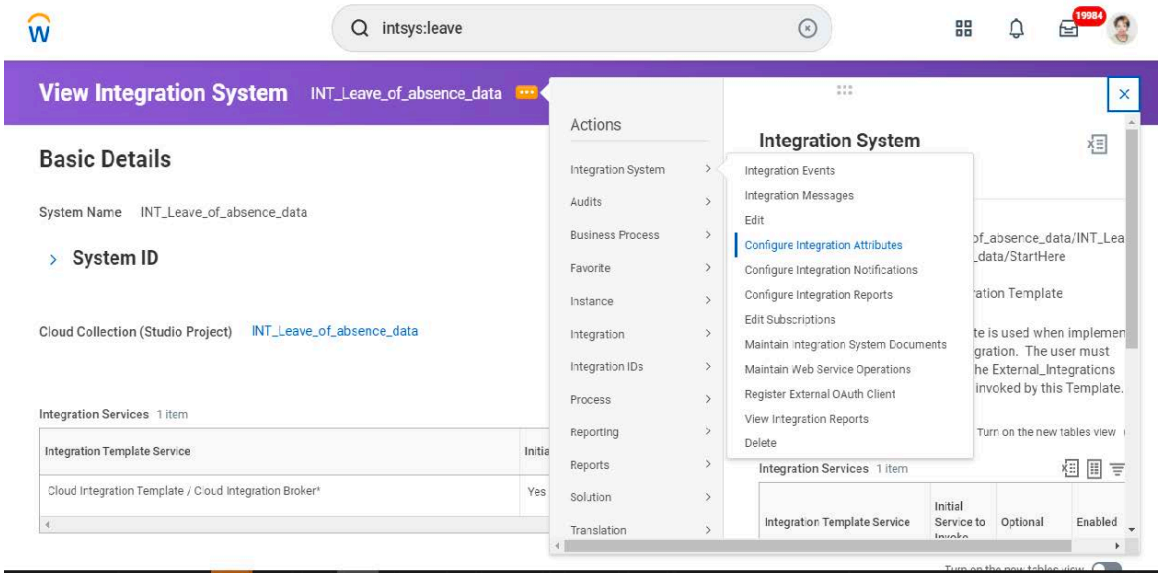


12. Save the changes.
13. In the project explorer, select the integration and deploy it in your Workday system.
14. Log in to your Workday instance and navigate to **Integration** > **Integration System** > **Configure Integration Attributes**.



15. Provide user name and password in **Configure Integration Attributes** that you have generated in Generate user name and password in your ServiceNow instance for LeaveofAbsence webhook.

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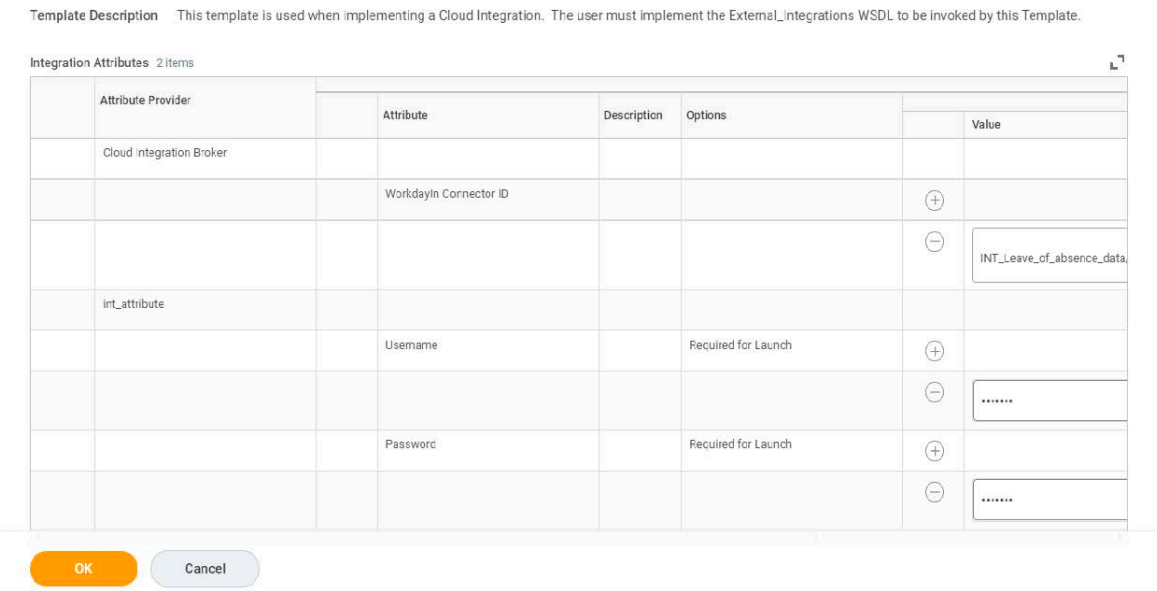
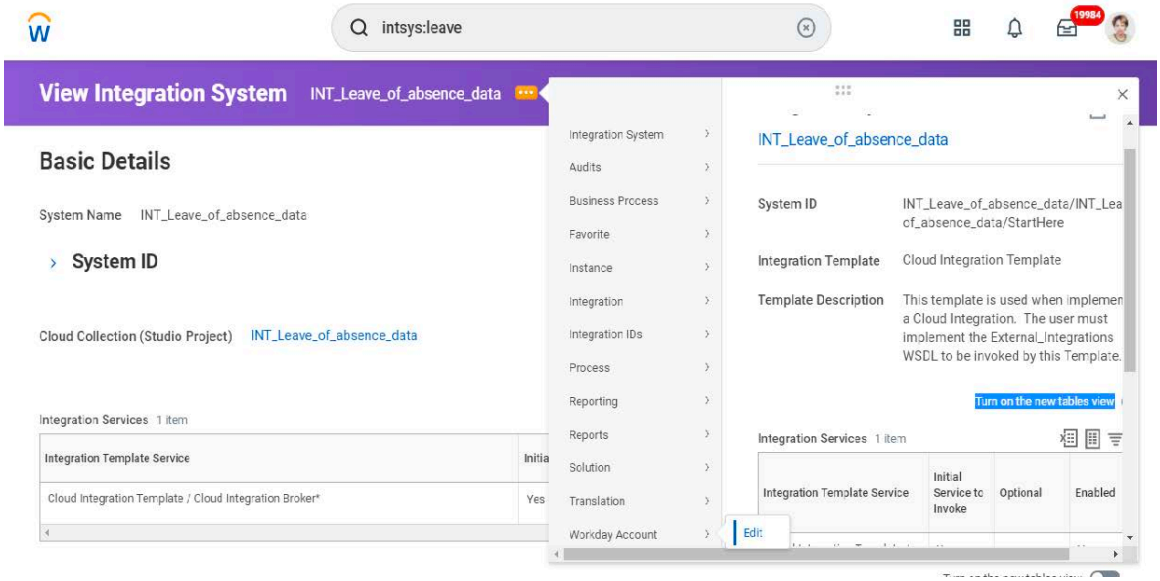


16. Modify a business process and add this integration in your business process.

a. Edit definition of the business process.



b. Select the ISU user in Workday Account box.

c. Select the effective date and click **Ok**.

d. Click the + sign and add a new business process step in BP.

e. Select an order, which is after the completion step of business process.

f. Add the business process and select **Type** as **Integration**.

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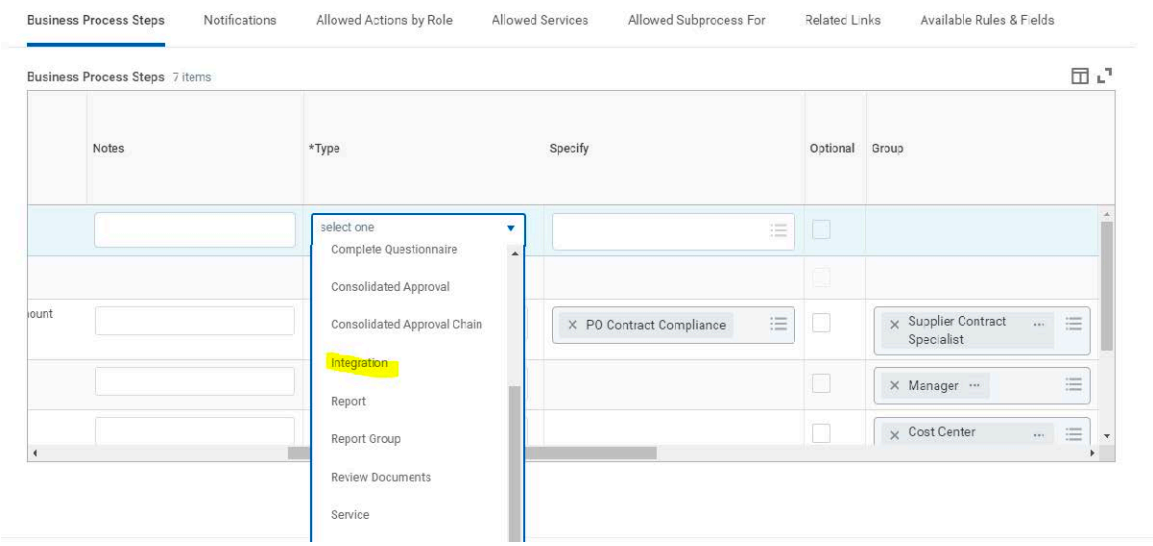
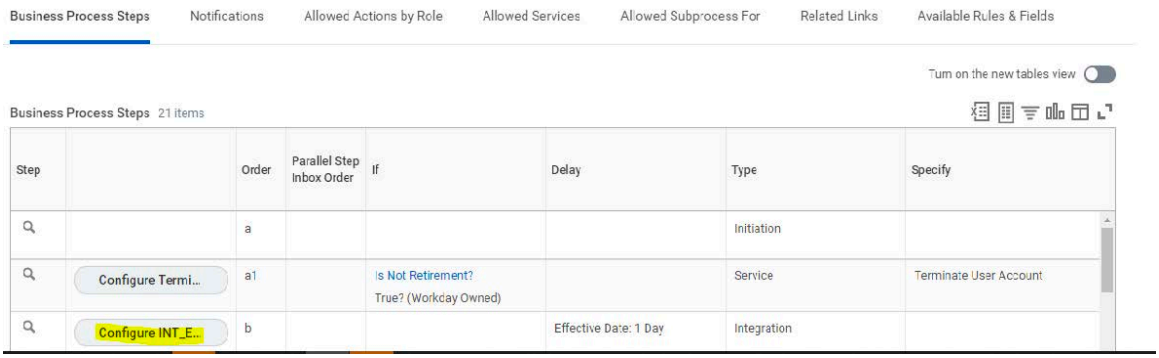


g. Provide ISU username in **Run as User** and click **Ok**.

h. Click **Configure Integration** on the newly added business process step in Hire BP.



i. In integration criteria, select value type as **Determine value at runtime** and select value as **Employee ID**.



Selected **Employee ID** field in value is displayed.

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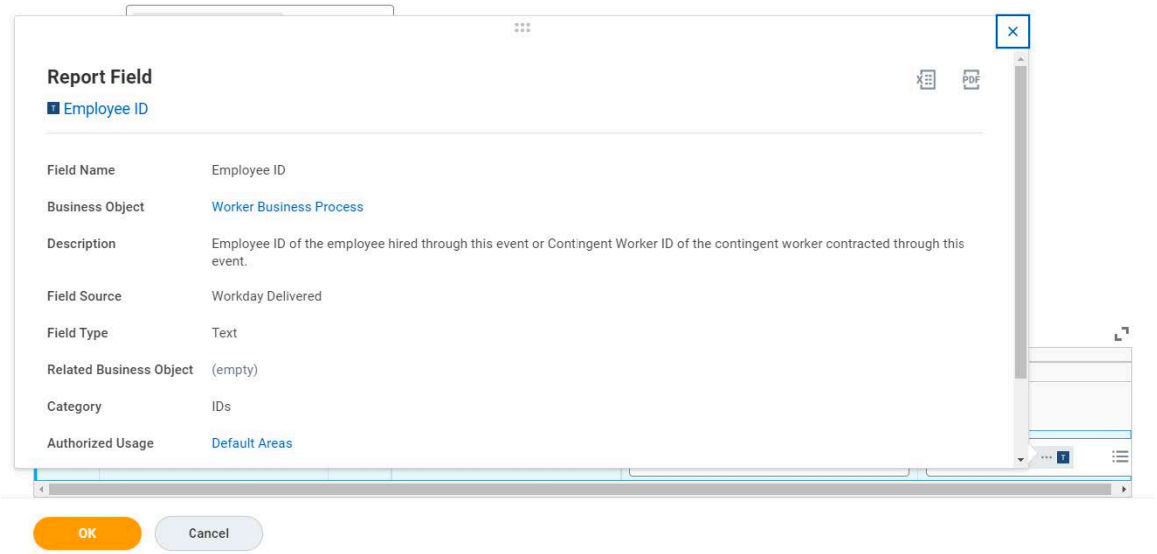


j. Click **Ok**.

k. Open **Create Custom Report** task.

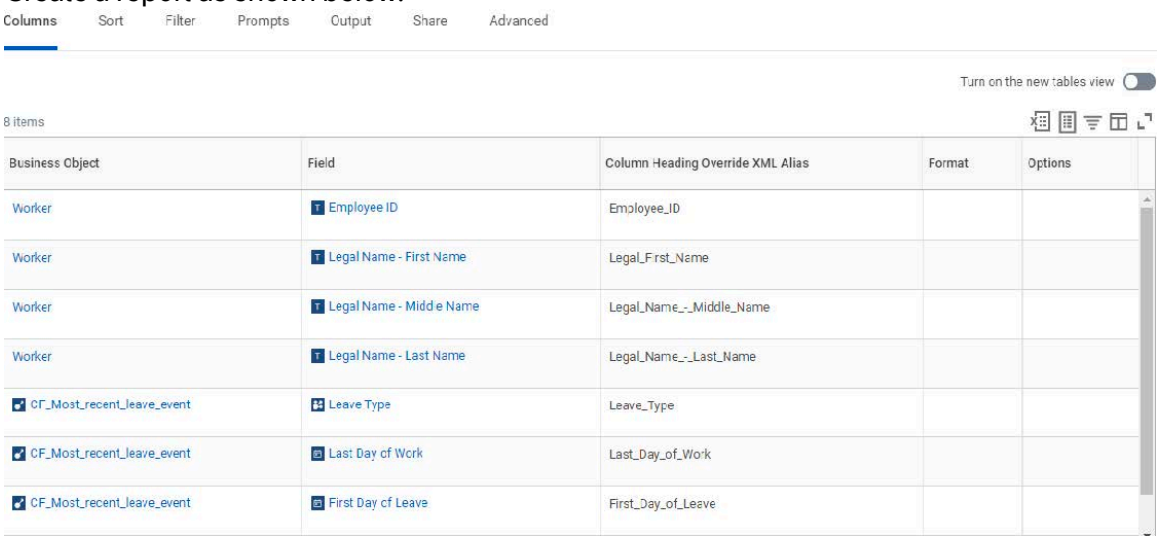
l. Enter the report name, for example, `Leave_of_absence_request`.

m. Select **Report Type** as Advanced.

n. Uncheck the Optimized for performance option.

o. Select **Data Source** as **All Active and Terminated Workers**.

p. Create a report as shown below:



Group Column Heading section in report



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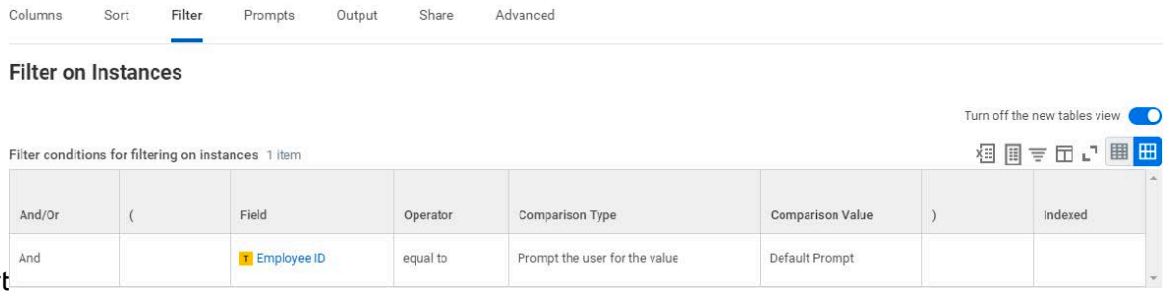
Filter section in report



q. Select **Populate Undefined Prompt defaults** option from the **Prompts** tab.

r. Select **Enable as web service** option from the **Advanced** tab.

Extend functionality of the Workday HR spoke

Extend the Workday HR spoke beyond the default functionalities, such as adding new input and output fields.

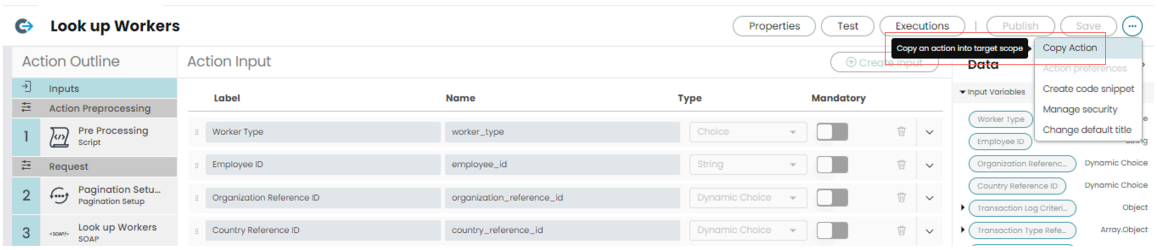
To extend the Workday HR spoke, ensure that the admin is aware of the Workday Public Web Services API and can configure the Workday system.

Example: Extend the Look up Workers action

Look up Workers action available along with the spoke provides most of the required inputs and outputs. Before adding more inputs and outputs to this action, explore ways to use the default spoke action.

This action transforms the input field data pills in the Workday HR spoke to the associated Workday request XML message and synchronously renders back the Workday response XML message as output field data pills in ServiceNow Workflow Studio. Ensure that you check the Sample request message and Sample response message.

Modify or extend the default Look up Workers action by creating a copy of it.



To add Position Reference ID as part of the request criteria for this action:

Note:

- Ensure that you check if the regular input field or the **Additional Field** input field has the desired input. If none of them have the desired input, perform these instructions to manually create the required input field.
- The Look up Workers action supports Position Reference ID request element in the **Additional Fields** input field. For the purpose of demonstration, this field is manually being added in the UI.

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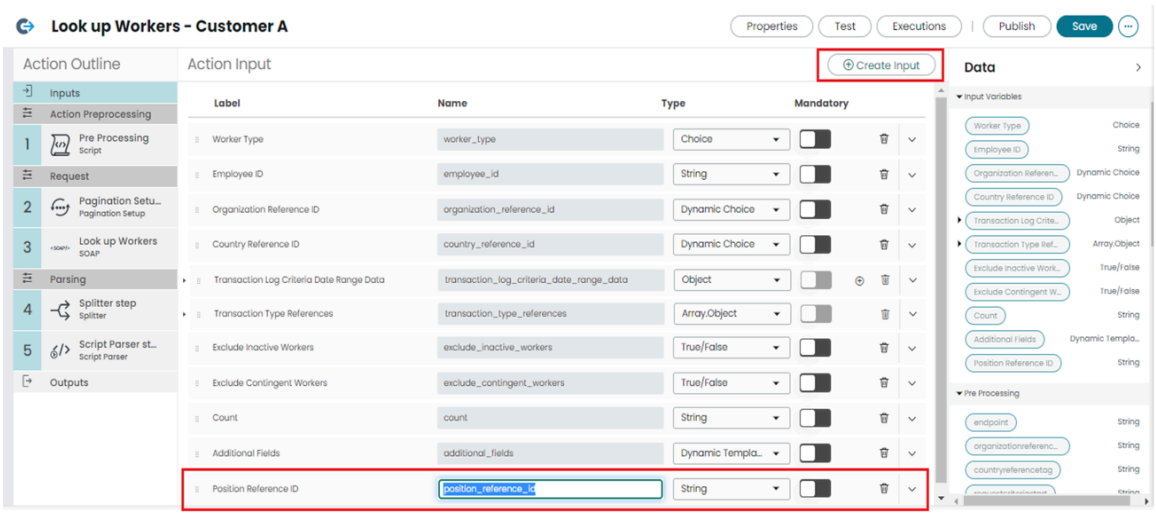
1. Evaluate and understand how Position Reference ID is structured in the Workday request message. The XPath to add a Position Reference ID in the request message is two-folded as per the Workday Public Web Services community post.
   a. Position Reference Type attribute: Get_Workers_Request/Request_Criteria/Position_Reference/@type
   b. The attribute value above, per the Public Web Services doc, is a hard-coded "Position ID."

Position_ElementObjectID
part of: Position_ElementObject
Contains a unique identifier for an instance of an object.

Parameter name	Type/Value	Cardinality	Description
#text	string		
@type	WID Position_ID	[1..1]	The unique identifier type. Each "ID" for an instance of an object contains a type and a value. A single instance of an object can have multiple "ID" but only a single "ID" per "type".

   c. Position Reference Value: Get_Workers_Request/Request_Criteria/Position_Reference
   d. The actual value above is a new input field in the spoke action.
2. Create an input variable in the **Action Input** step. Click **Create Input** and add a simple string type input variable.



3. Create an input variable in the Pre Processing script step.
   a. Click **Create Variable**.
   b. Add the input variable name with name as **position_reference_id**.

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c. Drag the **Position Reference ID** data pill from **Input Variables** and drop it at the value of the input variable.



4. Leverage the design pattern of var organizationReferenceStr in the script section.

a. Create the XML node to match the Workday Get Worker Request message in this example.

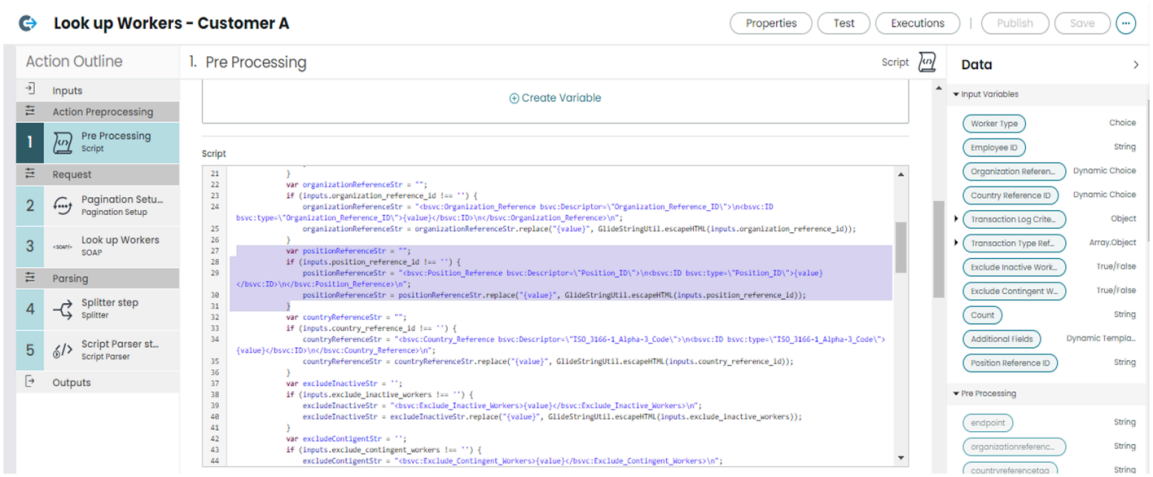
b. Find the appropriate design pattern in the script section accordingly. In this example, this XML node needs to be constructed for Position Reference.

```
<bsvc:Position_Reference bsvc:Descriptor="string">
<bsvc:ID bsvc:type="Position_ID">string</bsvc:ID>
</bsvc:Position_Reference>
```

c. When the above XML is compared with the similar XML node, Organization Reference is a good candidate to leverage the associated design pattern script from. In the **Script** section, the associated script snippet is under “var organizationReferenceStr.

```
<bsvc:Organization_Reference bsvc:Descriptor="string">
<bsvc:ID bsvc:type="Organization_ID">string</bsvc:ID>
</bsvc:Organization_Reference>
```

d. Leverage the var organizationReferenceStr code snippet to construct the Position Reference XML node accordingly.



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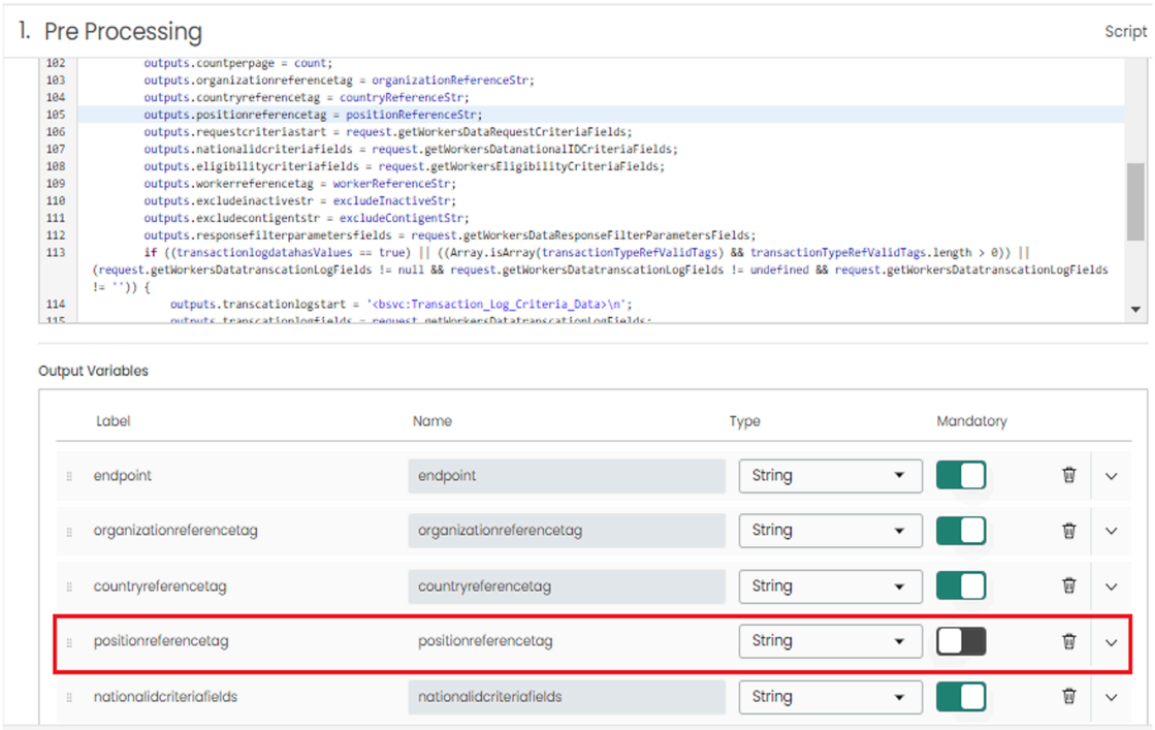
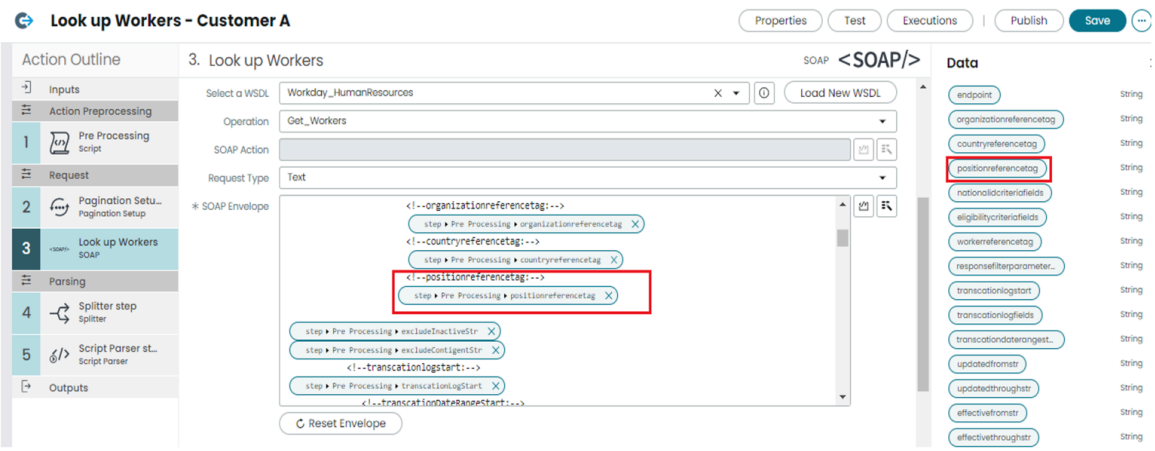
e. On the same script, in the **var request** section, leverage the design pattern, and define an output variable.



5. Create the Position XML node in the SOAP Step.

a. Refer to Workday Get Worker Request message and the position reference node accordingly.



b. Save and publish it.

6. Test the action.

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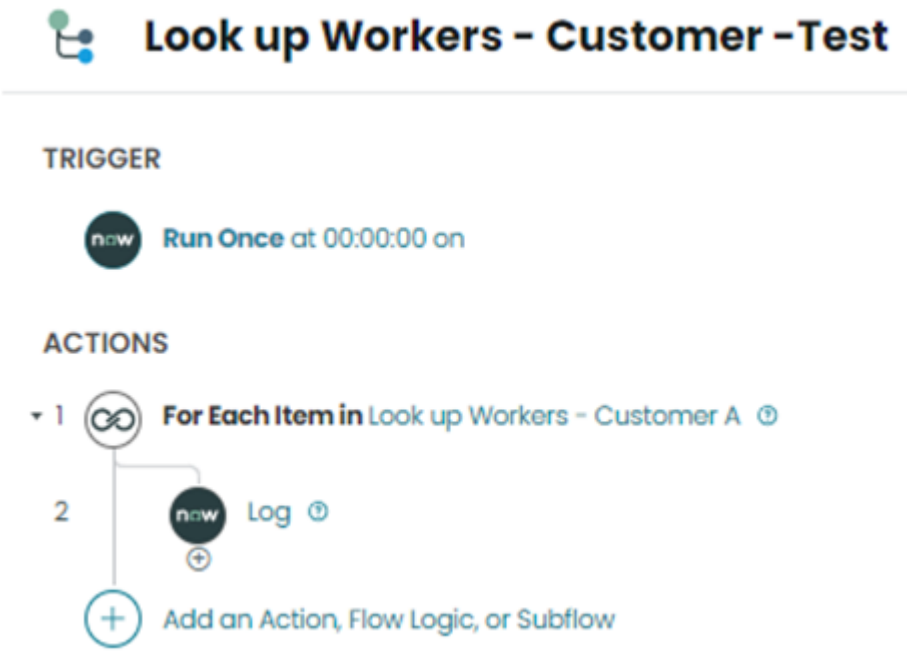
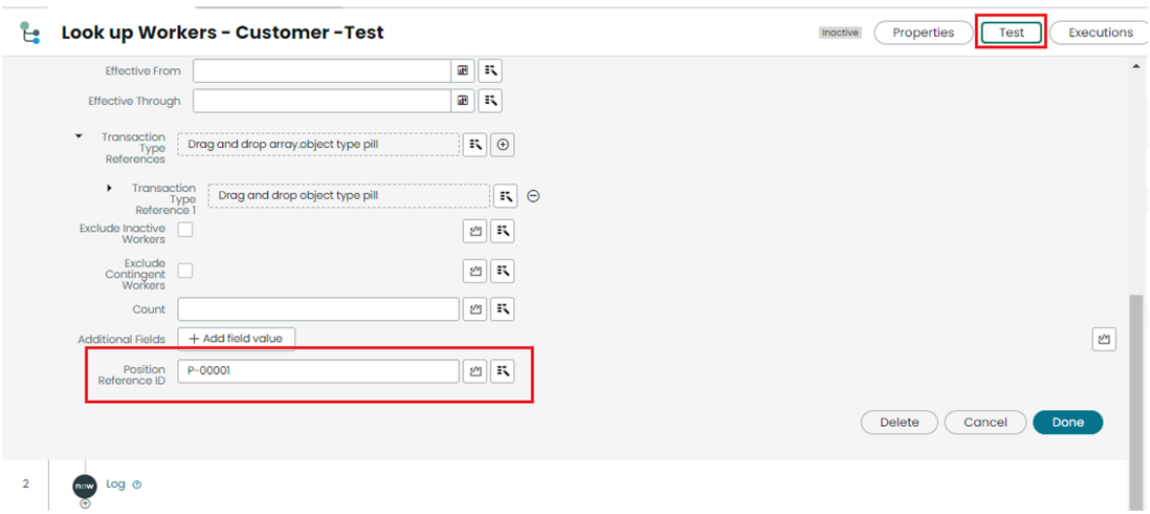
a. As this is a data stream action, it should be tested using a flow. Create a sample flow with the action in it.



b. Provide **Position ID** and test the flow.



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c. Open the execution and navigate to SOAP step to check if the updated XML element node with position reference is created.



Example: Add and modify output fields of Workday spoke action

Extend the Workday spoke to retrieve the local first name and local last name.

1. Evaluate and understand how the local name is structured in the Workday response message.
   - Local First Name: The XPath for this element is Get_Workers_Response/Response_Data/Worker/Worker_Data/Personal_Data/Name_Data/Legal_Name_Data/Name_Detail_Data/Local_Name_Detail_Data/First_Name
   - Local Last Name: The XPath for this element is Get_Workers_Response/Response_Data/Worker/Worker_Data/Personal_Data/Name_Data/Legal_Name_Data/Name_Detail_Data/Local_Name_Detail_Data/Last_Name
2. Leverage the Legal Name design pattern in the Script Parser step and create the snippet for local legal name.

```
var LocalFirstName =
 xmlDoc.getNodeText(Worker_DataXpath.concat("wd:Personal_Data/w
d:Name_Data/wd:Legal_Name_Data/wd:Name_Detail_Data/wd:Local_Nam
e_Detail_Data/wd:First_Name"));
        var LocalLastName =
 xmlDoc.getNodeText(Worker_DataXpath.concat("wd:Personal_Data/w
d:Name_Data/wd:Legal_Name_Data/wd:Name_Detail_Data/wd:Local_Nam
e_Detail_Data/wd:Last_Name"));

        var LocalLegalName = {
            LocalFirstName: LocalFirstName,
            LocalLastName: LocalLastName,
        };
```

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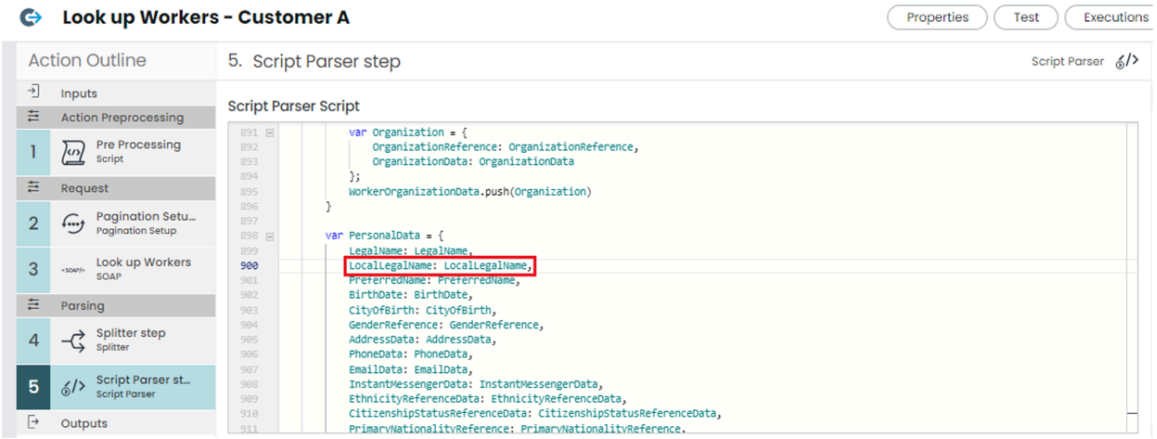
3. Add the LocalLegalName to the PersonalData object.



4. Create output variables in the **Outputs** step.

a. Click **Edit Output**.

b. Output fields don't need to follow the exact Workday response message hierarchy. As long as the XPAth from the step 2 follows the right Workday XPath, the spoke action can render the elements accordingly. In this case, adding the **Local Legal Name** under **Personal Data** is sufficient.

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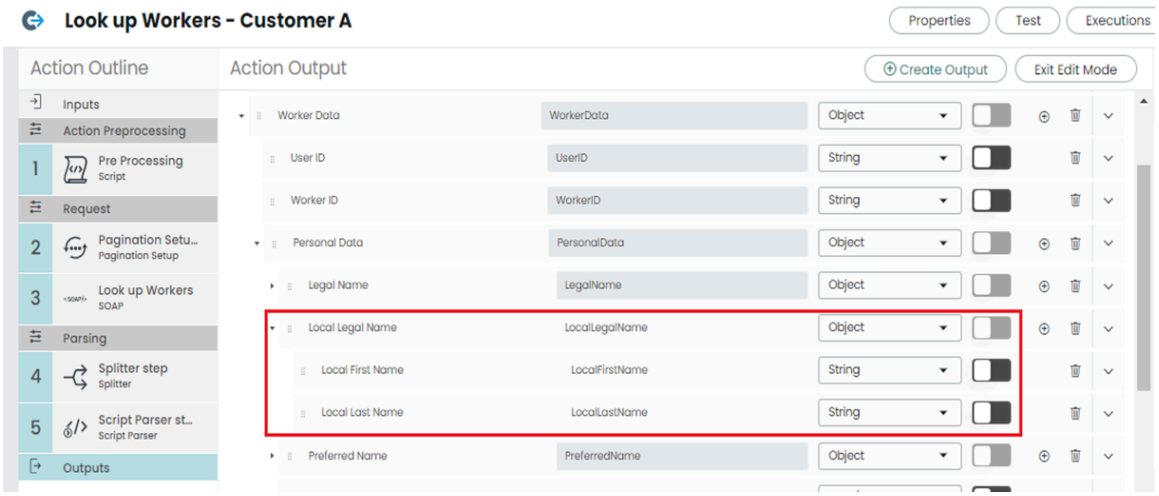

Note: String variable name under the **Name** section must match with the same var name defined in step 2 above.

5. Save and publish the action.

Note: The Look up Workers action has a maximum number of output elements that a data stream action can have. If any error occurs during the publish of copied action with new output elements, delete a few output elements that are not required and try to publish again.

6. Test the action.

a. Ensure that the testing worker subject has the local first name and local last name in Workday.

b. Create a sample flow, add the action to it, and log the response to verify output elements.

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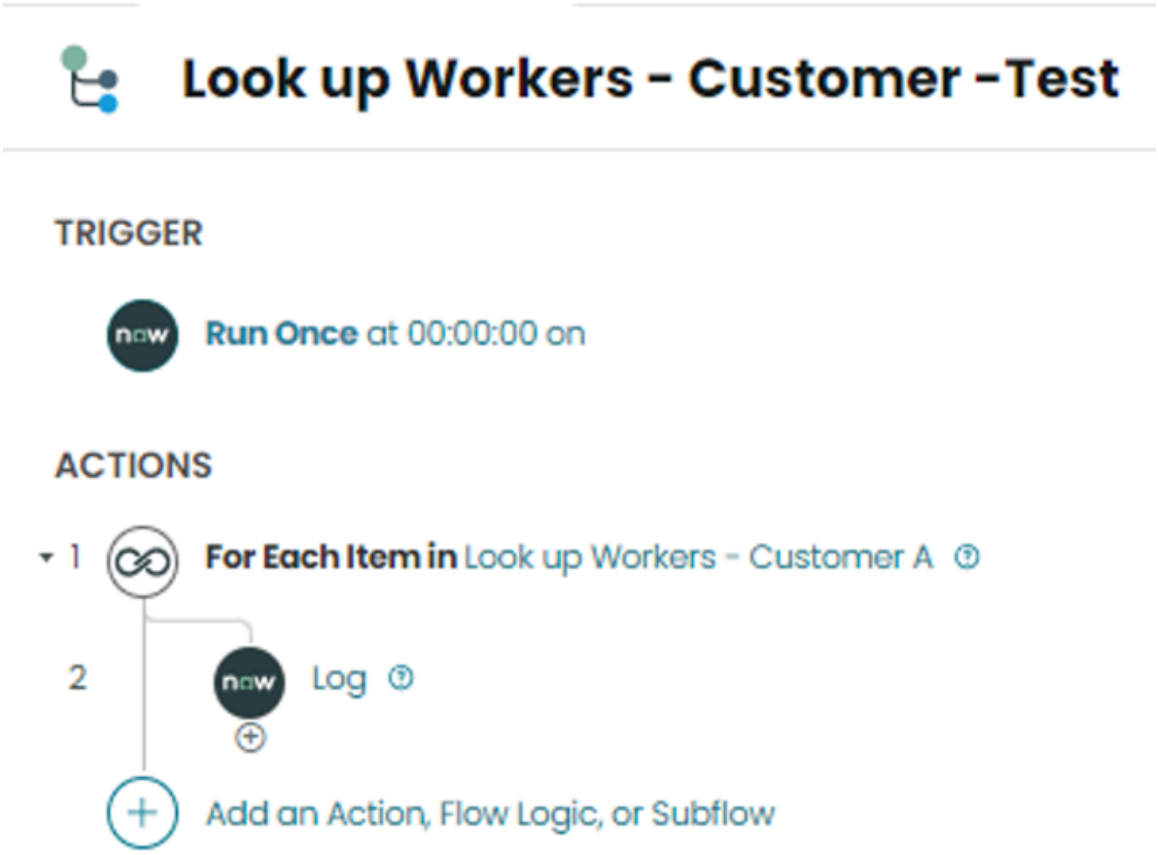
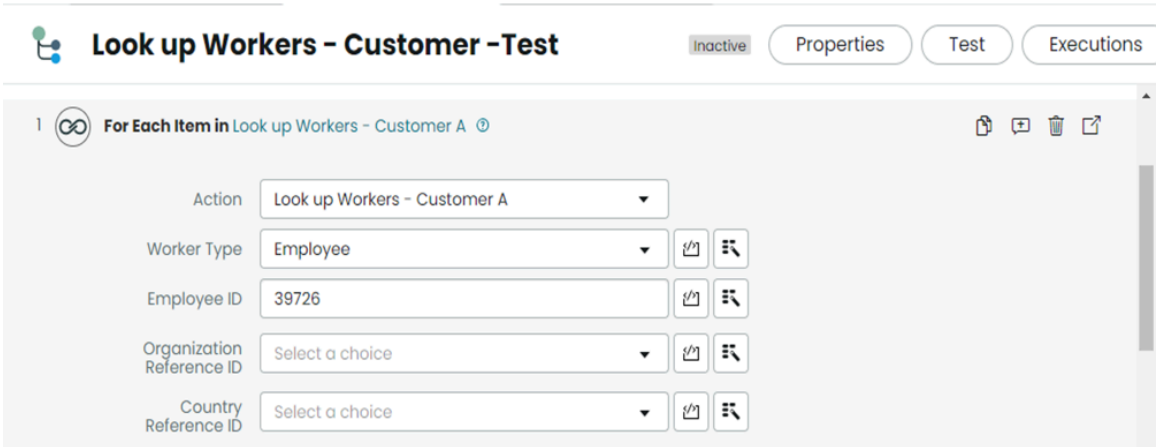


c. Provide the associated test worker subject's Employee ID to test and run the flow.



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d. Verify the log and executions to verify if the local first name and local last name are retrieved correctly.



Create report to extract skills

Create report to extract skill (maintains skills and skill cloud skills) details from Workday based on the time duration.

Before you begin

- Role required: User with access to report creation and Maintained Skills and Skills Cloud Skills report data source.
- Create all calculated fields for this report before developing the report. This ensure that all fields are available during report creation.

About this task

This procedure must be performed in your Workday instance.

- While creating the report, ensure that the report name, report field names, or column heading override for the respective field (if given in report document) should be same as in the report document.

> **Important:** Report field label should be same as in the report document.

- While creating filter, ensure that you add parenthesis in filter.
- All reports must be owned by ISU user which will be used for accessing these action on the ServiceNow platform.
- In the **Advanced** section, ensure that the **Enable as webservice** check box is selected.

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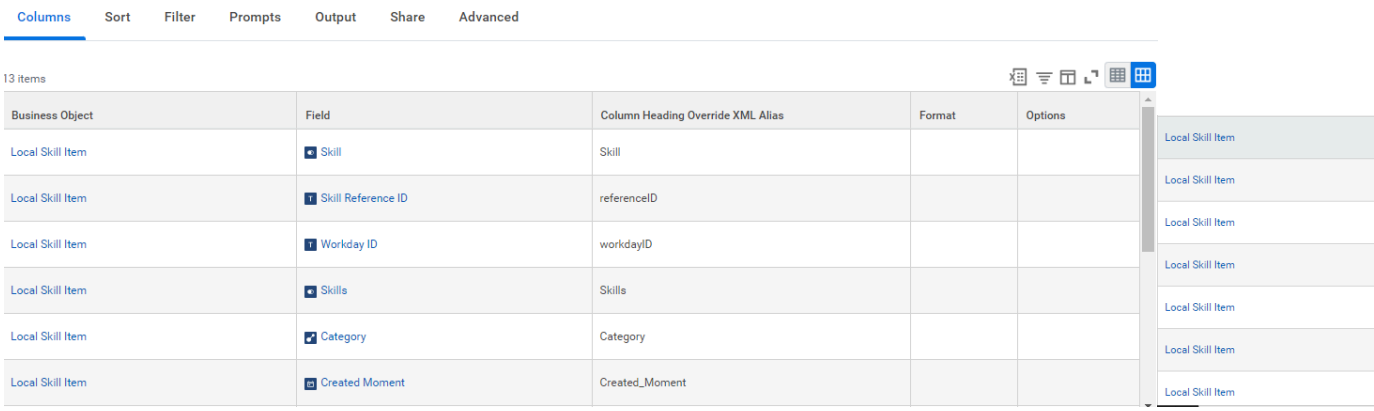
Procedure

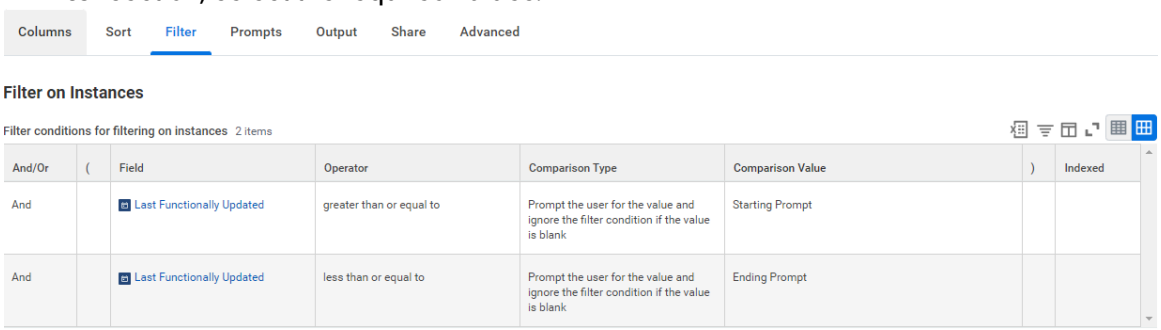
1. Access the **Create Custom Report** task.
2. Provide the report name.
   For example, `CR Skills details`.
3. Select report type as **Advanced**.
4. Clear the **Optimized for performance** check box.
5. Select **Maintained Skills and Skills Cloud Skills** for **Data Source**.
6. Do not select the **Temporary report** check box and click *Ok*.



7. Select the report business object and report fields.



8. In **Filter** section, select the required values.



9. In the **Prompts** section, select the **Populate Undefined Prompt Defaults** check box.

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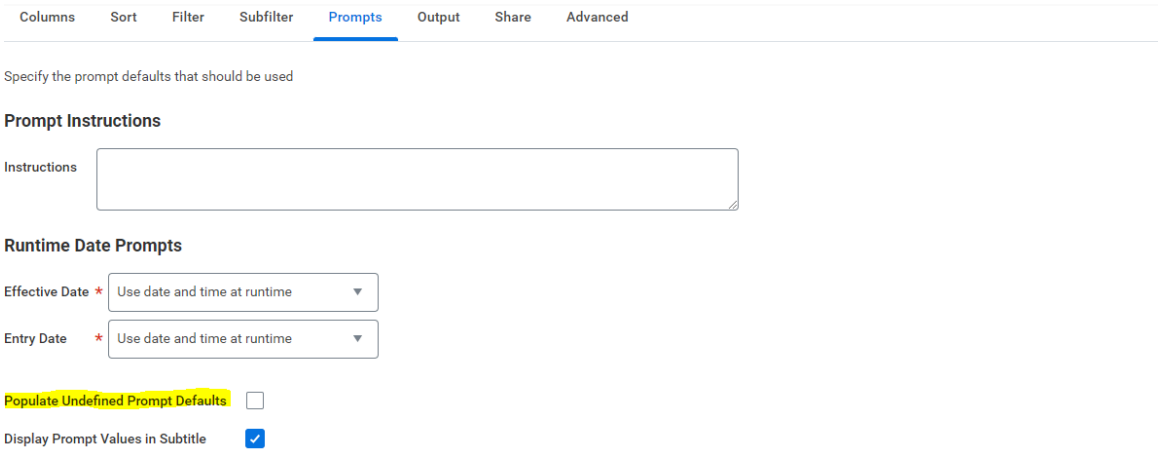
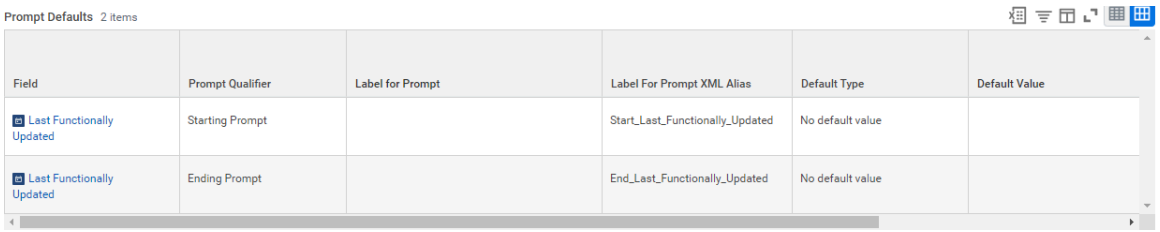
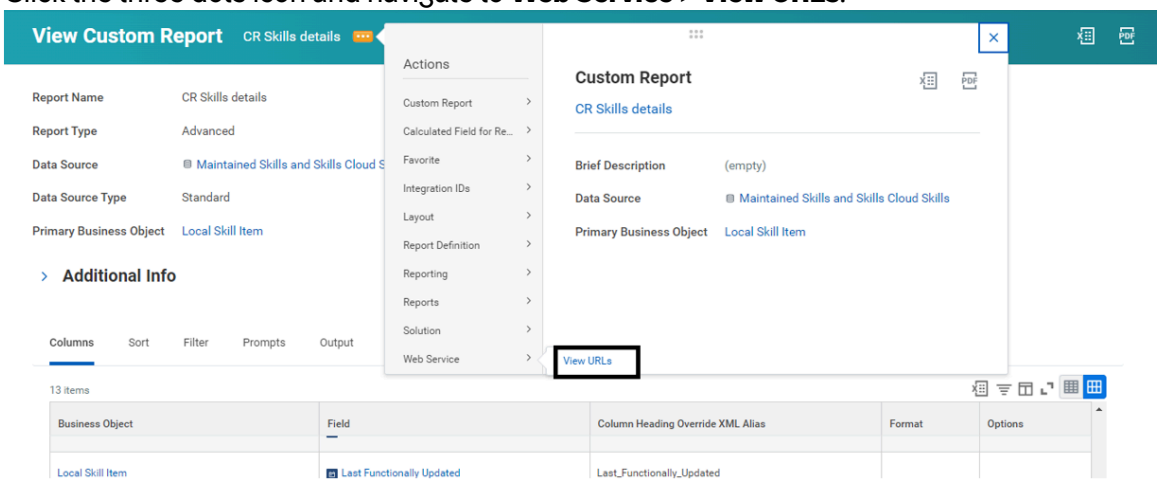


10. Select the value of prompts under the **Prompt Default** section.

    Ensure that the **Label For Prompt XML Alias** values for all prompt fields are as shown here.



11. In the **Advanced** section, select the **Enable as webservice** check box and click **Ok**.
12. Click the three dots icon and navigate to **Web Service** > **View URLs**.



13. Select the time duration for which you want to extract the data.

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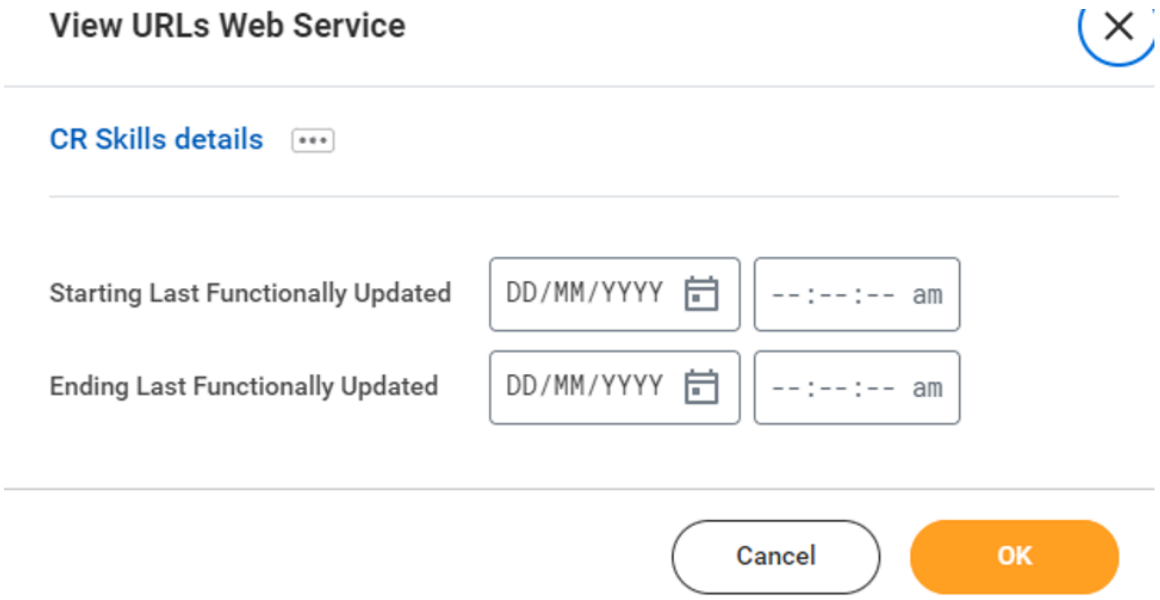
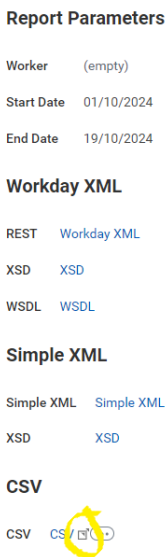
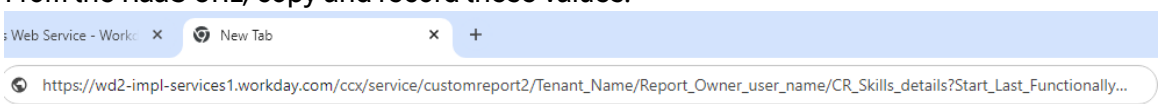


14. In View URLs Web Service page, click the marked icon under **CSV** section.



You will be navigated to a new browser and the RaaS URL of the report is displayed.

15. From the RaaS URL, copy and record these values.



- `https://wd2-impl-services1.workday.com` is the base URL of your Workday tenant.
- **Tenant_Name** is your Workday tenant.
- **Report_Owner_user_name** is user name of the report's owner.
- **CR_Skills_details** is the report name.

Extract workers skill (with the skill cloud)

Extract worker's skill details based on employee ID and time duration.

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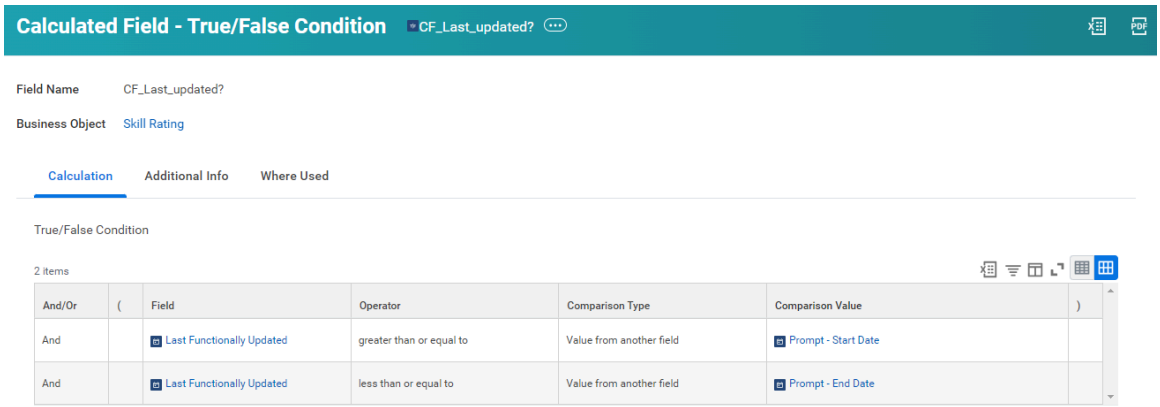
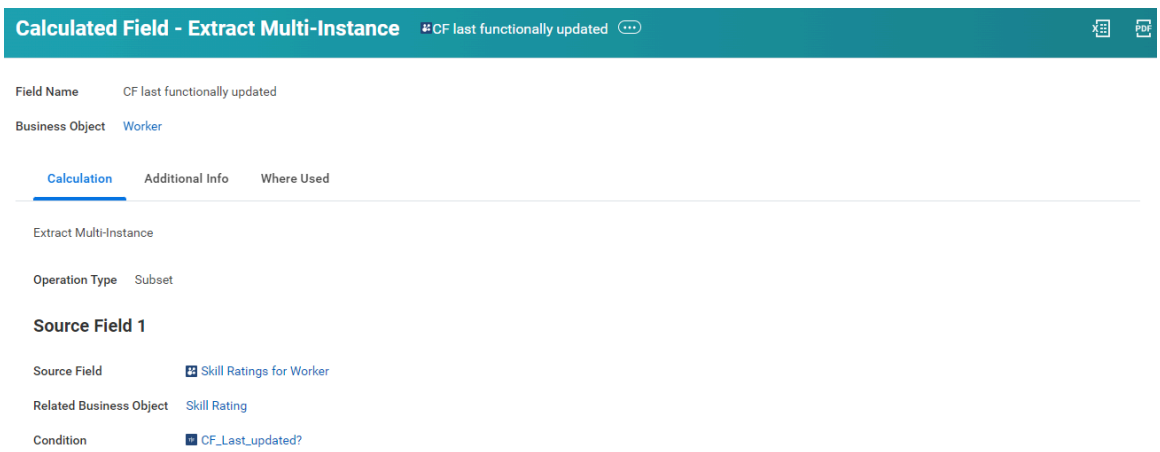
Before you begin

- Role required: User with access to report creation and All Active and Terminated Workers report data source.
- Create all calculated fields for this report before developing the report. This ensure that all fields are available during report creation.
  - Create a True/False condition type calculated field with name **CF_Last_updated?**.



  - Create a Extract Multi-instance calculated field with name **CF last functionally updated**.



About this task

This procedure must be performed in your Workday instance.

- While creating the report, ensure that the report name, report field names, or column heading override for the respective field (if given in report document) should be same as in the report document.

> **Important:** Report field label should be same as in the report document.

- While creating filter, ensure that you add parenthesis in filter.
- All reports must be owned by ISU user which will be used for accessing these action on the ServiceNow platform.
- In the **Advanced** section, ensure that the **Enable as webservice** check box is selected.

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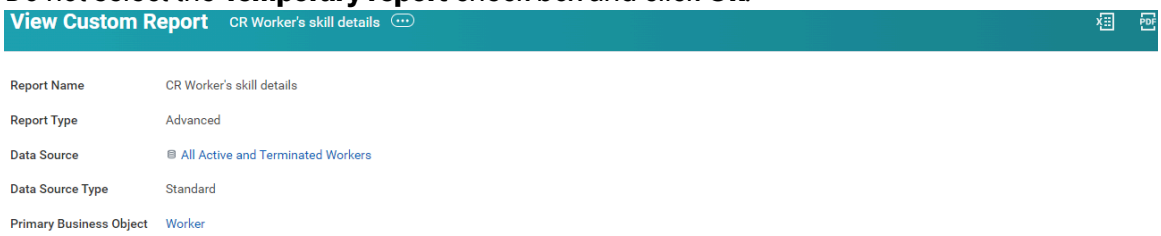
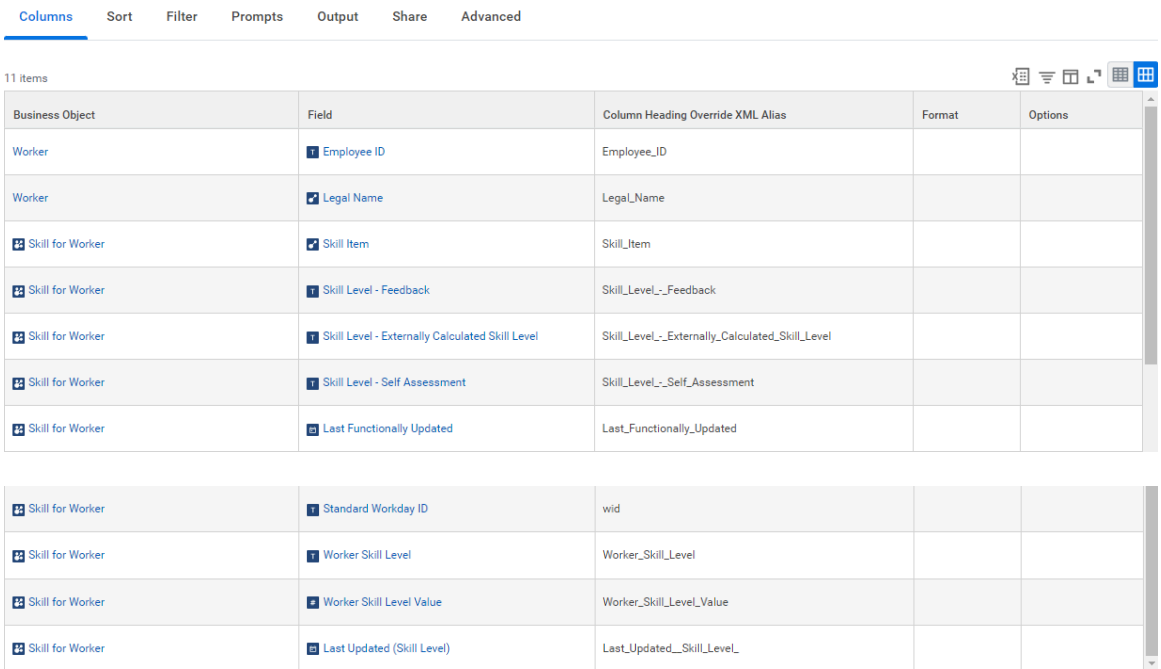
Procedure

1. Access the **Create Custom Report** task.
2. Provide the report name to identify the report.
   For example, `CR Worker's skill details`.
3. Select report type as **Advanced**.
4. Clear the **Optimized for performance** check box.
5. Select **All Active and Terminated Workers** for **Data Source**.
6. Do not select the **Temporary report** check box and click **Ok**.



7. Select the report business object and report fields.



8. In the **Group Column Headings** section, select all business objects.
   Group Column heading for each business object will be blank.



9. In the **Filter** section, select the value as shown here.
   Ensure that you add parenthesis as shown here.

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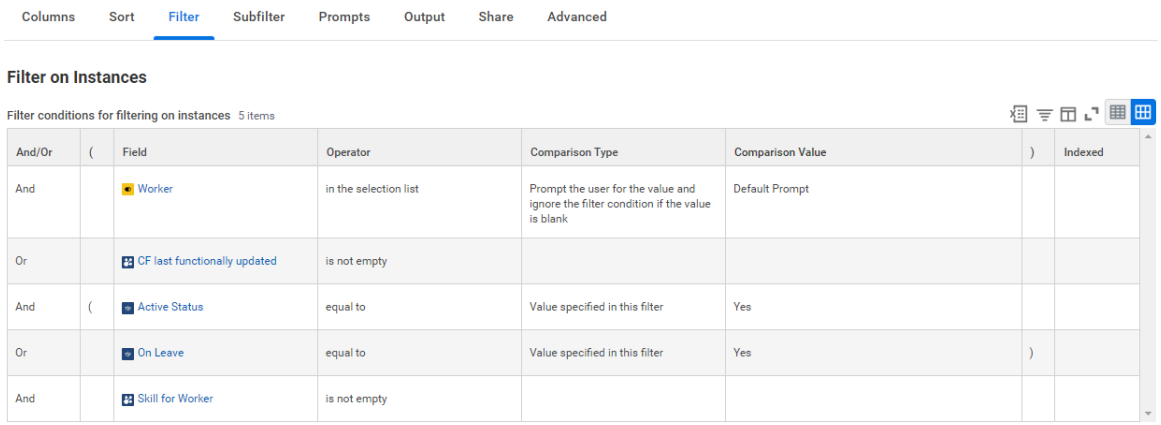
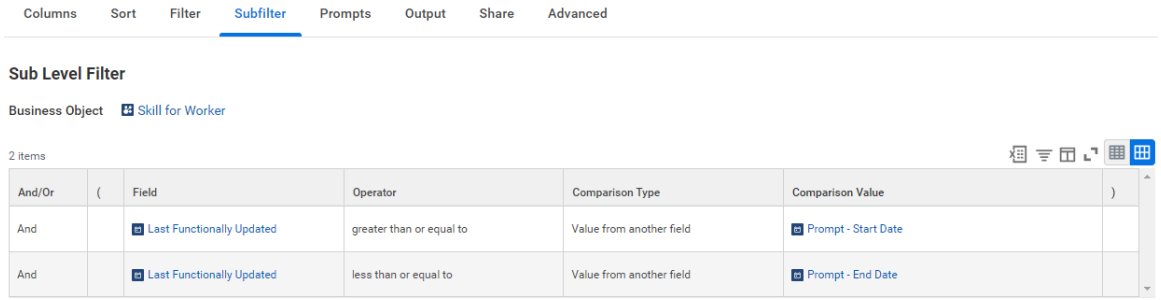
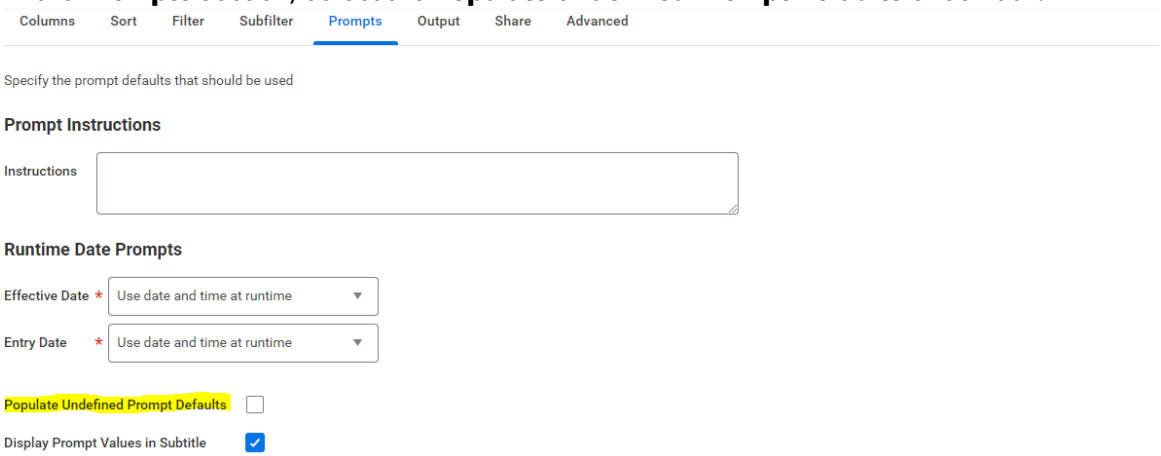


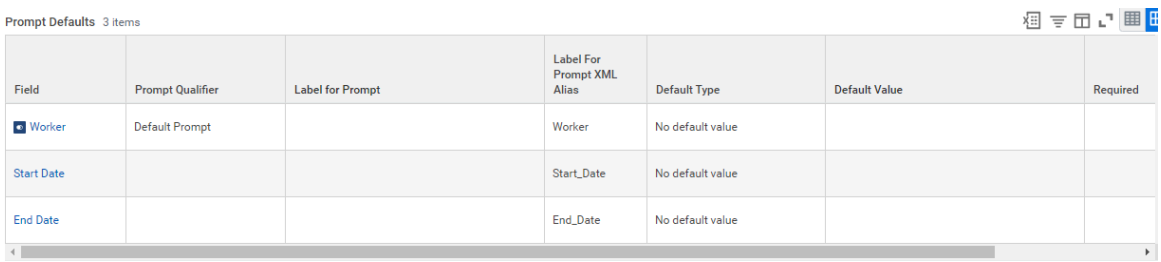
10. In the **Subfilter** section, select the value as shown.



11. In the **Prompts** section, select the **Populate Undefined Prompt Defaults** check box.



12. Select the value of prompts in the **Prompt Default** section as shown.
Ensure that the **Label For Prompt XML Alias** values of all prompt fields are as shown here.



13. In the **Advanced** section, select the **Enable as Webservice** check box and click **Ok**.

14. After configuring the report, click the three dots icon and navigate to **Web Service** > **View URLs**.

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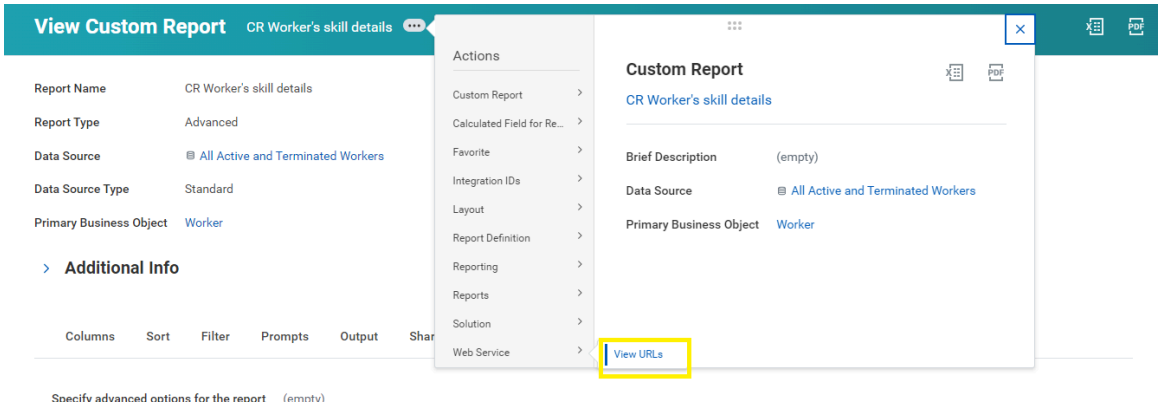
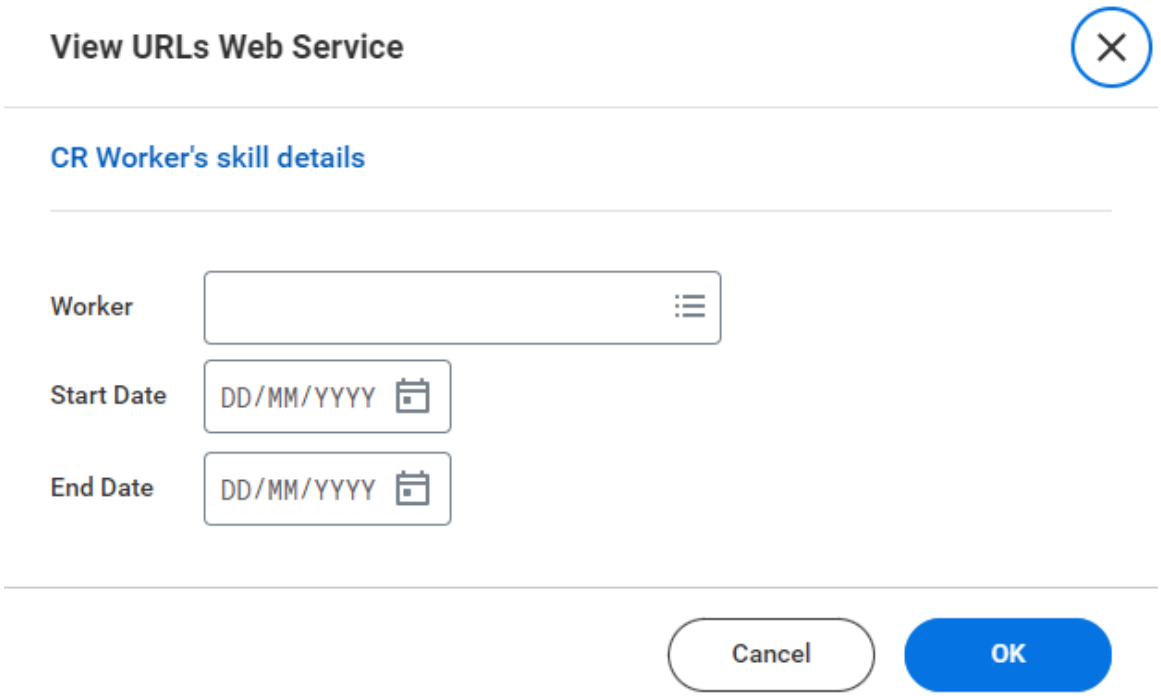
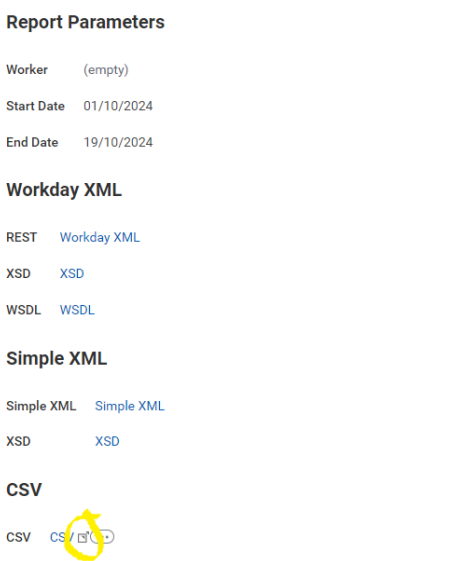


15. Select the worker whose details you want to see or select the time duration for which you want to see the data.



16. In the View URLs Web Service page, click the marked icon under the **CSV** section.



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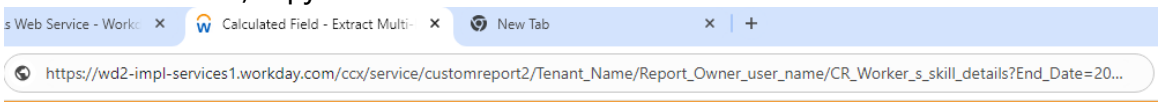
You will be navigated to a new browser and the RaaS URL of the report is displayed.

17. From the RaaS URL, copy and record these values.



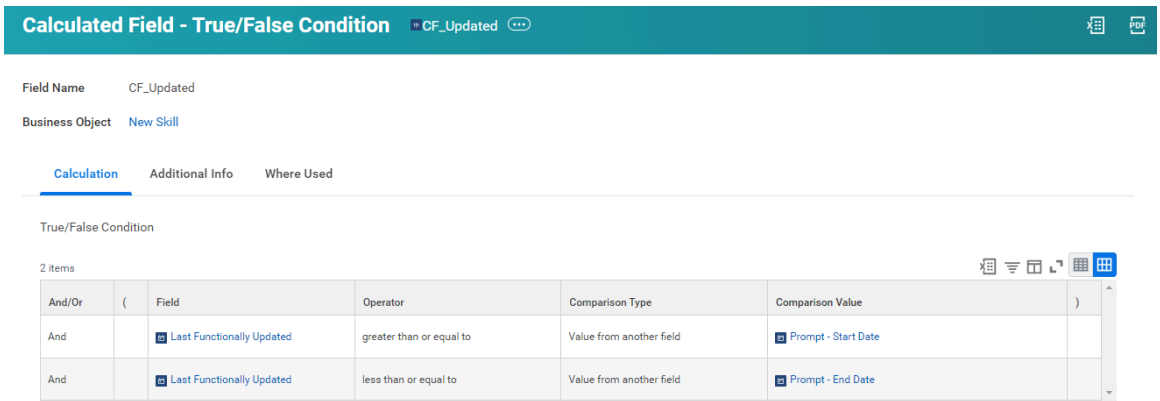
   - `https://wd2-impl-services1.workday.com` is the base URL of your Workday tenant.
   - **Tenant_Name** is your Workday tenant.
   - **Report_Owner_user_name** is user name of the report's owner.
   - **CR_Worker_s_skill_details** is the report name.

Extract workers skill (without the skill cloud)

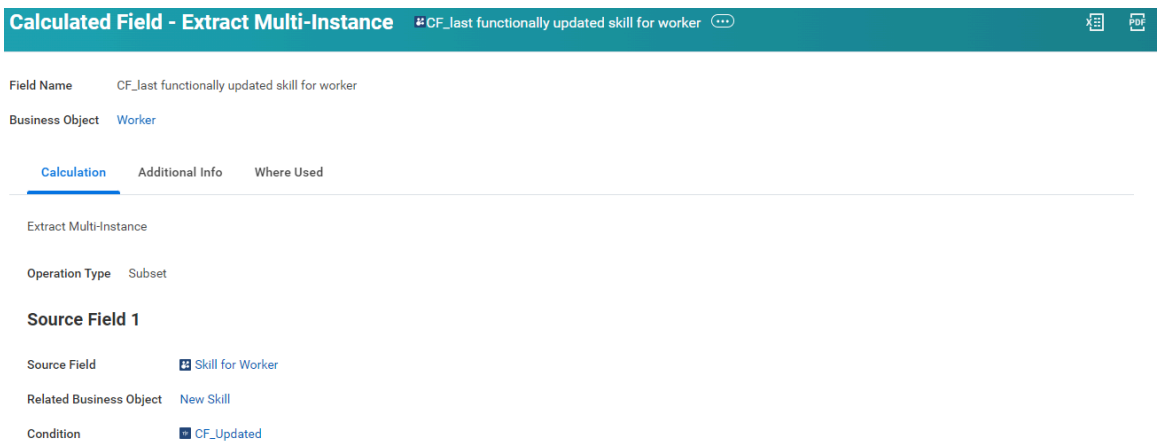
Extract worker's skill details without skill cloud, based on employee ID or time duration.

Before you begin

- Role required: User with access to report creation and All Active and Terminated Workers report data source.
- Create all calculated fields for this report before developing the report. This ensure that all fields are available during report creation.
   - Create a True/False condition type calculated field with name **CF_updated**.



   - Create a Extract Multi-instance calculated field with name **CF_last functionally updated skill for worker**.



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About this task

This procedure must be performed in your Workday instance.

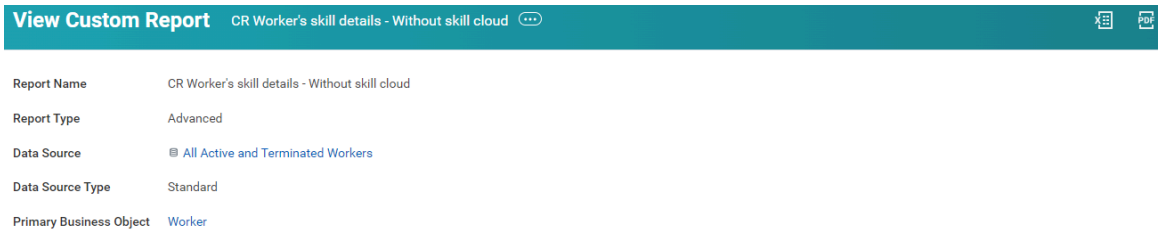
- While creating the report, ensure that the report name, report field names, or column heading override for the respective field (if given in report document) should be same as in the report document.

> **Important:** Report field label should be same as in the report document.

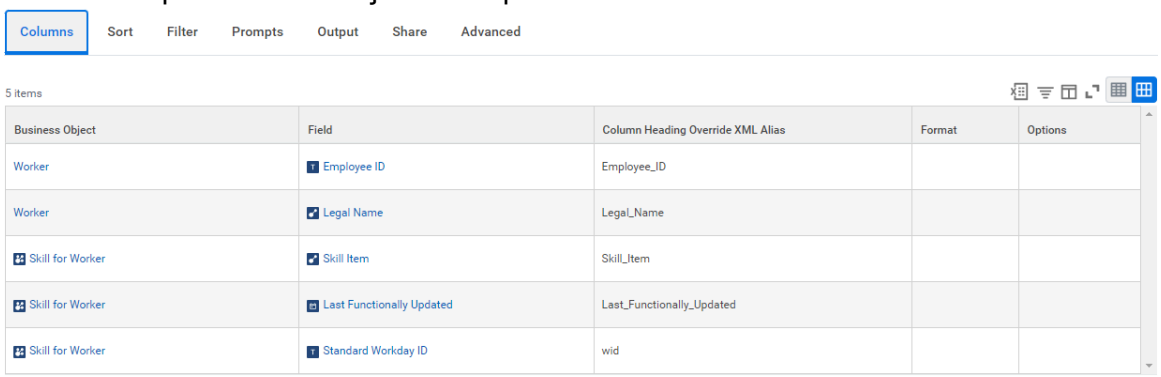
- While creating filter, ensure that you add parenthesis in filter.
- All reports must be owned by ISU user which will be used for accessing these action on the ServiceNow platform.
- In the **Advanced** section, ensure that the **Enable as webservice** check box is selected.

Procedure

1. Access the **Create Custom Report** task.
2. Provide the report name to identify the report.
   For example, `CR Worker's skill details`.
3. Select report type as **Advanced**.
4. Clear the **Optimized for performance** check box.
5. Select **All Active and Terminated Workers** for **Data Source**.
6. Do not select the **Temporary report** check box and click **Ok**.



7. Select the report business object and report fields as shown.



8. In the **Group Column Headings** section, select all business objects.

   Group Column heading for each business object will be blank.



9. In the **Filter** section, select the value as shown.

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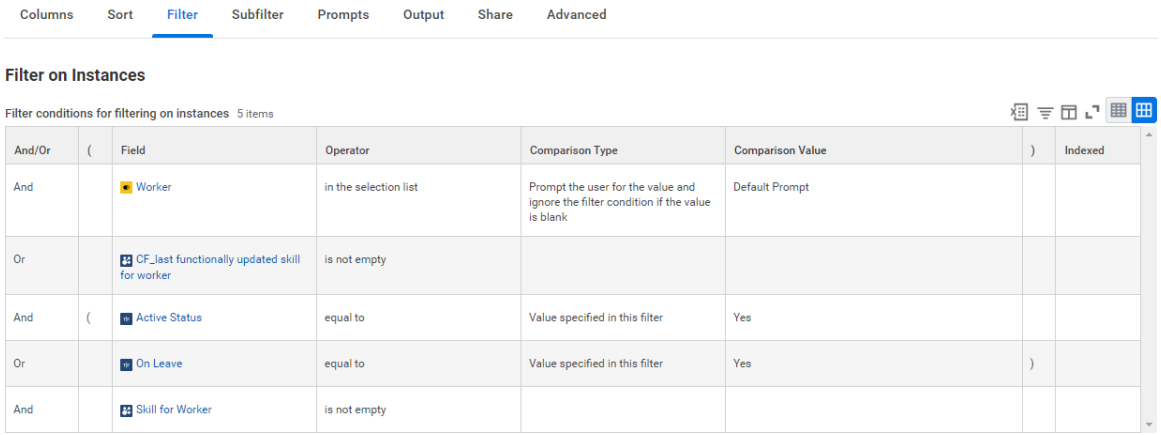
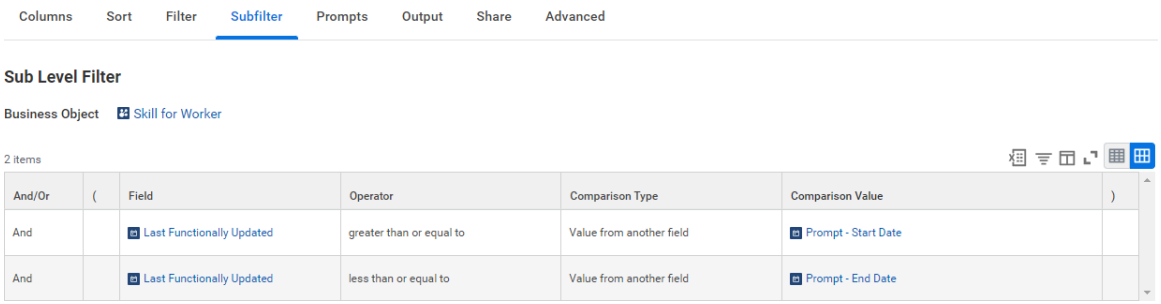
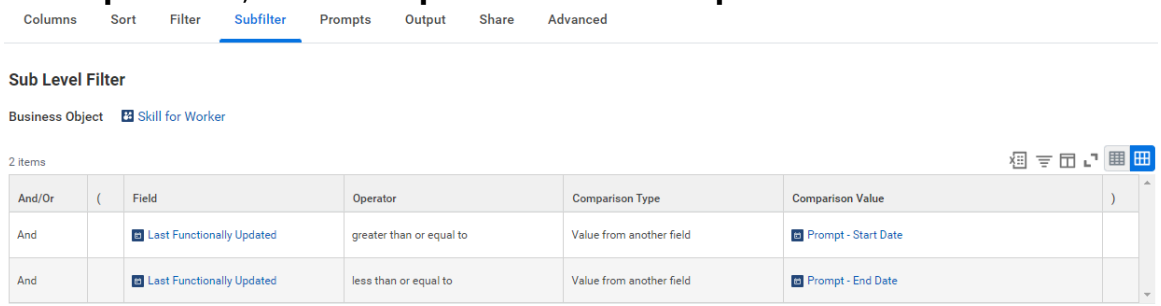
Ensure to add parenthesis as shown.



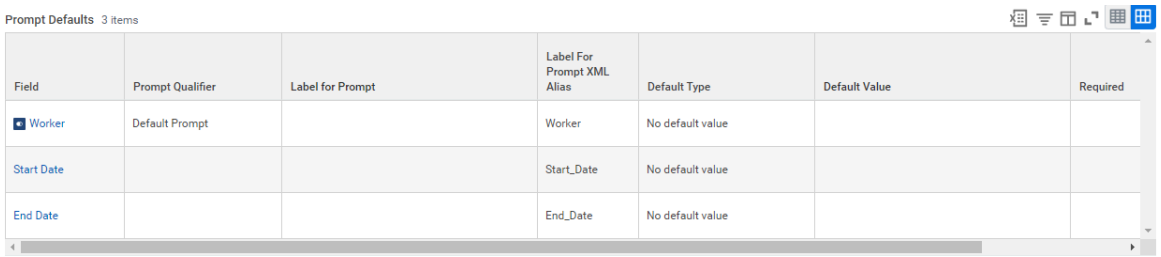
10. In the **Subfilter** section, select the value as shown.



11. In **Prompts** section, select the **Populate Undefined Prompt Defaults** check box.



12. Select the value of prompts in the **Prompt Default** section as shown.
Ensure that the **Label For Prompt XML Alias** values of all prompt fields are as shown here.



13. In the **Advanced** section, select the **Enable as Webservice** check box and click **Ok**.

14. After configuring the report, click the three dots icon and navigate to **Web Service** > **View URLs**.

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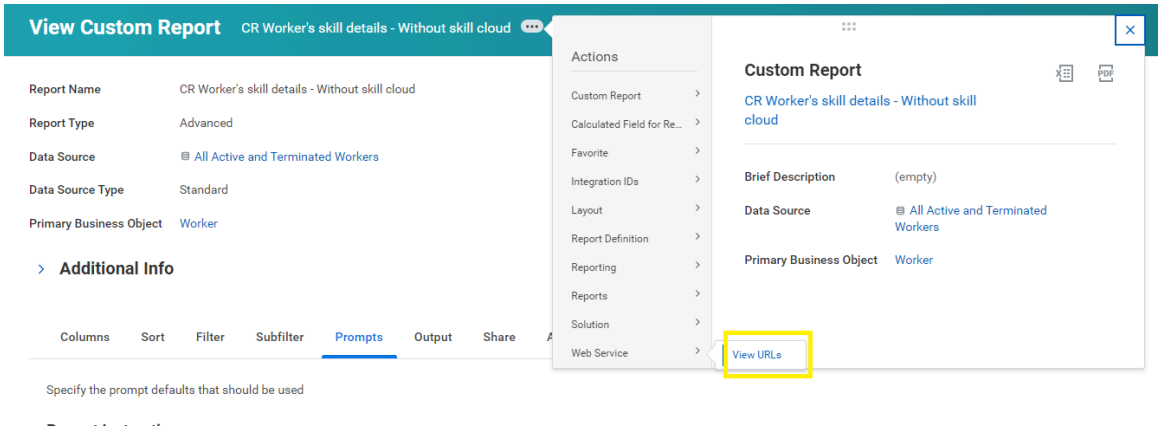
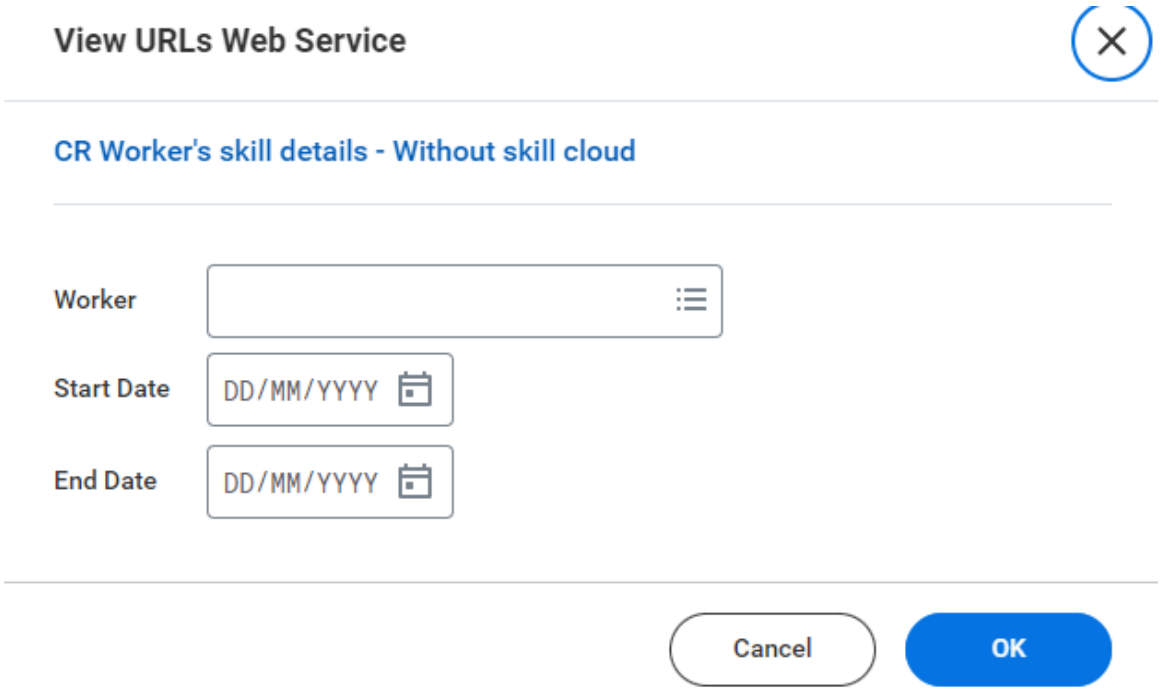
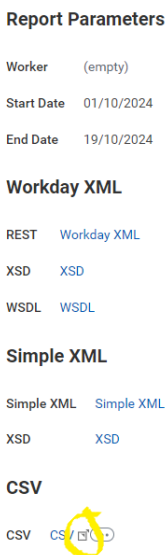


15. Select the worker whose details you want to see or select the time duration for which you want to see the data.



16. In the View URLs Web Service page, click the marked icon under the **CSV** section.



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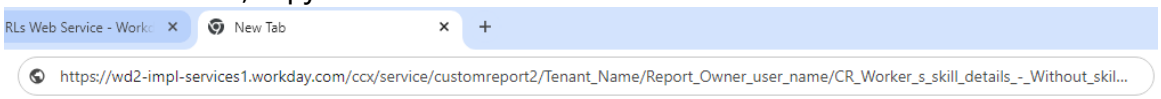
You will be navigated to a new browser and the RaaS URL of the report is displayed.

17. From the RaaS URL, copy and record these values.



- `https://wd2-impl-services1.workday.com` is the base URL of your Workday tenant.
- **Tenant_Name** is your Workday tenant.
- **Report_Owner_user_name** is user name of the report's owner.
- **CR_Worker_s_skill_details** is the report name.

Configure the Employee Latest Performance Review report

Set up the report to enable the Look up Employee Latest Performance Review action to fetch the latest performance review report.

Before you begin

Role required: Confirm that you have the access to create the reports.

Confirm that you have the access to the Workers by Organization report data source.

Create all calculated fields for this report before developing the report.

Confirm that the report name, field names, and column headings match exactly as they appear in the report document.

Confirm that you have added parentheses to the filters.

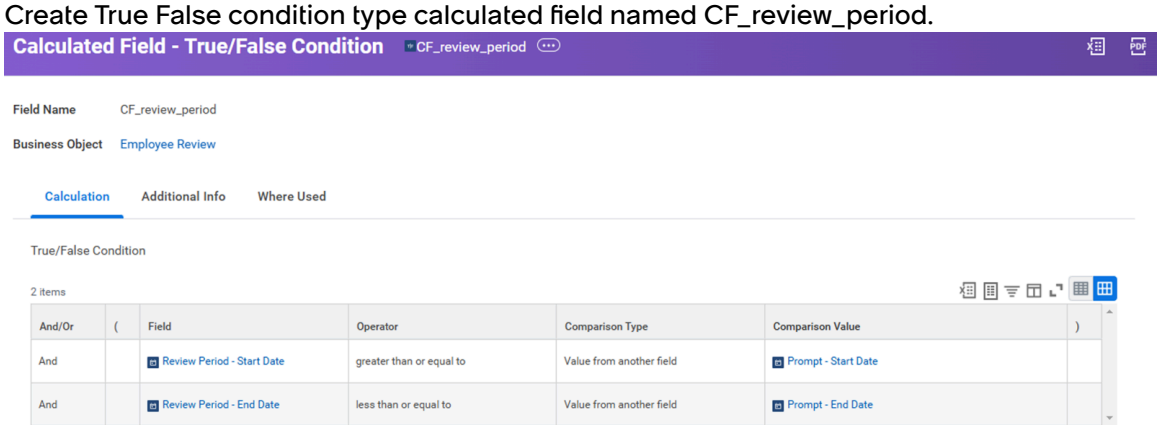
Confirm that reports are owned by the ISU user, which will be used to access these actions on the ServiceNow platform.

Confirm that you have enabled the **Enable as webservice** option.

Procedure

1. Create all calculated fields so that these fields can be used while developing report.

   a. Create True False condition type calculated field named CF_review_period.



   b. Create Extract multi instance calculated field named CF_latest_review.

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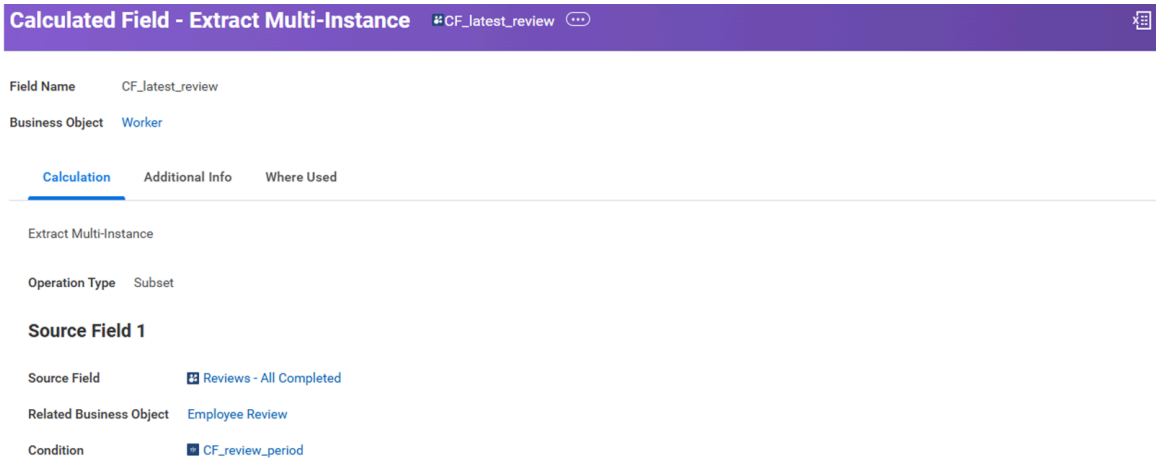
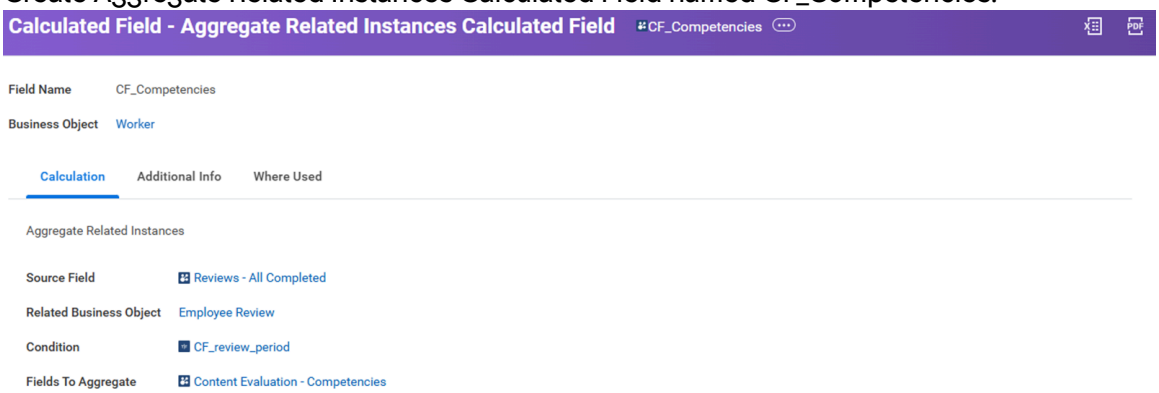
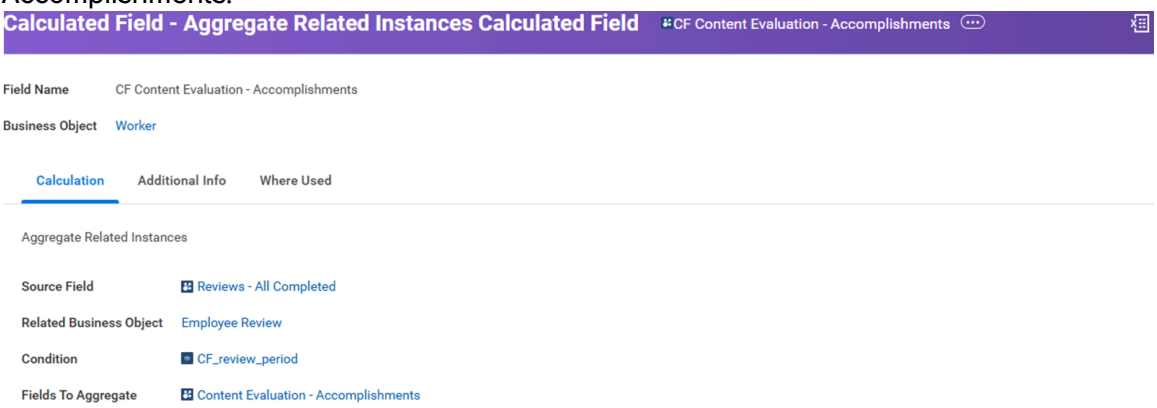


c. Create Aggregate Related Instances Calculated Field named CF_Competencies.



d. Create Aggregate Related Instances Calculated Field named CF Content Evaluation – Accomplishments.



e. Create Aggregate Related Instances Calculated Field named CF_Content Evaluation - Areas for Development.

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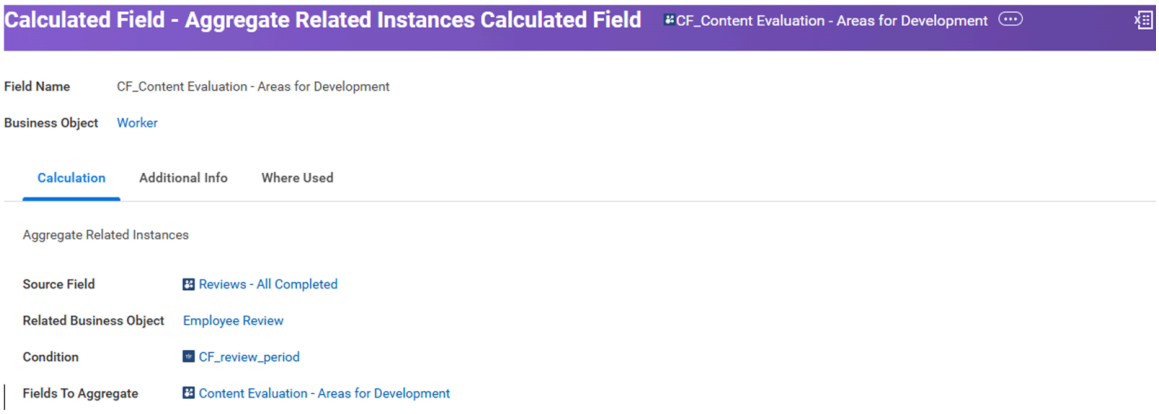
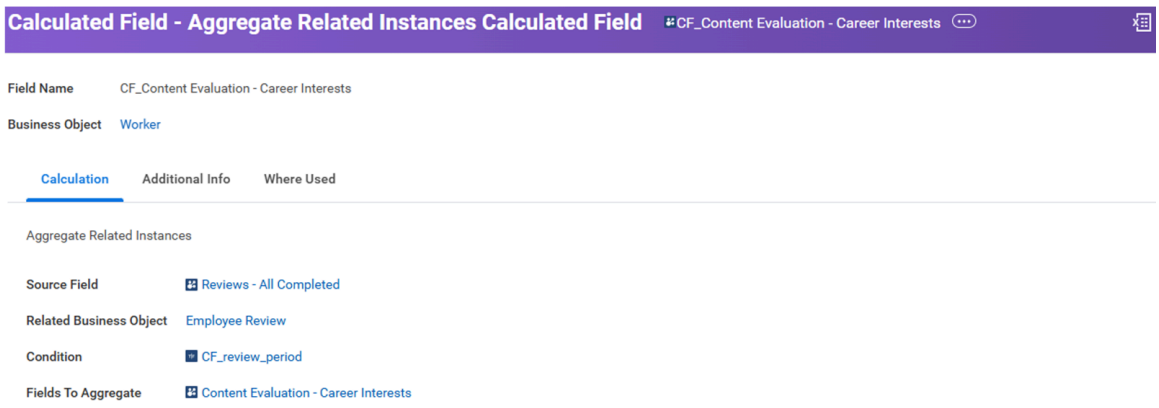
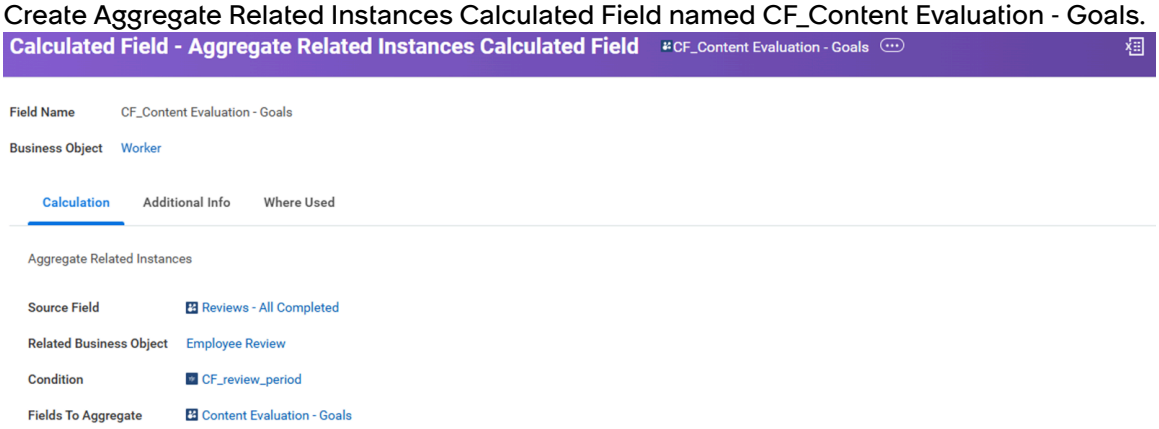


f. Create Aggregate Related Instances Calculated Field named CF_Content Evaluation - Career Interests.



g. Create Aggregate Related Instances Calculated Field named CF_Content Evaluation - Goals.



h. Create Aggregate Related Instances Calculated Field named CF_Content Evaluation - Responsibilities.

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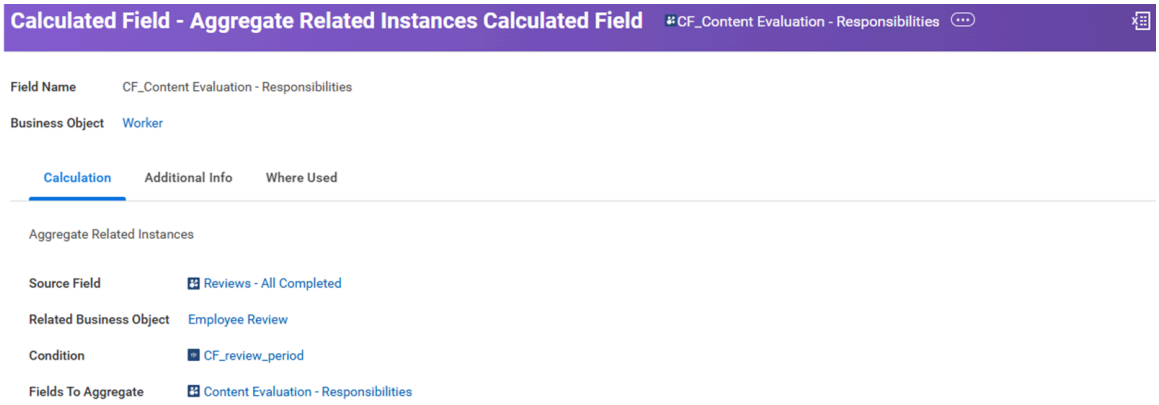
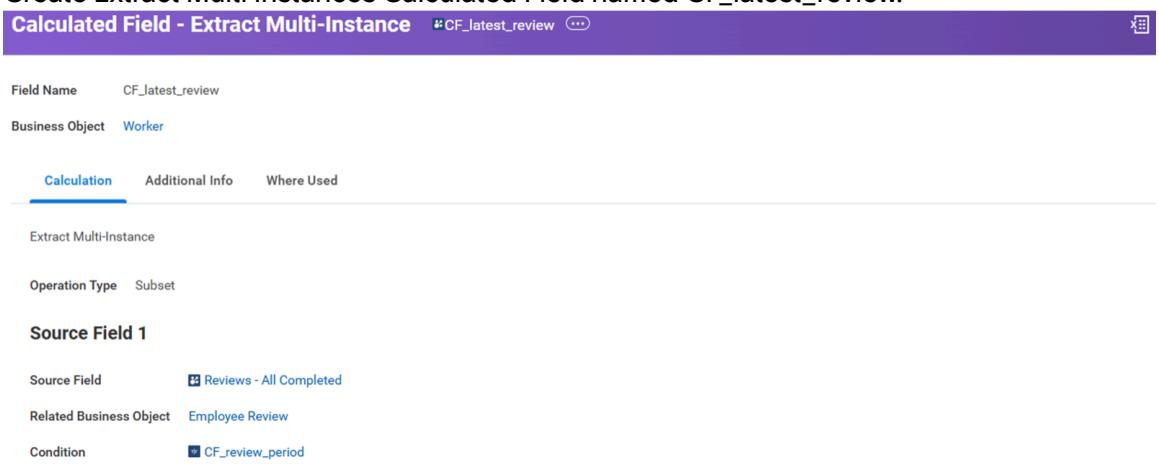
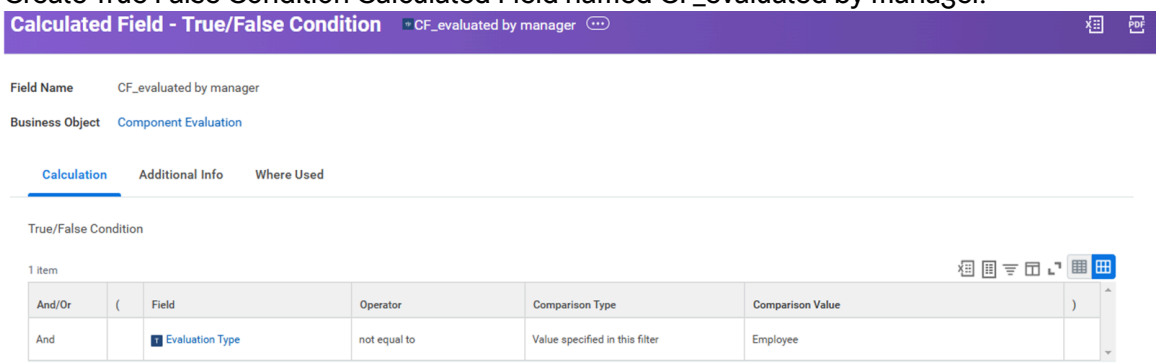


i. Create Extract Multi Instances Calculated Field named CF_latest_review.



j. Create True False Condition Calculated Field named CF_evaluated by manager.



2. Create the report.

a. Access the Create Custom Report task.

b. Provide a report name.
An example of report name: CR Employee latest performance review and feedback details.

c. Select report type as Advanced.

d. Deselect the Optimized for performance box.

e. Select Data Source as Workers by Organization.

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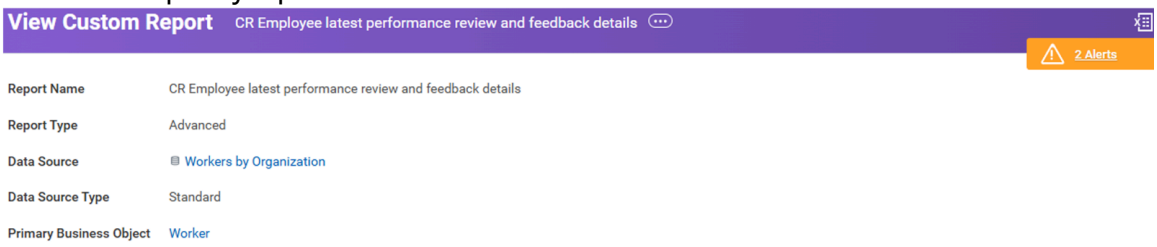
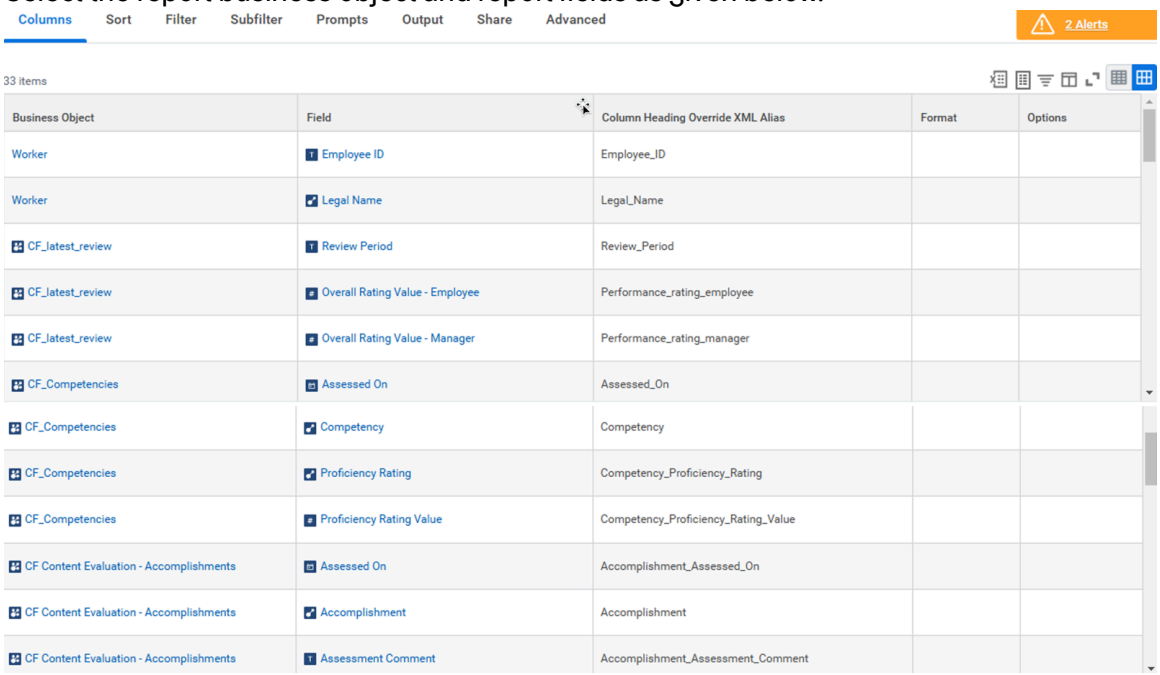
f. Deselect temporary report box and then Click **OK**.



g. Select the report business object and report fields as given below.



h. In the Group column heading section, select all business object as below.
Group Column heading for each business object will be blank.



i. In the Filter section, select the value as given below.
Confirm that you have added parenthesis as given in below image.

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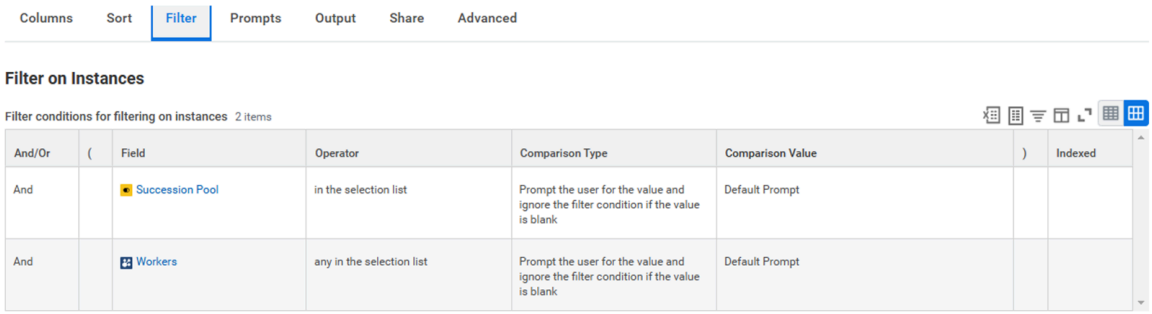
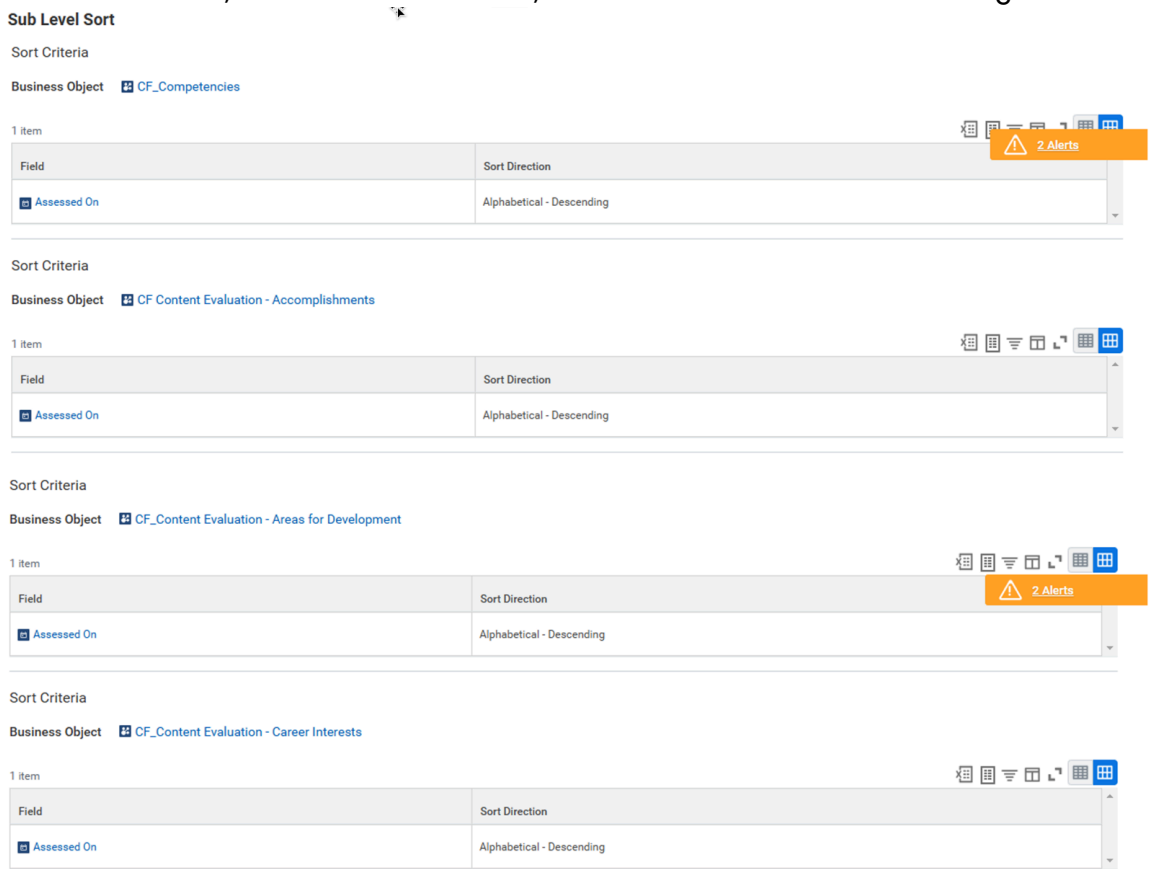


j. In the Sort section, under the Sub level sort, select the value as shown in the image.



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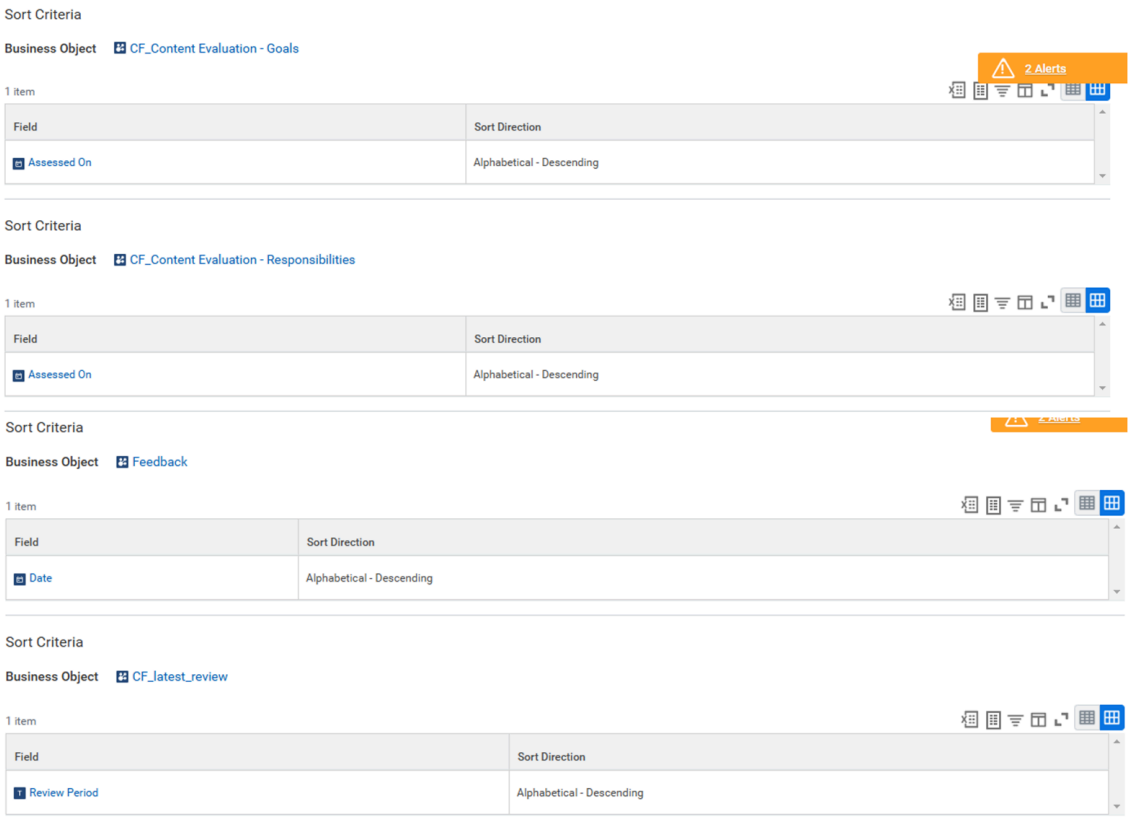
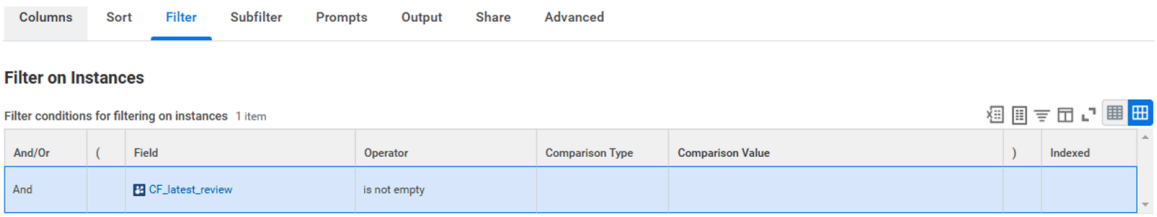


k. In Filter section, select the value as given below.
Confirm that you have added parenthesis as given in below image.



l. In the Sub-Filter section, select the value as given below.
Confirm that you have added parenthesis as given in below image.

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Columns | Sort | Filter | Subfilter | Prompts | Output | Share | Advanced

Sub Level Filter

Business Object Feedback

2 items

2 Alerts

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)
And		Date	greater than or equal to	Value from another field	Prompt - Start Date	
And		Date	less than or equal to	Value from another field	Prompt - End Date	

Condition as Text Date greater than or equal to Prompt - Start Date And Date less than or equal to Prompt - End Date

Sub Level Filter

Business Object CF_Competencies

1 item

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)
And		CF_evaluated by manager	equal to	Value specified in this filter	Yes	

Sub Level Filter

Business Object CF Content Evaluation - Accomplishments

1 item

2 Alerts

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)
And		CF_evaluated by manager	equal to	Value specified in this filter	Yes	

Condition as Text CF_evaluated by manager equal to Y

Condition as Text CF_evaluated by manager equal to Y

Sub Level Filter

Business Object CF_Content Evaluation - Areas for Development

1 item

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)
And		CF_evaluated by manager	equal to	Value specified in this filter	Yes	

Sub Level Filter

Business Object CF_Content Evaluation - Career Interests

1 item

2 Alerts

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)
And		CF_evaluated by manager	equal to	Value specified in this filter	Yes	

Condition as Text CF_evaluated by manager equal to Y

Sub Level Filter

Business Object CF_Content Evaluation - Goals

1 item

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)
And		CF_evaluated by manager	equal to	Value specified in this filter	Yes	

Sub Level Filter

Business Object CF_Content Evaluation - Responsibilities

1 item

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)
And		CF_evaluated by manager	equal to	Value specified in this filter	Yes	

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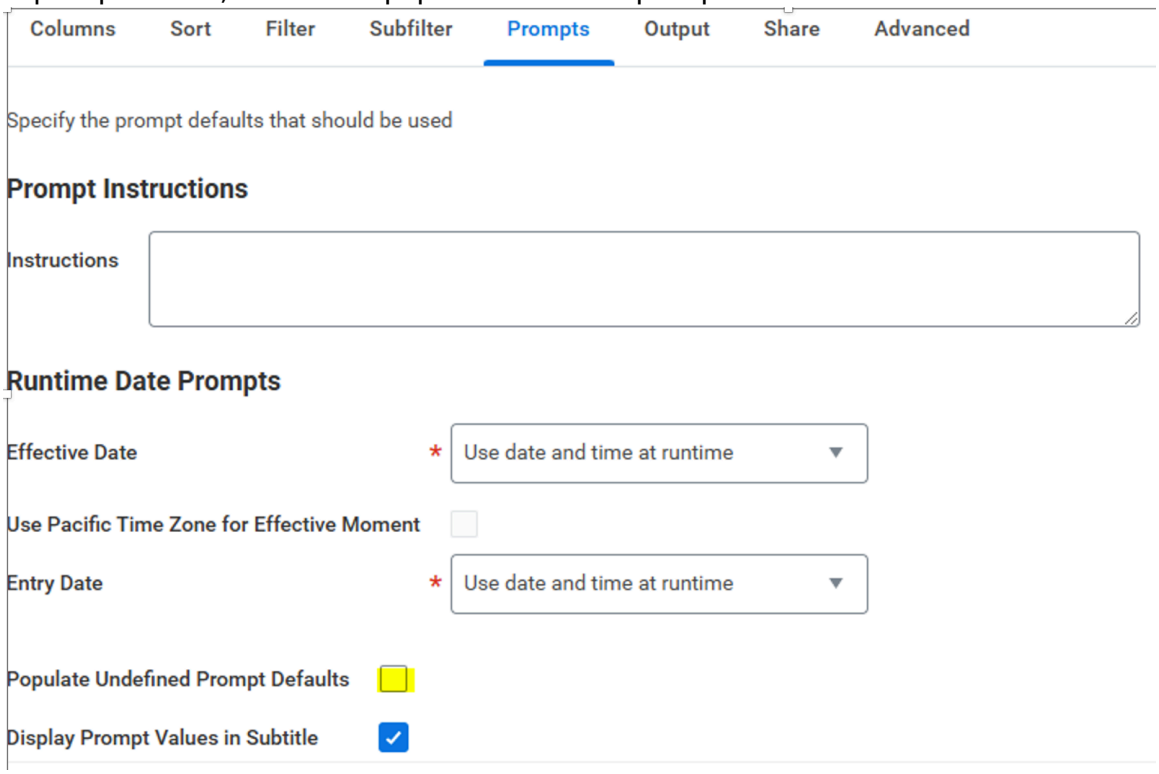
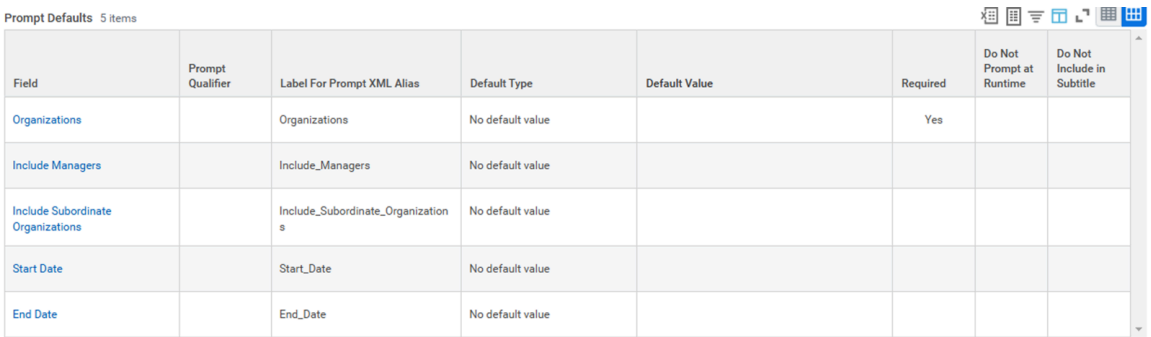
m. In prompt section, click on the populate undefined prompt defaults check box.



n. Select the value of prompts as given below under Prompt default section.
Confirm that the Label For Prompt XML Alias of all prompt fields is the same as given in the image below.


Prompt Defaults 5 items

Field	Prompt Qualifier	Label For Prompt XML Alias	Default Type	Default Value	Required	Do Not Prompt at Runtime	Do Not Include in Subtitle
Organizations		Organizations	No default value		Yes		
Include Managers		Include_Managers	No default value				
Include Subordinate Organizations		Include_Subordinate_Organizations	No default value				
Start Date		Start_Date	No default value				
End Date		End_Date	No default value				

o. In the advanced section, select the **enable as webservice** and then click OK.

p. Click on three dots icon and navigate to **web services> view URLs**.

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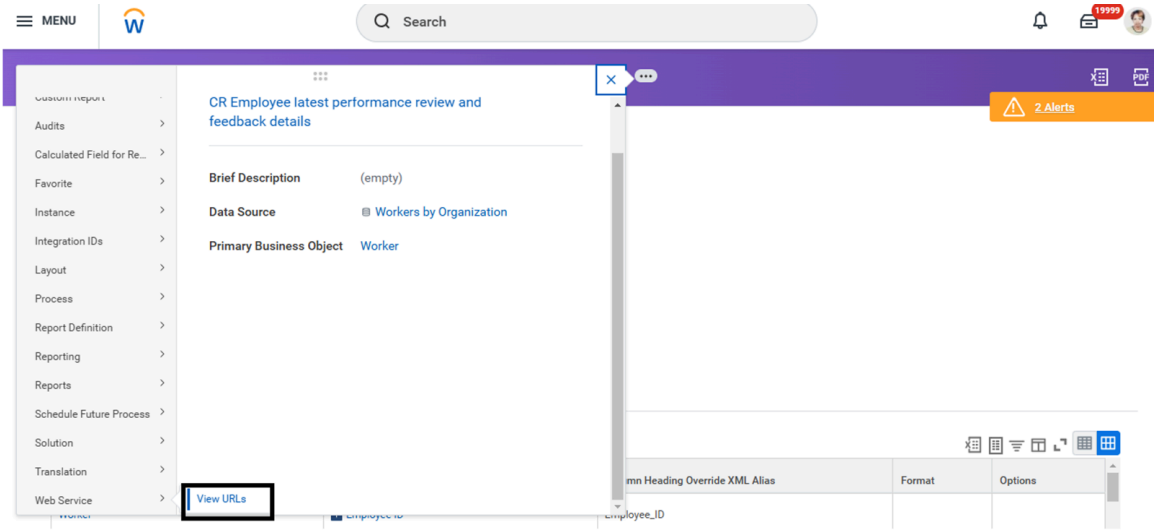
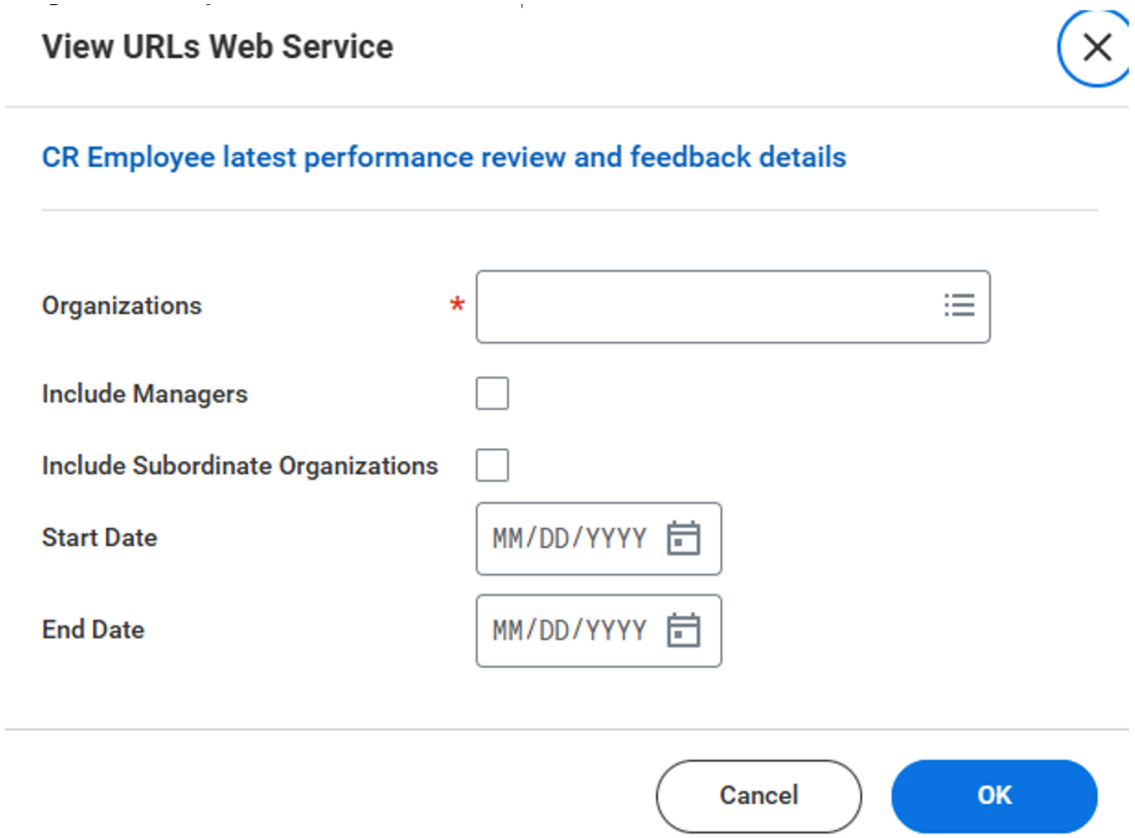


q. Select the Organization for which you want to run this report and check the box if you want to include subordinate organization and manager and select the date range for which you want to see the data.



r. In the View URLs Web Service page, click on marked icon under CSV section.
A new browser tab opens.

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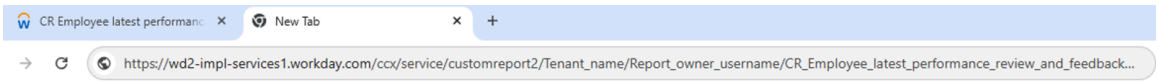
s. View the RaaS URL of the report in new browser tab and can get the below details from this link.



https://wd2-impl-services1.workday.com represents the Base URL of customer's workday tenant.
Tenant_Name represents customer's workday tenant.
Report_Owner_user_name represents user name of the report's owner.
Report_Name Represents report name.

Configure the Worker's Historical Performance Review report

Configure the report to fetch Workers Historical performance review information.

Before you begin

Role required: Confirm that you have the access to create reports.

Confirm that you have report data source "Workers by Organization" access.

Create all calculated fields for this report before developing the report.

Confirm that the report name, report field names or column heading override for the respective field (if given in report doc) are the same as it is in report document.

Confirm that the report field label is the same as in report.

Confirm that all reports are owned by the ISU user.

Confirm that in the advanced section, **Enable as webservice** is selected.

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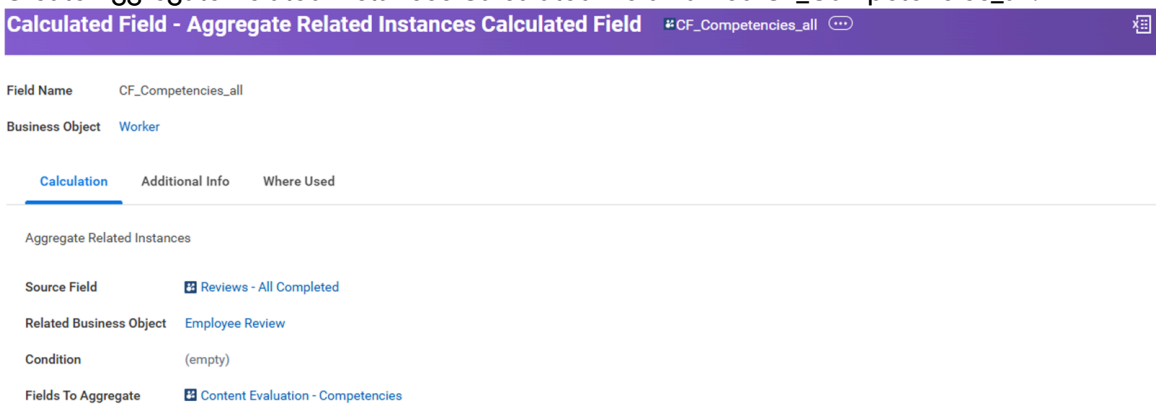
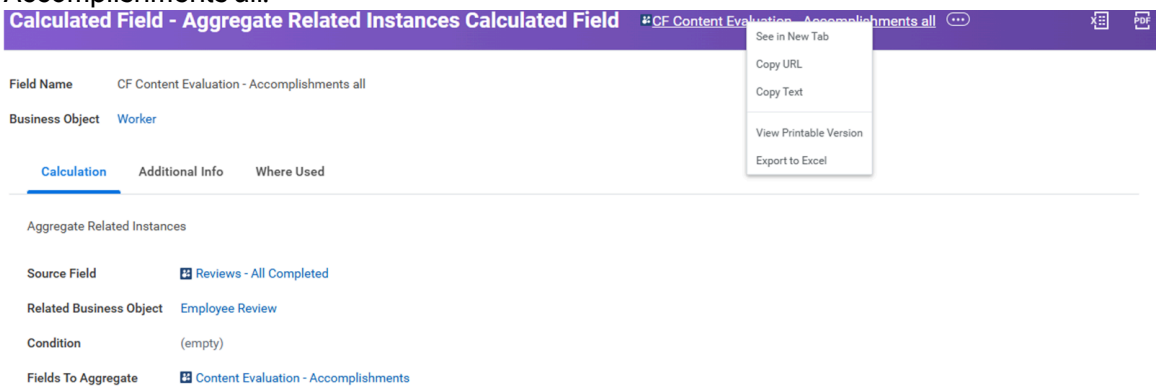
Procedure

1. Create the calculated fields.

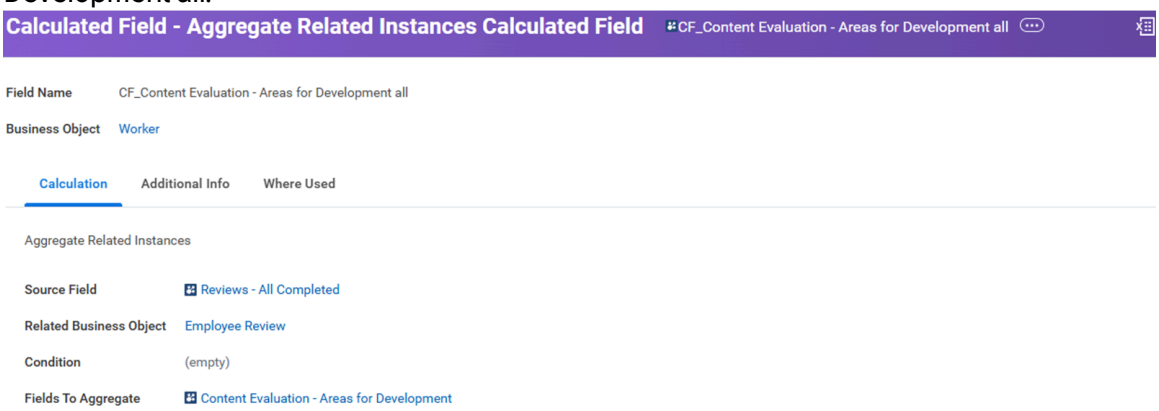
   a. Create Aggregate Related Instances Calculated Field named CF_Competencies_all.



   b. Create Aggregate Related Instances Calculated Field named CF Content Evaluation - Accomplishments all.



   c. Create Aggregate Related Instances Calculated Field CF_Content Evaluation - Areas for Development all.



   d. Create Aggregate Related Instances Calculated Field named CF_Content Evaluation - Career Interests all.

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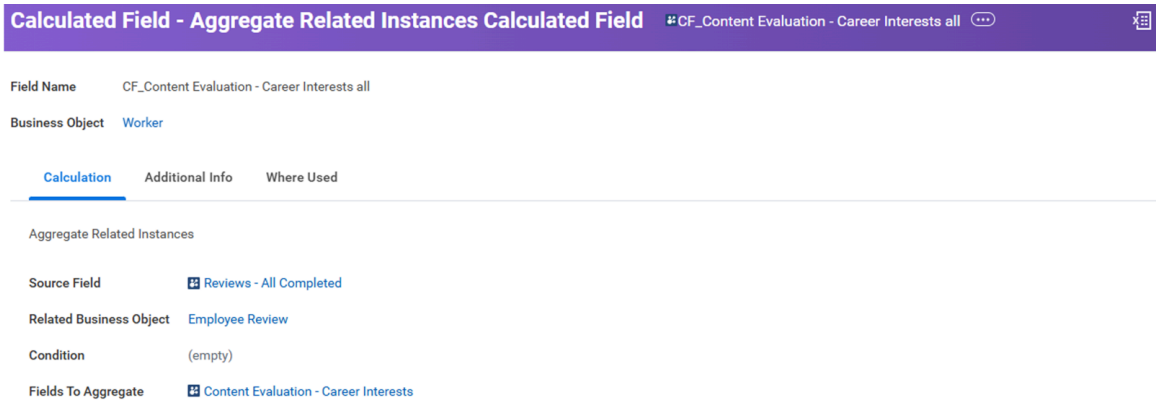
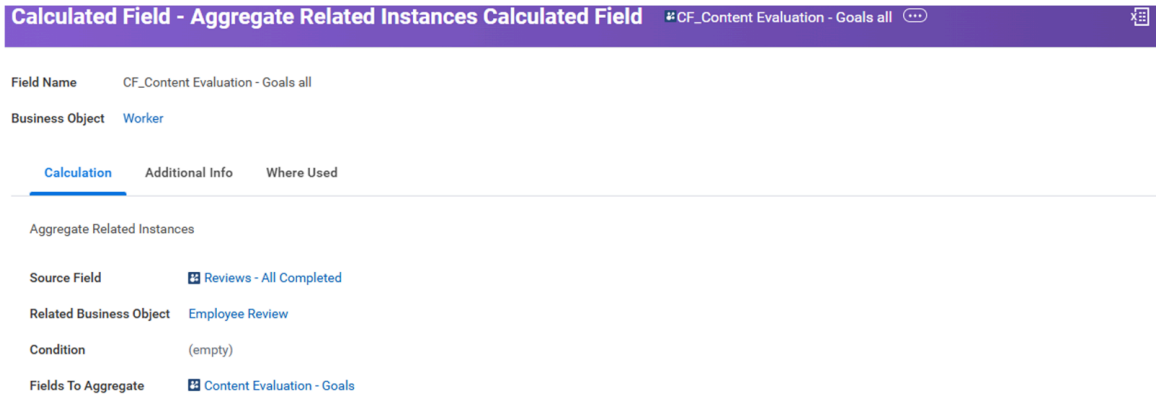
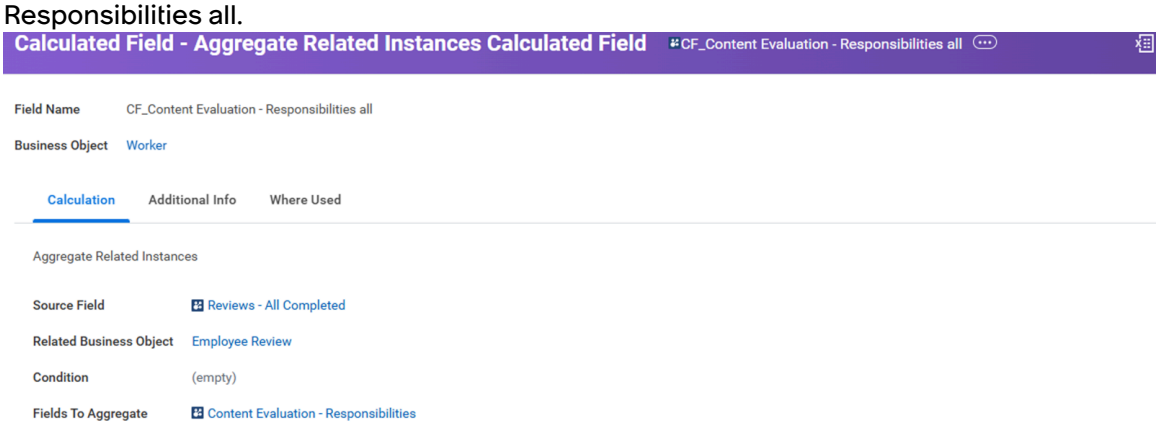


e. Create Aggregate Related Instances Calculated Field named CF_Content Evaluation - Goals all.



f. Create Aggregate Related Instances Calculated Field named CF_Content Evaluation - Responsibilities all.



2. Create the report.

a. Access the Create Custom Report task.

b. Enter a report name.

c. Select report type as Advanced.

d. Deselect the Optimized for performance option.

e. Select Data Source as Workers by Organization.

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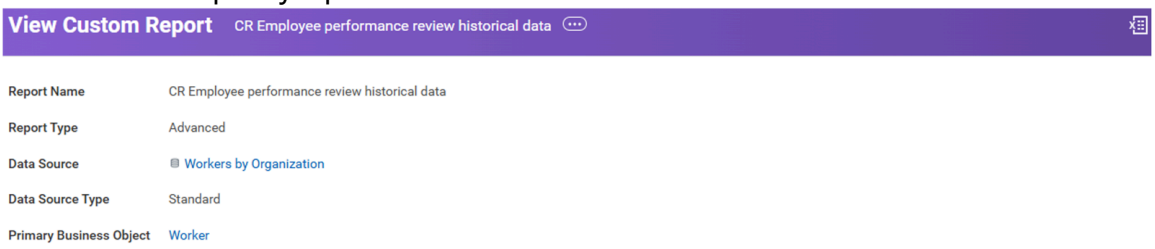
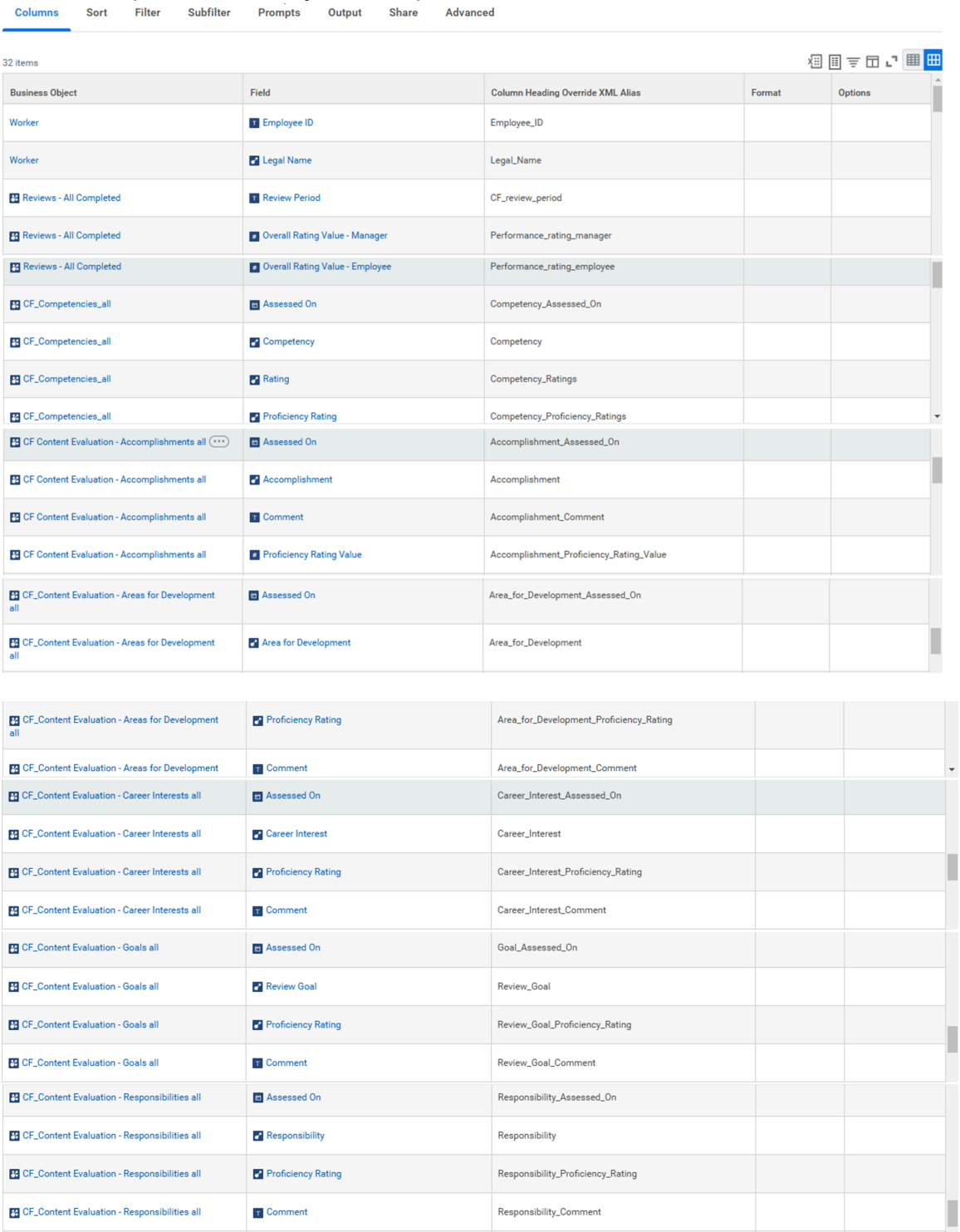
f. Deselect the temporary report box and then click ok.



g. Select the report business object and report fields.



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Feedback	Date	Date_of_feedback_provided		
Feedback	Comment	Feedback_Comment		
Feedback	Feedback Responder	Feedback_Responder		

h. In the Group column heading section, select all business object as given below. Group Column heading for each business object will be blank.

Group Column Headings

8 items

Business Object	Group Column Heading	Group Column Heading XML Alias
CF Content Evaluation - Accomplishments all		CF_Content_Evaluation_-_Accomplishments_all_group
CF_Competencies_all		CF_Competencies_all_group
CF_Content Evaluation - Areas for Development all		CF_Content_Evaluation_-_Areas_for_Development_all_group
CF_Content Evaluation - Career Interests all		CF_Content_Evaluation_-_Career_Interests_all_group
CF_Content Evaluation - Goals all		CF_Content_Evaluation_-_Goals_all_group
CF_Content Evaluation - Responsibilities all		CF_Content_Evaluation_-_Responsibilities_all_group
Feedback		Feedback_group
Reviews - All Completed		Reviews_-_All_Completed_group

i. In the Sort section, select the value.

Columns | Sort | Filter | Subfilter | Prompts | Output | Share | Advanced

Specify how the results should be sorted

Sort and Group

Sort by first accessible column

1 item

Field	Sort Direction	Display Headers	Summarize Detail Rows	Display Subtotals	Group Name Override
Reviews - All Completed	Alphabetical - Descending				

j. In Sort section, under Sub level sort, select the value.

Sub Level Sort

Sort Criteria

Business Object CF_Competencies_all

1 item

Field	Sort Direction
Assessed On	Alphabetical - Descending

Sort Criteria

Business Object CF Content Evaluation - Accomplishments all

1 item

Field	Sort Direction
Assessed On	Alphabetical - Descending

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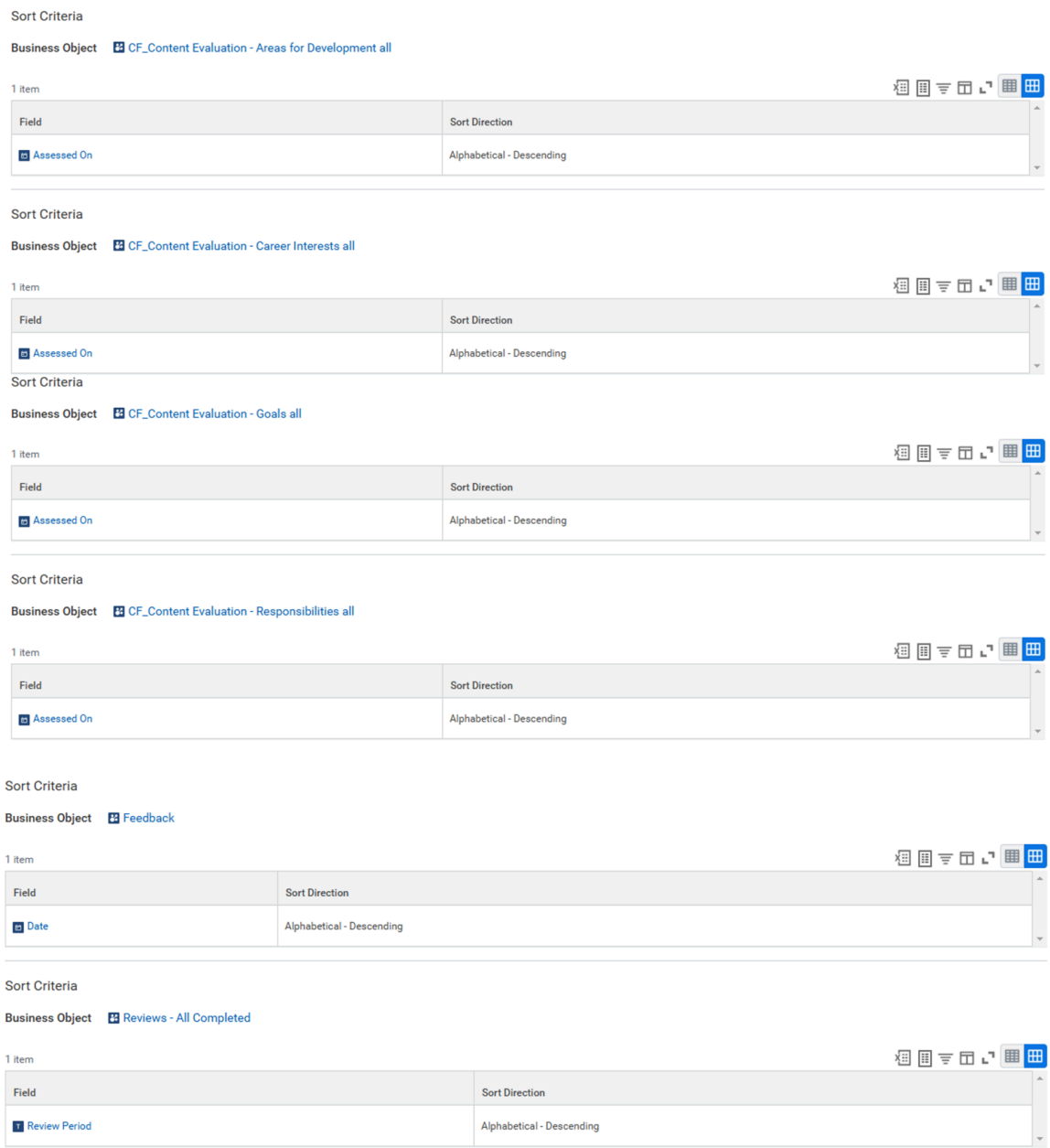
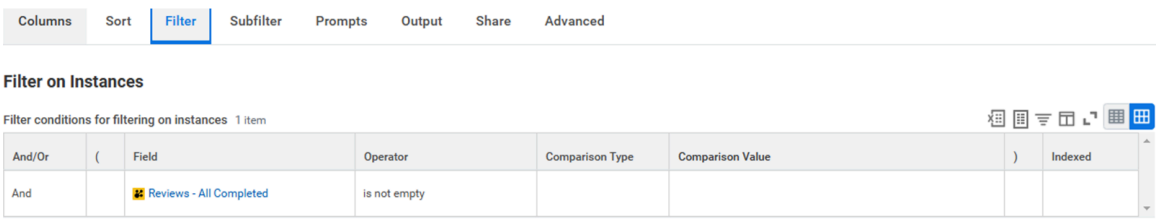


k. In the Filter section, select the value as given below.
Add parenthesis as given in the image.



l. In Sub-Filter section, select the value.
Add parenthesis as given in the image.

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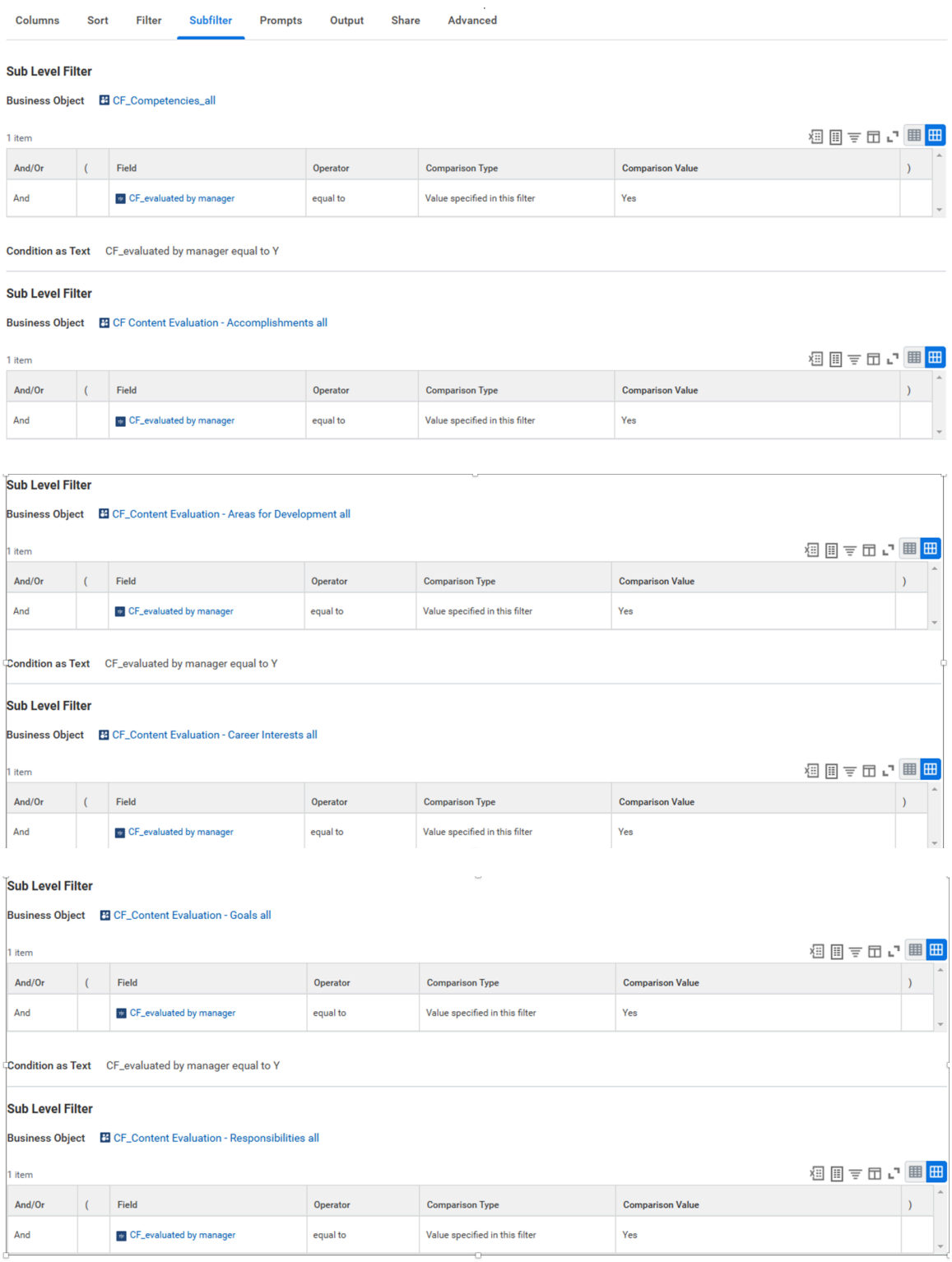

m. In the prompt section, click on populate undefined prompt defaults check box.

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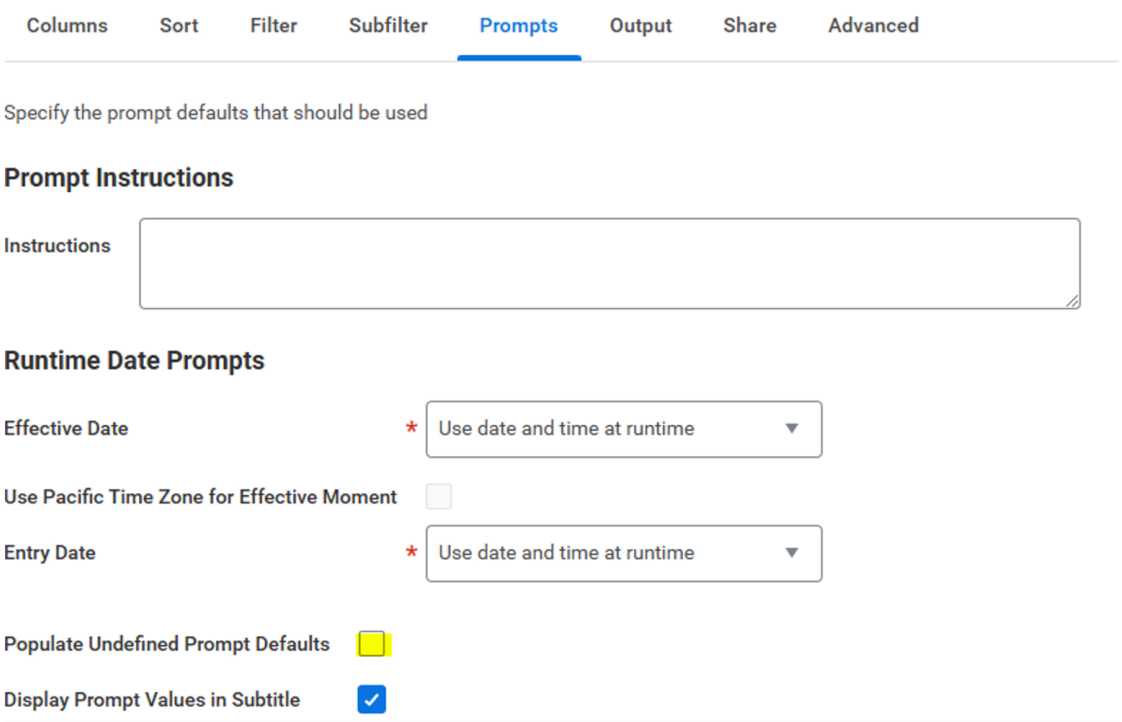
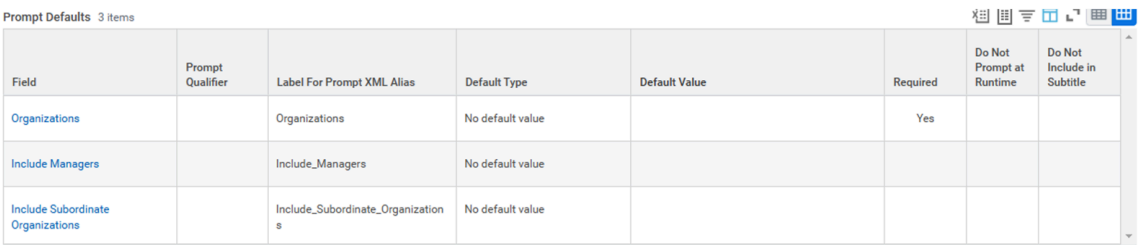


n. Select the value of prompts as given below under Prompt default section.
Confirm that the Label For Prompt XML Alias of all prompt fields is the same as the image below.

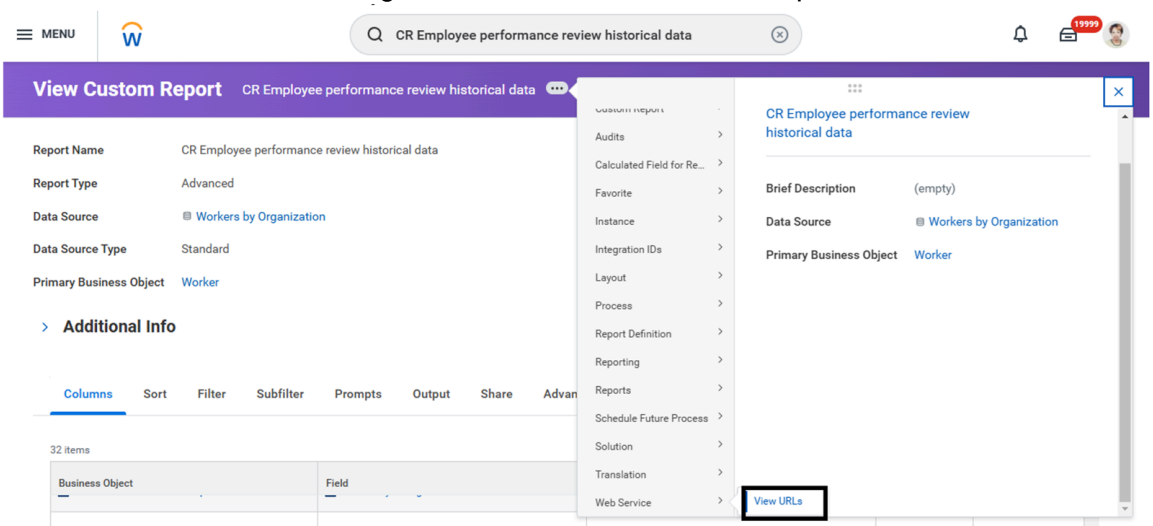


Prompt Defaults 3 items

Field	Prompt Qualifier	Label For Prompt XML Alias	Default Type	Default Value	Required	Do Not Prompt at Runtime	Do Not Include in Subtitle
Organizations		Organizations	No default value		Yes		
Include Managers		Include_Managers	No default value				
Include Subordinate Organizations		Include_Subordinate_Organizations	No default value				

o. In the advanced section, select **enable as webservice**, and click OK.

p. Select the three dots icon and go to **web services> view URLs** option.



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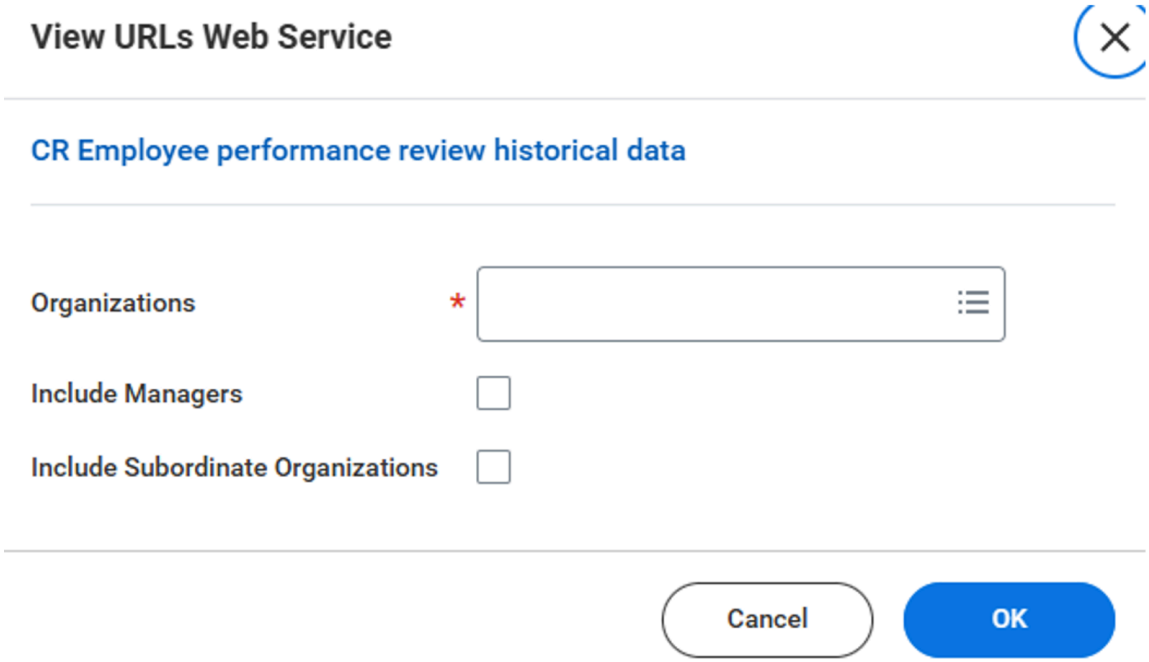
q. Select the organization for which you want to run this report and check the box if you want to include subordinate organization and managers.



r. In the View URLs Web Service page, click on marked icon under CSV section.
A new browser tab opens.



You can see the RaaS URL of the report in new browser tab.

Configure Succession Pool report

Configure the Succession Pool report to fetch Succession pool data based on Succession pool and employee.

Before you begin

Role required: Confirm that you have the access to create reports.

Confirm that you have report data source “All Succession Pools” access.

Create all calculated fields for this report before developing the report.

Confirm that the report name, report field names or column heading override for the respective field (if given in report doc) are the same as it is in report document.

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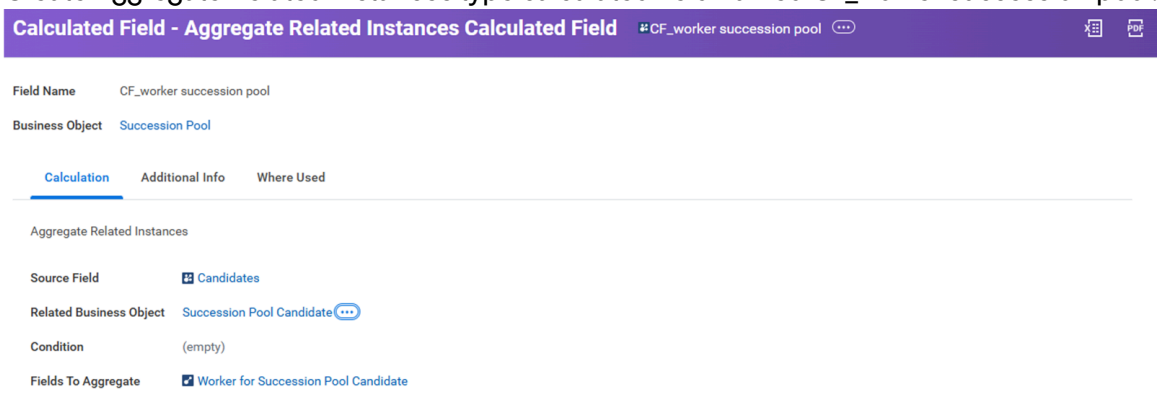
Confirm that the report field label is the same as in report.

Confirm that all reports are owned by the ISU user.

Confirm that in the advanced section, **Enable as webservice** is selected.

Procedure

1. Create Aggregate Related Instances type calculated field named CF_worker succession pool.



2. Create the report.

   a. Access the Create Custom Report task.

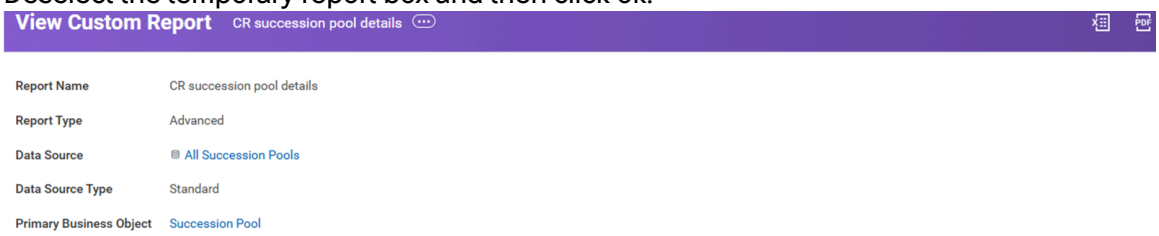
   b. Provide the report name.

   c. Select the report type as Advanced.

   d. Deselect the Optimized for performance option.

   e. Select Data Source as All Succession Pools.

   f. Deselect the temporary report box and then click ok.



   g. Select the report business object and report fields as given below.

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Columns | Sort | Filter | Prompts | Output | Share | Advanced

20 items

Business Object	Field	Column Heading Override XML Alias	Format	Options
Succession Pool	Succession Pool	Succession_Pool		
Succession Pool	Job Profiles	Job_Profiles		
Candidates	Candidate	Candidate		
Candidates	Workday ID	workdayID		
Candidates	Readiness	Readiness		
Candidates	Top Candidate	Top_Candidate		
Candidates	Succession Pool Member	Succession_Pool_Member		
CF_worker succession pool	Employee ID	Employee_ID		
CF_worker succession pool	Workday ID	workdayID		
CF_worker succession pool	Worker	Worker		
CF_worker succession pool	Skills	Skills		
CF_worker succession pool	Rating - Current	Rating_-_Current		
CF_worker succession pool	Rating - Previous	Rating_-_Previous		
CF_worker succession pool	Potential - Completed Rating	Potential_-_Completed_Rating		
CF_worker succession pool	Retention	Retention		
CF_worker succession pool	Loss Impact	Loss_Impact		
CF_worker succession pool	Achievable Level	Achievable_Level		
CF_worker succession pool	Job History Companies	Job_History_Companies		
CF_worker succession pool	Education	education		
CF_worker succession pool	Succession Plans	Succession_Plans		

h. In the Group column heading section, select all business object as shown below. The Group Column heading for each business object will be blank.

Group Column Headings 2 items

Business Object	Group Column Heading	Group Column Heading XML Alias
CF_worker succession pool		CF_worker_succession_pool_group
Candidates		Candidates_group

i. In the Filter section, select the value, as given below.

Columns | Sort | Filter | Prompts | Output | Share | Advanced

Filter on Instances

Filter conditions for filtering on instances 2 items

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)	Indexed
And		Succession Pool	in the selection list	Prompt the user for the value and ignore the filter condition if the value is blank	Default Prompt		
And		Workers	any in the selection list	Prompt the user for the value and ignore the filter condition if the value is blank	Default Prompt		

j. In prompt section, select the highlighted effective date as prompt for effective as of date and then click on populate undefined prompt defaults check box.

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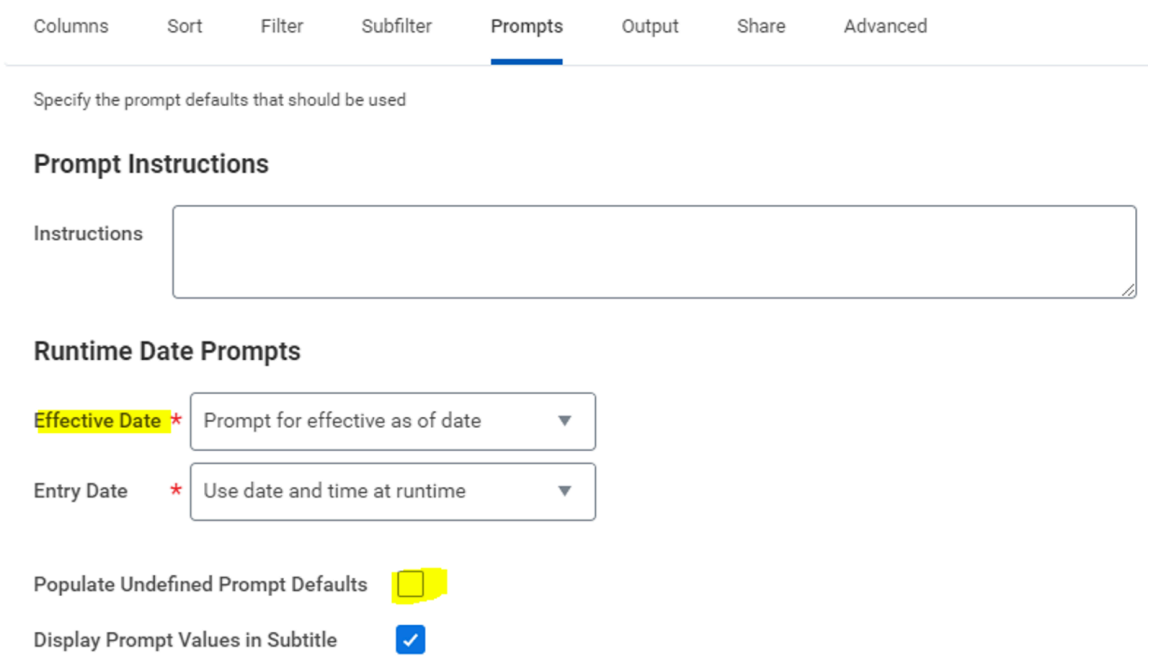
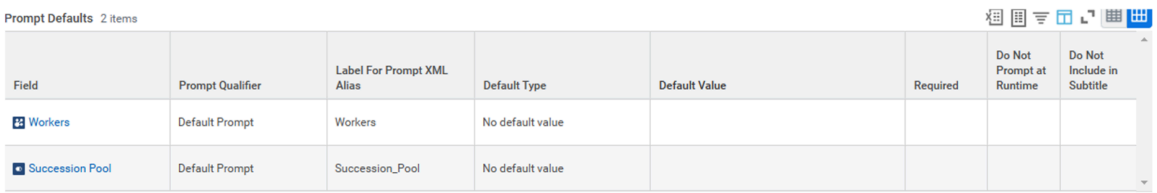
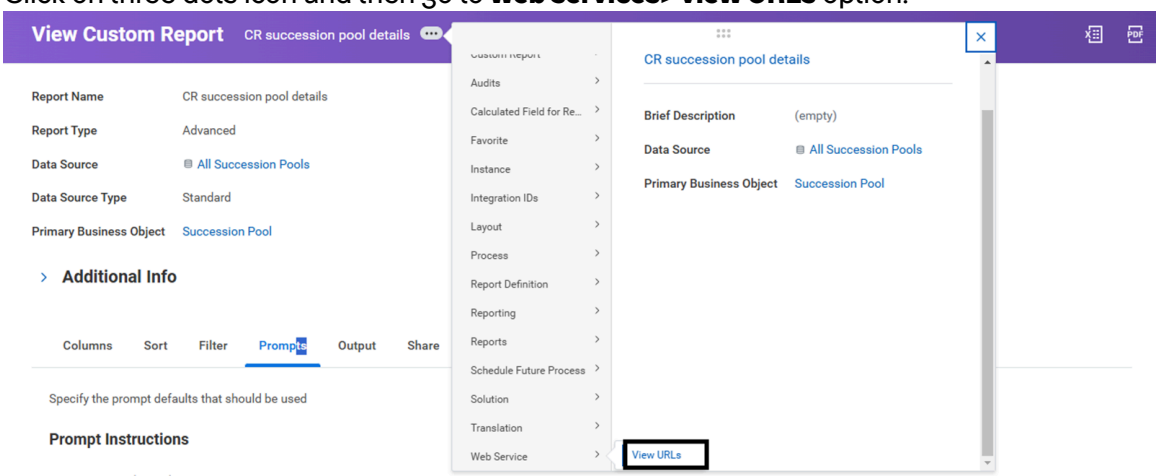


k. Select the value of prompts as given below under Prompt default section.
Make sure the Label For Prompt XML Alias of all prompt fields must be same as the image below.



l. In the advanced section, select **enable as webservice** and then click ok.

m. Click on three dots icon and then go to **web services> view URLs** option.



n. Select succession pool for which you want to run this report.
If you want any specific worker from the succession pool, select worker otherwise leave it blank.

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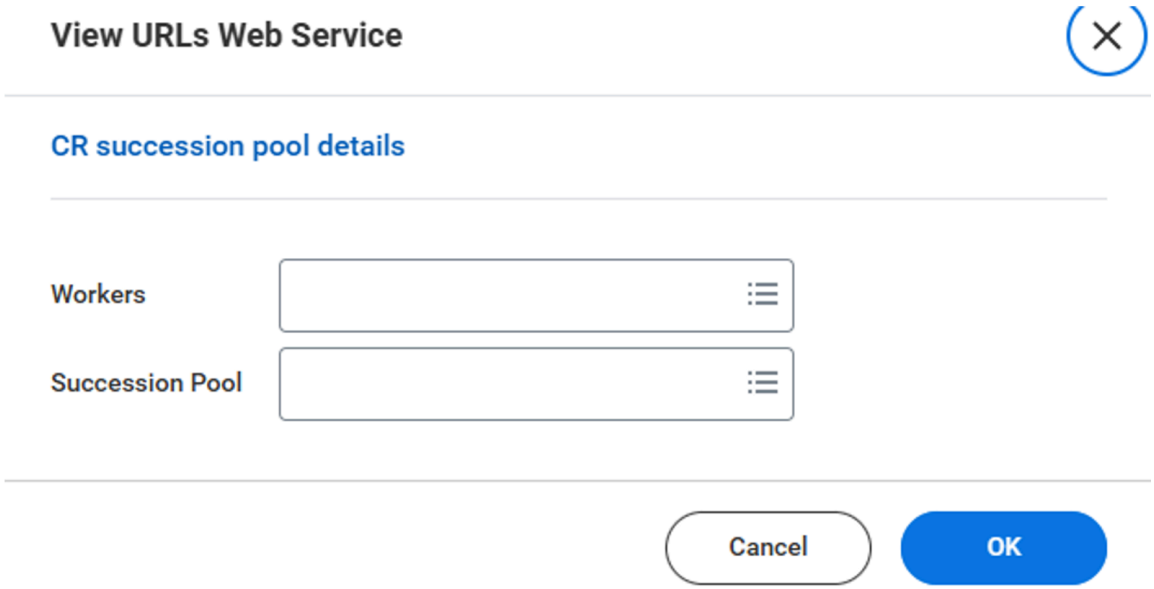

o. In the View URLs Web Service page, click on marked icon under CSV section.
A new browser tab opens and you can see the RaaS URL of the report in new browser tab.



Configure Succession Planning Report

Configure the Succession Planning report that the action Look up Succession Planning in the Workday HR spoke uses to view the details of succession planning.

Before you begin

Role required: Confirm that you have the privilege to create the report.

Confirm that you have the access to the data source of the Succession Plans by Organization.

Confirm that all reports are owned by the ISU user.

Confirm that the **Enable as webservice** option in the Advanced section is selected.

Procedure

1. Access the Create Custom Report task.
2. Provide the report name.
3. Select the report type as **Advanced**.
4. Deselect the **Optimized for performance** option.

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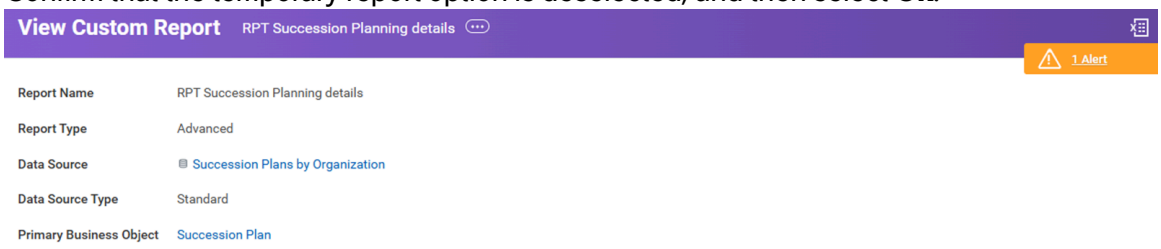
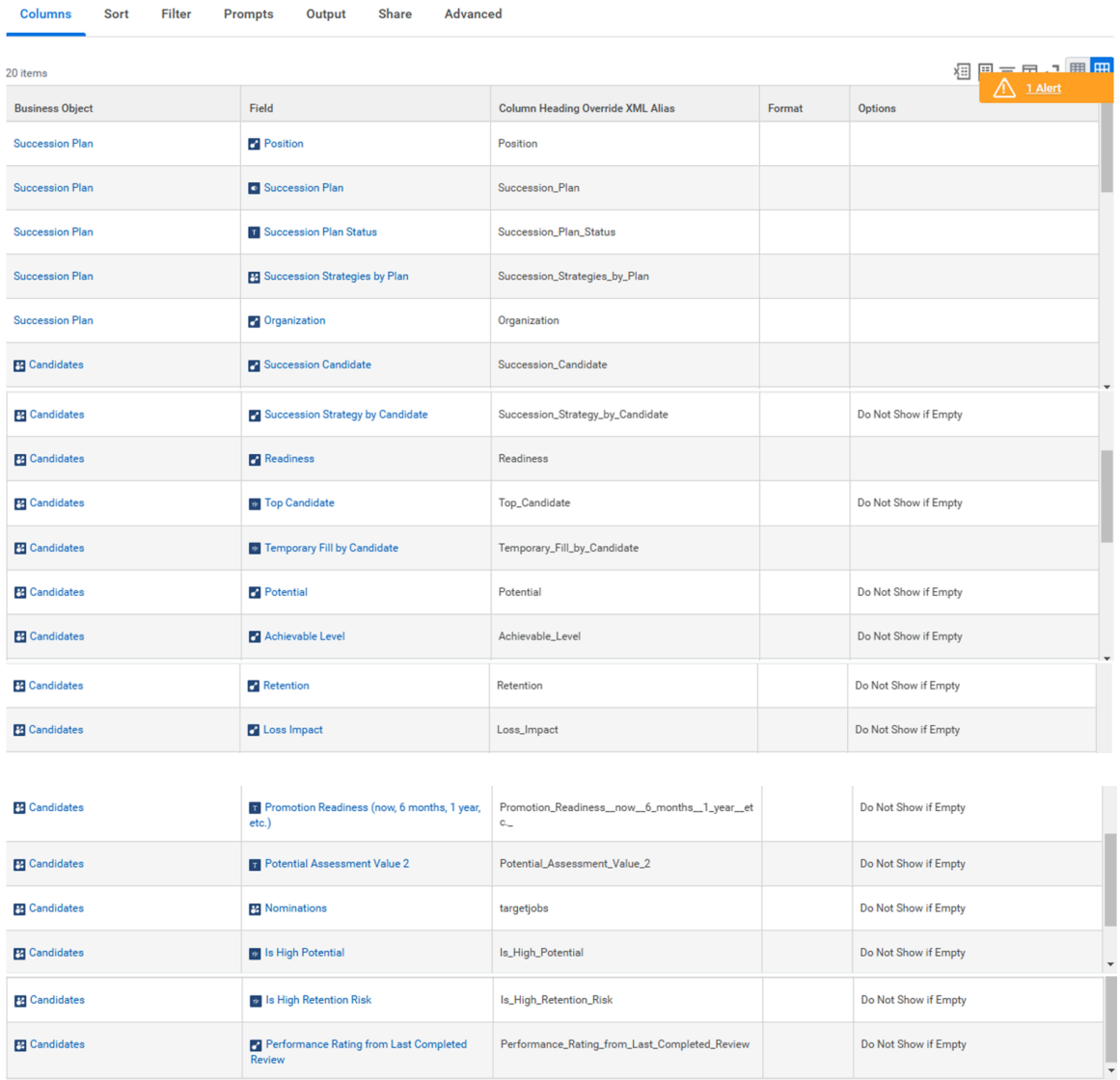
5. Select the Succession Plans by Organization data source.
6. Confirm that the temporary report option is deselected, and then select **Ok**.



7. Select the report business object and report fields as given in the image.



8. In the Group column heading section, select all business object.
The Group Column heading for each business object is empty.



9. In the Sort section, under Sub level sort, select the value as shown.

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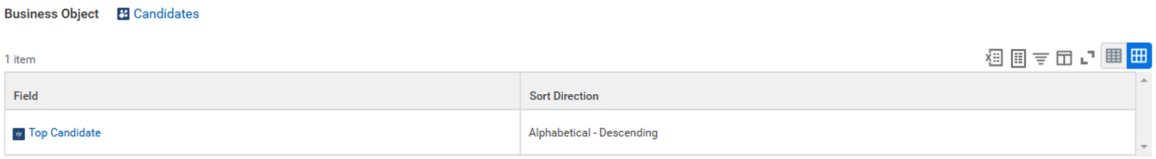
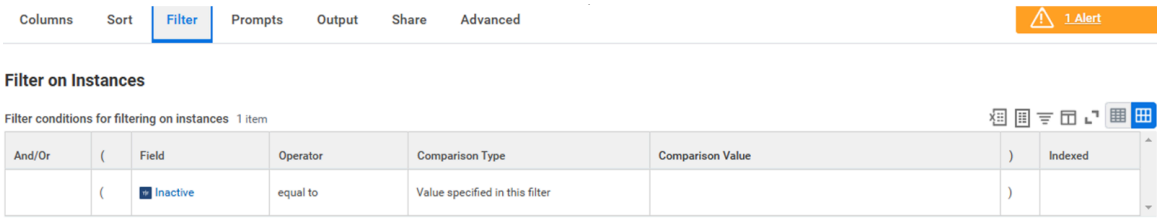
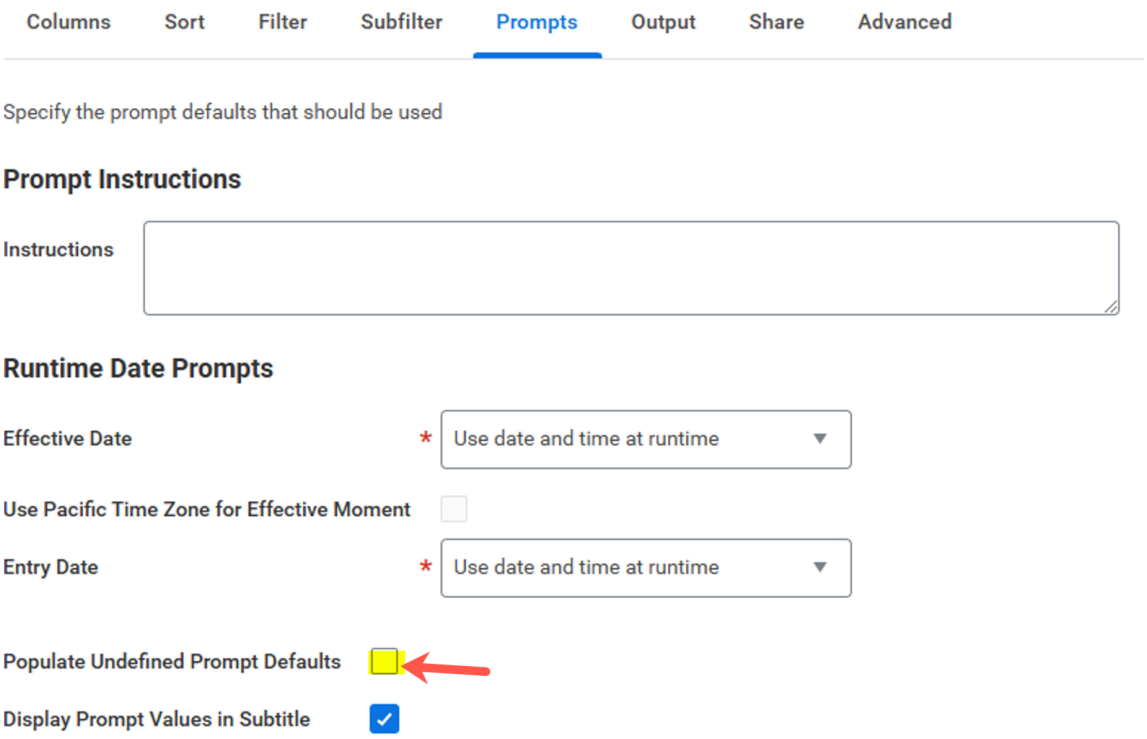


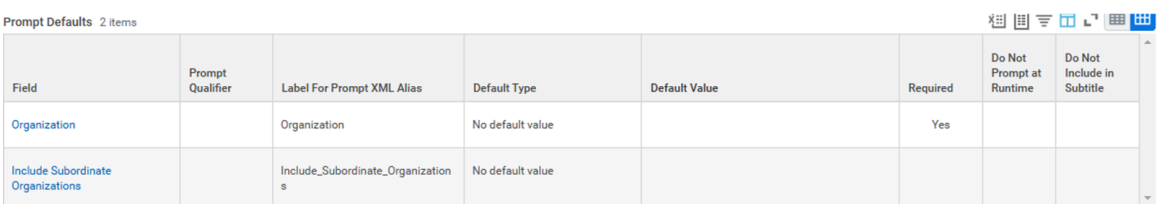
10. In the Filter section, select the value as given below.
Add parenthesis as given in the image.



11. In the prompt section, click on **Populate Undefined Prompt Defaults** option.



12. Select the value of prompts as given below under the Prompt default section.
Make sure the Label For Prompt XML Alias of all prompt fields must be the same as given below.



13. In the advanced section, select **enable as webservice**, and then click **OK**.

14. Select the three dots icon and go to **Web services> view URLs**.

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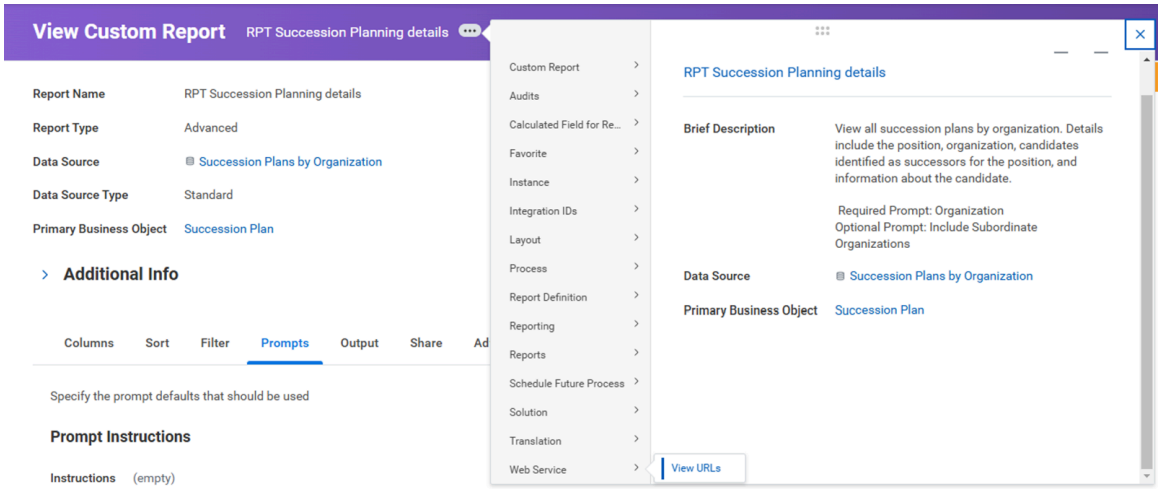
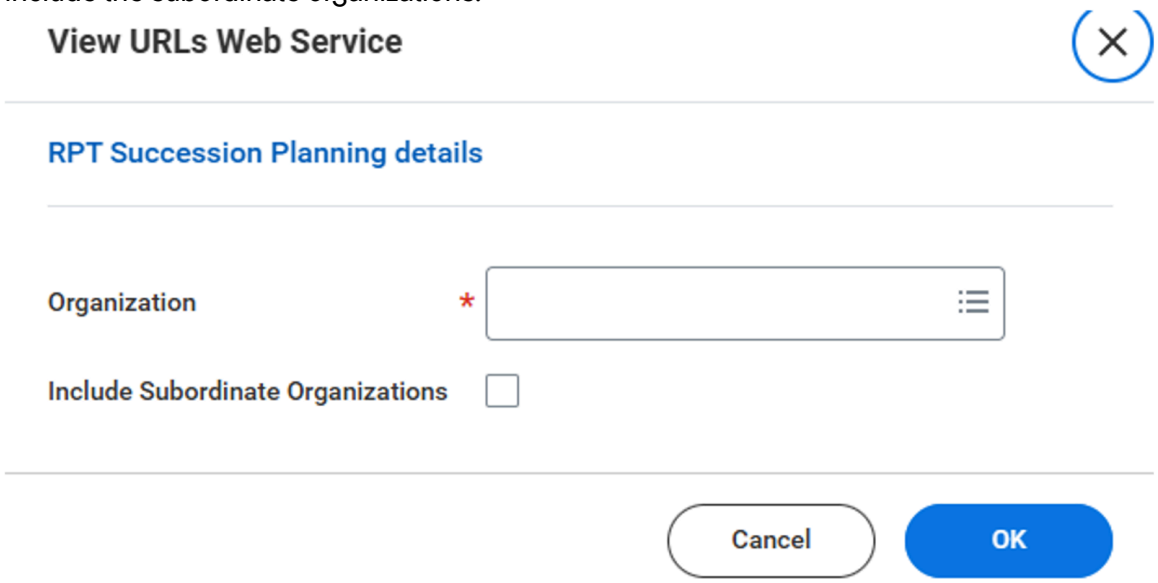


15. Select the organization for which you want to run this report and select the box if you want to include the subordinate organizations.



16. In the View URLs Web Service page, click on marked icon under CSV section.



A new browser tab displays the following results.

Details:

- https://wd2-impl-services1.workday.com represents the Base URL of customer's workday tenant.
- Tenant_Name represents customer's workday tenant.

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- Report_Owner_user_name represents user name of the report's owner.
- Report_Name Represents report name.



Workday Learning Spoke

The Workday HR spoke is built by Bristlecone, Inc. Manage approvals, courses, and user in the Workday Learning instance from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Workday Learning spoke v1.1.4 is the latest version. For version history of the spoke, see Workday Learning spoke release notes.

Supported versions

This spoke was built for Workday Learning v36.0, but may be compatible with later versions.

Spoke requirements

- Register Integration System User.

  Note: While filling account information details, ensure that you select the **Do Not Allow UI Sessions** check box.

- Workday REST and Report-as-a-Service (RAAS) API works with OAuth 2.0 to authorize access to resources in your Workday tenant. To use OAuth 2.0, you must register your client in the tenant, using the Register API Client task.

  Record and save these values while registering your client:

  - Client ID
  - Client Secret
  - Workday REST API Endpoint
  - Token Endpoint
  - Authorization Endpoint
- Create a security group and assign it to the integration system user and provide these permissions.

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Domain Security Policy Permissions

Operation	Domain Security Policy	Domain Security Policies Inheriting Permission	Functional Areas
View Only	Worker Data: Public Worker Reports		Staffing
Get Only	Worker Data: Public Worker Reports		Staffing
Get Only	Manage: Learning Content		Learning Core
View Only	Reports: Learning Record		Learning Core
Get Only	Reports: Learning Record		Learning Core
View Only	Person Data: Learning		Learning Core
Get Only	Person Data: Learning		Learning Core
View Only	Business Process Reporting		System
View Only	Reports: Learning Record		Learning Core
Get Only	Reports: Learning Record		Learning Core
Get and Put	Manage: Learning Course Enrollments		Learning Core
View and Modify	Business Process Administration	Business Process Delegation	System
Get only	Set up: Skills and Experience		Worker Profile and Skills

Business Process Security Policy Permissions

Operation	Business Process Type	Functional Area
Initiate (Enroll In Learning Content (Web Service))	Enroll in Content	Learning Core

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - SOAP (com.glide.hub.action_step.soap)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow Flow Designer - Dynamic Outputs (com.glide.hub.dynamic_outputs)

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- Complex Object (com.glide.cobject)
- System Import Data Source (glide.system_import_data_source)
- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Workday Learning spoke provides a sample flow, Trigger Workday Learning Integration. This flow in turn triggers the subflows to automate tasks. To customize the sample flow, copy it to the required application scope.

Spoke subflows

The Workday Learning spoke provides sample subflows to demonstrate automating Workday Learning tasks. To customize a sample subflow, copy it to the required application scope. Available sample subflows include:

Subflow	Description
Assign Course to Workday Learning	Assigns learning courses to the ServiceNow users.
Pull Courses from Workday Learning	Retrieves details of the learning courses and maps courses from Workday Learning to ServiceNow.
Pull User Activity from Workday Learning	Retrieves user course activity data from Workday Learning and saves it in the ServiceNow instance.
Track Approval for Workday Learning	Retrieves details of learning todos from Workday Learning and saves it in the ServiceNow instance.
Workday Learning User Mapping	Maps users between Workday Learning and ServiceNow instance.

Spoke actions

The Workday Learning spoke provides actions to automate Workday tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Approval Management	Look up Approvals	Retrieves approval items from the inbox.
Course Management	Create Assignment	Creates an enrollment in the Learning Content.
	Look up Assignment	Retrieves details of the learning assignments.

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Category	Action	Description
	Look up Blended Courses Stream	Retrieves details of the blended courses.
	Look up Course Offerings Stream	Retrieves details of the blended course offerings.
	Look up Digital Courses Stream	Retrieves details of the digital courses.
	Look up Enrollment	Retrieves details of the self learning enrollments.
	Look up Lessons Stream	Retrieves details of the standalone lessons.
	Look up Programs Stream	Retrieves details of the learning programs.
User Management	Look up Users Stream	Retrieves worker details such as, personal data, employment data, email data, worker reference data, and so on.
Skills management	Look up Skills Stream	Retrieves details of the skills required for the learning program.

Spoke module

The Workday Learning spoke provides Workday Learning application that has these modules:

Module	Description
Report Configuration	Enables you to create a record to specify the RAAS report configurations. Only one record can be created in this module.
Profile Sync Configuration	Enables you to specify the Workday tenant timezone.
Data Sources	
Sync User Activity	Saves the details of the user course activity as an attachment. These details are retrieved by the Look up Assignment action.
Self Enrollment Activity	Saves the details of the user course self enrollment as an attachment. These details are retrieved by the Look up Enrollment action.
Track Approval	Saves the details of the todo approvals as an attachment. These details are retrieved by the Look up Approvals actions.
Scheduled Imports	
Sync User Activity	Enables handling of the transformation errors while synchronizing the user activity.

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Module	Description
Self Enrollment Activity	Enables handling of the transformation errors while synchronizing the self enrollment activity.
Track Approval	Enables handling of the transformation errors while synchronizing the approvals.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Workday Learning spoke.

Configure the Track Approval report

Configure the Learning Assignment report in Workday to retrieve worker's inbox items like to-dos, action items, approval, and so on.

Before you begin

User with access to report creation and the Business process event steps report data source.

About this task

- For identification purposes, all calculated field name starts with **CF**.
- Create all calculated fields for this report before developing the report. Thus, all fields are available while creating the report.
- Report name can be different while creating the report. But ensure that the report field name or column heading override for the respective field (if it’s given in the report document) is same as it is in the report document. Report field label should be same as it is in the report document. Else, the developed action fails.
- **Group Column Heading** for each business object in the **Group Column Headings** section should be empty.
- Ensure that you add parenthesis in filter while creating it.
- All reports must be shared or owned by the ISU user that accesses these actions on the ServiceNow platform.
- In the **Advanced** section, select the **Enable as webservice** check box.

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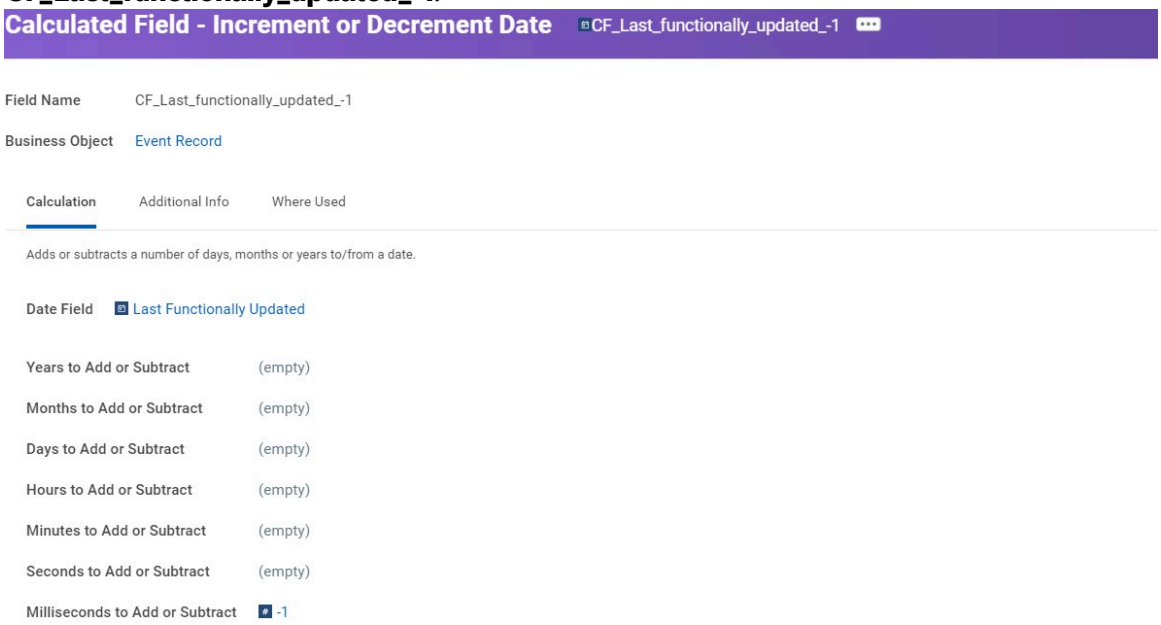
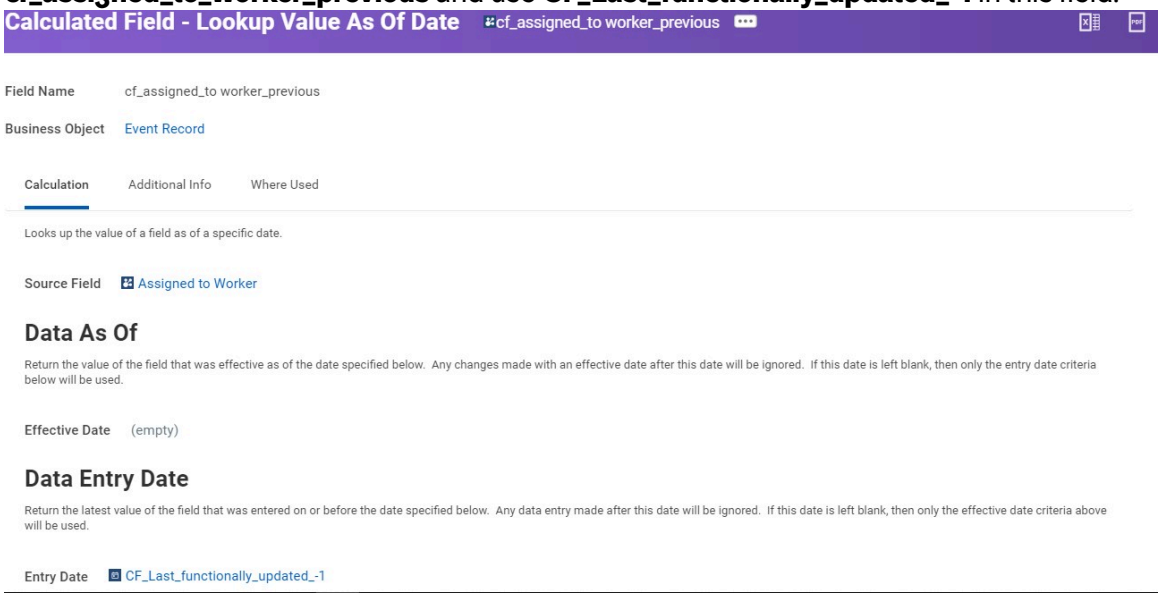
Procedure

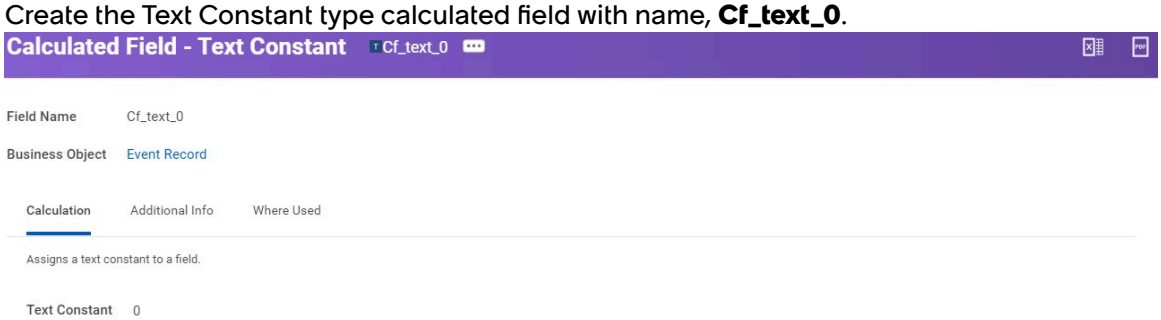
1. Create increment and decrement type calculated field with name, **CF_Last_functionally_updated_-1**.



2. Create the Lookup Value As Of Date type calculated field with name, **cf_assigned_to_worker_previous** and use **CF_Last_functionally_updated_-1** in this field.



3. Create the Text Constant type calculated field with name, **Cf_text_0**.



4. Create the Text Constant type calculated field with name, **CF_Text_as_1**.

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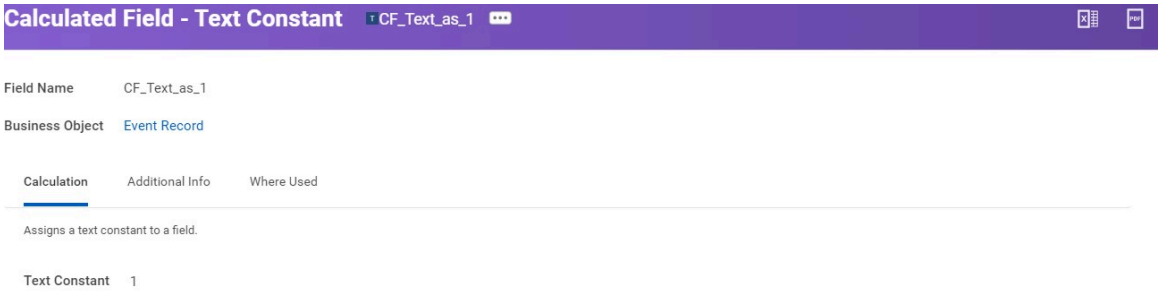
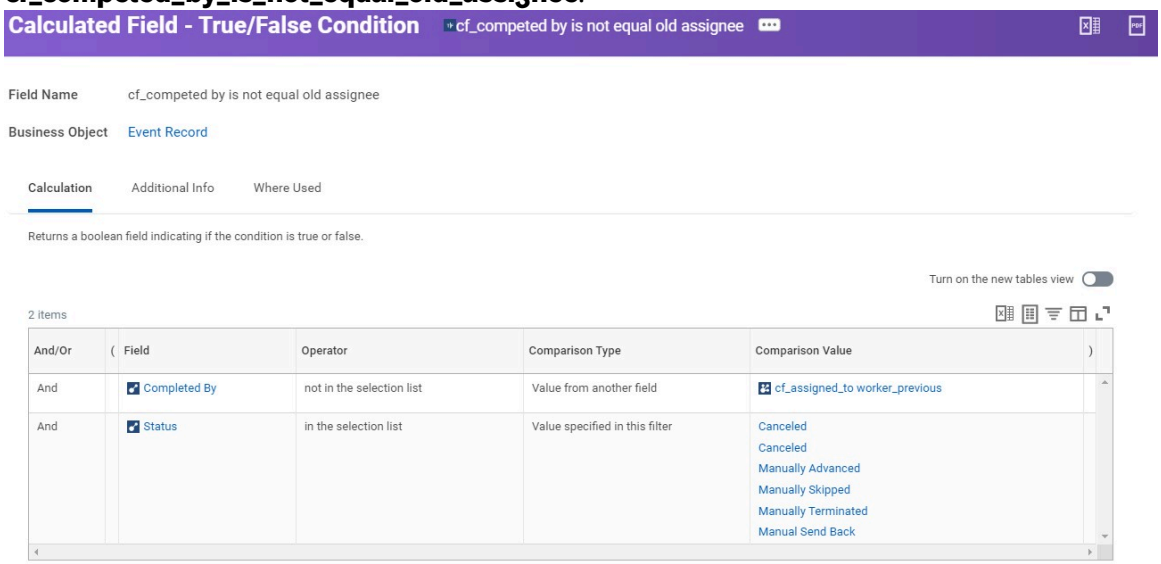


5. Create the True/False condition type calculated field with name, **cf_competed_by_is_not_equal_old_assignee**.



6. Create Evaluate Expression calculated field with name, **CF_EE_Completed_by_admin_exist_as_old_Assignee_or_not**.



7. Create the Text Constant type calculated field with name, **CF_Text**.

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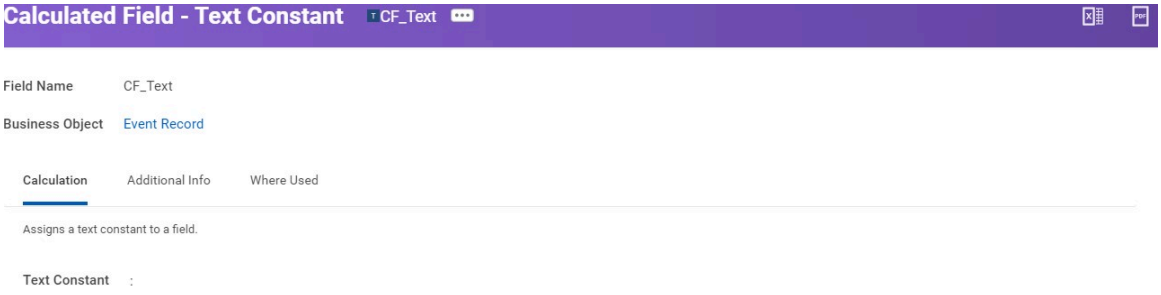
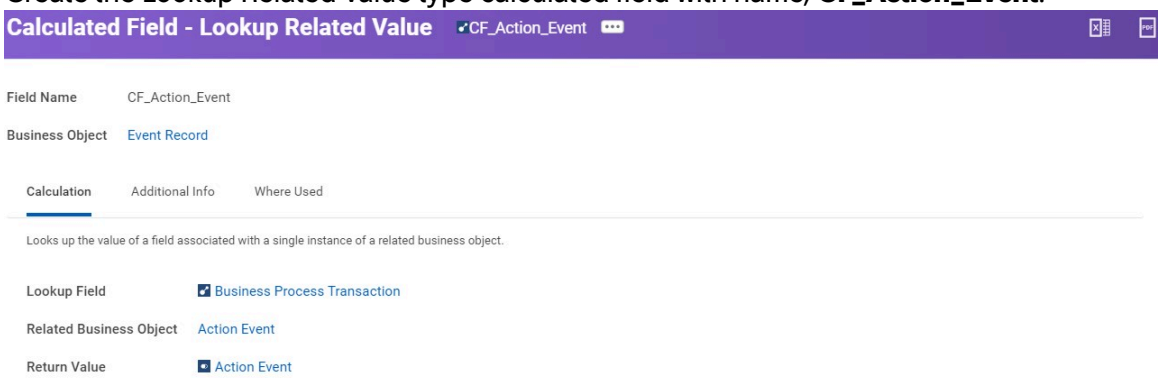
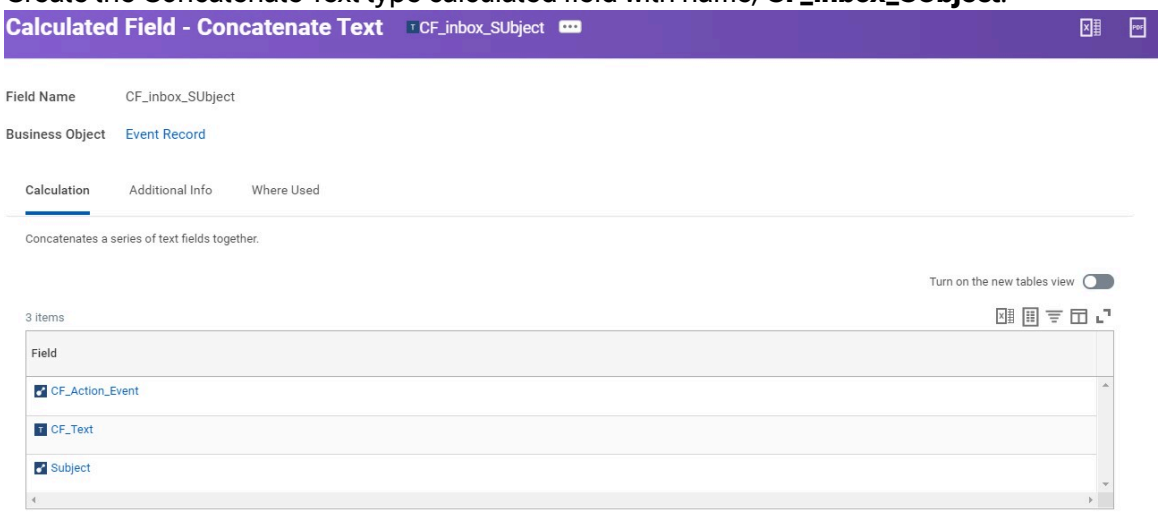


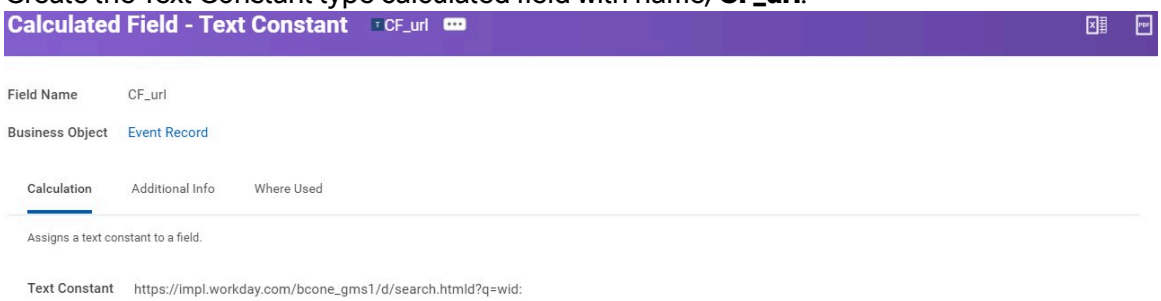
8. Create the Lookup Related Value type calculated field with name, **CF_Action_Event**.



9. Create the Concatenate Text type calculated field with name, **CF_inbox_SUbject**.



10. Create the Text Constant type calculated field with name, **CF_url**.



11. Create the Lookup Related Value type calculated field with name, **CF_business_pro_transaction**.

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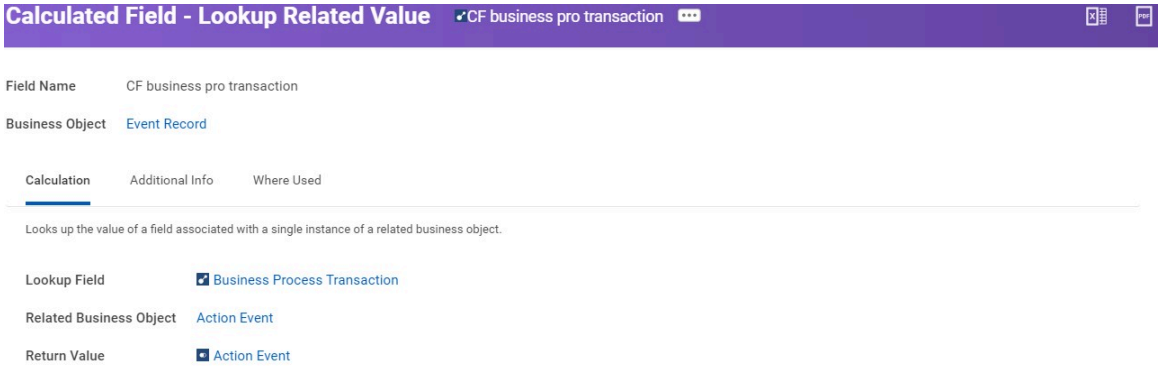
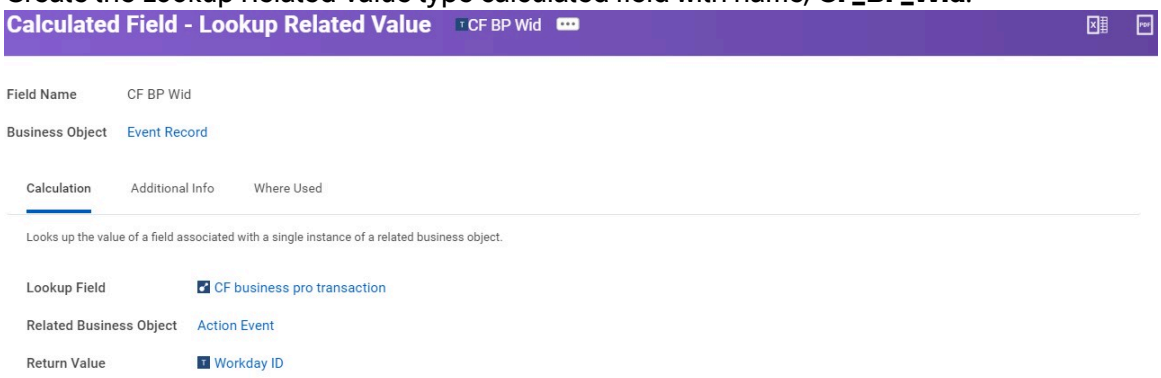
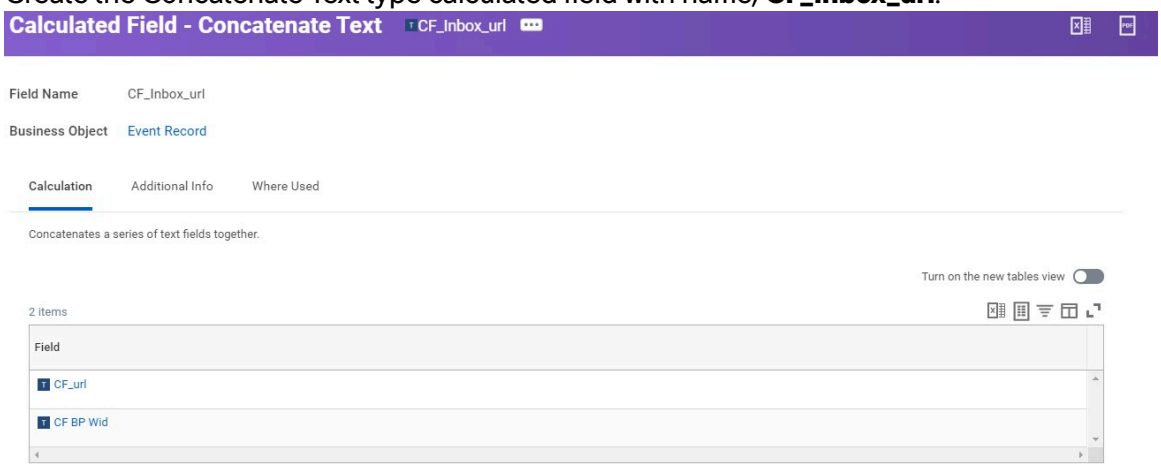


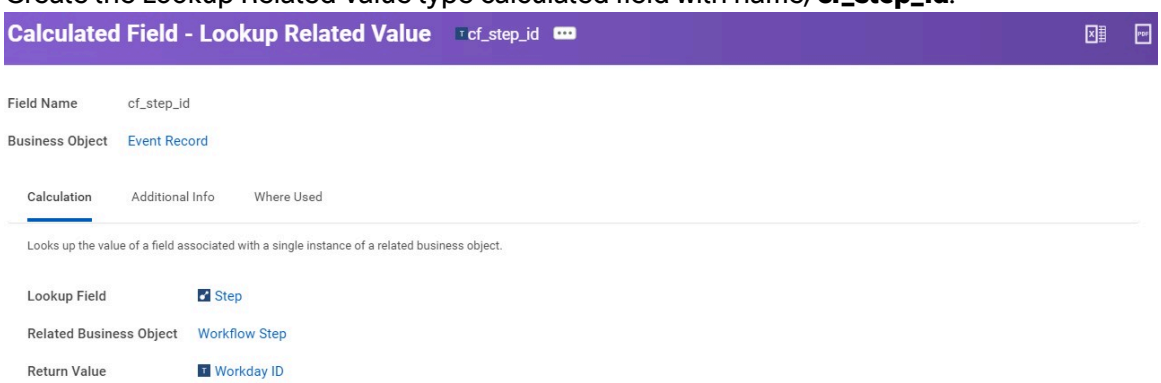
12. Create the Lookup Related Value type calculated field with name, **CF_BP_Wid**.



13. Create the Concatenate Text type calculated field with name, **CF_Inbox_url**.



14. Create the Lookup Related Value type calculated field with name, **cf_step_id**.



15. Create the Lookup Related Value type calculated field with name, **CF_subject_id**.

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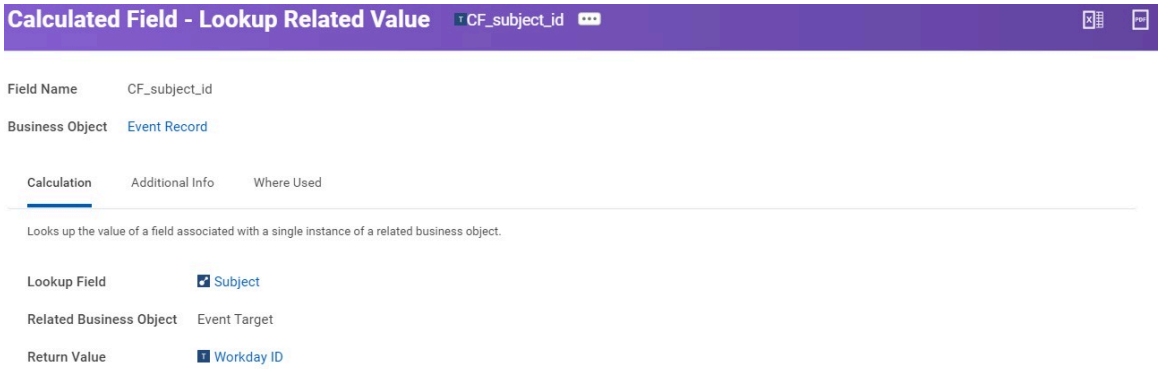
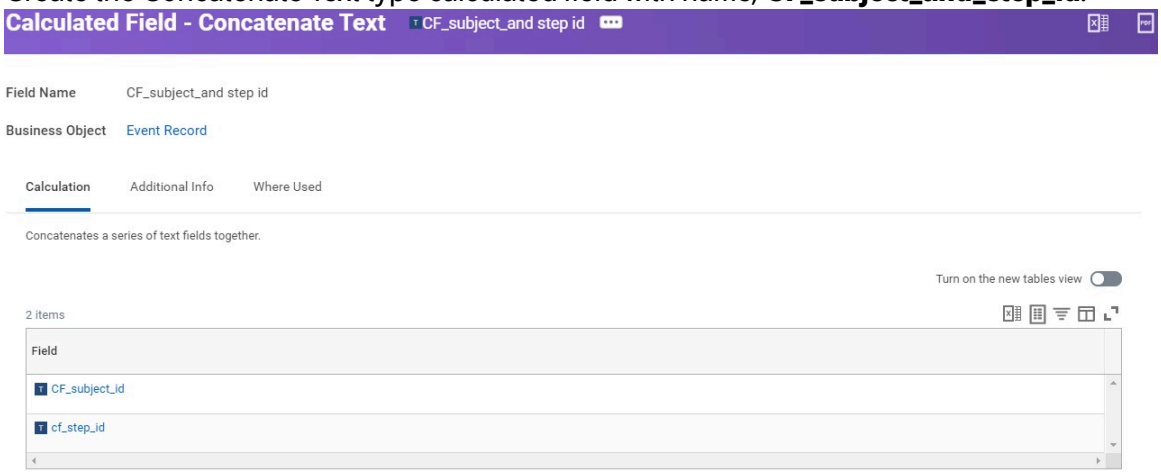
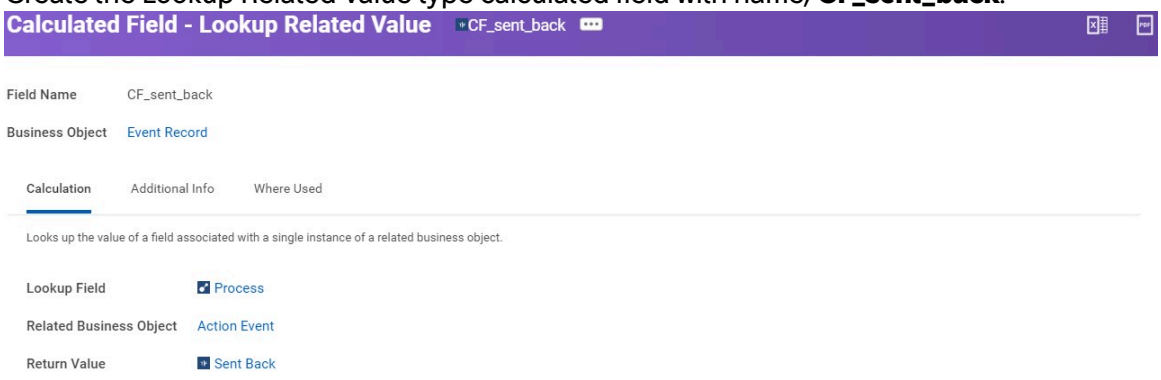


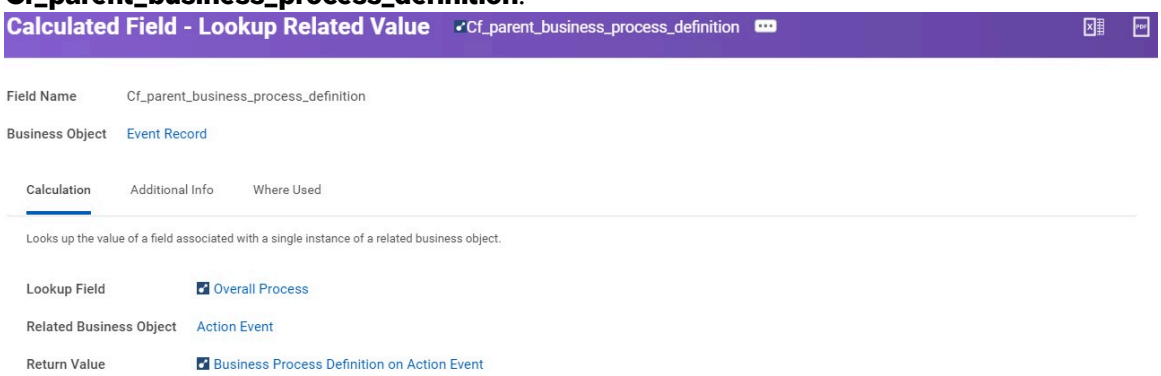
16. Create the Concatenate Text type calculated field with name, **CF_subject_and_step_id**.



17. Create the Lookup Related Value type calculated field with name, **CF_sent_back**.



18. Create the Lookup Related Value type calculated field with name, **Cf_parent_business_process_definition**.



19. Create the Increment or Decrement Date type calculated field with name, **CF_Last_updated_on-1**.

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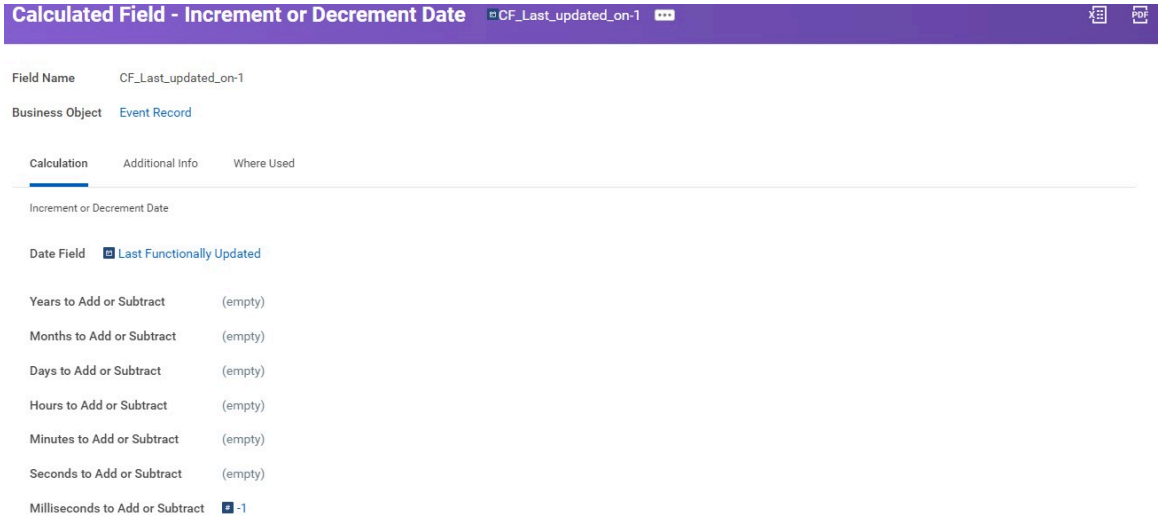
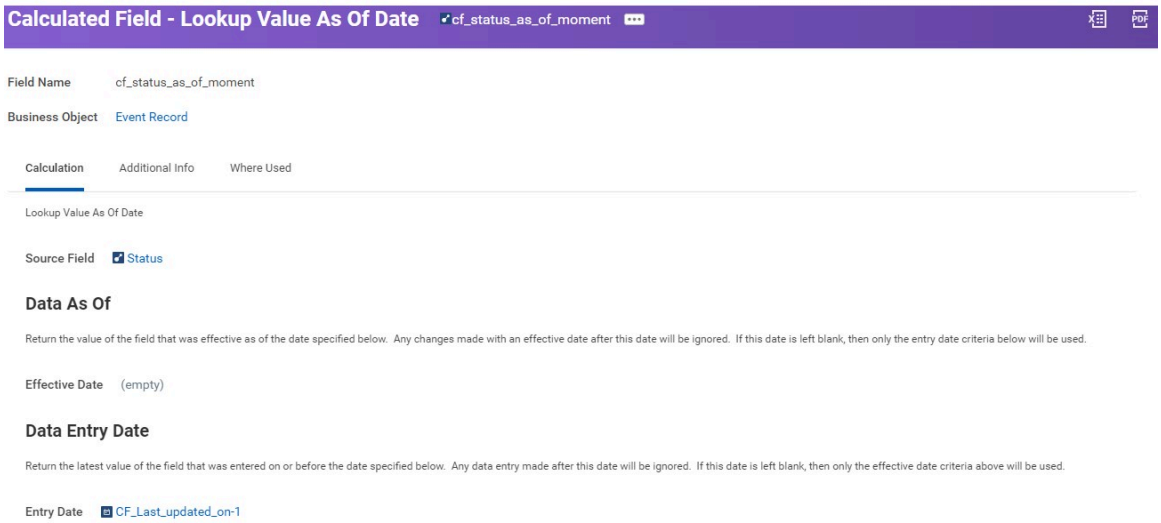


20. Create the Lookup Value As Of Date type calculated field with name, **cf_status_as_of_moment** and use **CF_Last_updated_on-1** in this field.



21. Create the Track Approval report.

a. Access **Create Custom Report** task.

b. Provide the report name such as, **SNIH_Inbox_Items**.

c. Select report type as **Advanced**.

d. Clear the **Optimized for performance** check box.

e. Select **Business Process Event steps** for **Data Source**.

f. Don't select **temporary report** check box.

g. Click **Ok**.

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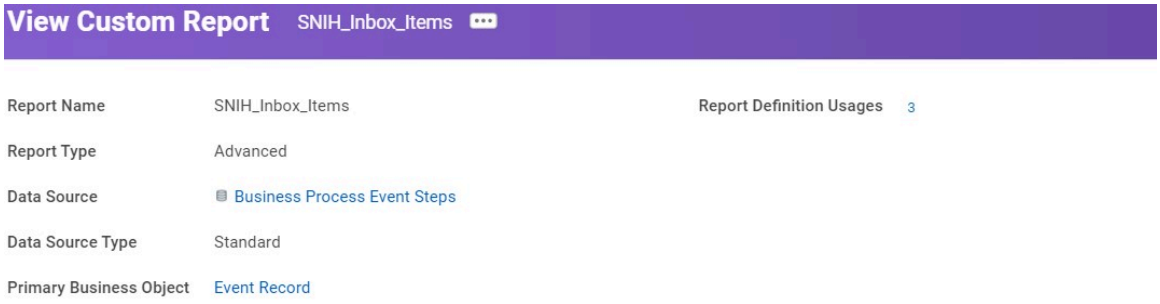
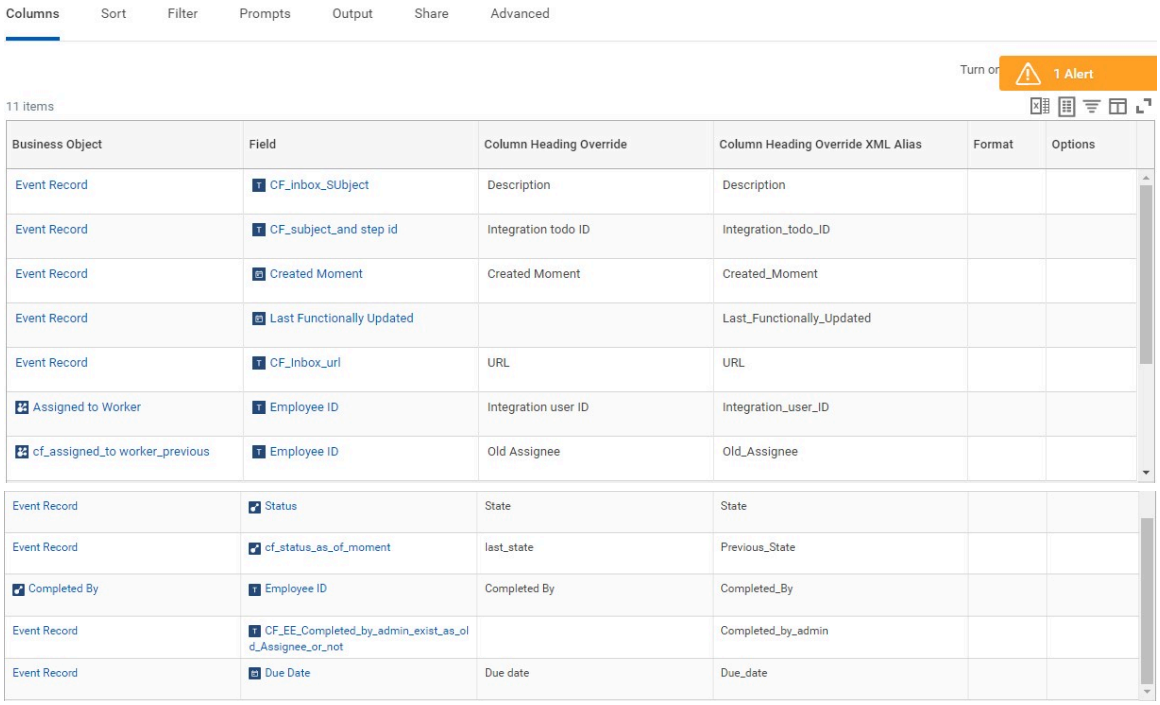


h. Select the report business object and report fields as shown here.



i. In the **Group Column Headings** section, select the business object as shown here.

The **Group Column Heading** for each business object is empty.



j. In the **Filter conditions for filtering on instances** section, select the values as shown.

Be sure to add parentheses.

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Filter on Instances

Filter conditions for filtering on instances 21 items

And/Or	(	Field	Operator	Comparison Type	Comparison Value	)	Indexed
And		Business Process Name	in the selection list	Value specified in this filter	Cancel Course Offering Cancel Learning Enrollment Drop Learning Enrollment Edit Course Additional Data Edit Course Offering Additional Data Edit Program Additional Data Enroll in Content Manage Course Manage Course Offering Manage Equivalency Rule Manage Extended Enterprise Learner Manage External Learning Instructor Manage External Learning User		
					Manage External Learning User Auto Manage Internal Learning Instructor Manage Learning Certification Rule Manage Lesson Manage Program Mass Cancel Learning Enrollments Request Extended Enterprise Learner Less (15)		
And	((	Status	in the selection list	Value specified in this filter	Awaiting Action In Progress Saved for Later Saved for Later		
And		Assigned to Worker	is not empty			)	
Or	(	Status	in the selection list	Value specified in this filter	Approved Approvers Added Canceled Canceled Declined Declined Declined Denied Denied In Progress		
					Manually Advanced Manually Terminated Manual Send Back Saved for Later Saved for Later Sent Back Step Completed Submitted Submitted Less (14)		
And		Step Type	not in the selection list	Value specified in this filter	Initiation Integration Service		
And		Completed By	is not empty			)	
Or	(	Step Type	in the selection list	Value specified in this filter	Initiation		
And		cf_status_as_of_moment	is not empty				
And		cf_assigned_to worker_previous	is not empty			)	
Or	(	Step Type	in the selection list	Value specified in this filter	Initiation		
And		CF_sent_back	equal to	Value specified in this filter	Yes	)	
Or	(	Step Type	in the selection list	Value specified in this filter	Initiation		
And		Cf_parent_business_process_definition	not in the selection list	Value from another field	Business Process Definition	)	
And	(	Status	not in the selection list	Value specified in this filter	Automatic Approval Automatic Cancel Automatic Complete Automatic Initiate Automatic Move Automatic Skip Notification Not Required Less (3)	)	

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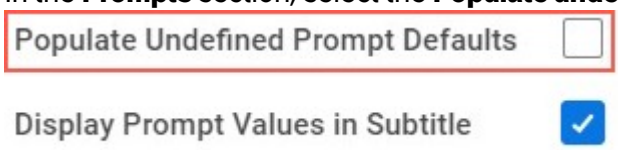
And		Status	is not empty				
And	(	Assigned to Worker	is not empty				
Or		cf_assigned_to worker_previous	is not empty				
Or		Completed By	is not empty			)	
And		Last Functionally Updated	greater than or equal to	Prompt the user for the value	Starting Prompt		
And		Last Functionally Updated	less than or equal to	Prompt the user for the value and ignore the filter condition if the value	Ending Prompt		
And		Step Type	is not empty			)	

k. In the **Prompts** section, select the **Populate undefined prompt defaults** check box.



l. Select the values under the **Prompt Default** section and ensure that the values of **Label For Prompt XML Alias** are as shown here.

Prompt Defaults 7 items

Field	Prompt Qualifier	Label for Prompt	Label For Prompt XML Alias	Default Type	Default Value	Required	Do Not Prompt at Runtime	Do Not Include in Subtitle
Workers			Workers	No default value			Yes	
Start Date			Start_Date	No default value		Yes		
End Date			End_Date	No default value		Yes		
Business Process Types			Business_Process_Types	No default value			Yes	
Event Record Actions			Event_Record_Actions	No default value			Yes	
Last Functionally Updated	Starting Prompt		Start_Date_and_time	No default value		Yes		
Last Functionally Updated	Ending Prompt		End_Date_and_time	No default value				

m. In the **Advanced** section, select the **Enable as webservice** check box and click **Ok**.

n. After the report configuration is done, click the three dots icon and navigate to **Web Services** > **View URLs**.

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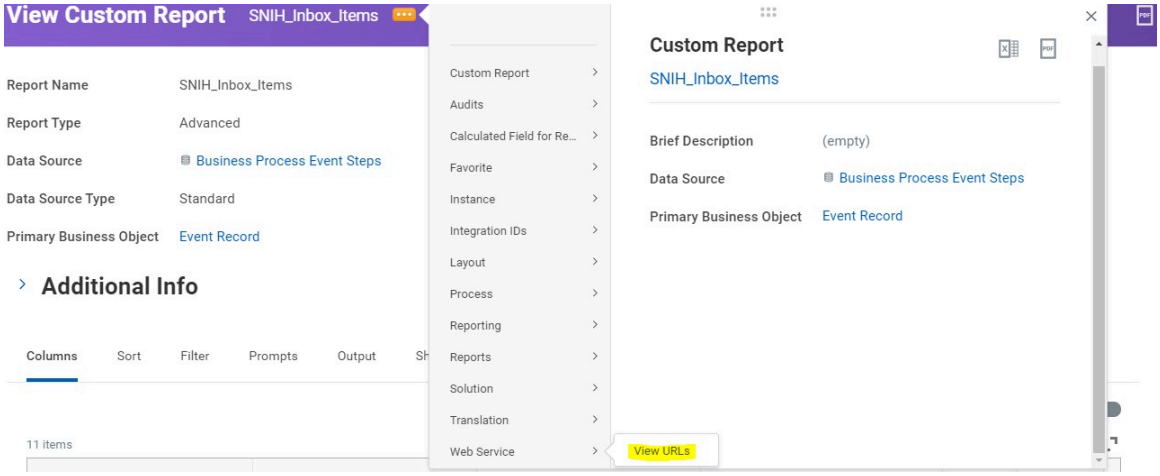
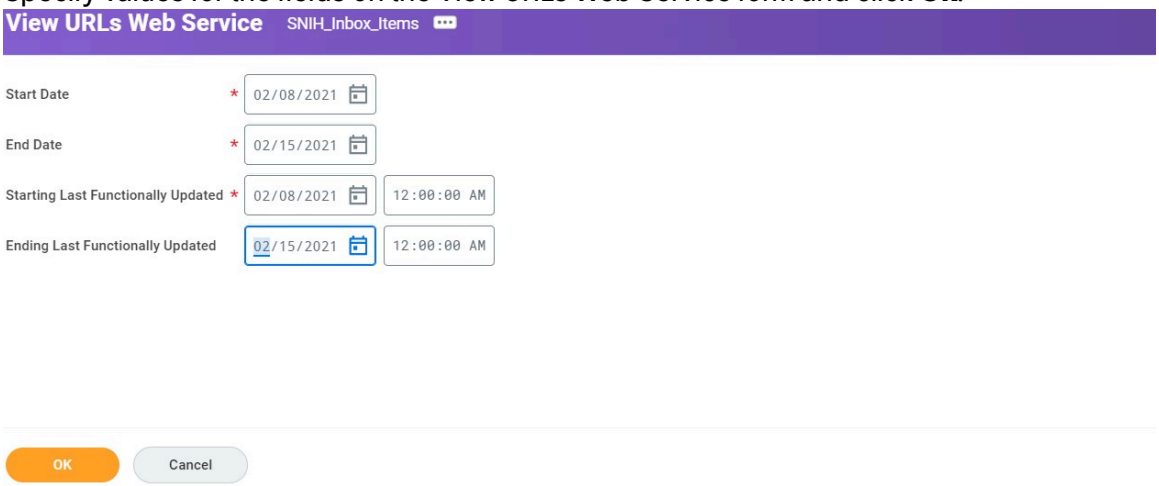
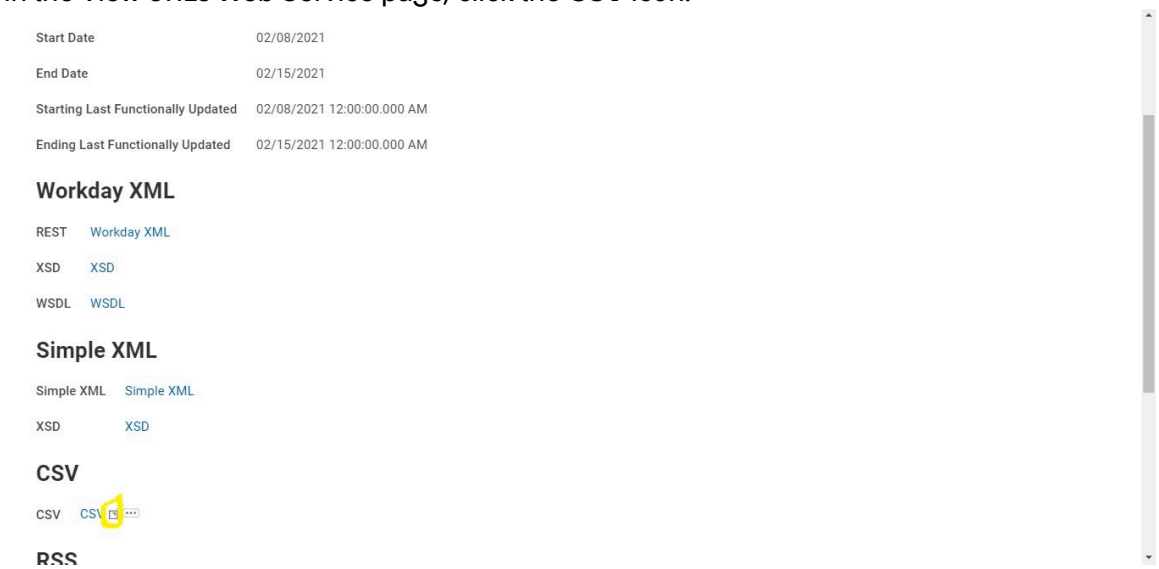


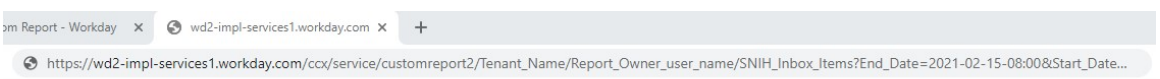
o. Specify values for the fields on the View URLs Web Service form and click **Ok**.



p. In the View URLs Web Service page, click the **CSV** icon.



The RaaS URL of the report is displayed in a new browser tab.



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- `https://wd2-impl-services1.workday.com` is the base URL of your Workday tenant.
- `Tenant_Name` is your Workday tenant.
- `Report_Owner_user_name` is the user name of the report's owner.
- `SNIh_Inbox_Items` is the report name.

Configure the Learning Enrollment report

Configure the Learning Enrollment report in Workday to retrieve user's learning enrollments.

Before you begin

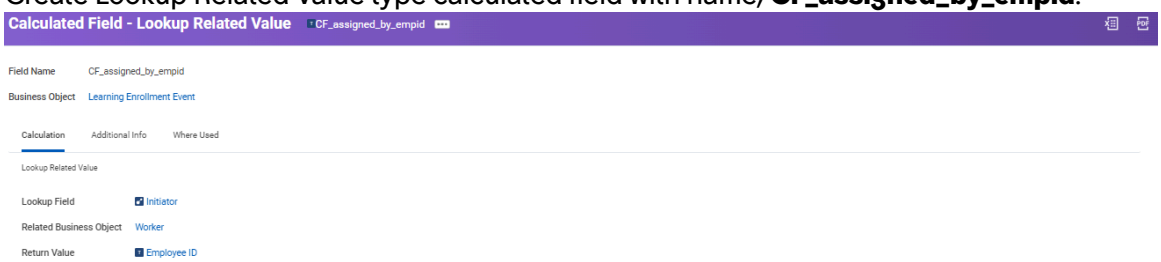
User with access to report creation and the Learning Enrollments data source.

About this task

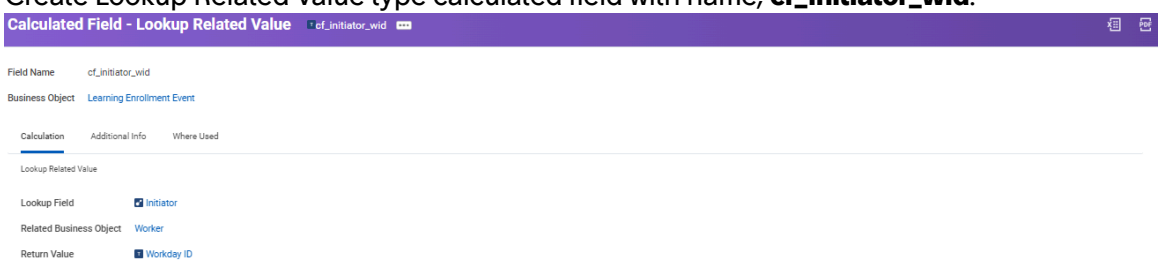
- For identification purposes, all calculated field name starts with **CF**.
- Create all calculated fields for this report before developing the report. Thus, all fields are available while creating the report.
- Report name can be different while creating the report. But ensure that the report field name or column heading override for the respective field (if it's given in the report document) is same as it is in the report document. Report field label should be same as it is in the report document. Else, the developed action fails.
- **Group Column Heading** for each business object in the **Group Column Headings** section should be empty.
- Ensure that you add parenthesis in filter while creating it.
- All reports must be shared or owned by the ISU user that accesses these actions on the ServiceNow platform.
- In the **Advanced** section, select the **Enable as webservice** check box.

Procedure

1. Create Lookup Related Value type calculated field with name, **CF_assigned_by_empid**.



2. Create Lookup Related Value type calculated field with name, **cf_initiator_wid**.



3. Create the True/False condition type calculated field with name, **CF_status_successfully_completed**.

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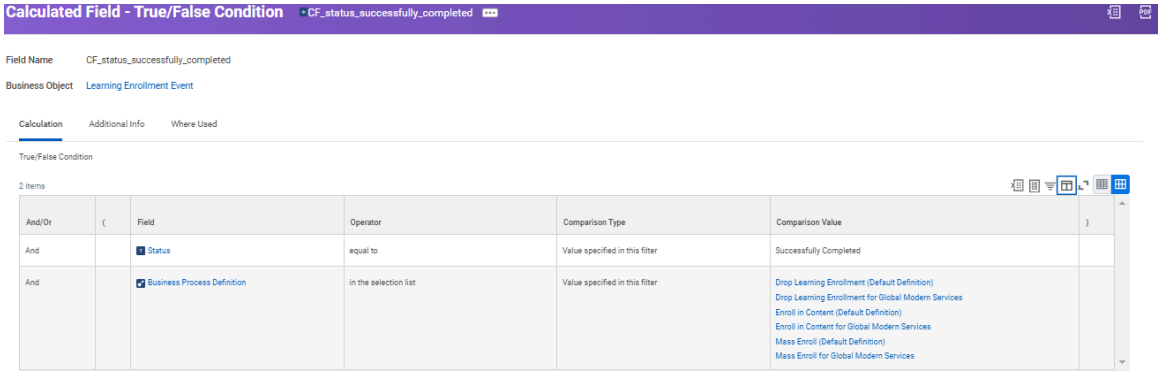
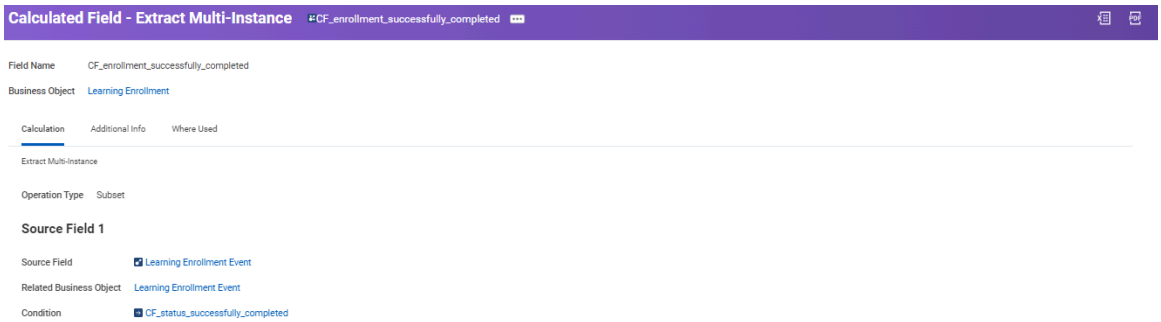
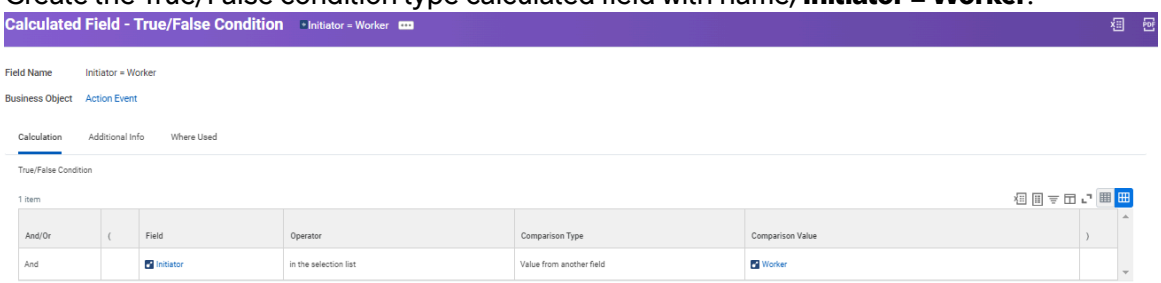


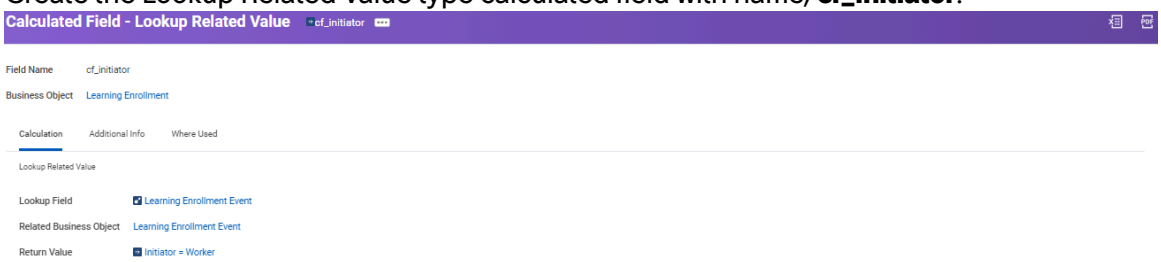
4. Create Extract Multi-instance type calculated field with name, **CF_enrollment_successfully_completed** and select **CF_status_successfully_completed** as the return value.



5. Create the True/False condition type calculated field with name, **Initiator = Worker**.



6. Create the Lookup Related Value type calculated field with name, **cf_initiator**.



7. Create the Learning Enrollment report.

   a. Access the **Create Custom Report** task.

   b. Provide the report name, for example, `Test -Learning Assignment`.

   c. Select report type as **Advanced**.

   d. Clear the **Optimized for performance** check box.

   e. Select **Data Source** as **Learning Enrollments**.

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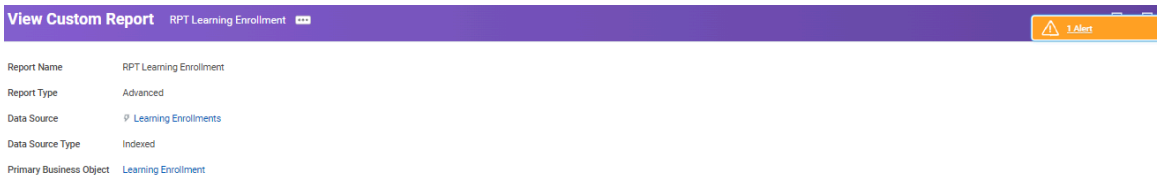
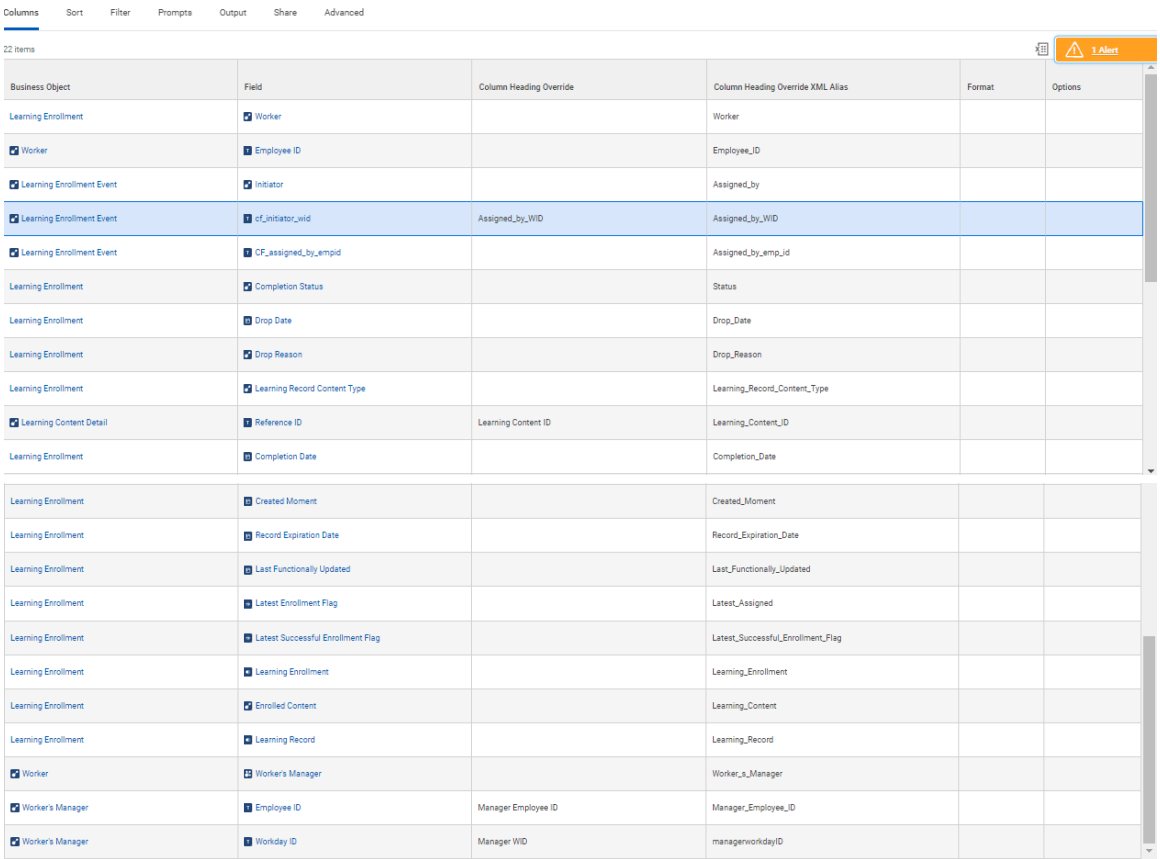
f. Don’t select the temporary report check box.

g. Click **Ok**.



h. Select the report business object and report fields.



i. In the **Group Column Headings** section, select all business objects as shown here.

The **Group Column Heading** for each business object is empty.



j. In the **Filter** section, select the values as shown here.

Be sure to add the parentheses.

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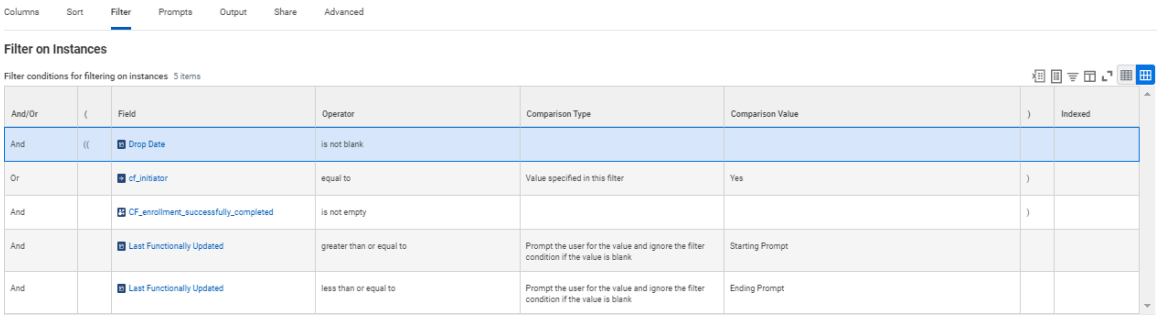
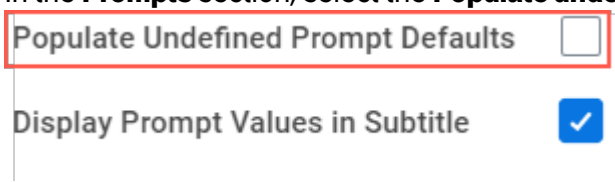


k. In the **Prompts** section, select the **Populate undefined prompt defaults** check box.



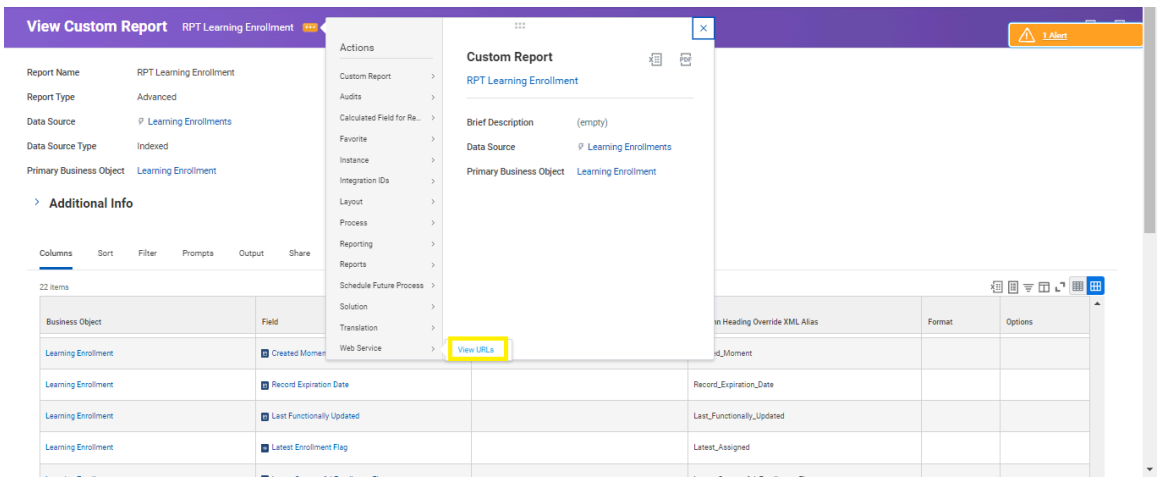
l. Under the **Prompts** section, select values as shown here.

Make sure that the values of **Label For Prompt XML Alias** for all prompt fields are as shown.



m. In the **Advanced** section, select the **Enable as webservice** check box and click **Ok**.

n. After report configuration is done, click the three dots icon and navigate to **Web Services** > **View URLs**.



o. Select time range and click **Ok**.

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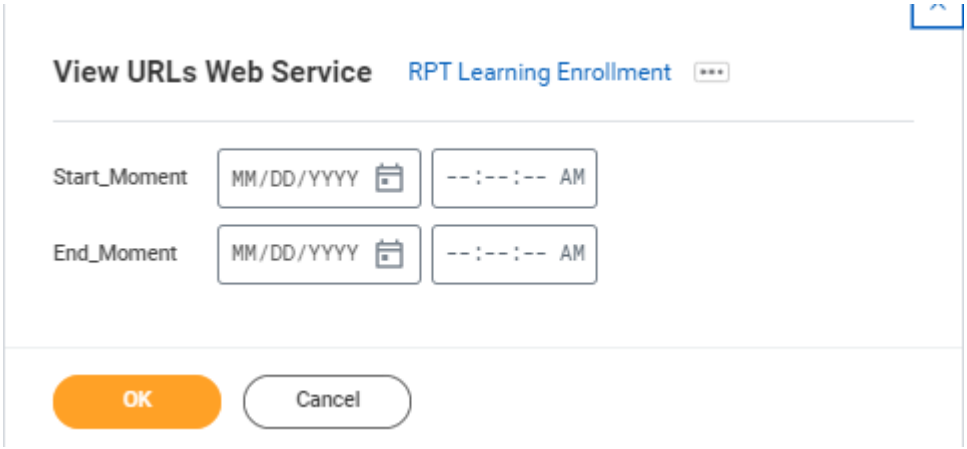

p. In the View URLs Web Service page, click the active link you want to generate. In a new browser tab, you can access the RaaS URL.

Configure the Learning Assignment report

Configure the Learning Assignment report in Workday to retrieve user's learning assignments.

Before you begin

User with access to report creation and the Learning Assignments by Learning Organization data source.

About this task

- For identification purposes, all calculated field name starts with **CF**.
- Create all calculated fields for this report before developing the report. Thus, all fields are available while creating the report.
- Report name can be different while creating the report. But ensure that the report field name or column heading override for the respective field (if it's given in the report document) is same as it is in the report document. Report field label should be same as it is in the report document. Else, the developed action fails.
- **Group Column Heading** for each business object in the **Group Column Headings** section should be empty.
- Ensure that you add parenthesis in filter while creating it.
- All reports must be shared or owned by the ISU user that accesses these actions on the ServiceNow platform.
- In the **Advanced** section, select the **Enable as webservice** check box.

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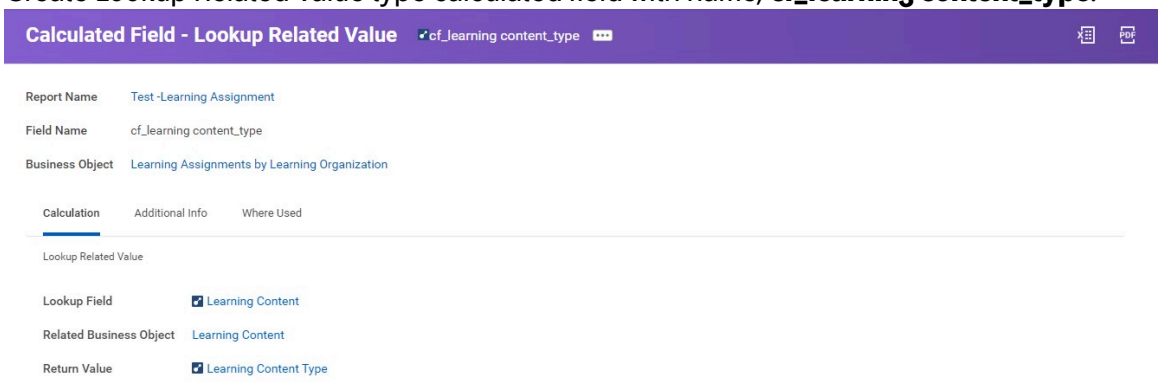
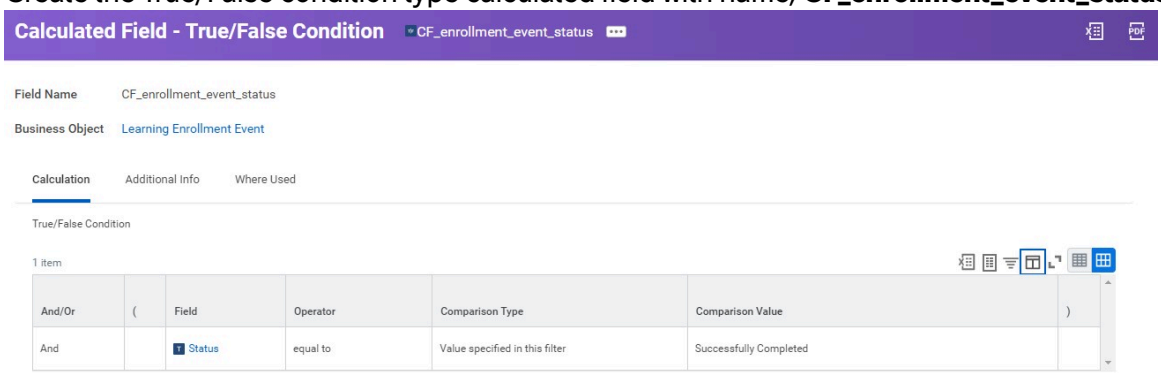
Procedure

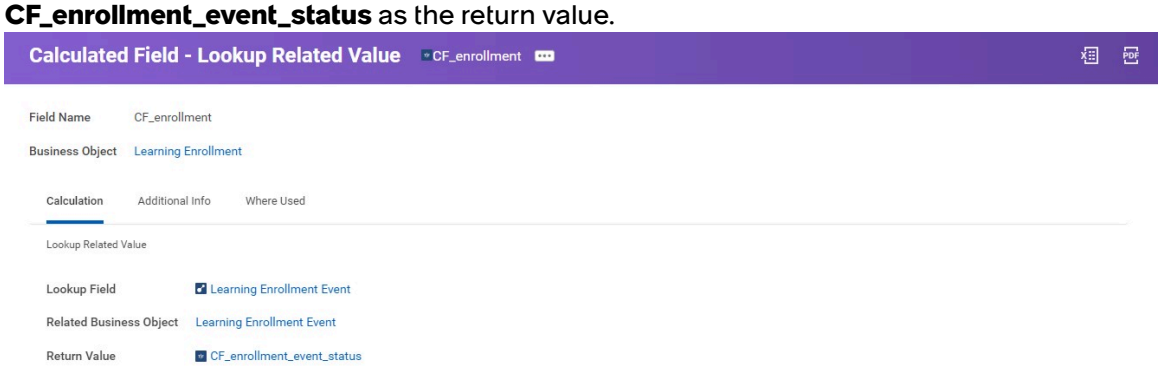
1. Create Lookup Related Value type calculated field with name, **cf_learning content_type**.



2. Create the True/False condition type calculated field with name, **CF_enrollment_event_status**.



3. Create the Lookup Related Value type calculated field with name, **CF_enrollment** and select **CF_enrollment_event_status** as the return value.



4. Create Extract Multi-Instance type calculated field with name, **CF_learning_enrollment** and select **CF_enrollment** as the return value.

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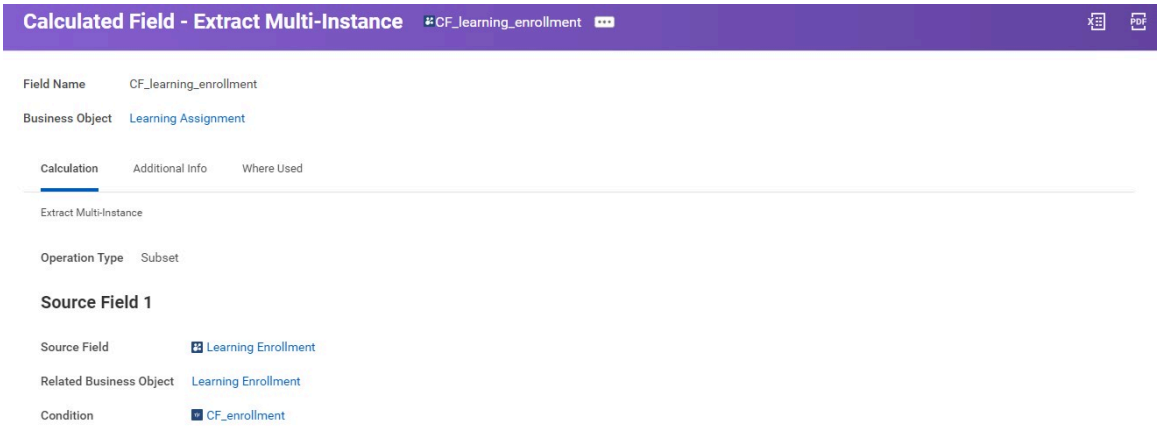
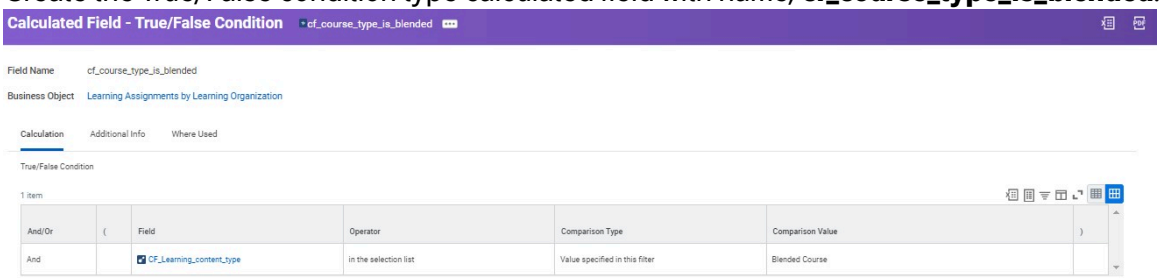
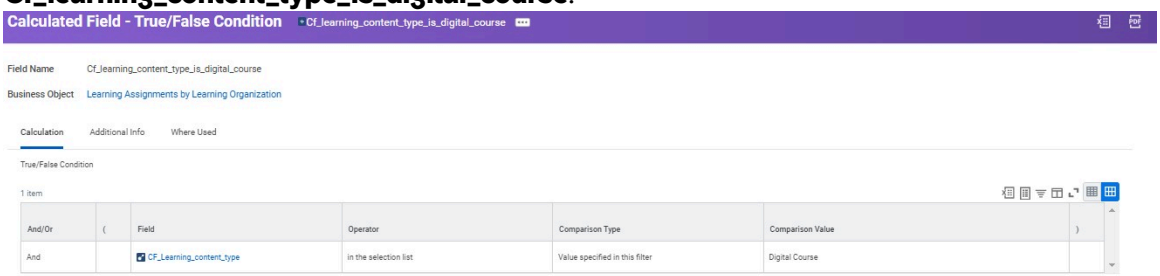


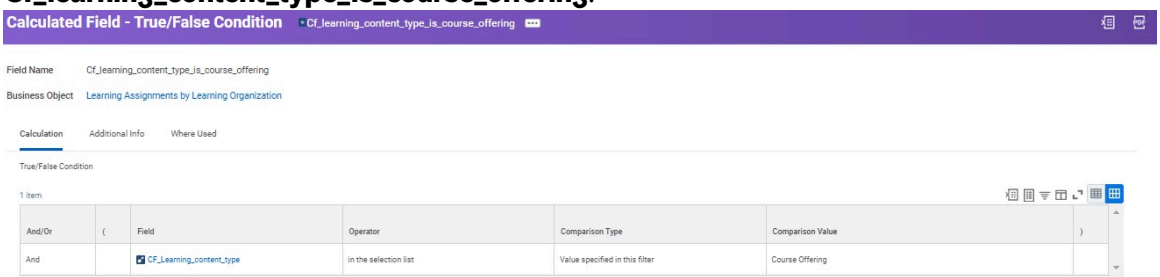
5. Create the True/False condition type calculated field with name, **cf_course_type_is_blended**.



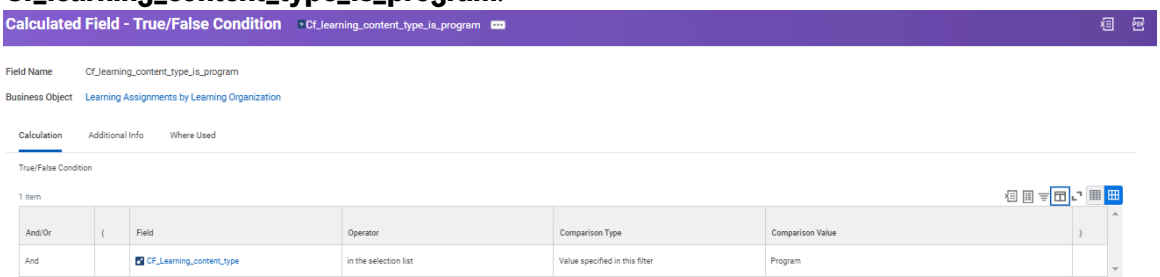
6. Create the True/False condition type calculated field with name, **Cf_learning_content_type_is_digital_course**.



7. Create the True/False condition type calculated field with name, **Cf_learning_content_type_is_course_offering**.



8. Create the True/False condition type calculated field with name, **Cf_learning_content_type_is_program**.



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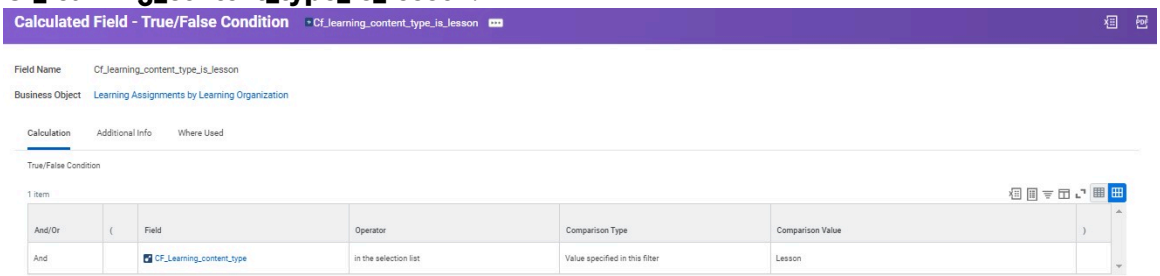
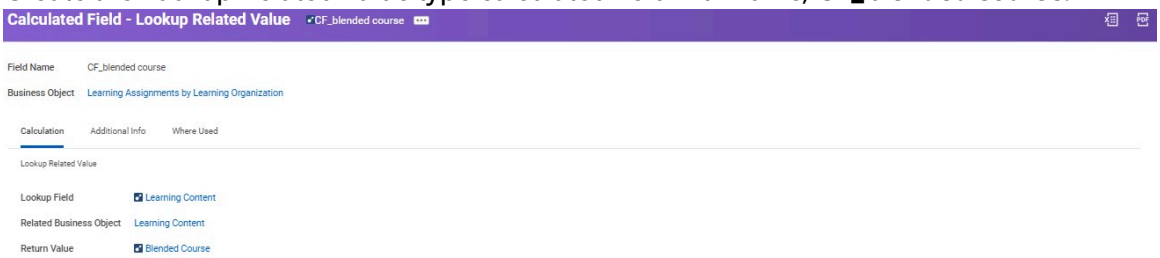
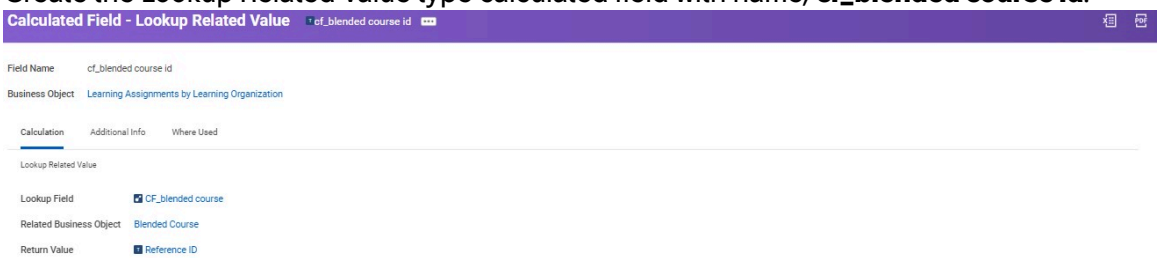
9. Create the True/False condition type calculated field with name, **Cf_learning_content_type_is_lesson**.



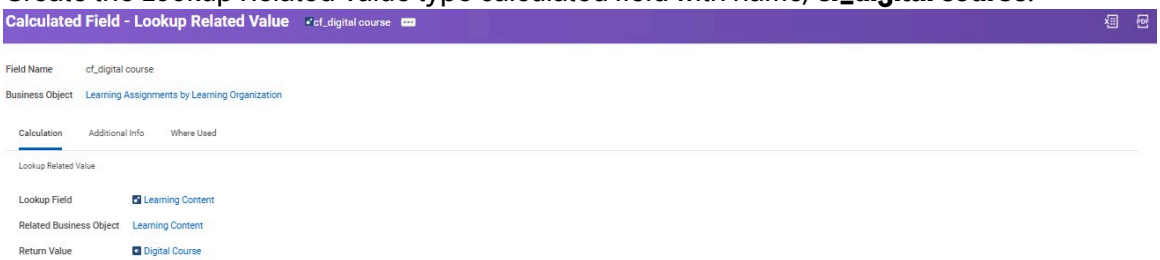
10. Create the Lookup Related Value type calculated field with name, **CF_blended course**.



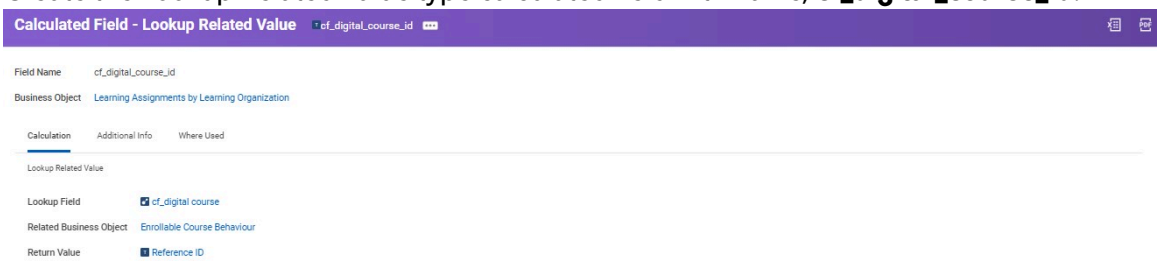
11. Create the Lookup Related Value type calculated field with name, **cf_blended course id**.



12. Create the Lookup Related Value type calculated field with name, **cf_digital course**.



13. Create the Lookup Related Value type calculated field with name, **cf_digital_course_id**.



14. Create the Lookup Related Value type calculated field with name, **cf_course_offering**.

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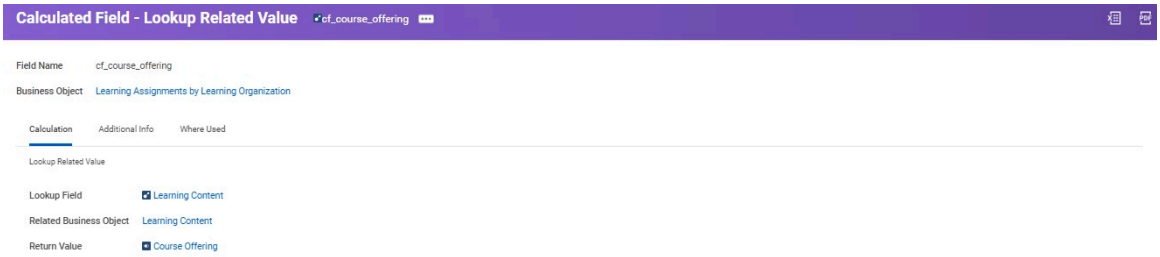
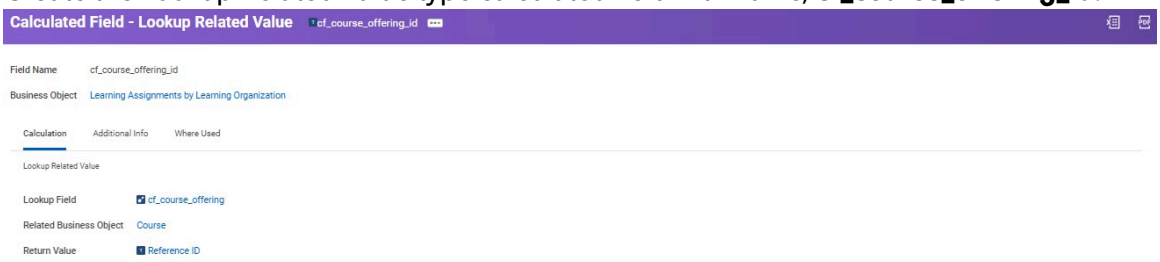
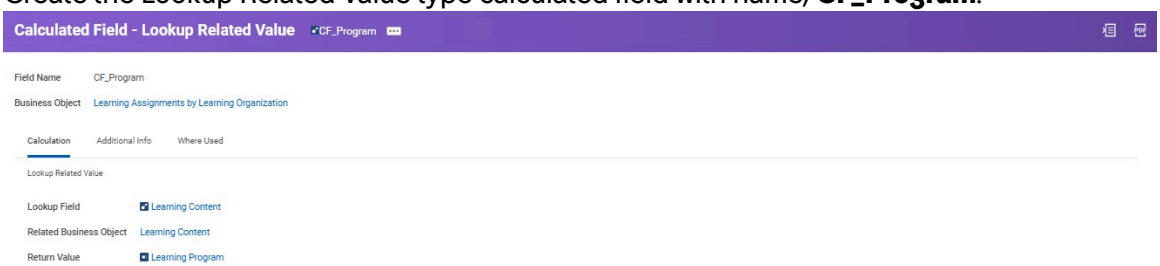


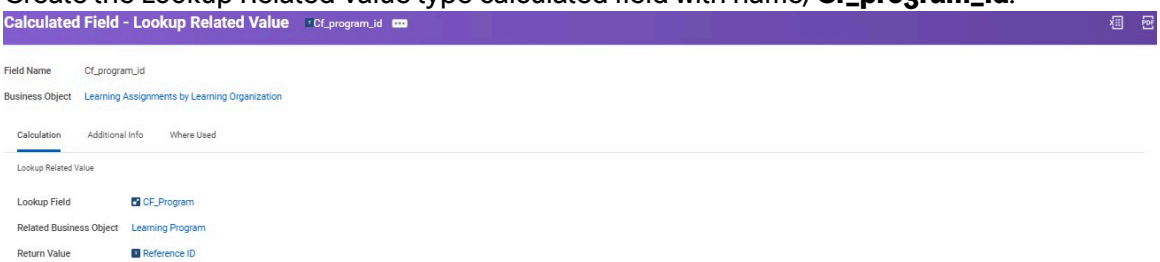
15. Create the Lookup Related Value type calculated field with name, **cf_course_offering_id**.



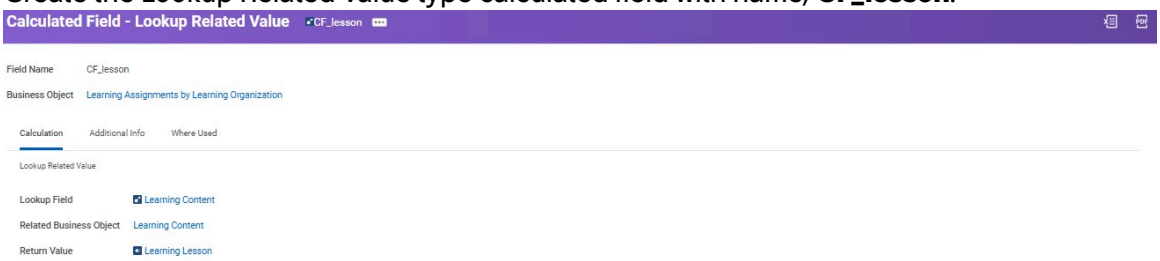
16. Create the Lookup Related Value type calculated field with name, **CF_Program**.



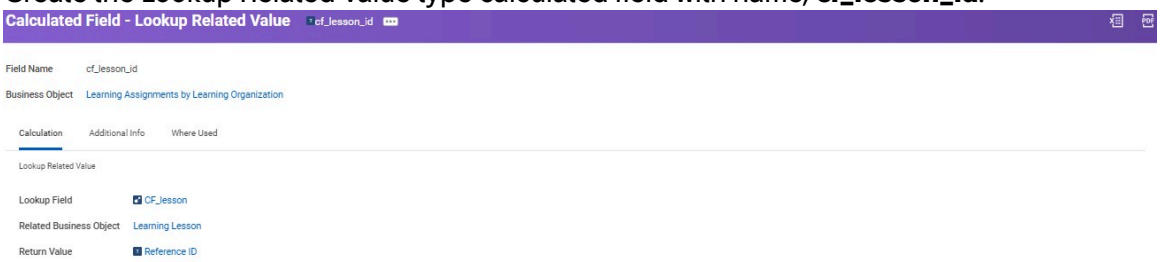
17. Create the Lookup Related Value type calculated field with name, **Cf_program_id**.



18. Create the Lookup Related Value type calculated field with name, **CF_lesson**.



19. Create the Lookup Related Value type calculated field with name, **cf_lesson_id**.



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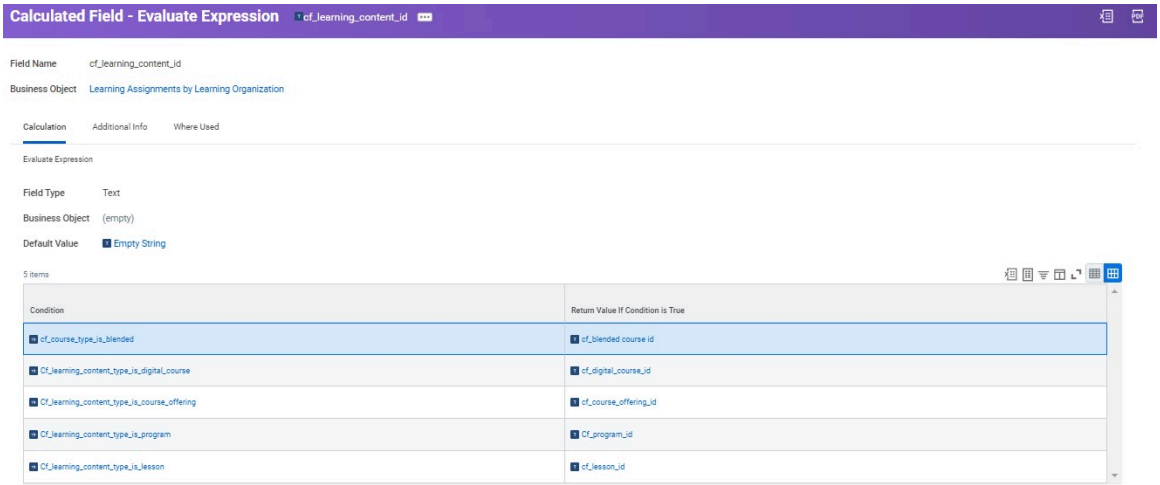
20. Create the Evaluate Expression type calculated field with name, **cf_learning_content_id** and use all the calculated field created under **Calculated field 3**.



21. Create the Learning Assignment report.

a. Access the **Create Custom Report** task.

b. Provide the report name, for example, `Test -Learning Assignment`.

c. Select report type as **Advanced**.

d. Clear the **Optimized for performance** check box.

e. Select data source as **Learning Assignments by Learning Organization**.

f. Don't select the temporary report check box.

g. Click **Ok**.



h. Select the report business object and report fields.

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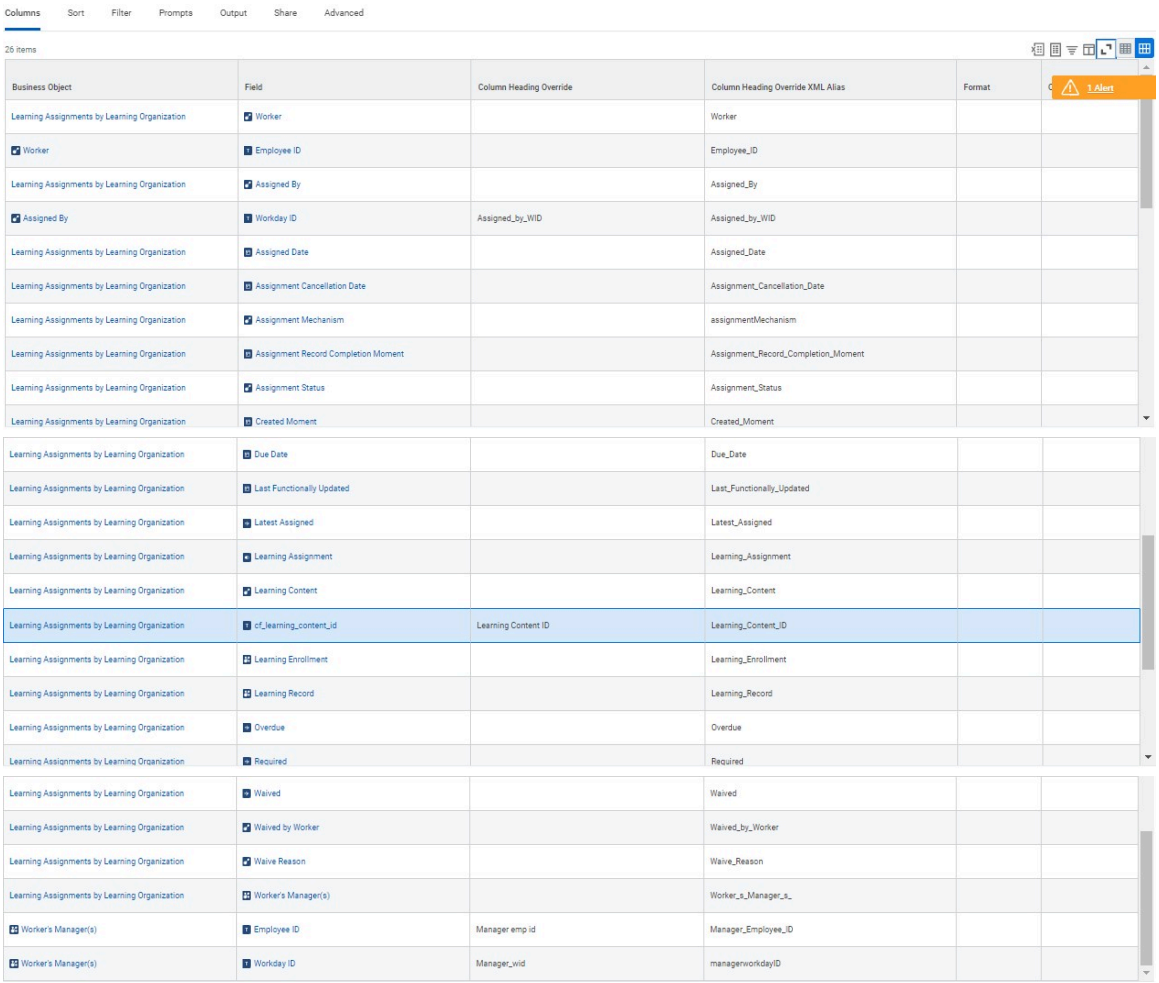
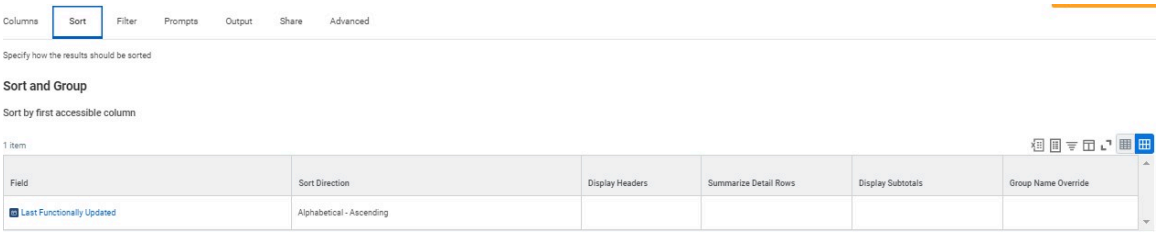


i. In the **Group Column Headings** section, select all business objects.

The **Group Column Heading** for each business object is empty.



j. In the **Sort** tab, select the values as shown here.



k. In the **Filter** tab, select the values as show here.

Be sure to add parentheses.

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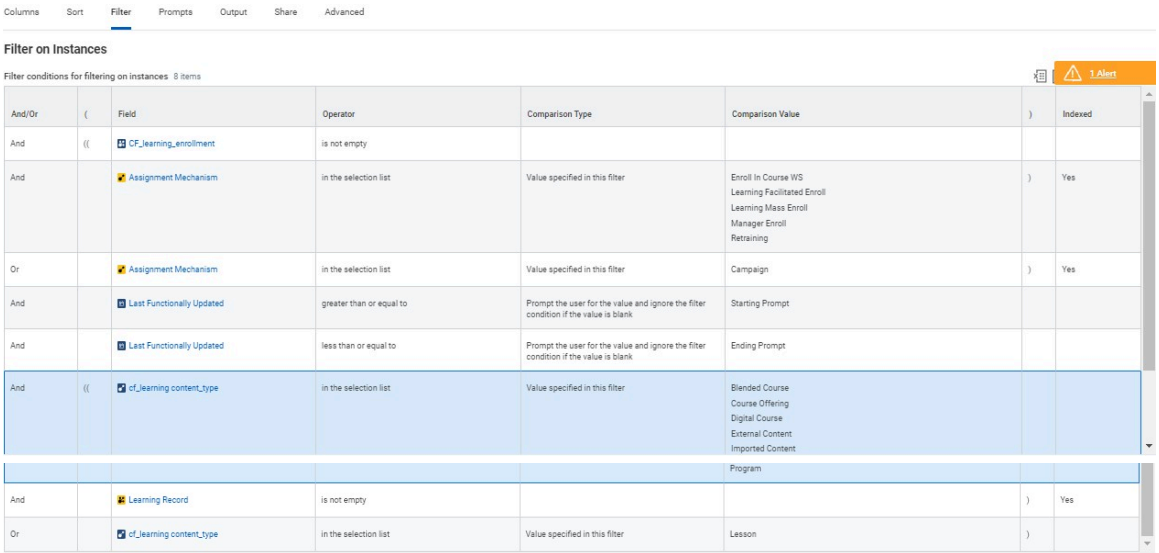
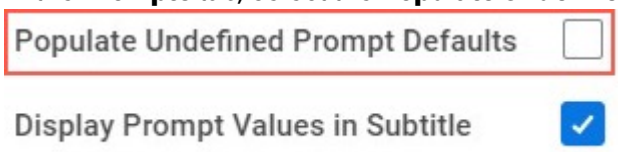
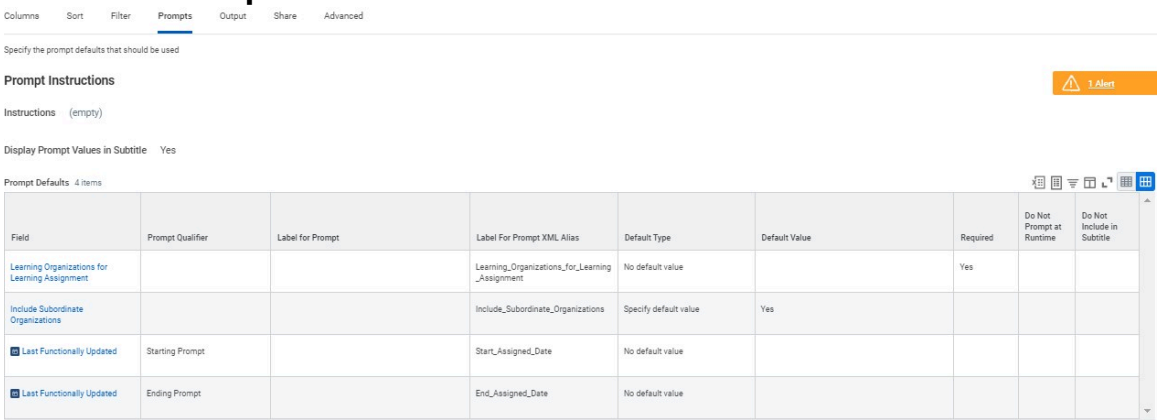


l. In the **Prompts** tab, select the **Populate Undefined prompt defaults** check box.



m. Select the values of prompts under the **Prompt Default** section and ensure that the values of the **Label For Prompt XML Alias** field are as shown here.



n. In the **Advanced** section, select the **Enable as webservice** check box and click **Ok**.

o. After the report configuration is done, click the three dots icon and navigate to **Web Services** > **View URLs**.

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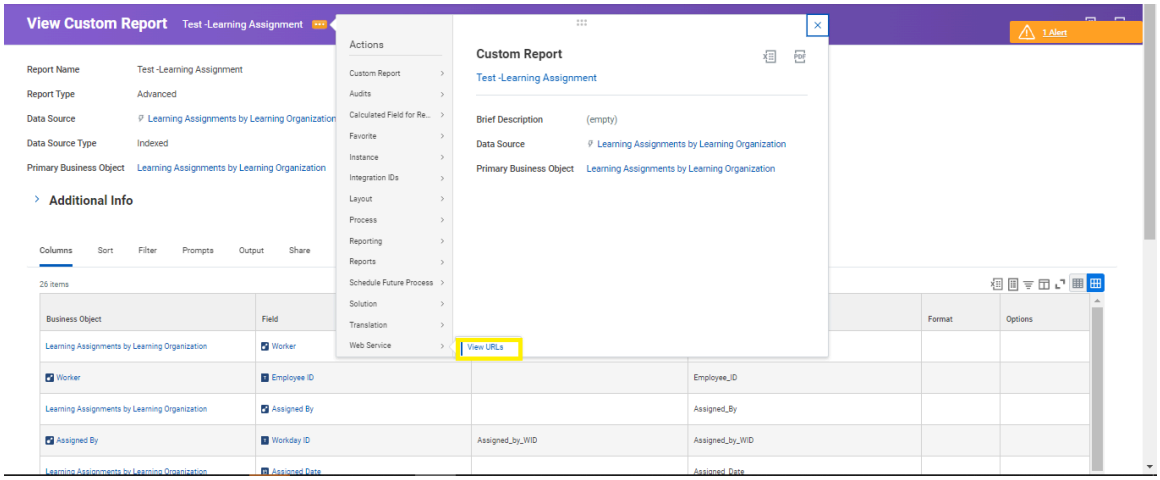
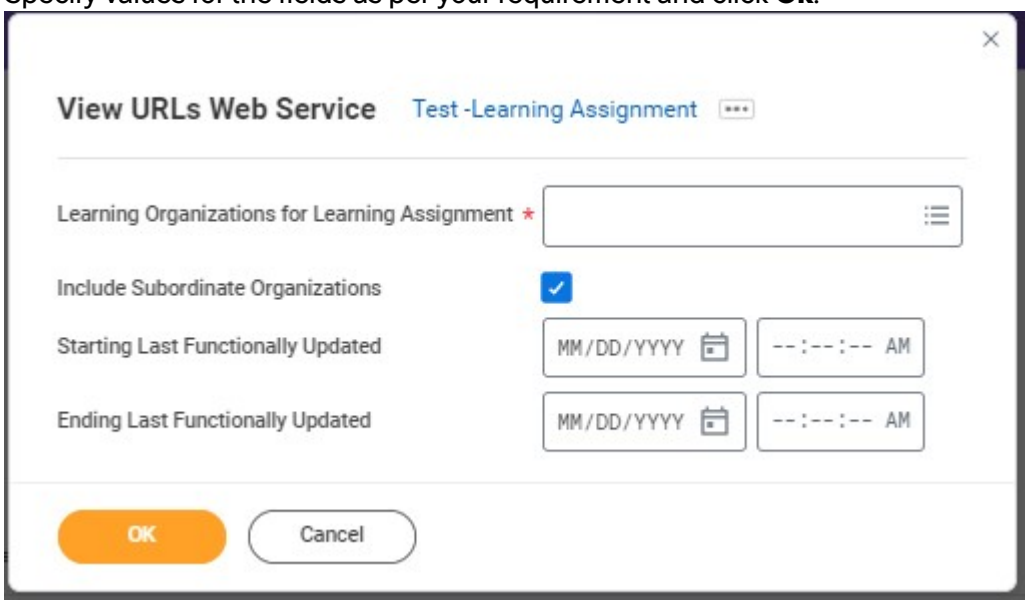


p. Specify values for the fields as per your requirement and click **Ok**.



q. In the View URLs Web Service page, click the active link you want to generate. The RaaS URL is displayed in a new browser tab.

Set up the Workday Learning spoke

Integrate the ServiceNow® instance Workday instance by using the OAuth 2.0 to authenticate ServiceNow® requests.

Before you begin

- Configure these reports in the Workday instance:
  - Learning Assignment
  - Learning Enrollment
  - Track Approval
- Request an Integration Hub subscription.
- Activate the Workday Learning spoke.
- Role required: admin.

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Configurations to use Workday SOAP web services

Configure your ServiceNow® instance to perform actions that use the Workday SOAP web services.

Before you begin

Role required: admin

Procedure

1. Create a WS-Security Username Profile to provide your Workday credentials to authenticate requests from ServiceNow®.

   a. Navigate to **All** > **Integration Hub** > **SOAP Integrations** > **WS-Security Username Profiles**.

   b. Click **New**.

   c. On the form, fill these values.

   WS-Security Username Profiles (Outbound)

Field	Description
Name	Name to uniquely identify this credential. For example, enter `Workday Learning User`.
Application	Application in which the record is applicable. Select **Workday Learning Spoke**.
Username	Workday user who has integration rights using Workday Web Services.
Password	Password of the Workday user.

   d. Click **Submit**.

2. Configure the SOAP security profile by adding the security user name profile you had created to authenticate requests from ServiceNow.

   a. Navigate to **All** > **IntegrationHub** > **SOAP Integrations** > **SOAP Security Policies**.

   b. Open the record for the Workday Learning spoke, for example, **Workday Learning**.

   > **Note:** If you intend to use another SOAP security policy record and not the default record, you must ensure that you select that record you had created in all the actions that use Workday SOAP web services.

   c. For **WS-Security Username Profile**, select the security username profile you had created for the Workday Learning spoke.

   d. Do not provide value in **WS-Security X.509 Profile**.

   e. Right-click the form header and click **Save**.

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Configurations to use Workday REST API

Configure the default connection and credential record by providing the required details to authenticate requests.

Before you begin

Role required: admin

Procedure

1. Configure the default application registry to register Workday Learning as an OAuth provider.

   a. Navigate to **System OAuth** > **Application Registry**.

   b. Open the record, **Workday Learning**.

   c. On the form, fill these values.

Field	Description
Client ID	Client ID you had copied when you registered an API client in your Workday instance.
Client Secret	Client secret you had copied when you registered an API client in your Workday instance.
Authorization URL	Authorization URL you had copied when you registered an API client in your Workday instance.
Token URL	Token URL you had copied when you registered an API client in your Workday instance.
Redirect URL	Redirect URL of the ServiceNow® instance in this format: `https://<ServiceNow-Instance-Name>.service-now.com/oauth_redirect.do`.
Default Grant type	Default grant type to establish the OAuth token. Select **Authorization Code**.

   d. Click **Update**.

2. Create a credential record.

   a. Navigate to **Integration Hub** > **Credentials**.

   b. Click **New**.
   The system displays the message `What type of Credentials would you like to create?`.

   c. Select **OAuth 2.0 Credentials**.

   d. On the form, fill these values.

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Field	Description
Name	Name to identify the credential record. For example, `Workday Learning Cred`.
OAuth Entity Profile	Default OAuth entity profile record. For example, `Workday Learning default_profile`.

e. Click **Submit**.

3. Configure the default connection and credential alias record.

a. Navigate to **Integration Hub** > **Connection & Credential Aliases**.

b. Open the **Workday Learning** record.

c. In the **Connections** tab, click **New**.

d. On the form, fill these values.

Field	Description
Name	Name to identify the connection record. For example, **Workday Learning Conn**.
Credential	Associated credential record. Select the credential record you had created earlier. For example, `Workday Learning Cred`.
Connection URL	URL to connect to your Workday instance.

e. In the **Attributes** tab, specify the tenant name of your Workday instance in **Tenant Name**.

f. Click **Submit**.

4. Navigate to **Integration Hub** > **Credentials**.
5. Open the record, **Workday Cred**.
6. Click **Get OAuth Token**.
System prompts to confirm if you want to authorize Workday.

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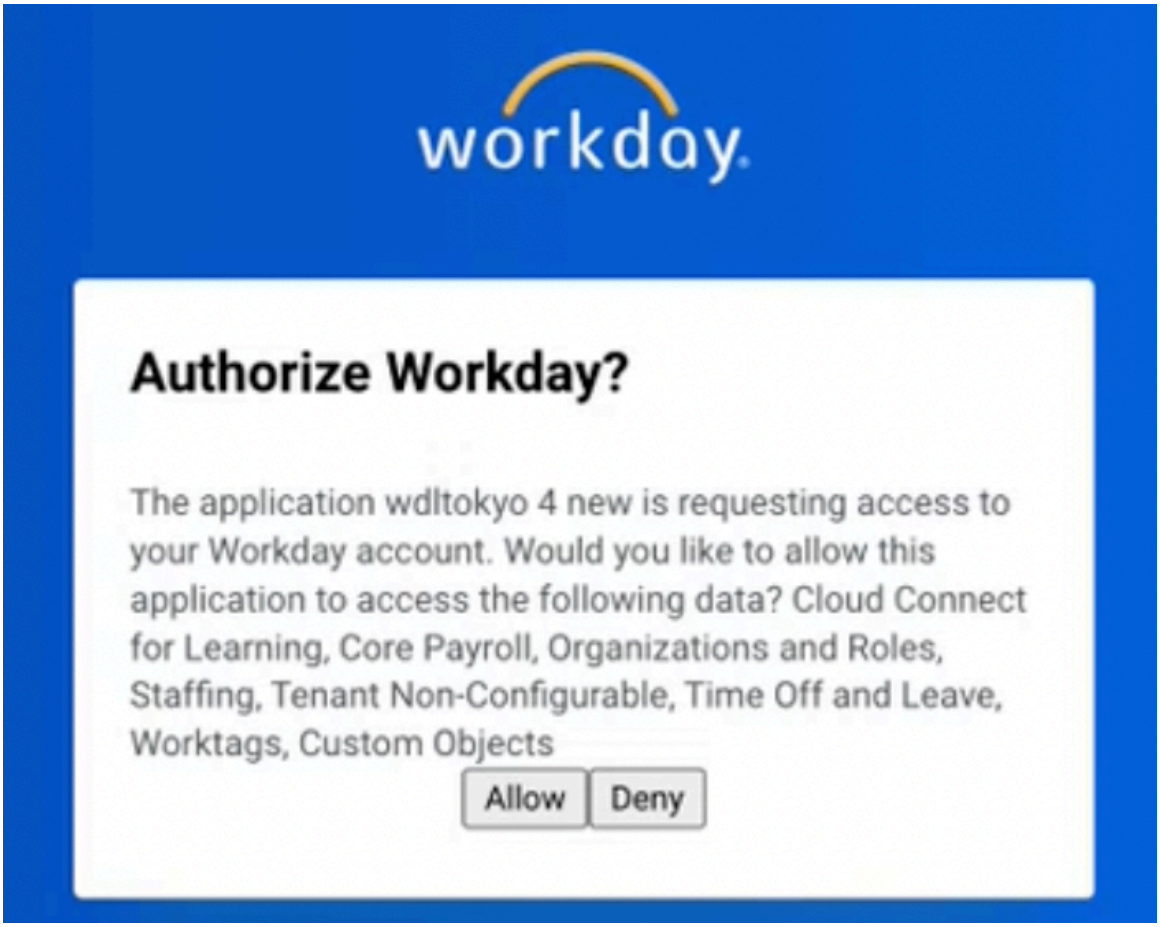
7. Click **Allow**.



Configure the Workday reports

Set up the required Workday reports in your ServiceNow® instance.

Before you begin

Role required: admin

Procedure

1. Navigate to **Workday Learning** > **Report Configuration**.
2. On the form, fill the fields.

Field	Description
Workday learning assignment RAAS report name	Report name of the learning assignment RAAS report.
Workday learning to dos report owner username	Username of the learning todos RAAS report owner.
Workday learning to dos RAAS report name	Report name of the learning todos RAAS report.
Workday learning enrollment RAAS report name	Report name of the learning enrollment RAAS report.

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Field	Description
Learning organization type	Organization type to which employee belongs to. You can select either **Organization Reference ID** or **WID**.
Workday learning enrollment report owner username	Username of the learning enrollment RAAS report owner.
Initial load start date time	Initial start date and time that is needed for the Look up Approvals actions.
Workday learning assignment report owner username	Username of the learning assignment RAAS report owner.
Learning organization ID	Unique identifiers of the organizations separated by commas (,). You can provide a maximum of upto 999 identifiers.

3. Click **Submit**.

Note: You can maintain only one record in this module.

Update timezone

Update the timezone of the Workday tenant in your ServiceNow instance.

Before you begin

Role required: admin

Procedure

1. Navigate to **Workday Learning** > **Profile Sync Configuration**.
2. Click **New**.
3. On the form, select **Workday tenant time zone** and **Domain** as per your requirement.
4. Click **Submit**.

Workfront Spoke

The Workfront spoke provides actions to view and analyze meaningful usage data for Workfront software subscriptions. Analyze usage for your Workfront account to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Workfront v1.4.3 is the latest version. For version history of the spoke, see Workfront spoke release notes.

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Supported versions

This spoke was built for Workfront v1.1.1, but may be compatible with later versions.

Spoke requirements

Adobe Workfront administrator account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Workfront spoke provides actions to automate Workfront tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Document Management	Check in Documents	Checks in a checked-out document based on its ID.
	Check out Documents	Checks out a checked-in document based on its ID.
	Is Document Linked	Determines if the document is linked by its unique identifier.
	Is Proof Auto Generation Enabled	Determines if proof is auto enabled for the corresponding ID.
	Look up Documents Stream	Retrieves the details of all access levels.
	Upload Attachment	Creates a document in a Workfront Instance.
	Unlink Document	Unlinks a document from the Workfront.
	Upload Attachment to Handle	Creates a new document on the Workfront instance.
	Look up Proof Templates	Gets all proof template information.
	Move Document	Moves a document to a project, task, or an issue.
	Look up Proof Recipients	Returns the details of the recipients for the given template and proof stage ID.
	Look up Proof Stages	Gets the stage information of the Proof ID.

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Category	Action	Description
	Look up Total Documents Size	Determines the size of the documents.
	Upload Attachment to Object	Creates or links the document to the Workfront Object after the 'Upload Attachment to Handle' action.
	Look up Documents Stream	Retrieves a list of all documents.
	Look up Templates Stream	Retrieves a list of all templates.
Finance Management	Look up Expenses Stream	Retrieves a list of all expenses.
Issue Management	Move Issue to another Project	Moves an issue to a project.
	Move Issue to Task	Moves one or more issues from the Workfront.
	Bulk Move of Issues	Moves bulk issues to a task.
Portfolio Management	Look up Portfolios Stream	Retrieves a list of all portfolios.
Program Management	Look up Programs Stream	Retrieves a list of all programs.
Project Management	Calculate Project Timeline	Calculates the timeline for a project based on its ID.
	Calculate Project Finance	Calculates the finances for a project with the unique ID specified.
	Set Project Budget	Sets the budget for the specific project with the unique ID specified.
	Look up Issues Stream	Retrieves a list of all issues.
	Look up Projects Stream	Retrieves a list of all projects.
	Look up Tasks Stream	Retrieves a list of all tasks.
Record Management	Accept Object Work	Accepts work in Workfront for the recently created object.
	Approve Approval of Object	Approves the request for the object's approval.
	Assign Assignee to Object	Assigns a team, user, or role to a Workfront object.
	Assign Multiple Assignees to Object	Assigns a Workfront object to multiple users, roles, or a team.
	Calculate Object Data Extension	Calculates the data extension for the specified object.
	Create Object	Creates an object in your Workfront instance.
	Delete Object	Removes an object from the Workfront instance.

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Category	Action	Description
	Look up Object by ID	Retrieves the details for the given object ID as an input.
	Look up Object Count	Returns the current item count.
	Recall Object Approval	Recalls the approval request for the Workfront object.
	Reject Approval of Object	Rejects the approval request for the Workfront object.
	Reject Object Work	Rejects the work action on the object.
	Reply to Object Assignment	Responds to the assignment of an object.
	Unassign User from Object	Unassigns a user from a Workfront object.
	Update Object as Done	Updates an object as done in the Workfront.
	Update Object as Not Done	Updates an object as not done in the Workfront.
	Update Object by ID	Updates the object in the Workfront.
Report Management	Look up Filters Stream	Retrieves a list of all filters.
	Look up Reports Stream	Retrieves a list of all reports.
Task Management	Bulk Copy of Tasks	Copies one or more tasks from the Workfront.
	Bulk Move of Tasks	Moves one or more tasks from the Workfront.
	Move Task	Moves a specific task to different project or task.
Template Management	Look up Task Templates	Gets all task template information.
	Look up Project Templates	Gets all project template information.
User Management	API Inputs (Metadata)	Retrieves a list of fields for the specified object code that is used as dynamic input.
	API Outputs (Metadata)	Retrieves a list of fields for the specified object code that is used as dynamic output.
	Look up Access Levels Stream	Retrieves a list of all access levels for Workfront licenses.
	Look up Users Stream	Retrieves a list of all users within an account.
	Update User	Modifies details about the specified user.
Webhook Management	Look up Event Subscriptions Stream	Retrieves the details of all event subscriptions.

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Category	Action	Description
	Look up Event Subscription by ID	Retrieves the details of the event subscription for the specified ID.
	Create Event Subscription	Creates a new event subscription in your Workfront instance.
	Delete Event Subscription	Removes a subscription from the Workfront instance.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Workfront spoke.

Set up the Workfront spoke

Set up an outbound integration between the ServiceNow instance and the Workfront instance.

Before you begin

- Request an Integration Hub subscription.
- Activate the Workfront spoke.
- Workfront role required: Administrator
- Role required: admin

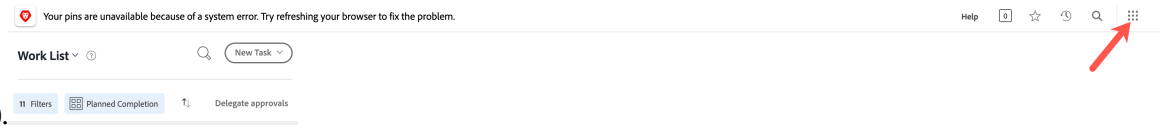
Generate a Workfront API key

Generate an API key for authenticating Workfront API requests.

Before you begin

Role required: Workfront administrator

Procedure

1. From a web browser, open Adobe Workfront.
2. Log in to the Adobe Workfront instance.
3. On the page header of your Adobe Workfront instance, select the main Menu icon ().


4. Select the Setup icon ().
5. From the left navigation menu of the Setup page, navigate to **System** > **Customer Info**.

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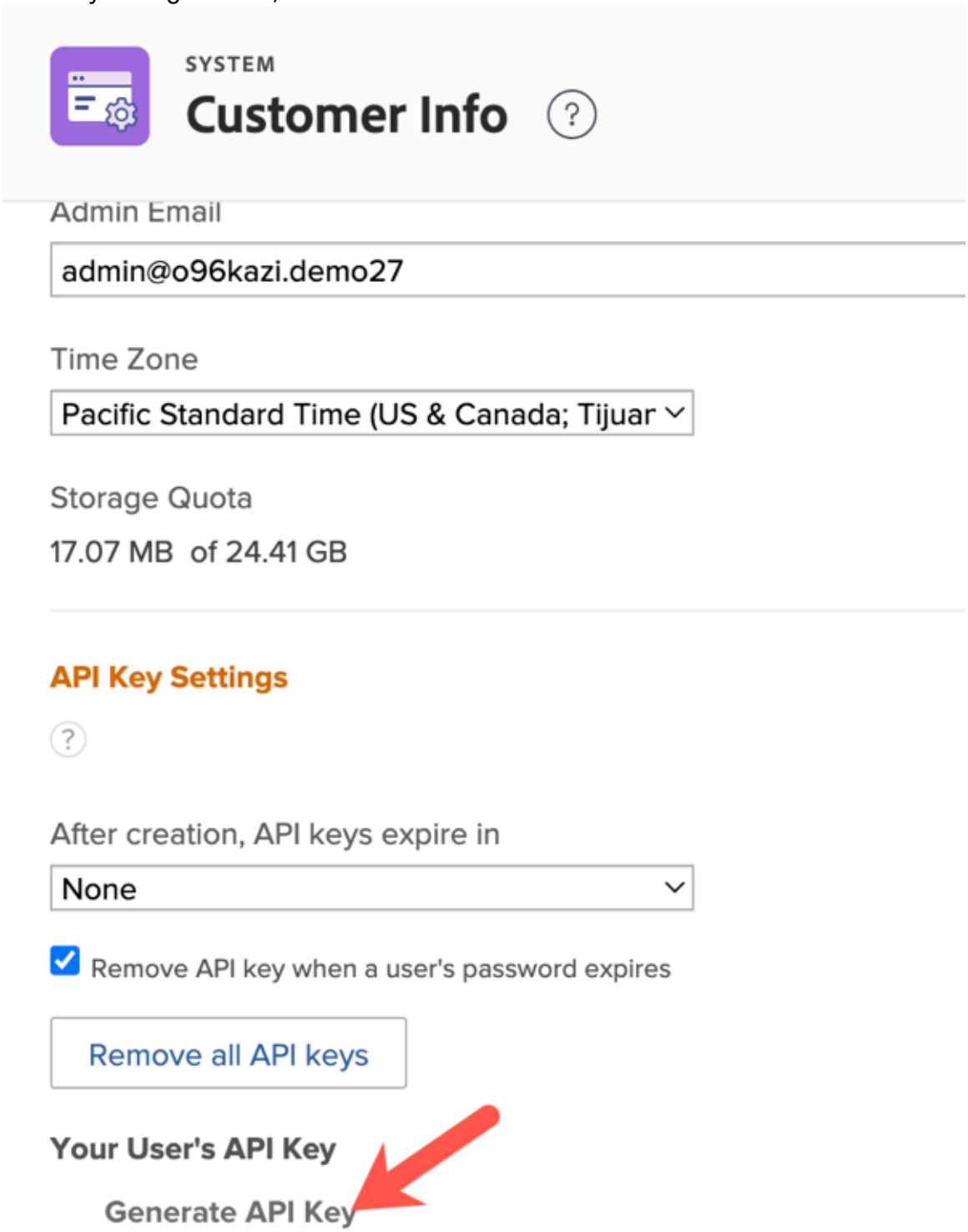
6. In the API Key Settings section, select **Generate API Key**.



The API key is generated.

7. Copy the API key and save for later use.
8. **Optional:** To set an expiry date to the API key, in the **After creation, API keys expire in** list, select the time period.
9. Click **Save**.

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Create a Workfront connection record

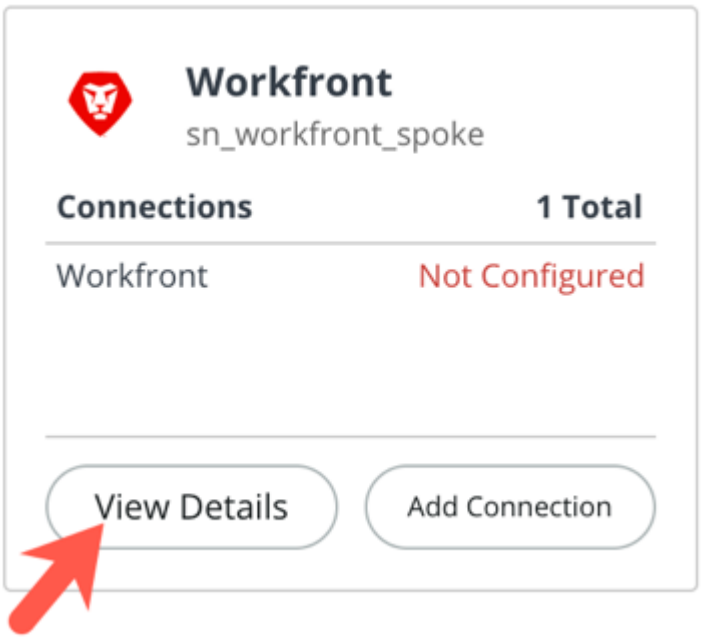
Create a connection record between the ServiceNow instance and the Workfront instance. The connection record consists of the connection details and the API key.

Before you begin

Role required: admin

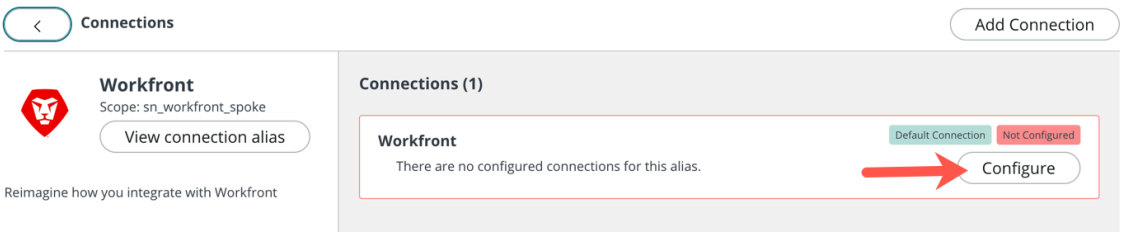
Procedure

1. Log in to the ServiceNow instance.
2. Navigate to **Process Automation** > **Flow Designer**.
3. Select **Connections**.
4. In the Search all connections field, enter `workfront`.
5. On the Workfront tile, click **View**



Details.

6. Click



Configure.

7. Fill the form.

Create Connection dialog box

Field	Description
Connection Name	Name of the Workfront connection. **Note:** The default name of the first connection record is Workfront and it's read-only. To provide a custom name, you must create another connection record.

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Field	Description
Connection URL	URL for the connection. Enter `https://<domain-name>.my.workfront.com`, where <*domain-name*> is your company subdomain.
API Key	The API key that you generated from the Workfront instance. To learn how to generate an API key, see Generate a Workfront API key.

8. Click **Configure Connection**.

Workplace from Facebook Spoke

Manage users, groups, and notifications in Workplace from Facebook account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Note: Workplace from Facebook is compatible with ServiceNow version, Paris with Patch 3 and later.

Spoke version

Workplace from Facebook spoke v4.2.0is the latest version. For version history of the spoke, see Workplace from Facebook spoke release notes.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)

Note: Some of these plugins are licensable features and require an appropriate license if used outside the spoke implementation. For information on licenses, contact your account manager.

Spoke subflows

The Workplace from Facebook spoke provides a sample subflow, Fetch Workplace from Facebook Groups that demonstrates automating group management tasks. To customize the sample flow, copy it to the required application scope.

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Spoke actions

The Workplace from Facebook spoke provides actions to manage users, groups, and notifications. Available actions include:

Category	Action	Description
Group Management	Add User To Group	Adds a user to a group in Workplace from Facebook.
	Create Group	Creates a group in Workplace from Facebook.
	Deactivate Groups	Deactivates groups that have not been updated during the last execution of the Fetch Workplace from Facebook Groups subflow.
	Lookup Group ID	Retrieves the group ID for a given group name in Workplace from Facebook.
	Lookup Groups	List all groups in Workplace from Facebook.
	Remove User From Group	Removes a user from a group in Workplace from Facebook.
Group Post Management	Post Message	Posts a message to a Workplace from Facebook group.
	Post Picture	Posts an image and message to a Workplace from Facebook group.
	Post Change Details	Posts change request details in a Workplace from Facebook group.
	Post Incident Details	Posts incident details in a Workplace from Facebook group.
	Post Problem Details	Posts problem details in a Workplace from Facebook group.
User Management	Lookup User ID	Retrieves the user ID from a registered email in Workplace from Facebook.
	Look up Organization Members Stream	Retrieves a list of#users in#Workplace from Facebook.
	Deactivate a User	Deactivates a Workplace from Facebook user.
	Create User	Creates a user in Workplace from Facebook.
	Look up User	Retrieves user details based on the user's registered email in Workplace from Facebook.
Event Management	Look up Events Stream	Retrieves events of the Workplace from Facebook community.
Knowledge Library Category Management	Look up Knowledge Library Categories Stream	Retrieves the knowledge library categories created in Workplace from Facebook.
Message Management	Look up Conversations Stream	Retrieves conversations of the specified user.
	Look up Feeds Stream	Retrieves feeds on the specified group.

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Category	Action	Description
	Send Change Details	Sends change details to user in a Workplace from Facebook group.
	Send Image	Sends an image or file to users in Workplace from Facebook.
	Send Incident Details	Sends incident details to user in a Workplace from Facebook group.
	Send Message	Sends messages to users in Workplace from Facebook.
	Send Problem Details	Sends problem details to user in a Workplace from Facebook group.

Spoke modules

The Workplace from Facebook spoke adds a Workplace from Facebook application to your ServiceNow instance and includes these modules:

Module	Description
Credentials	Displays the credentials records created for the Workplace from Facebook spoke. You can create credential records as per your requirement. For example, a credential record for each Workplace from Facebook instance.
Install on your Workplace	Displays the default credential record to set up the Workplace from Facebook spoke. For more information, see Set up Workplace from Facebook spoke.
Groups Cache	Displays details of the groups in Workplace from Facebook. When you click **Synchronise Cache**, the Fetch Workplace from Facebook Groups subflow is triggered and the groups details are retrieved.

For information about setting up the spoke, see Set up Workplace from Facebook spoke.

Set up Workplace from Facebook spoke

Integrate the ServiceNow instance and your Workplace from Facebook account using the Workplace from Facebook credentials to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription
- Activate the Workplace from Facebook spoke
- Role required: admin.

Procedure

1. Navigate to **All** > **Workplace from Facebook** > **Install on your Workplace**.
2. Click **Install on your Workplace**.
   You will redirected to the Workplace sign-up/sign-in page.
3. Log in to your Workplace from Facebook account using your credentials.
   Add ServiceNow Spoke to Workplace pop-up window is displayed.
4. Click **Add to Workplace**.

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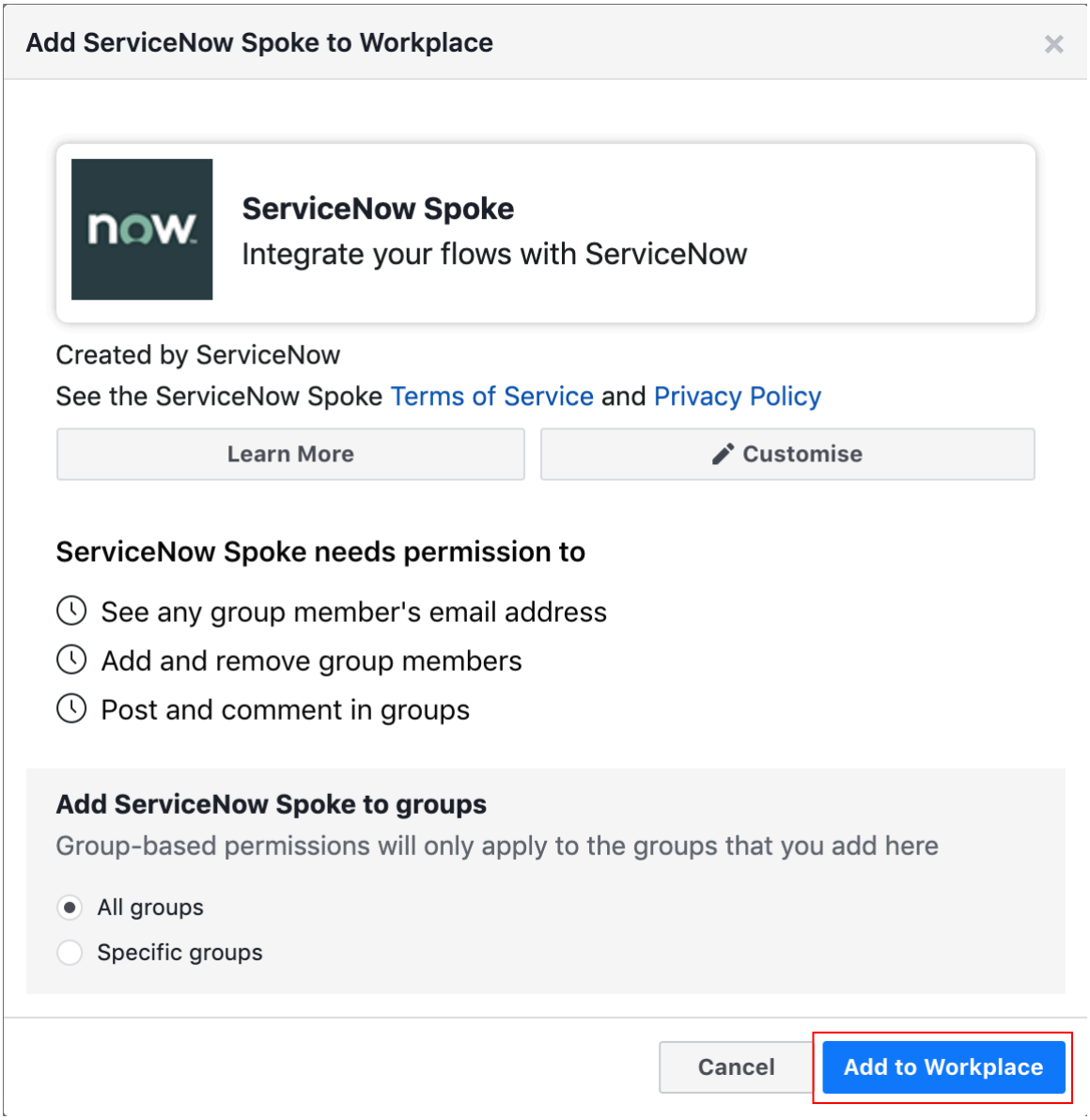
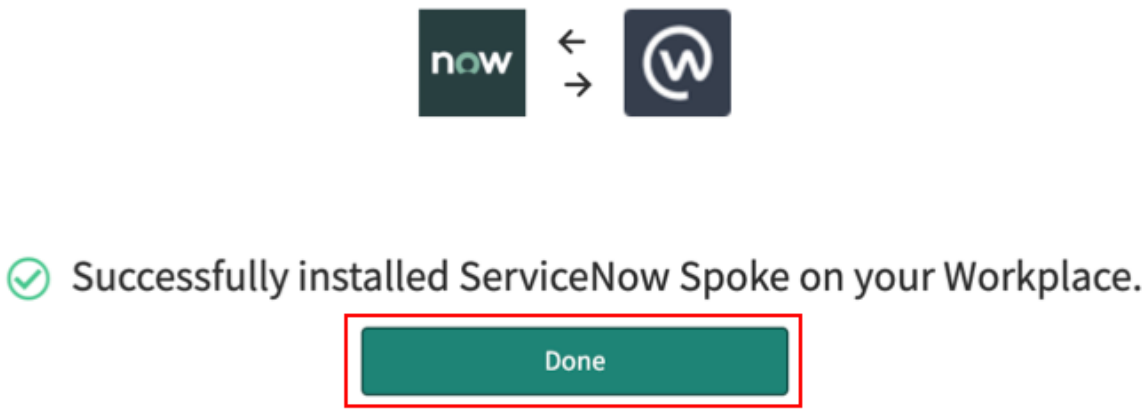


The ServiceNow spoke is added to Workplace account and a confirmation message is displayed.



5. Click **Done**.
   You will be redirected back to your ServiceNow instance and the relevant fields are updated.

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6. **Optional:** If you want to create multiple connection records, perform these steps:

   a. Navigate to **Process Automation** > **Flow Designer**.

   b. Click the **Connections** tab.

   c. Locate the **FB_Workplace_Alias** connection alias and click **View Details**.

   d. Click **Add Connection**.

   e. Provide a name to identify the new connection record for **Connection Name**.

   f. Click **Create Connection**.

   g. Navigate to **All** > **Workplace from Facebook** > **Credentials**.

   h. Open the credential record that is associated with the connection record you had created.

   i. Click **Install on your Workplace**.
   You will redirected to the Workplace sign-up/sign-in page.

   j. Log in to your Workplace from Facebook account using your credentials.
   Add ServiceNow Spoke to Workplace pop-up window is displayed.

   k. Click **Add to Workplace**.
   The ServiceNow spoke is added to Workplace account and a confirmation message is displayed.

   l. Click **Done**.
   You will be redirected back to your ServiceNow instance and the relevant fields are updated.

Result
The Workplace from Facebook account is integrated with your ServiceNow instance.

Uninstall Workplace from Facebook spoke

Log in to Workplace from Facebook account to uninstall the Workplace from Facebook spoke.

Before you begin
Role required: admin

Procedure
1. Log in to your Workplace from Facebook account as an admin.
2. Navigate to **Admin Panel** > **Integrations**.
3. Enter password.
4. Click **ServiceNow Spoke**.
5. Click **Uninstall**.

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6. In the Uninstall window, confirm your choice by clicking **Uninstall** again.
   The Workplace from Facebook spoke is uninstalled.

Wrike Spoke

Manage approvals, attachments, folders, projects, and so on, in the Wrike account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Wrike spoke v1.3.0 is the latest version. For version history of the spoke, see Wrike spoke release notes.

Supported versions

This spoke was built for Wrike API version v4, but may be compatible with later versions.

Note: You must have the Wrike Enterprise account to create an app and obtain values of Client ID and Client Secret from the Wrike account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The Wrike spoke provides actions to automate Wrike tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Approvals Management	Create Approval for Folder	Creates an approval for the specified folder or project.

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Category	Action	Description
	Create Approval for Task	Creates an approval for the specified folder task.
	Delete Approval	Cancels the specified approval.
	Look up Approvals	Retrieves details of the approvals based on the filter criteria.
	Look up Approvals by Folder	Retrieves all approvals on the specified folder or project.
	Look up Approvals by Task	Retrieves all approvals on the specified task.
	Update Approval	Updates details of the specified approval.
Attachment Management	Delete Attachment	Deletes the specified attachment.
	Download Attachment to ServiceNow	Downloads attachment to the specified ServiceNow record.
	Look up Attachments	Retrieves list of attachments.
	Update Attachment	Updates a previously uploaded attachment with the new version.
	Update Attachment to Folder	Uploads an attachment to the specified folder.
	Update Attachment to Task	Adds an attachment to a task record.
Comment Management	Create Comment in Folder	Creates a comment in the folder.
	Create Comment in Task	Creates comment in task.
	Delete Comment	Deletes the specified comment.
	Look up Comments by Folder ID	Retrieves the folder comments.
	Look up Comments by Task ID	Retrieves the task comments.
	Update Comment	Updates the specified comment.
Folder and Project Management	Create Folder	Creates a folder within a folder.
	Create Project	Creates a project within a folder.
	Delete Folder or Project	Moves folder, project and all descendant folders and tasks to Recycle Bin unless they have parents outside of deletion scope.
	Look up Folders	Retrieves the list of entries required to build a folder tree for the current account.
	Update Folder	Updates details of the folder.
	Update Project	Updates details of the project.
Group Management	Create Group	Creates group in account.
	Delete Group	Deletes the specified group.

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Category	Action	Description
	Look up Groups	Retrieves all groups in the account.
	Update Group	Updates details of the specified group.
Task Management	Create Task	Creates a task in folder.
	Delete Task	Deletes the specified task.
	Look up Tasks	Retrieves details of all tasks in current account.
	Update Task	Updates details of the specified task.
User Management	Get User Details	Retrieves information about the specified user.
	Look up Contacts	Retrieves contacts of all users and user groups in the current account.
	Update User Details	Updates details of the specified user.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Wrike attachment management AI agent	Enables the Process Analysts to automate attachment-related workflows within Wrike using Integration Hub. It can automate actions such as updating attachments to tasks or folders, downloading attachments to ServiceNow, and deleting attachments.
Wrike approvals management AI agent	Enables the Process Analysts to automate approval workflows in Wrike using Integration Hub. It can automate tasks such as deleting approvals for tasks or folders.
Wrike comment management AI agent	Enables the Process Analyst to automate comment-related tasks in Wrike, such as

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AI Agent	Description
	creating, updating, and deleting comments by folder or task ID.
Wrike group management AI agent	Enables the Process Analysts to automate group-related tasks in Wrike using Integration Hub. It can automate actions such as deleting groups to enable efficient group management.
Wrike task management AI agent	Enables the Process Analysts to automate tasks in Wrike such as deleting a task.
Wrike user management AI agent	Enables the Process Analysts to automate user and contact management tasks, such as updating user details and retrieving user details.
Wrike folder and project management AI agent	Enables the Process Analyst to automate folder and project management tasks such as deleting folders and projects.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information, and OAuth credentials. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection.

For information about setting up the spoke, see Set up the Wrike spoke.

Set up the Wrike spoke

Integrate your ServiceNow instance with Wrike by creating a custom OAuth application in the Wrike API Developer Site and configuring a connection in the Wrike spoke.

Before you begin

- Copy and record the **Client ID** and **Client Secret** by logging in to Wrike account as an admin and add an app. For more information about creating an app, see OAuth 2.0 Authorization.
- Request an Integration Hub subscription.
- Activate the Wrike spoke.
- Role required: admin.

Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Select **Integrations**.
3. Select the **Connections** tab.
4. Locate the alias for **Wrike** and select **View Details**.

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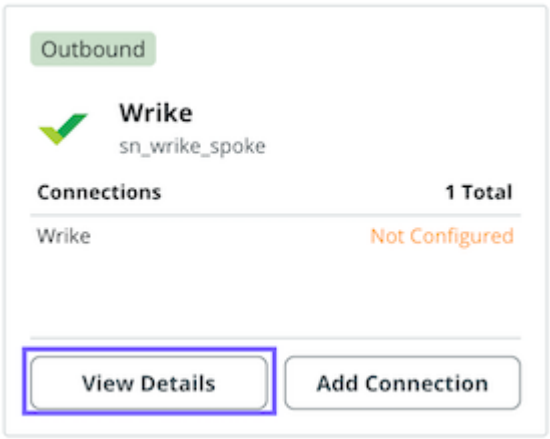
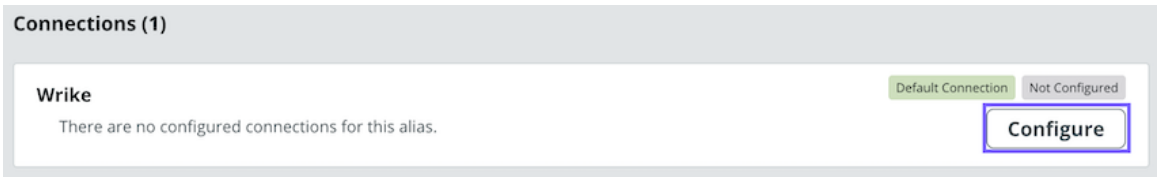
- To configure the default connection and credential alias record that is shipped along with the Wrike, click **View Details**.



- To manage more than one Wrike spoke connection records, you should create child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

If you're configuring the spoke for the first time, click **Configure**. Otherwise, select **Edit**.



5. On the form, fill in these fields:

Create Connection form

Field	Description
Connection Name	Name of the connection.
Connection URL	Web address that specifies the location and access details of the Wrike portal.
OAuth Client ID	OAuth client ID that you generated when you set up the OAuth app.
OAuth Client Secret	OAuth client secret that you generated when you set up the OAuth app.
OAuth Redirect URL	Redirect URL that you had provided when you set up the OAuth app. The redirect URL must be in the format `https://instance-name.service-now.com/oauth_redirect.do`.

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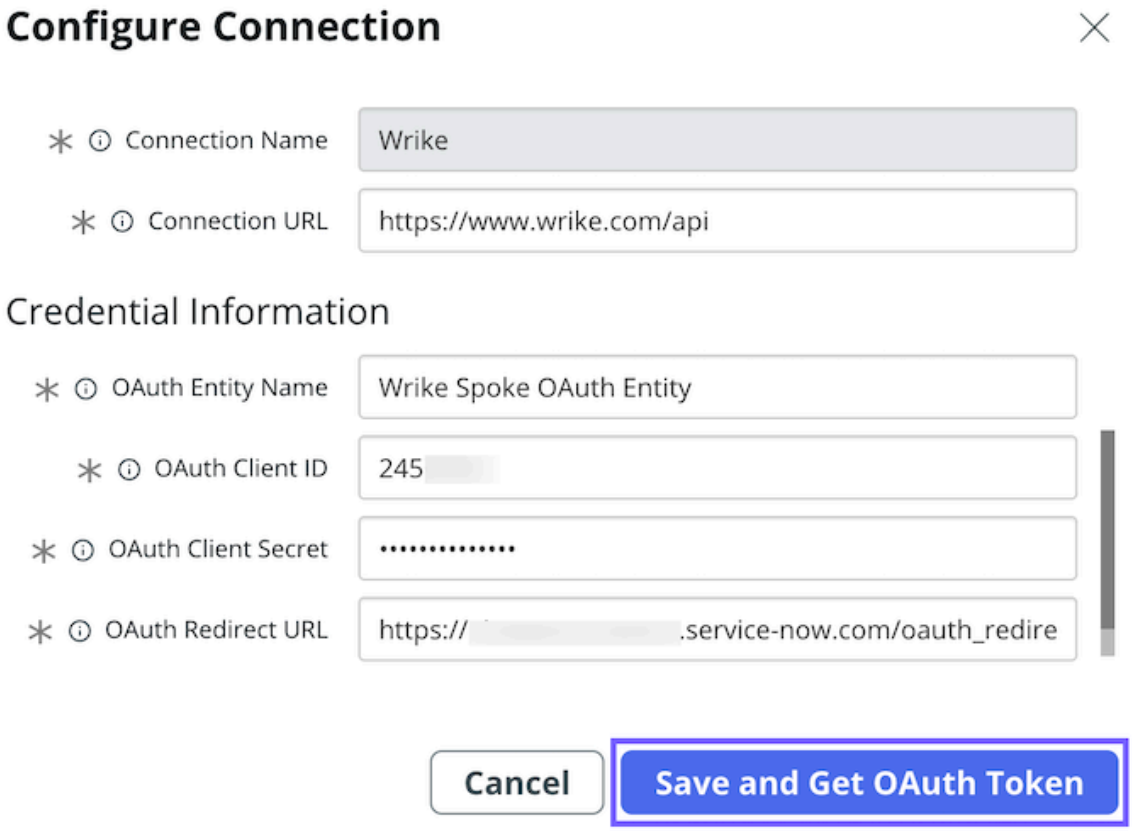

6. Select **Create and Get OAuth Token**.
   You will be asked to log in to the Wrike API developer's portal before getting the OAuth token.

Result
The Wrike spoke is set up and integrated with the ServiceNow instance.

X Spoke (formerly Twitter Spoke)

Use the X spoke (formerly Twitter spoke) to have private chats and group chats, and to automatically tweet messages or media in your X account from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

X spoke v2.4.0 is the latest version. For version history of the spoke, see X spoke release notes.

Supported versions

API version v1.1.

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Spoke requirements

- X developer account
- X developer app to access the X APIs
- Access token and secret of your X developer app
- Consumer key and secret from your X developer app

See the X Developers documentation for instructions on creating the developer application and gathering the required details.

Spoke actions

The X spoke provides actions to automate tweeting when events occur in ServiceNow. Available actions include:

Action	Description
Tweet	Tweets a message or media. Messages and media are tweeted as per X limits. **Note:** If you wish to tweet media, use the Look Up Attachment Records action before this action in your custom flow to retrieve the required media.

Available AI agents

Install Now Assist for Spokes and start using the available AI agents. For more information, see Now Assist for Integration Hub.

The X Spoke provides AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance. For more information about AI agents, see AI Agent Studio (legacy).

Available AI agents include:

AI Agent	Description
X Tweet management AI agent	This AI Agent posts tweets to the X handle that you had configured that contain text. **Note:** You must configure a valid X handle before using this AI Agent.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't

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need to update any actions that use the connection. For more information, see Connections and Credentials.

Note: Two connection and credential alias records are needed for the X spoke. One for tweeting messages and other for tweeting media. Each alias should be associated with the respective X API.

For information about setting up the spoke, see Set up the X spoke.

Set up the X spoke

Integrate the ServiceNow instance and X account to authenticate the requests from ServiceNow.

Before you begin

- Request an Integration Hub subscription.
- Activate the X spoke.
- Role required: admin.

Obtain the token and secret values from the X developer account

Create an app in the X developer account and obtain the values of Access Token, Access Token Secret, Consumer key, and Consumer Secret for authenticating the requests.

Before you begin

Role required: X admin.

Procedure

1. Log in to the Developer Portal - Twitter Developer - X (formerly Twitter).
2. Obtain the values of **API Key**, **API Key Secret**, and **Bearer Token**.
   a. Navigate to **Projects & Apps** > **Default project**.
   b. Under **Apps**, click **+Add App**.
   c. Under **App Environment**, choose the required environment and lick **Next**.
   d. Under **App name**, provide the app name in **DEVELOPMENT APP** and click **Next**.

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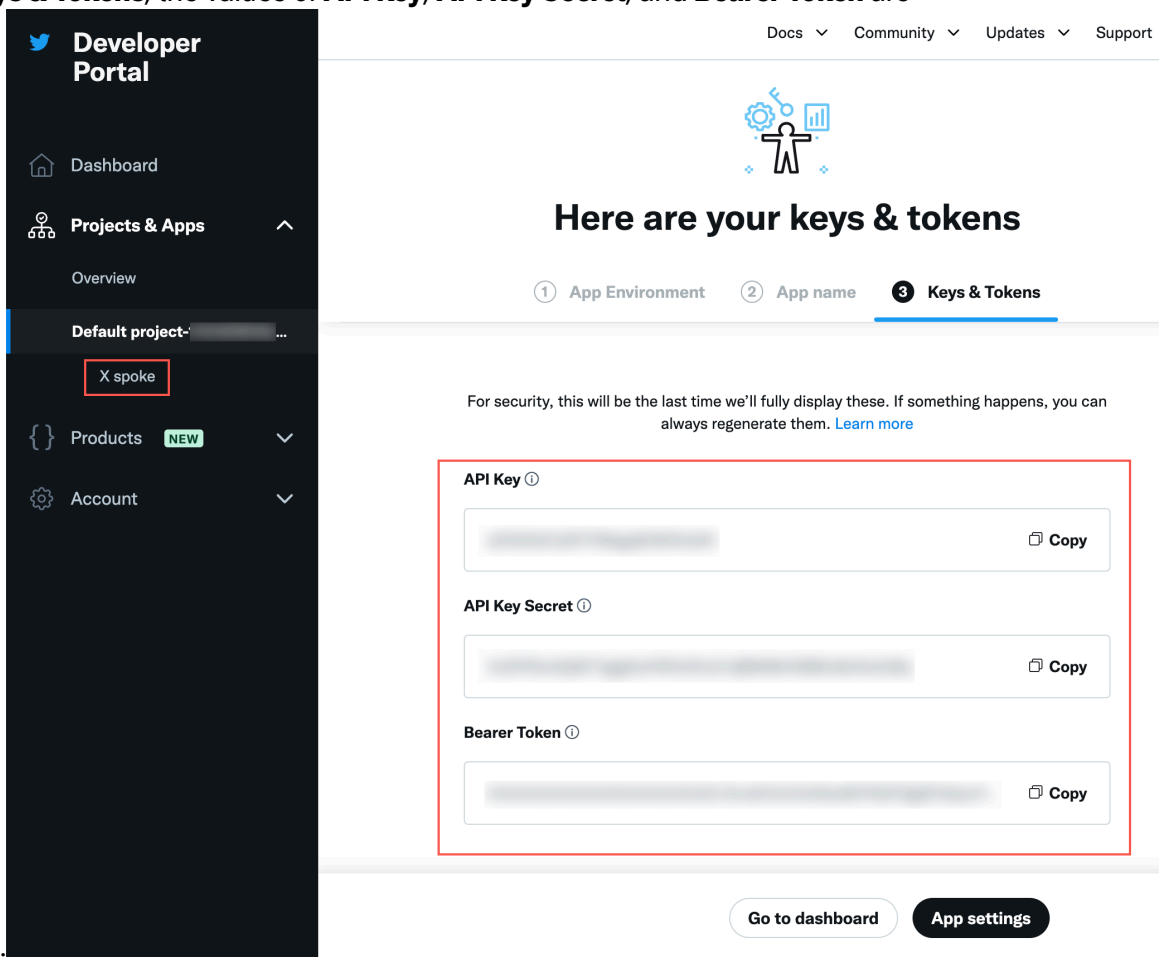
Under **Keys & Tokens**, the values of **API Key**, **API Key Secret**, and **Bearer Token** are displayed.



e. Copy and record these values for later use.

3. Provide the required permissions for OAuth 1.0.

a. Navigate to **Projects & Apps** > **Default project**.

b. Navigate to the app you had created.

c. In the **Settings** tab, under **User authentication settings**, click **Set up**.

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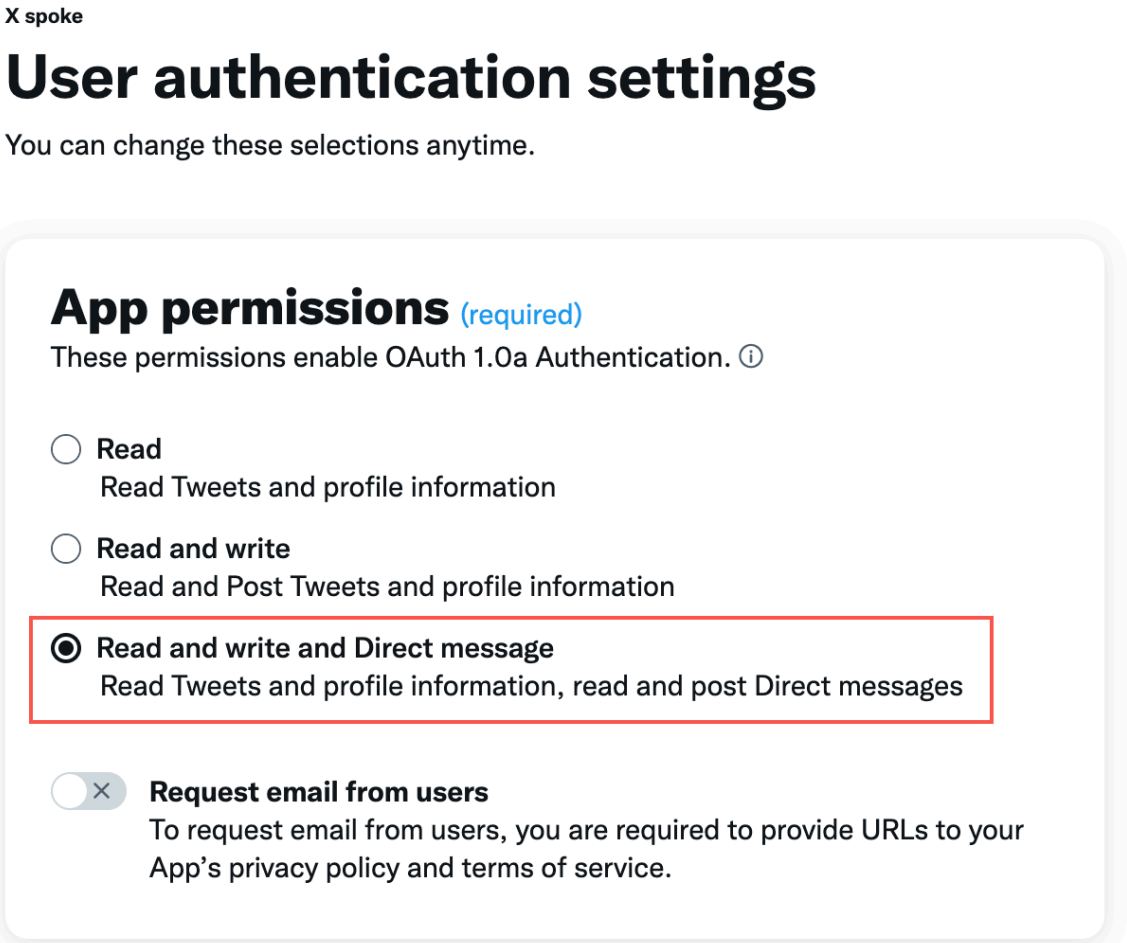
d. On the User authentication settings page, under **App permissions** select the **Read and write and Direct message**



option.

e. Click **Save**.
The systems prompts you to confirm the permissions.

f. Copy and record these values for later use.

g. Click **Done**.

4. Obtain the values of **Access Token** and **Access Token Secret**.

a. Navigate to **Projects & Apps** > **Default project**.

b. Navigate to the app you had created.

c. Click the **Keys and tokens** tab.

d. Under **Authentication Tokens**, click **Regenerate** for **Access Token and Secret**.
System prompts you to confirm.

e. Click **Yes, regenerate**.

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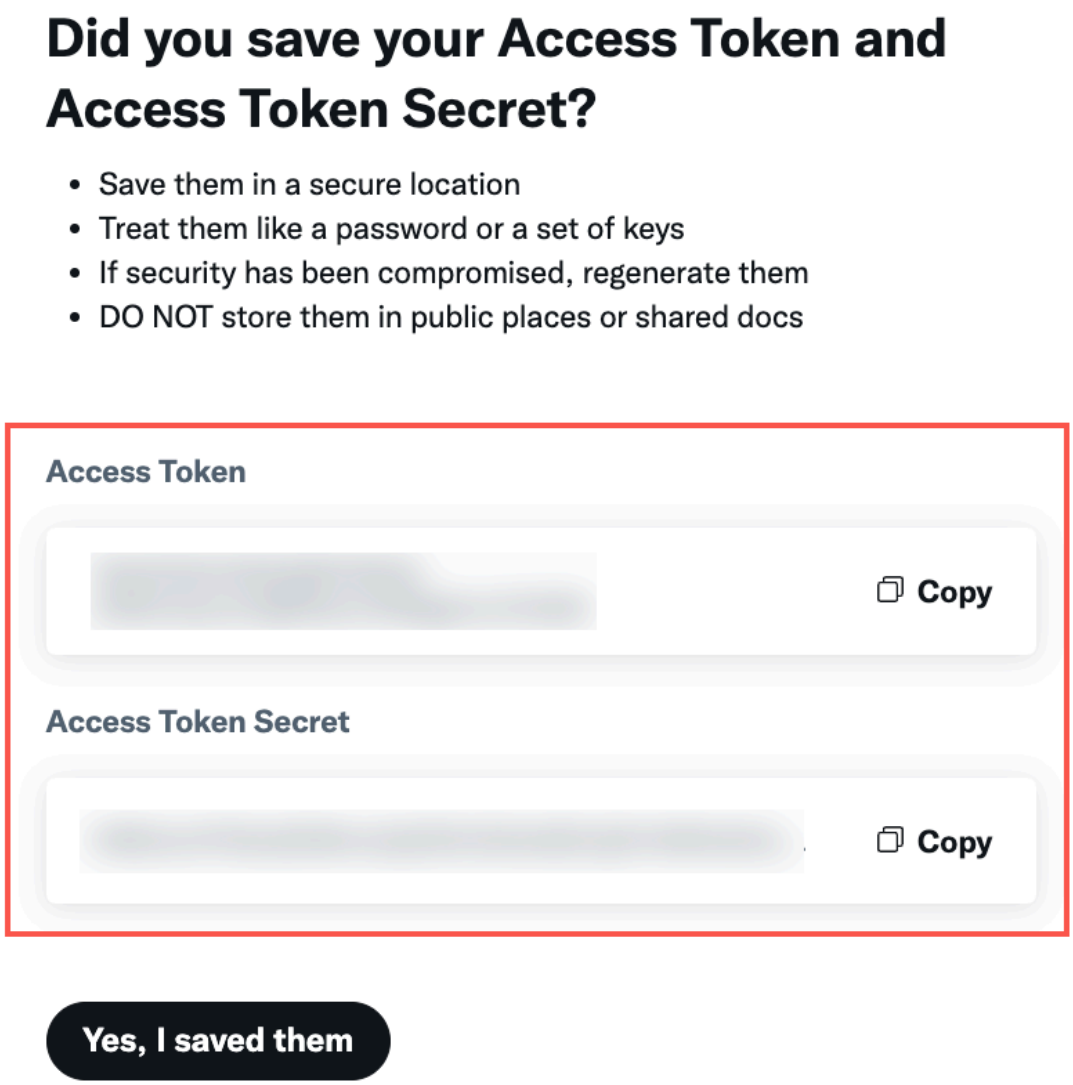
The values of **Access Token** and **Access Token Secret** are



displayed.

f. Copy these values for later use.

Configure a connection for the X spoke (formerly Twitter spoke)

Add and configure the X connections to authenticate ServiceNow requests in the X spoke.

Before you begin

- Access Token and Access Token Secret of your X developer app.
- Consumer key and Consumer Secret of your X developer app.
- Ensure that the Application scope is X scope.
- Role required: ServiceNow admin

See the X Developers documentation for instructions on creating the developer application and gathering the required details.

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About this task

Two connections, **Twitter** and **Twitter_Media**, are provided in the Flow Designer. You must configure both of these connections.

Procedure

1. Configure the **Twitter** connection alias.

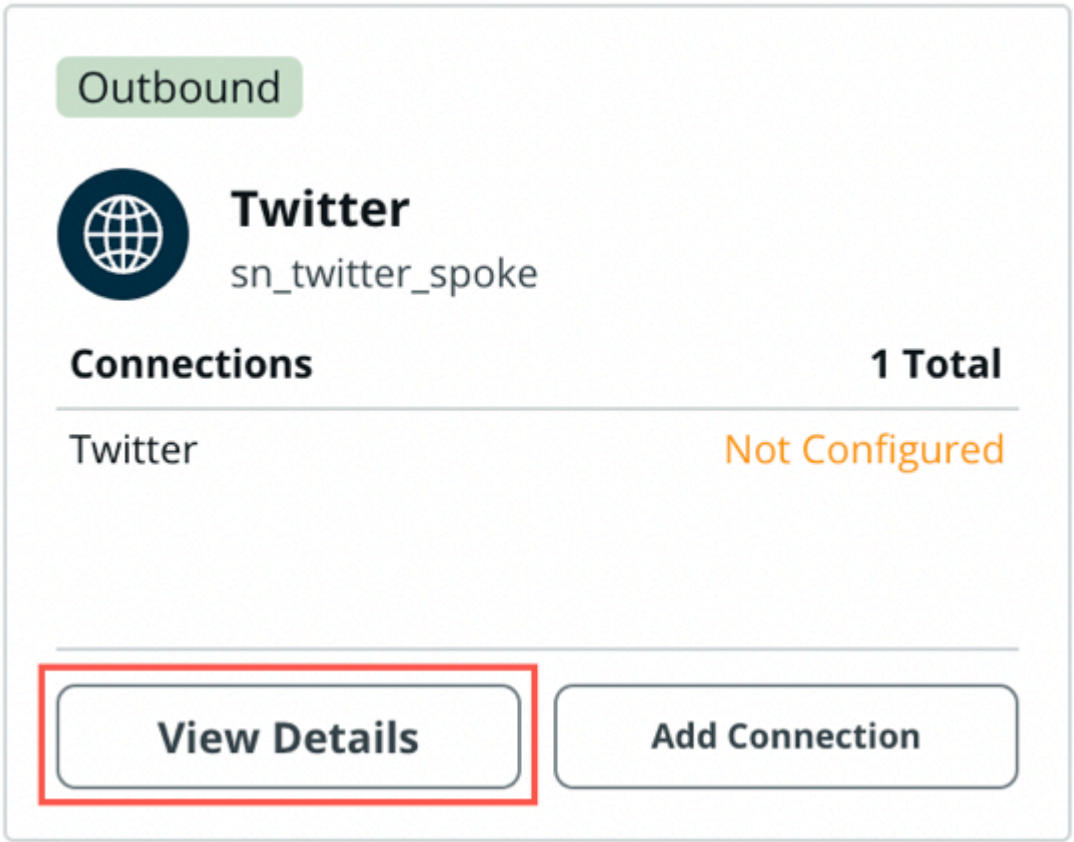
   a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

   b. Click the **Integrations** tab.

   c. Select the **Connections** tab.

   d. In the Search all connections field, enter `Twitter`.

   e. On the Twitter tile, select **View Details**.



   f. Select **Configure**.

   g. On the **Configure Connection** form, fill in the fields.

Field	Description
Connection Name	Name to identify the Twitter connection alias record.
Connection URL	Enter `https://api.twitter.com`.

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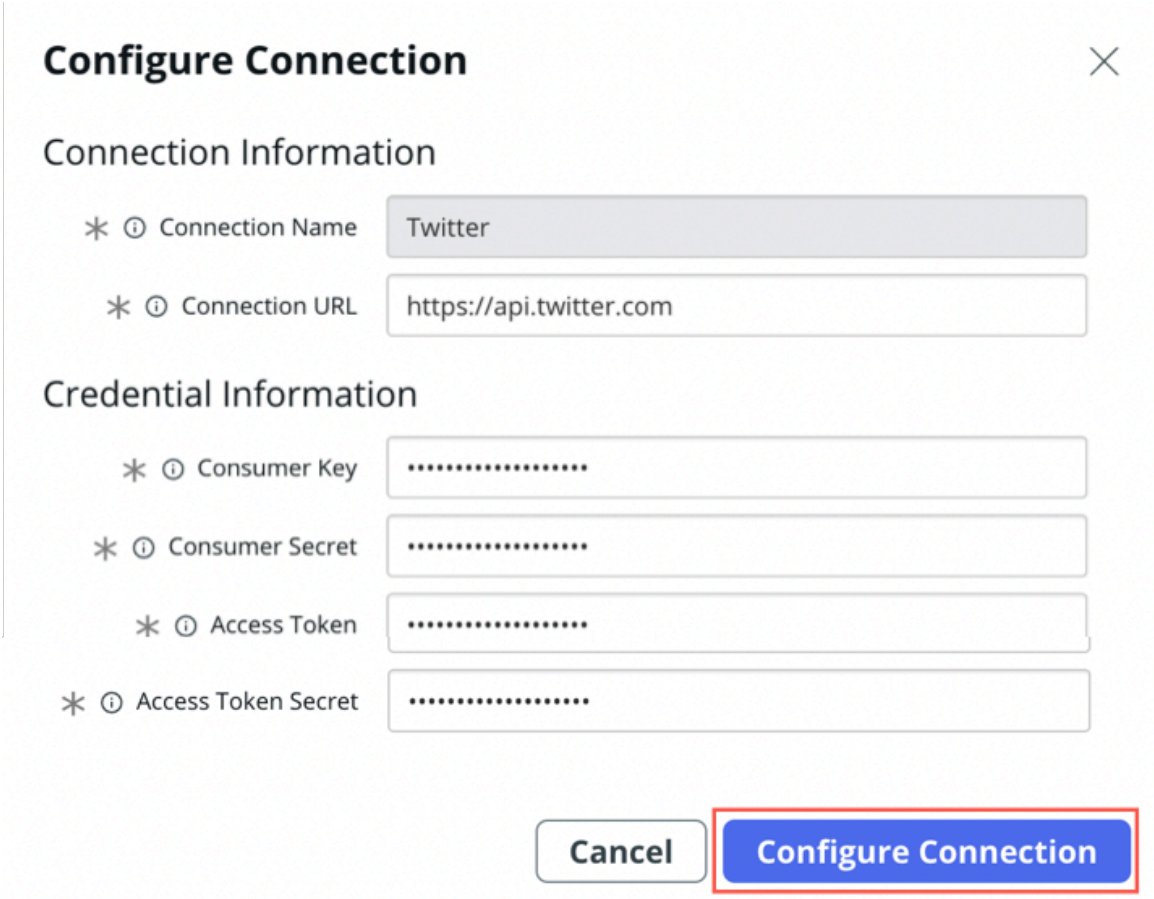
Field	Description
Consumer Key	Consumer key of your X developer app.
Consumer Secret	Consumer secret of your X developer app.
Access Token	Access token of your X developer app.
Access Token Secret	Access token secret of your X developer app.



h. Select **Create Connection**.

2. Configure the **Twitter_Media** connection alias.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. Click the **Integrations** tab.

c. Select the **Connections** tab.

d. In the Search all connections field, enter `Twitter_Media`.

e. On the Twitter_Media tile, select **View Details**.

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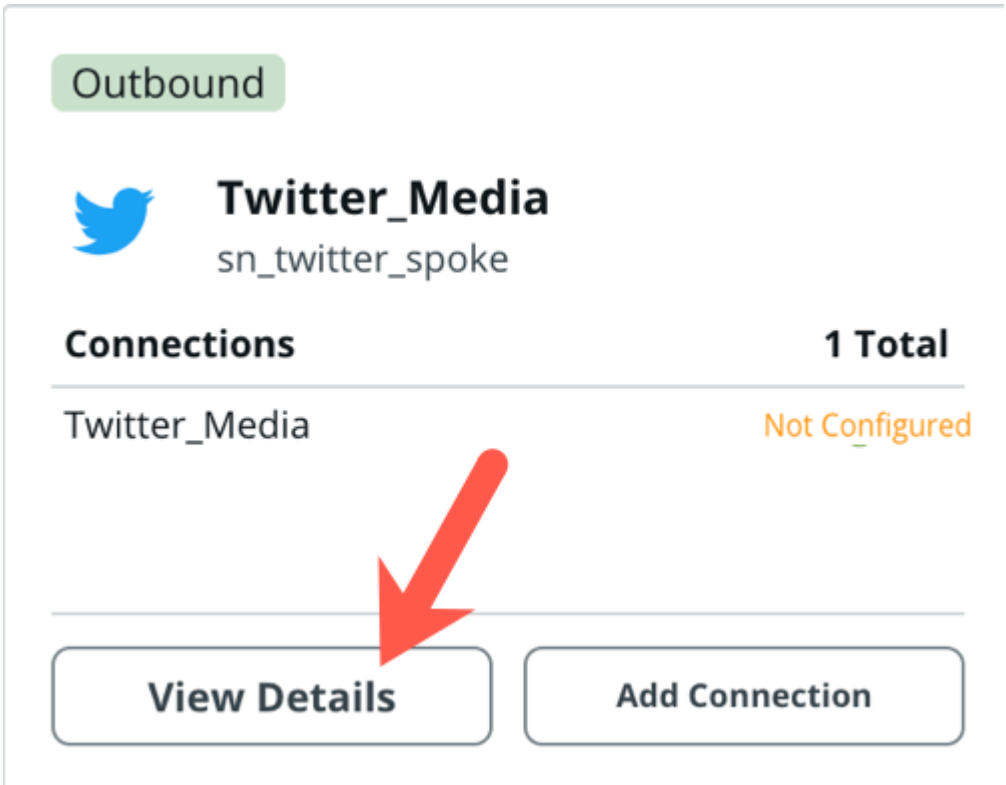

f. Select **Configure**.

g. On the **Create Connection** form, fill in the fields.

Field	Description
Connection Name	Name to identify the Twitter connection alias record.
Connection URL	Enter `https://upload.twitter.com`.
Consumer Key	Consumer key of your X developer app.
Consumer Secret	Consumer secret of your X developer app.
Access Token	Access token of your X developer app.
Access Token Secret	Access token secret of your X developer app.

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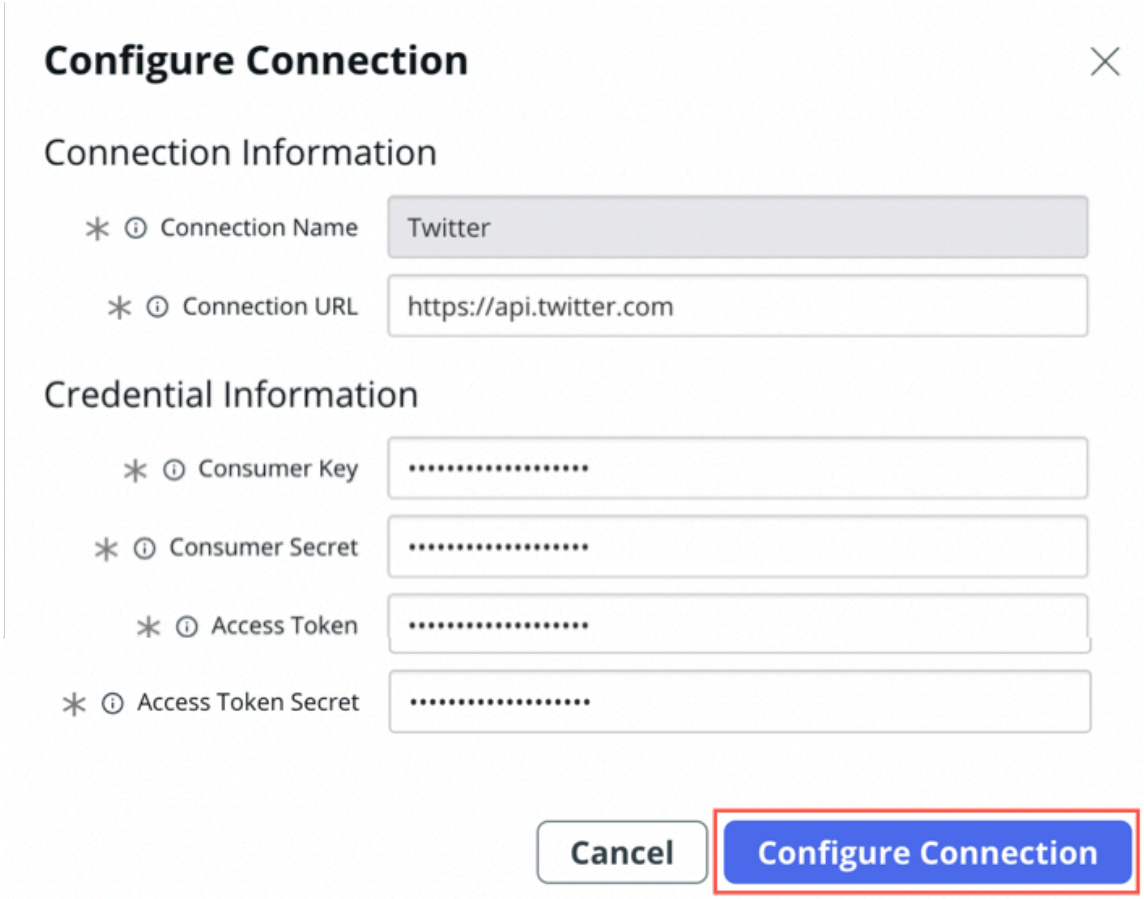

h. Select **Create Connection**.

YouTube Spoke

Manage your videos, channels, subscriptions, and playlists in YouTube account, and access analytics and statistics from your ServiceNow instance.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

YouTube spoke v1.0.5 is the latest version. For version history of the spoke, see YouTube spoke release notes.

Supported versions

This spoke was built for these YouTube versions, but may be compatible with later versions.

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- Reporting API version v1
- Data API version v3
- Analytics API version v2

YouTube spoke requirements

The YouTube spoke requires a custom app that you create in Google Cloud Platform.

Spoke dependencies

If you're having trouble installing the app, confirm that these dependent plugins are installed:

- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)
- ServiceNow IntegrationHub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke actions

The YouTube spoke provides actions to automate YouTube tasks when events occur in the ServiceNow AI Platform. Available actions include:

Category	Action	Description
Analytics	Audience Retention Statistics	Retrieves information about the audience retention statistics.
	Basic Statistics	Retrieves information about the basic statistics.
	Demographics	Retrieves information about the demographics. That is, details about the age, gender, and geographical location of your audience.
	Device/OS Statistics	Retrieves information about the devices from which your audience accesses your content.
	Get Country Codes (Metadata)	Retrieves details of countries and their ISO codes. **Note:** This action is a metadata action.
	Traffic Source Statistics	Retrieves information about the various traffic sources.
Captions	Delete Caption	Deletes captions on a video.
	Look up Captions	Retrieves information about the captions on a video.
Comments	Delete Comment	Delete the specified comment on a video.

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Category	Action	Description
	Look up Comments	Retrieves details about the top-level comments in a comment thread.
	Post Comment	Posts a top-level comment on a video.
	Reply to Comment	Posts a reply to a top-level comment on a video.
Groups	Create Groups	Creates a group for videos, channels, or playlists.
	Delete Group	Deletes the specified group.
	Delete Group Item	Deletes the specified group item.
	Insert Item into Group	Inserts an item in the specified group.
	Look up Group-Items	Retrieves information about all items in a group.
	Look up Groups	Retrieves information about the specified groups.
Playlist	Create Playlist	Creates a playlist in your YouTube account.
	Delete Playlist	Deletes a playlist from your YouTube account.
	Delete Playlist Item	Deletes the specified playlist item.
	Insert into Playlist	Inserts an item in the specified playlist.
Reports	Create Report Job	Creates a report job in YouTube account. YouTube generates the requested report within 24 hours.
	Get Report Types Choice (Metadata)	Retrieves information about the Report Types list.
	Look up Reports	Retrieves information about the reports generated for a job.
	View Report	Retrieves data in a report in CSV format.
Subscriptions	Look up Subscriptions	Retrieves information about the specified subscriptions.
	Subscribe Channel	Subscribes to the required channel.
	Unsubscribe Channel	Unsubscribes to the required channel.
Video	Delete Video	Deletes an uploaded video.
	Look up Video	Retrieves information about the specified video.
	Look up Videos	Retrieves information about the specified multiple videos.
	Rate/Unrate Video	Likes or dislikes the specified video. Also, remove the previous rating for a video.
	Search	Searches for the required video, channel, or playlist.
	Set Thumbnail to Video	Sets a thumbnail image for an uploaded video.

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Category	Action	Description
	Set Video Metadata	Sets the metadata of a video.
	Upload Video	Uploads a video to your channel in YouTube.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the YouTube spoke.

Set up the YouTube spoke

Integrate the ServiceNow instance and YouTube account by creating a custom OAuth application in Google Cloud Platform to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the YouTube spoke.
- Role required: admin.

Configure the YouTube application

Create a custom OAuth application in your Google Cloud Platform account to enable OAuth 2.0 authentication with the YouTube spoke.

Before you begin

Role required: admin.

About this task

Complete the Create a Google Cloud project steps from the Google Cloud Platform. See the Creating and managing projects product documentation for instructions on creating and configuring custom applications.

Procedure

1. Register a new custom application and open it.
   a. Navigate to https://console.cloud.google.com.
   b. Create a project with your administrator credentials.
   c. Open the project.
2. Provide the OAuth authorized domain name.
   a. From the APIs & Services menu, select **OAuth consent screen**.
   b. Enter the application name.
   c. Specify the Authorized domain `service-now.com`.
   d. Click **Save**.
3. Create the credentials.

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a. From the APIs & Services menu, select **Credentials**.

b. Select **Create OAuth client ID** from the **Create credentials** list.

4. Select the application type **OAuth client ID**.
5. Enter the following **Authorized redirect URI**: `https://<instance>.service-now.com/oauth_redirect.do` and click **Create**.
6. Copy your client ID and client secret to a text file so that you can use them when you Register YouTube as an OAuth provider.

Tip: You can always access the client ID and secret in the Google APIs & Services interface by clicking **Credentials** and selecting the OAuth 2.0 client ID name.

Register YouTube as an OAuth provider

Use the information generated during the YouTube application configuration to register YouTube as an OAuth provider and allow the ServiceNow instance to request OAuth 2.0 tokens.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Open for the record, **Youtube**.
3. On the form, fill these values.

Application Registries form

Field	Description
Client ID	Client ID of the YouTube application.
Client Secret	Client Secret of the YouTube application.
Redirect URL	OAuth callback endpoint in this format: `https://<instance>.service-now.com/oauth_redirect.do`.

4. Ensure that these scopes are available in the **OAuth Entity Scopes** tab.

Name	OAuth scope
YouTube Partner	`https://www.googleapis.com/auth/youtubepartner`
YouTube Reporting S1	`https://www.googleapis.com/auth/yt-analytics.readonly`
YouTube Reporting S2	`https://www.googleapis.com/auth/yt-analytics-monetary.readonly`
YouTube Scope	`https://www.googleapis.com/auth/youtube`

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Name	OAuth scope
YouTube Scope Force SSL	`https://www.googleapis.com/auth/youtube.force-ssl`

5. Right-click the form header, and click **Save**.

Create a credential record for the YouTube spoke

Create a credential record for the YouTube application. The YouTube spoke connection and credential alias uses these credentials to authorize actions.

Before you begin

Role required: admin.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connections & Credential Aliases**.
2. Open record for the YouTube spoke, for example, `YouTube`.
3. In the **Credentials** tab, click **New**.
4. Select **OAuth 2.0 Credentials**.
5. Enter a unique name for the credential, for example, `Youtube_Cred`.
6. Click the **OAuth Entity Profile** search icon () and select the profile with the name of the OAuth application registry you configured when you registered the YouTube service as an OAuth provider.
   See Register YouTube as an OAuth provider for more information.
7. Right-click the form header and click **Save**.
8. Click **Get OAuth Token**.

Zendesk Spoke

The Zendesk spoke provides actions to view and analyze meaningful usage data for Zendesk software subscriptions. Analyze usage for your Zendesk account to determine which licenses are stale so that you can reclaim these licenses and realize your potential savings.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Zendesk spoke v1.9.2 is the latest version. For version history of the spoke, see Zendesk spoke release notes.

Supported versions

This spoke was built for Zendesk version 11015, but may be compatible with later versions.

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Spoke requirements

Zendesk admin account.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- ServiceNow Integration Hub Runtime (com.glide.hub.integration.runtime)
- ServiceNow Integration Hub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Integration Hub Action Template - Data Stream (com.glide.hub.action_type.datastream)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Spoke flows

The Zendesk spoke provides the Upsert Zendesk Tickets flow to check if a new ticket has been created in the Zendesk Ticket table or if an existing ticket has been updated, and accordingly synchronizes it in Zendesk. To customize a sample flow, copy it to a new application scope.

Spoke subflows

The Zendesk spoke provides sample subflows to demonstrate automating tasks. To customize the sample subflow, copy it to a new application scope. Available subflows include:

Subflow	Description
Create Zendesk Webhook	Creates a webhook in Zendesk whene a request is received from the Webhook Registries [sn_zendesk_spoke_webhook_registries] table.
Process Zendesk Webhook	Inserts and updates records in the Zendesk Tickets table based on the changes happening in Zendesk.
Update Zendesk Webhook	Updates the webhook tokens and synchronizes them both in ServiceNow and Zendesk.

Spoke actions

The Zendesk spoke provides actions to automate Zendesk tasks when events occurs in your ServiceNow instance. Available actions include:

Category	Action	Description
Activity Management	Look up Activities Stream	Retrieves details of the ticket activities. Ticket activities include assigning a ticket to the agent, increasing the priority of a ticket assigned to the agent, or adding a comment to a ticket assigned to the agent.

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Category	Action	Description
	Look up Activity by ID	Retrieves details of the specified ticket activity. Activities include assigning a ticket to the agent, increasing the priority of a ticket assigned to the agent, or adding a comment to a ticket assigned to the agent.
Attachment Management	Look up Attachment by ID	Retrieves attachment details by value of the Attachment ID.
	Upload Attachment	Uploads a file you want to attach.
Group Management	Look up Group by ID	Retrieves information about the specified group.
	Look up Groups Stream	Retrieves the list of all groups within an account.
Organization Management	Look up Organization by ID	Retrieves information about the specified organization.
	Look up Organizations Stream	Retrieves the list of all organizations.
Request Management	Create Request	Creates a request by setting one or more properties.
	Look up Comment by ID	Retrieves the comment added to the request corresponding to the Request ID and the Comment ID.
	Look up Comments by Request ID Stream	Retrieves the comments added to the request related to the Request ID that you sent through the input.
	Look up Request by ID	Retrieves the request details by value of the Request ID.
	Look up Requests by Organization ID Stream	Retrieves all the requests in an account corresponding to the Requester ID.
	Look up Requests by Requester ID Stream	Retrieves all the requests in an account corresponding to the Requester ID.
	Look up Requests Stream	Retrieves all the requests in an account based on the state of the request.
	Update Request by ID	Updates the request with a comment or collaborators (cc's).

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Category	Action	Description
Role Management	Look up Custom Role by ID	Retrieves information about the specified custom role.
	Look up Custom Roles	Retrieves the list of all custom roles within an enterprise account.
Search	Search Entities by Parameter Stream	Retrieves all tickets, requests, and users in an account related to the query.
	Search Requests by Keyword Stream	Retrieves all requests in an account related to the search string.
Suspended Tickets Management	Delete Multiple Suspended Tickets by IDs	Deletes multiple suspended tickets. A list of suspended ticket IDs should be provided.
	Delete Suspended Ticket by ID	Deletes a specific suspended ticket.
	Look up Suspended Ticket by ID	Searches for a specific suspended ticket by its ID.
	Look up Suspended Tickets Stream	Retrieves the details of suspended tickets.
	Recover Suspended Ticket by ID	Recovers the details of the specified suspended ticket.
Ticket Audit	Look up Audit by ID	Retrieves the audit details of a ticket specific to an audit.
	Look up Audit Log by ID	Retrieves the audit log details of a ticket specific to an audit.
	Look up Audit Logs Stream	Retrieves the audit log displaying the various changes in a Zendesk account since the account creation.
	Look up Audits Stream	Retrieves the list of audits for all the tickets.
	Look up Ticket Audits Stream	Retrieves the audits for the specified ticket.
	Update Audit as Private	Updates a comment from public to private for a ticket specific to an audit.

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Category	Action	Description
Ticket Comment Management	Look up Comments by Ticket ID Stream	Retrieves the comments added to the specified ticket.
Ticket Management	Create Multiple Tickets	Creates multiple tickets with the provided details, at a time.
	Create Ticket	Creates a ticket in the Zendesk instance.
	Create Ticket Async	Creates a ticket in the Zendesk instance. Ticket creation can sometimes take a while because of the complex business rules. Asynchronous creation enables you to get the response back quickly and queues a background job to do the actual work.
	Look up Job Status by ID	Retrieves the status record created when a user starts a job.
	Look up Multiple Tickets Stream	Retrieves details of multiple tickets.
	Look up Ticket by ID	Retrieves details of the specified ticket.
	Look up Tickets Stream	Retrieves the ticket properties.
	Recover Multiple Suspended Tickets by IDs	Recovers the specified suspended tickets.
	Update Multiple Tickets	Updates details of multiple tickets.
	Update Ticket	Updates the specified properties of a ticket.
Ticket Metric Management	Look up Metric by ID	Retrieves a specific metric, or the required metrics of a ticket.
	Look up Metrics by Ticket ID	Retrieves the metric details of the specified ticket.
	Look up Ticket Metric Events Stream	Retrieves the ticket metric events that occurred on or after the start time.
	Look up Tickets Metric Stream	Retrieves a list of tickets, along with their metrics.
User Management	Delete User	Deletes the specified user and associated records from an account. Deleted users cannot be recovered.

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Category	Action	Description
		To comply with General Data Protection Regulation (GDPR), you must use the additional Permanently Delete User action to permanently delete the user after deleting the user.
	Create User	Creates a user with the specified details.
	Look up Deleted Users Stream	Retrieves the list of all deleted users, including permanently deleted users, within an account.
	Look up User by ID	Retrieves the specified user's details.
	Look up Users Stream	Retrieves the list of all users within an account.
	Permanently Delete User	Permanently deletes the specified user from an account. Before you can permanently delete the user, you must first delete the user using the Delete User action.
	Update User	Modifies details about the specified user.
Webhook Management	Create Webhook	Creates a webhook with the provided details.
	Delete Webhook	Deletes the specified webhook.
	Look up Webhook Details by ID	Retrieves details of the specified webhook.
	Look up Webhook Signing Secret by ID	Retrieves signing secret of the required webhook.
	Look up Webhooks Stream	Retrieves details of all the available webhooks.
	Reset Webhook Signing Secret by ID	Resets the signing secret of the specified webhook.
	Update Webhook	Updates details of the specified webhook.

Note: This spoke has a Look up User action and Software Asset Management related actions only.

Integration Hub imports

The Zendesk spoke adds the Import Zendesk Users Integration Hub imports to your ServiceNow instance. The Integration Hub imports help you import the users' data from Zendesk account to your ServiceNow instance in an automated way. For more information about Integration Hub imports, seeIntegration Hub - Import.

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Spoke modules

The Zendesk spoke adds the Zendesk Spoke application to your ServiceNow instance. The Zendesk Spoke application includes these modules:

Module	Description
Users	Stores the details of the Zendesk users. These details are imported using the Import Zendesk Users Integration Hub imports.
Remote table	
Request	Retrieves and displayes the details of the requests raised by the specified requestor. For this, you must provide the value of **Requester ID**.
Webhook	
Webhook Registries	Stores the webhook registries. The webhook registries register a Zendesk webhook in ServiceNow to notify ServiceNow when certain events occur in Zendesk.
Routing Policies	Stores the details of the webhook.
Tickets	Stores detailf of the tickets created or updated in Zendesk.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

For information about setting up the spoke, see Set up the Zendesk spoke.

Set up the Zendesk spoke

Integrate the ServiceNow instance and Zendesk by creating a custom OAuth application in Zendesk to authenticate ServiceNow requests.

Before you begin

- Request an Integration Hub subscription.
- Activate the Zendesk spoke.
- Role required: admin.

Create a Zendesk OAuth client

Create an OAuth client for authenticating Zendesk API requests.

Before you begin

Role required: Zendesk admin

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Procedure

1. From a web browser, open Zendesk.
2. Log in using your admin credentials.
   The Zendesk Agent Workspace opens.
3. On the left navigation menu of the Zendesk Agent Workspace, select the Admin icon (⚙).
   The Admin menu opens.
4. From the Admin menu, navigate to **Channels** > **API**.
   The Zendesk API page opens.
5. Select the **OAuth Clients** tab and then click **Add OAuth client**.
6. The Create a new OAuth client form opens.
7. On the form, fill in the fields.

Create a new OAuth client form

Field	Description
Client name	Name of the OAuth client.
Description	Brief description of the OAuth client.
Company	Name of the company whose data the OAuth client grants access to through the Zendesk API. The company name is displayed during authentication of your Zendesk API requests. This field populates automatically based on the company that your Zendesk account is associated with. However, you can modify the company name as needed.
Logo	Logo that is displayed during authentication of your Zendesk API requests. Click the green square to locate and select the logo that you want to display.
Unique identifier	Unique identifier for the OAuth client. This field populates automatically based on the OAuth client name that you specified in the **Client name** field. However, you can modify the unique identifier as needed. **Note:** The unique identifier is used only in the Zendesk code.
Redirect URLs	URL of the OAuth provider that users are redirected to after authentication. Enter `https://instance.service-now.com/oauth_redirect.do`, where <*instance*> is the name of your ServiceNow instance.

8. Click **Save**.
   The Please store the secret that will appear dialog box opens.
9. On the dialog box, click **OK**.
   The dialog box closes and the form reloads.
10. Copy the value in the **Secret** field.
    Save this in a secure location for later use.

Create a Zendesk connection

Create a connection between your Zendesk applications and your ServiceNow instance so that your instance can retrieve user data from your applications.

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Before you begin

Role required: ServiceNow admin

Procedure

1. From your ServiceNow instance, navigate to **Process Automation** > **Flow Designer**.
   The Flow Designer launches in a new tab.
2. Select the **Connections** tab.
3. Locate your Zendesk connection and then click **Add Connection**.
   The Create Connection dialog box opens.
4. On the dialog box, fill in the fields.

Create Connection dialog box

Field	Description
Connection Information	
Connection Name	Name of the Zendesk connection. This field populates automatically.
Connection URL	URL for the connection. Enter `https://<subdomain>.zendesk.com`, where <*subdomain*> is your organization subdomain.
Credential Information	
OAuth Client ID	Unique identifier for your Zendesk OAuth client. Enter the same unique identifier that you specified in Create a Zendesk OAuth client.
OAuth Client Secret	Secret that is assigned to your Zendesk OAuth client. Enter the same secret that you copied in Create a Zendesk OAuth client.
OAuth Redirect URL	URL of the OAuth provider that users are redirected to after authentication. This field populates automatically based on the redirect URL that you specified in Create a Zendesk OAuth client.

5. Click **Create and Get OAuth Token**.
   The Zendesk OAuth authorization dialog box opens.
6. On the dialog box, click **Authorize**.
   The OAuth access token becomes available for authorizing your Zendesk connection.
7. In your ServiceNow instance, add OAuth entity profile scope.
   a. Navigate to **System OAuth** > **Application Registry**.
   b. Open the record for the Zendesk spoke. For example, **Zendesk OAuth**.
   c. In the **OAuth Entity Profiles** tab, open the default record, for example, **Zendesk.OAuthProfile**.
   d. Insert a new row with these values.

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Field	Value
OAuth Entity Scope	users:write read
OAuth scope	write read

Set up a webhook

Configure a webhook to subscribe to Zendesk with a ServiceNow callback URL.

Before you begin

Role required: admin

Procedure

1. Register a Zendesk webhook in ServiceNow to notify ServiceNow when certain events occur in Zendesk.

   a. Log in to your ServiceNow instance as an admin.

   b. Navigate to **Zendesk Spoke** > **Webhook Registries**.

   c. Click **New**.

   d. Provide a name to identify the webhook registry record for **Name**.

   e. Click the Generate Token related link.
   A secret token is generated and displayed. This values is also updated in **Token**.

   f. Right-click the form header and click **Save**.

   g. Click **Create Webhook**.
   A confirmation message is displayed that the webhook creation is initiated and value of **Webhook ID** is populated.

2. In the Zendesk account, set up event-based rules that run every time a ticket is created or updated.

   a. Log in to the Zendesk account.

   b. Navigate to Zendesk Admin Center.

   c. Navigate to **Objects and rules** > **Business rules** > **Triggers**.

   d. Click **Add trigger**.

   e. On the form, fill these values.

Field	Description
Trigger name	Name to identify the trigger.

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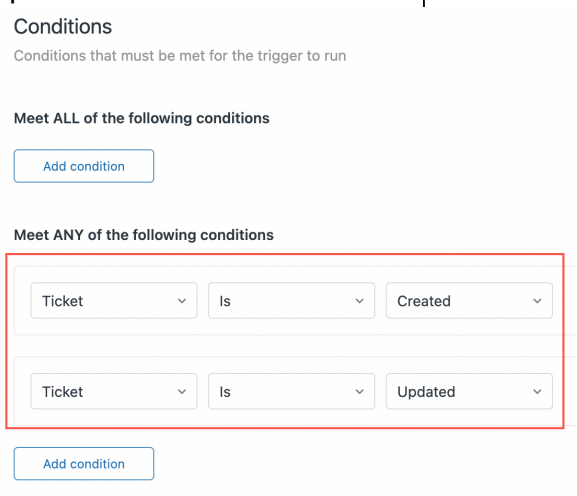
Field	Description
Category	Required event category. Select **Tickets**.
Conditions	Trigger conditions. Under **Meet ANY of the following conditions**, provide these conditions: 
Actions	Select **Notify active webhook** for **Notifications** and select the ServiceNow webhook. In **JSON body**, enter: `{ "id":"{{ticket.id}}", "priority":"{{ticket.priority}}", "status":"{{ticket.status}}", "subject":"{{ticket.title}}", "description":"{{ticket.description}}", "due_at":"{{ticket.due_date}}", "requester":"{{ticket.requester.name}}" }`

f. Click **Create**.
A confirmation message is displayed that the trigger is created.

Result

The webhook is setup. When a ticket is created or updated in Zendesk, the details are stored in your ServiceNow instance. To access the Zendesk tickets in your ServiceNow instance, navigate to **Zendesk Spoke** > **Webhook** > **Tickets**.

Zoom Spoke

Create and manage Zoom meetings with the Zoom spoke from your ServiceNow instance. With this spoke, you can add participants, retrieve details, end or delete a meeting, or fetch the participant details of a conference.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Spoke version

Zoom spoke v5.0.0 is the latest version. For version history of the spoke, see Zoom spoke release notes.

Supported versions

Zoom API version v2.0.

Spoke dependencies

If you're having trouble installing the app, make sure that these dependent plugins are installed:

- ServiceNow IntegrationHub Action Step - REST (com.glide.hub.action_step.rest)
- ServiceNow Flow Designer - Dynamic Inputs (com.glide.hub.dynamic_inputs)
- Key Management Framework (com.glide.kmf.global)
- NOW Platform Encryption (com.glide.now.platform.encryption)
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- Complex Object (com.glide.cobject)

Spoke flows

This spoke has no sample flows.

Spoke subflows

The Zoom spoke provides sample subflows for processing inbound events that are related to meetings, recordings, webinars, and users. Available sample subflows are described in the following table.

Spoke subflows

Subflow	Description
Zoom Process Meeting Events	Handles Zoom meeting webhook events.
Zoom Process Recording Events	Handles Zoom recording webhook events.
Zoom Process User Events	Handles Zoom user webhook events.
Zoom Process Webinar Event	Handles Zoom webinar webhook events.

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Spoke subflows (continued)

Subflow	Description
Create Zoom Meeting	Creates a Zoom meeting and provides the Zoom meeting URL. This subflow is used by the Meeting scheduler AI agent in the Now Assist for Integration Hub application.

Spoke modules

The Zoom spoke adds the Zoom application to your instance and includes the modules in the following table.

Spoke modules

Module	Description
Phone Numbers	Displays a list of Zoom Phone numbers.
Zoom Webhook Registries	Displays a list of webhook registries that are associated to Zoom.

Spoke actions

The Zoom spoke provides you with actions so that you can automate Zoom tasks when events occur in the ServiceNow AI Platform. Th available actions are described in the following table.

Spoke actions

Category	Action	Description	Granular scope needed
Cloud Recording Management	Look up meeting recording settings	Retrieves the settings of the meeting's cloud recordings. **Note:** The meeting password is retrieved and displayed as plain text.	cloud_recording:read:recording_settings:admin
	Look up meeting recordings	Retrieves all the recorded meetings for the specified meeting ID.	cloud_recording:read:list_recording_files:admin
	Look up recordings stream	Lists all the recorded meetings of the specified user.	cloud_recording:read:list_user_recordings:admin

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Spoke actions (continued)

Category	Action	Description	Granular scope needed
Phone Management	Assign calling plan To User	Assigns a calling plan to a user.	phone:write:calling_plan:admin
	Assign phone number to user	Assigns a phone number to a user who has already enabled Zoom Phone.	phone:write:user_number:admin
	Get country codes (metadata)	Retrieves the metadata of countries and their ISO codes.	
	Look up Account Call History Stream	Retrieves the call logs for an account.	phone:read:list_call_logs:admin
	Look up calling plans	Retrieves a list of calling plans.	phone:read:list_calling_plans:admin
	Look up phone number details	Retrieves the details of a specified phone number in a Zoom account.	phone:read:numbers:admin
	Look up phone numbers stream	Retrieves the list of phone numbers.	phone:read:list_numbers:admin
	Look up phone users stream	Retrieves all the users that are associated to an account with assigned Zoom Phone licenses.	phone:read:list_users:admin
	Look up User Call History Stream	Retrieves the call logs of a user's Zoom Phone.	phone:read:list_call_logs:admin
	Look up user phone profile	Retrieves a Zoom Phone user's profile.	phone:read:user:admin
	Look up user recordings stream	Retrieves a Zoom Phone user's recordings.	phone:read:list_recordings:admin

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Spoke actions (continued)

Category	Action	Description	Granular scope needed
	Look up user phone settings	Retrieve a user's Zoom Phone profile.	phone:read:user_setting:admin
	Look up user voicemails Stream	Retrieves a Zoom Phone user's voicemails.	phone:read:list_voicemails:admin
	Unassign user calling plan	Unassigns a calling plan to a user who has enabled Zoom Phone.	phone:delete:users_calling_plan:admin
	Unassign user phone number	Unassigns a phone number to a user who has enabled Zoom Phone.	phone:delete:user_number:admin
	Update main company number	Updates the main company number of an account.	
	Update user phone profile	Updates a user's Zoom Phone profile.	phone:update:user:admin
	Update user phone settings	Updates the settings of a specific Zoom Phone user.	phone:update:user_setting:admin
Meeting Management	Add meeting registrant	Registers a participant for a specific meeting.	meeting:write:meeting:admin
	Create meeting	Creates a meeting for a user using their Zoom user ID or the email address and other details such as start time, type of meeting, and agenda. The action can also include in the meeting details one or more alternative hosts' email ID.	meeting:write:meeting:admin

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Spoke actions (continued)

Category	Action	Description	Granular scope needed
	Download Meeting Transcript	Downloads the meeting transcript for the specified transcript ID.	cloud_recording:read:recording:admin
	Delete meeting	Deletes a specific meeting by using its meeting ID.	meeting:delete:meeting:admin
	End meeting	Ends an ongoing meeting.	meeting:delete:meeting:admin
	Look up meeting Details	Gets details of a specific meeting by its meeting ID.	meeting:read:meeting:admin
	Update Meeting	Identifies a meeting by its ID and then updates its details such as start time, duration, and topic.	meeting:update:meeting:admin
	Look up ended meeting instances	Lists all the meeting instances that were ended.	meeting:read:list_meetings:admin
	Look up live meetings by user stream	Lists all the live or ongoing meetings for a specific user.	meeting:read:list_meetings:admin
	Look up Meetings Stream	Lists the given user's meetings.	meeting:read:list_meetings:admin
	Look up Past Meeting Participants Stream	Lists information on participants from a past meeting.	meeting:read:list_past_participants:admin
User Management	Create user	Creates a user in your account.	user:write:user:admin

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Spoke actions (continued)

Category	Action	Description	Granular scope needed
		Note: A Zoom pro plan or later is required for this action. You must enable pre-provisioning for SSO users in your Zoom account.	
	Delete user	Deletes a specific user from your account.	user:delete:user:admin
	Disassociate user	Unlinks a specific user from your account.	user:delete:user:admin
	Look up user details	Gets the details of a specific user on your account by using their user ID.	user:read:user:admin
	Look up users stream	Retrieves all the users that are associated to your account.	user:read:list_users:admin
	Look up User Settings	Retrieves the settings details for a users profile.	user:read:settings:admin
	Update User	Updates the Zoom profile information of the required user.	user:update:user:admin
	Update user settings	Updates the settings of a specific user.	user:update:user:admin
Chat Management	Add members to channel	Adds members to a Zoom channel.	team_chat:write:members:admin
	Create channel	Creates a Zoom channel.	team_chat:write:user_channel:admin

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Spoke actions (continued)

Category	Action	Description	Granular scope needed
	Look up channel	Retrieves the details of a Zoom channel.	team_chat:read:user_channel:admin
	Look up channel members stream	Retrieves the details of the members in a Zoom channel.	team_chat:read:list_members:admin
	Look up user chat message stream	Retrieves the details of a member's chats in a Zoom channel.	team_chat:read:list_user_messages:admin
	Look up user channels stream	Retrieves the names of theZoom channels.	team_chat:read:list_user_channels:admin
	Remove member from channel	Removes a member from a Zoom channel.	team_chat:delete:member:admin
	Send chat message	Sends a chat message to a Zoom channel.	team_chat:write:user_message:admin
	Update channel	Updates a Zoom channel's details.	team_chat:update:user_channel:admin
Utility Actions	Copy chat message attachment to record	Copies the attachment that contains the chat message to the incident record.	team_chat:read:user_message:admin
Webinar Management	Look up Webinars Stream	Retrieves a list of upcoming or scheduled webinars for the required user.	webinar:read:list_webinars:admin

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This spoke provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

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You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI Agent	Description
Zoom user management AI agent	Looks up the details of a user, and creates, deletes, and disassociates a user.
Zoom meeting management AI agent	Creates, ends, and deletes meetings, looks up meeting details, and adds a meeting registrant.
Zoom cloud recording management AI agent	Looks up meeting recordings and meeting recording settings.
Zoom chat management AI agent	Enables users to create and manage chat channels, send and update messages, and handle member-related operations.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Zoom spoke requirements

These actions use REST calls, which can run on an instance or Zoom spoke See Building flows for more information. Use the connection record that is associated with the Zoom alias to configure where actions run and set Zoom spoke selection attributes. For more information about the alias, see Connection and credential alias.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

This spoke uses the Zoom Connection & Credential Alias record to authorize actions. For information about setting up the spoke, see Set up the Zoom spoke.

Set up the Zoom spoke

Integrate your Zoom account with your ServiceNow instance so that you can use the Zoom spoke to perform various actions on your Zoom account. You can also create a custom OAuth application in the Zoom account so that it can authenticate requests from your instance.

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Before you begin

- Request an Integration Hub subscription.
- Activate the Zoom spoke .
- Role required: admin.

Create a connected app in Zoom

Create a connected app in your Zoom account to establish an OAuth 2.0 level of authentication between the Zoom APIs and the Zoom spoke on the ServiceNow AI Platform. After creating the connected app, you can add scopes that enable you to perform different actions from the Zoom spoke.

Before you begin

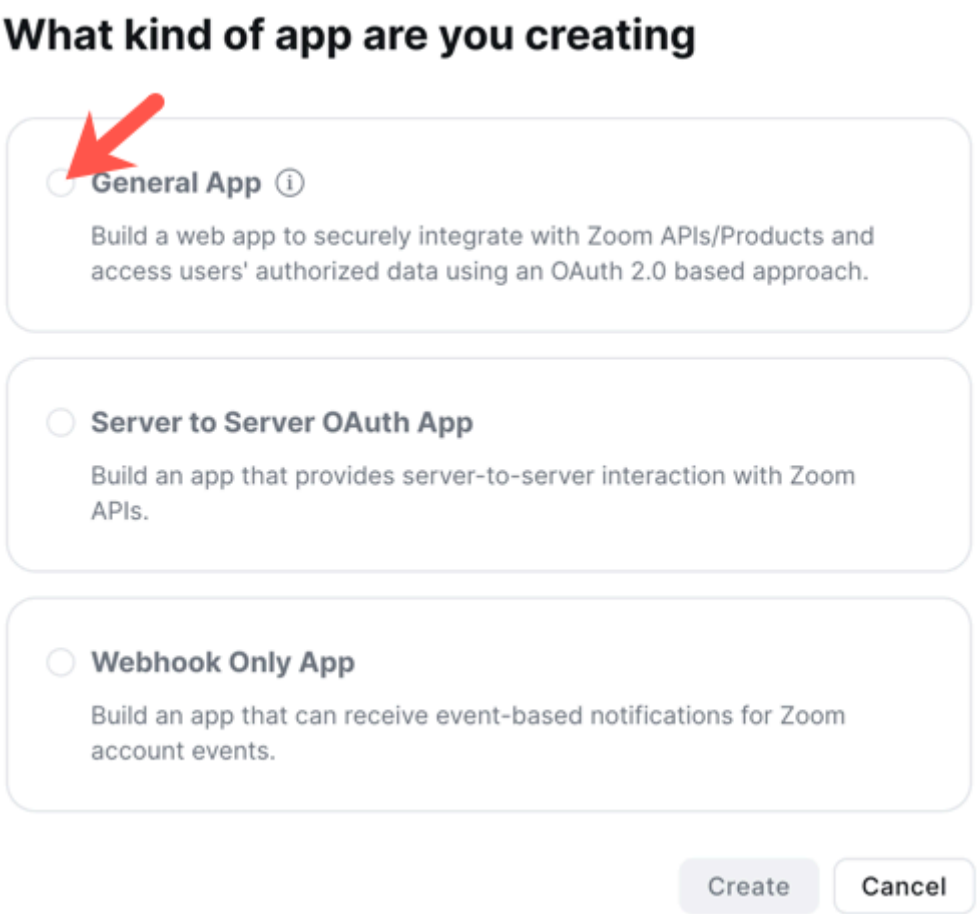
1. Create a Zoom account
2. Role required: Zoom admin

About this task

Creating the connected app is a one-time activity.

Procedure

1. Log in to Zoom marketplace.
2. Navigate to **Develop** > **Build App**.
3. Select **General App**.



4. Select **Create**.

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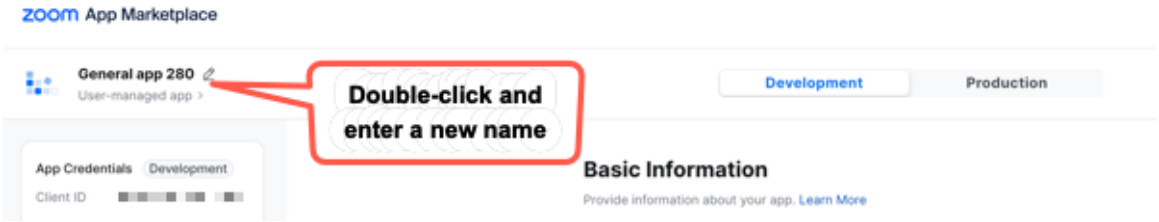
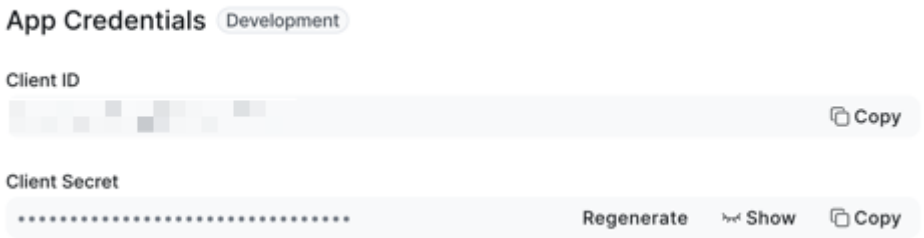
5. **Optional:** Double-click the default name of the app and update the name.



6. Select **Admin-managed**.
7. Select **Save**.
8. Under the App Credentials section, copy the Client ID and Client secret and store them at a secure place.



9. Under the OAuth Information section, do the steps.

   a. In the **OAuth Redirect URL** field, enter the redirect URL in this format: `https://<ServiceNow-Instance-Name>.service-now.com/oauth_redirect.do`.

   b. Under the **OAuth Allow List**, add a ServiceNow instance redirect URL in this format: `https://<ServiceNow-Instance-Name>.service-now.com/oauth_redirect.do`.
   A token is generated. This token is used by the OAuth app to give the Zoom spokes access to the Zoom APIs.

   c. **Optional:** To add another URL to the allow list, click **Add New List**.
   The following example shows the screen that you use to generate the credentials for the OAuth app.

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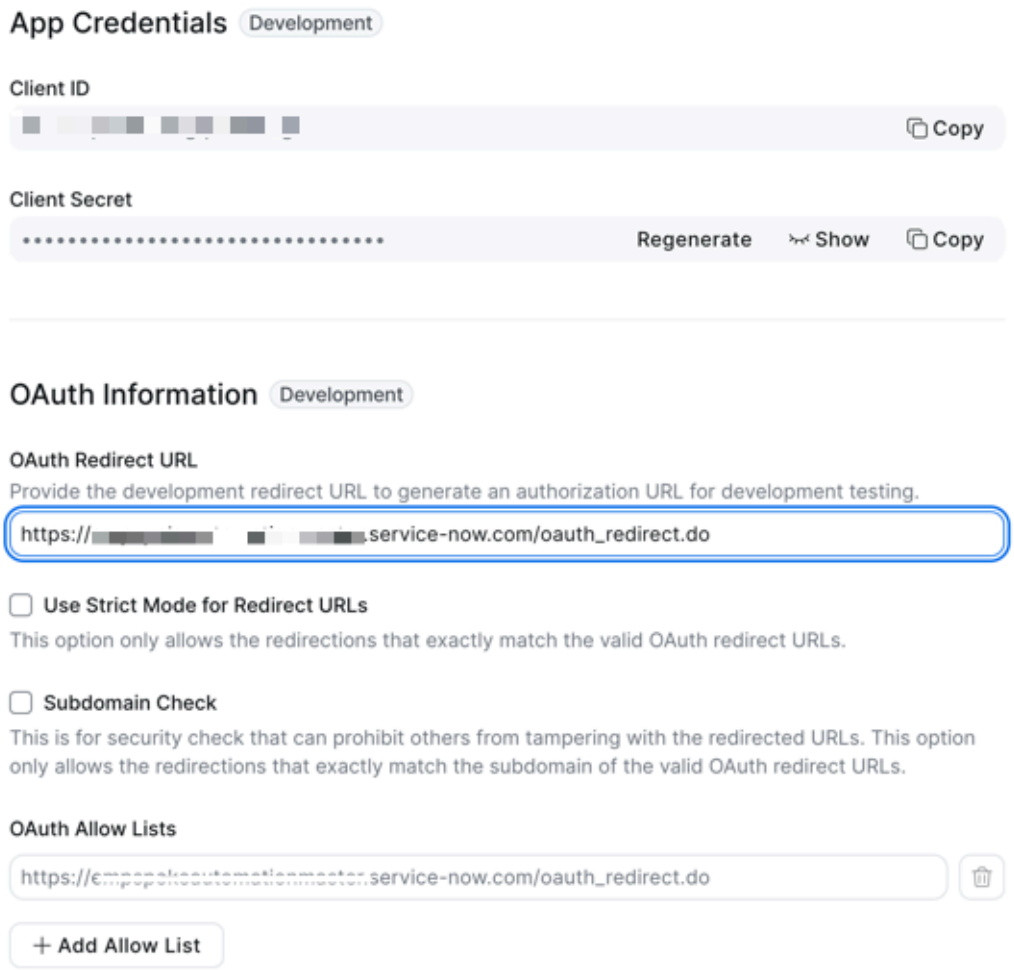
OAuth credentials configuration for Zoom spokes



Note: To know the difference between the Redirect URL for OAuth and the URL that is mentioned in the OAuth allow list, see Zoom Developer Forum.

10. On the left panel, select Access.
11. Under the Access section, copy the Secret Token.
12. On the left panel, select **Scopes**.
13. Select **+ Add Scopes**.
14. In the Search scope field, enter the granular scope.
    An example of a granular scope is `meeting:delete:meeting:admin`.
    The granular scope appears.

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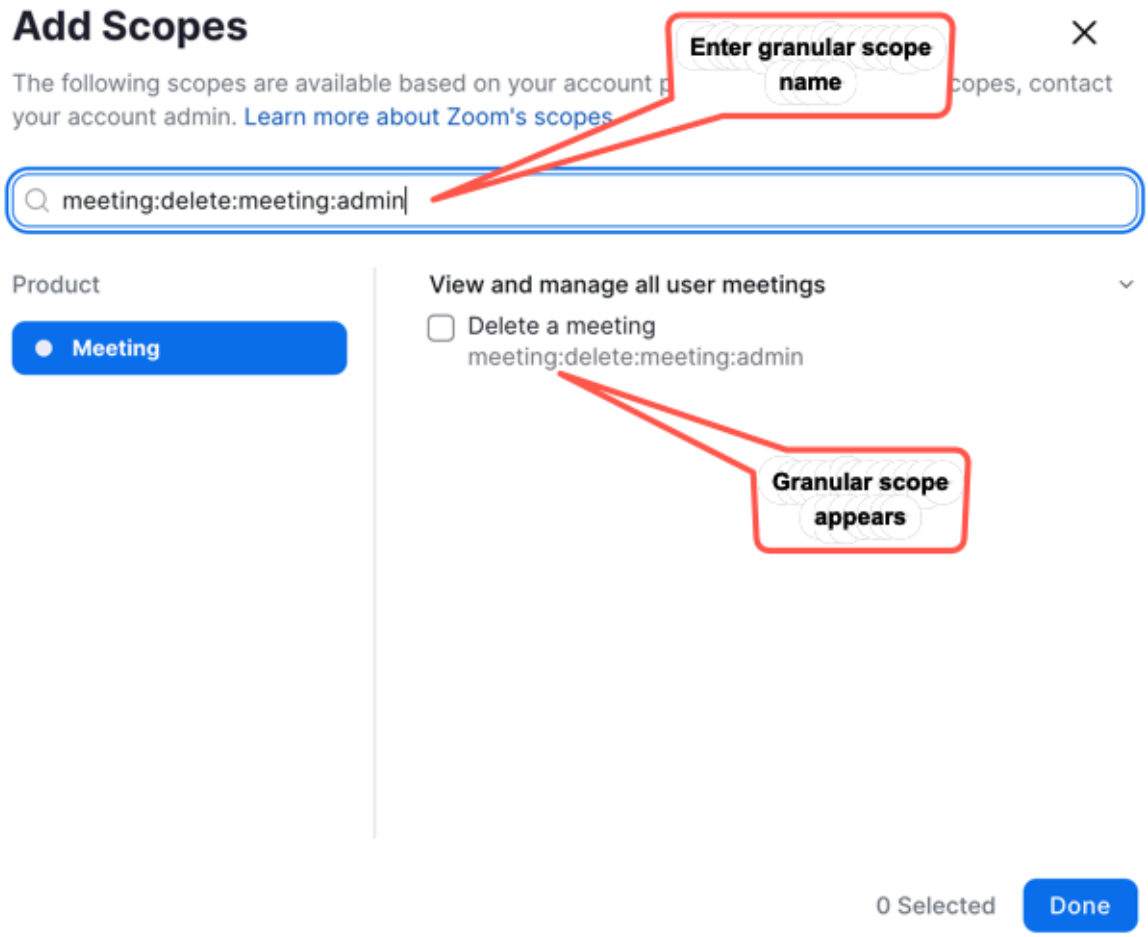

15. Select the scope and then select **Done**.
The granular scope is added.

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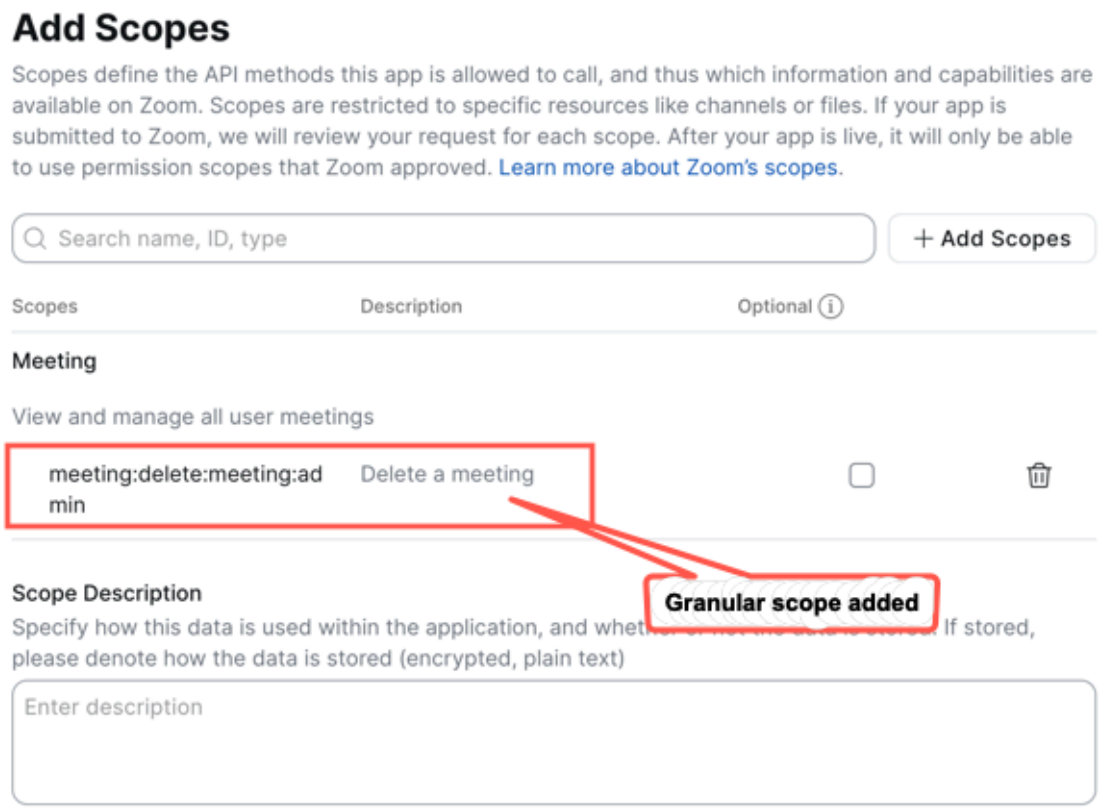

16. **Optional:** Repeat the steps to add more granular scopes.

Add Zoom connection in ServiceNow instance

Use the information generated during Zoom account configuration to register Zoom spoke as an OAuth provider and allow the instance to request OAuth 2.0 tokens. Add the Zoom connection in Workflow Studio to perform actions in Zoom.

Before you begin

Role required: admin

Procedure

1. From your ServiceNow instance, navigate to **Process Automation** > **Workflow Studio**.
2. Select the **Integrations** tab.
3. In the Search all connections field, enter `Zoom`.

   Note: The **Outbound** tab is selected by default. Confirm that the **Outbound** tab is already selected.

4. In the Zoom card, select **View Details**.
   - To configure the default connection and credential alias record that is shipped along with the Zoom spoke, click **View Details**.
   - To manage more than one Zoom spoke connection records, you should create a new child alias record by clicking **Add Connection**. For more information about using multiple connections, see Supporting multiple connections.

   If you are configuring the spoke for the first time, select **Configure**. Otherwise, click **Edit**.
5. On the form, fill these values.

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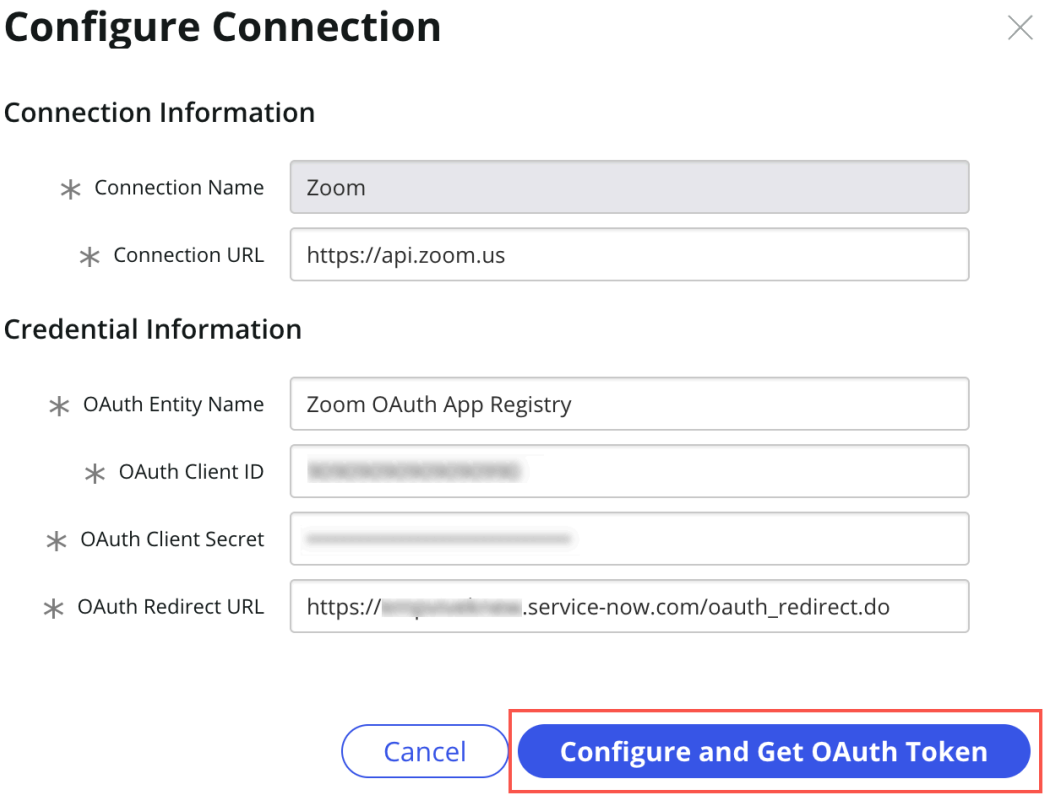
Field	Description
Connection Name	Name to identify the connection record.
Connection URL	Base URL to connect to your Zoom instance. Enter `https://api.zoom.us`.
OAuth Entity Name	Name to identify the application registry record.
OAuth Client ID	Client ID created during application registration.
OAuth Client Secret	Client secret created during application registration.
OAuth Redirect URL	OAuth callback endpoint. Enter `https://<instance-name>.service-now.com/oauth_redirect.do`.



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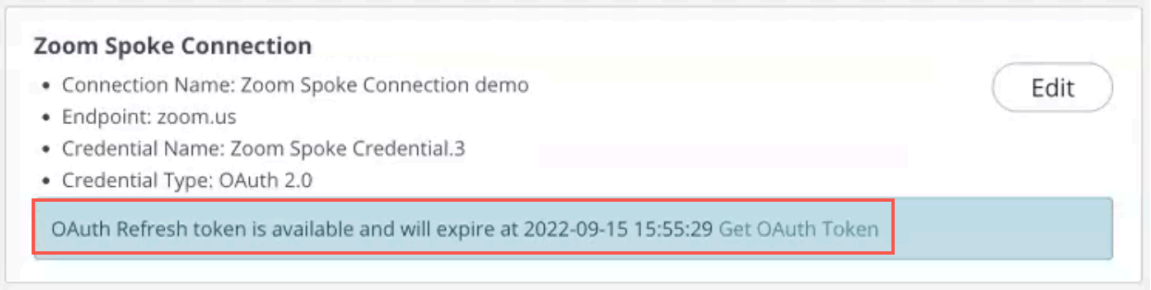
6. Click **Configure and Get OAuth Token**.
   A confirmation message is displayed that the token is available.



Set up a bi-directional webhook for Zoom spoke

Configure a webhook to subscribe to Zoom with a ServiceNow callback URL.

Before you begin

- Request an Integration Hub subscription.
- Activate the Zoom spoke.
- Role required: admin.

Add an endpoint URL in Zoom account

Specify an endpoint URL in your Zoom account to create a webhook for Zoom spoke.

Before you begin

Role required: admin

Procedure

1. Log in to your Zoom account.
2. Create a webhook app according to your requirements.
   For more information about Zoom webhook only app, see Create a Webhook-only App.
3. Generate a secret token and record the token value.
4. Create a webhook validation for Zoom spoke.

a. Log in to your ServiceNow instance.

b. Navigate to **Zoom spoke** > **Zoom Webhook Validations.**

c. On the form, fill in the fields:

Field	Description
Name	Unique name to identify the webhook validation record. For example, Zoom spoke webhook validation.
Secret Token	Secret token of the app in your Zoom account.

d. Click Submit.

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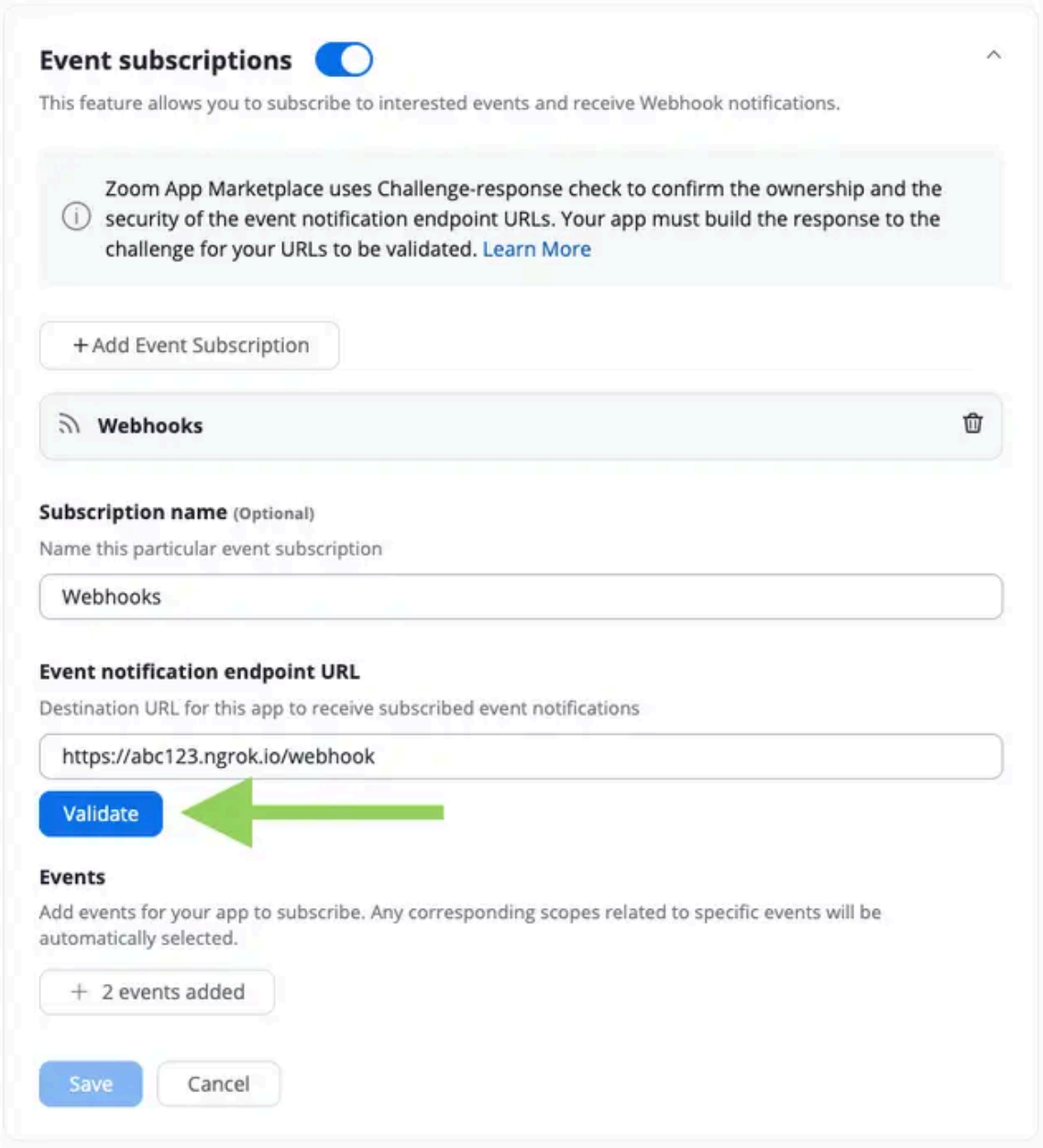
5. Enable Event Subscriptions and enter the Event notification endpoint URL in the following format.
   `https://<instance-name>.service-now.com/api/sn_zoom_spoke/zoom_webhook_endpoint/webhook`
6. Validate the event notification endpoint URL.
   For more information, see Validate your webhook endpoint.



7. Specify the Event Types according to your requirement.

Result
The endpoint URL is added in your Zoom account. You can create webhook registries and subflows according to your requirements.

Register a Zoom webhook in ServiceNow

Register a Zoom webhook in ServiceNow to notify the ServiceNow app when certain events occur in Zoom.

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Before you begin
Role required: admin.

Procedure
1. Navigate to **All** > **Zoom Spoke** > **Zoom Webhook Registries**.
2. Click **New**.

   Note: If you want to use an out-of-the-box webhook registry, open the registry and update the secret token.

3. On the form, fill in the fields:

Zoom Webhook Registry

Field	Description
Trigger Type	Type of the Zoom event that triggers the subflow.
Secret Token	Secret token from your Zoom account used for validating event notification. **Note:** If you are using an earlier version of the spoke or the default registry, update the registry to replace the verification token with the secret token.
Subflow Name	Subflow which is to be triggered when the specified conditions are met.
Input	Input for the webhook registry.
Trigger Object	Zoom object which is used to trigger the subflow.
Name	Name of the webhook registry.

Set up MID Server for a spoke

Configure MID Server settings on your ServiceNow instance that enables it to integrate with a third-party application via MID Server after you have set up the connection record for a spoke.

https://player.vimeo.com/video/1123289430?h=f4f6cff258&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin
Role required: admin

Confirm that you have set up the connection record for the spoke.

About this task
Setting up MID Server may be mandatory or optional for the spoke that you set up. For example, configuring MID Server is required for Microsoft Active Directory v2 Spoke but optional for the Jira Spoke. Use this procedure to set up the MID Server for your spoke after you have set up your spoke by filling the default connection alias form.

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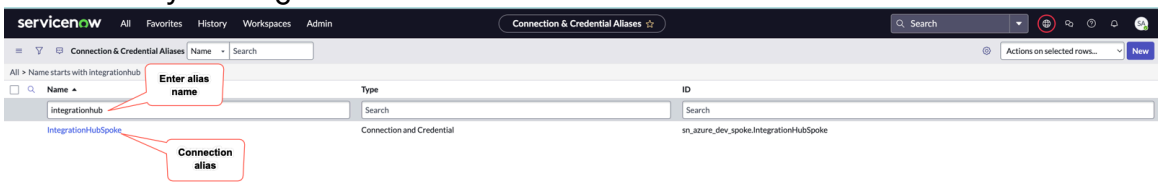
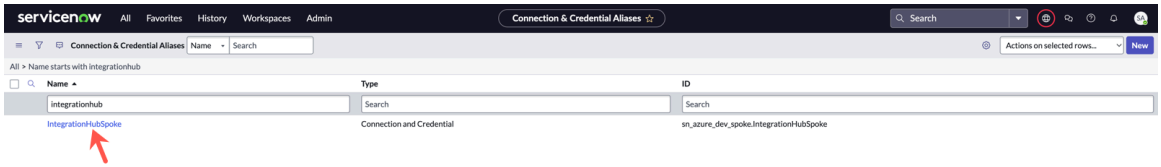
Procedure

1. Navigate to **All** > **IntegrationHub** > **Connection & Credential Alias**.
2. Find the connection and credential alias of the spoke.
   Search the alias by entering its name in the **Name**



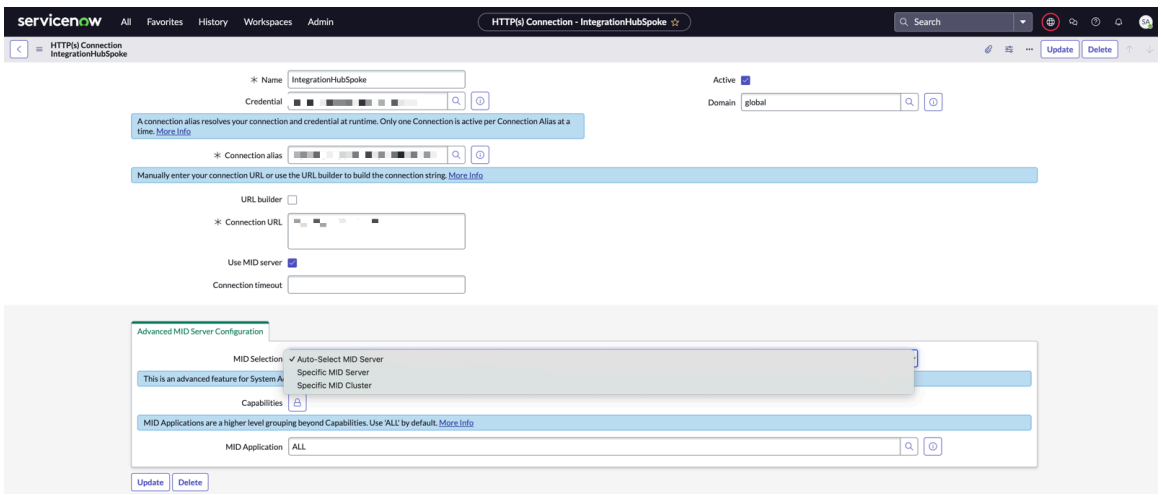
   field.
3. Under the **Name** column, select the connection and credential alias.



4. In the **Connections** tab, select the default connection record for the spoke.



5. Select **Use MID server**.
   The **Advanced MID Server Configuration** tab is enabled.



6. Fill the form under the **Advanced MID Server Configuration** tab.

Field	Description
MID Selection	Option to select a specific MID Server or MID Cluster. Choose any one of the following options.

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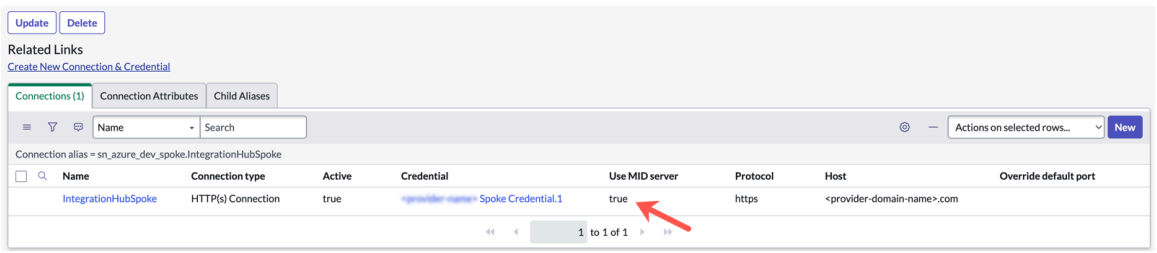
Field	Description
	○ **Auto-Select MID Server**: Your ServiceNow instance selects the MID Server without manual input. ○ **Specific MID Server**: Your ServiceNow instance uses MID Server that you specify. ○ **Specific MID Cluster**: Your ServiceNow instance uses the MID Cluster that you specify. A MID Cluster is a group of MID Servers that enables your ServiceNow instance to handle multiple integrations, and improve integration speed. For more information, see Configure a MID Server cluster.
Capabilities	The capabilities the MID Server must support to be eligible for selection. The system runs the action or activity from a MID Server that supports the selected capabilities. Only displays if **Use MID server** is selected. Required capabilities determine which MID Server is selected at runtime. To learn more about how a MID Server is selected during runtime, see MID Server selection. **Note:** This field is visible only when **Auto-Select MID Server** is selected from the MID Selection list.
MID Application	The application the MID Server must support to be eligible for selection. The system runs the action from a MID Server that supports the selected application. Only displays if **Use MID server** is selected. To learn more about how a MID Server is selected during runtime, see MID Server selection. **Note:** This field is visible only when **Auto-Select MID Server** is selected from the MID Selection list.

7. Select **Update**.
   The MID Server is enabled on the connection form of the spoke.



What to do next

Confirm that the spoke connection form has the Use MID option.

Now Assist in Conversational Spokes

Use Now Assist in Conversational Spokes application to start utilizing the conversational ability of Integration Hub spoke actions.

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Request apps on Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store.

Capabilities

Perform business actions through conversational interface like Now Assist. Unlock the interactive conversational experience to automate your business workflows. This feature requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

For information about configuring the conversational settings, see Conversational actions. For information about the Integration Hub Spoke actions that are currently conversational ready, see Available conversational actions.

Supported versions

The Now Assist in Conversational Spokes application is supported on Xanadu Patch 3 and later releases.

Activation of the conversational actions

Now Assist in Conversational Spokes application offers generative AI capabilities to make the spoke actions conversational. This application requires these subscriptions:

- Now Assist for Platform (sn_genai_platform) subscription
- One of these Workflow Data Fabric subscriptions:
  - Integration Hub Professional V4 SKU
  - Workflow Data Fabric Professional V5 SKU
  - Workflow Data Fabric Enterprise V4 SKU
  - Workflow Data Fabric Enterprise UU V4 SKU

After installing the Now Assist in Conversational Spokes application, you can configure the available conversational spoke actions.

- See Conversational subflows to learn more about configuring the conversational settings.
- See in Now Assist skills in the Platform workflow to learn more about conversation experience and skills.

Now Assist for Integration Hub

Use the ServiceNow Now Assist AI agents to mimic human-like intelligence by using Large Language Models (LLMs) to perform tasks that range from simple automated responses to complex problem-solving. Utilize the conversational ability of Integration Hub spoke actions.

Request apps on Store

Visit the ServiceNow Store website to view all the available apps and for information about submitting requests to the store.

Capabilities

AI agents are autonomous systems that interact with their environment to gather data, make decisions, and complete tasks that would otherwise need to be completed by a human. Now

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Assist products provide AI agents that are tailored to meet the needs of users in different workflows. You can take actions to drive towards a specific goal, such as resolving an incident or a case by providing a set of instructions to the AI agents.

Perform business actions through conversational interface like Now Assist. Unlock the interactive conversational experience to automate your business workflows.

Dependency

Before using Now Assist for Integration Hub, confirm that you are using the latest Now Assist for platform version.

Supported version

The Now Assist for Integration Hub application is supported on Xanadu Patch 7 and later releases.

Important: Ensure that you install the latest available version of the Now Assist for Integration Hub application.

Application version

Now Assist for Integration Hub v2.2.0 is the latest version.

Activation of the application

The Now Assist for Integration Hub application requires these subscriptions:

- Now Assist for Platform (sn_genai_platform) subscription
- An Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

After installing the Now Assist for Integration Hub application, you can use the available AI agents and configure the available conversational spoke actions.

- See AI Agent Studio (legacy) to learn about AI agents.
- See Conversational subflows to learn more about configuring the conversational settings.
- See Conversational actions to learn more about creating and configuring the conversational skill from Workflow Studio.
- See in Now Assist skills in the Platform workflow to learn more about conversation experience and skills.

Available AI agents

This application provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

Available AI agent includes, Meeting scheduler AI agent that can be used to organize Zoom or Teams meetings and create regular calendar events. This AI agent retrieves details of available rooms, details of the relevant users you want to invite such as, email address and timezone, finds an available time slot, creates a calendar event, and generates a Zoom URL for the meeting.

Role masking

Agentic workflows and their AI agents use role masking to determine which users can access them. Ones installed with your applications have specific roles that come included with the

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application. If you select *Users with specific roles* for user access, you must configure the security controls to include these roles. For the instructions to change the security controls, see Define security controls for an agentic workflow.

Available AI agents for Integration Hub

Now Assist AI agents are provided with some of the Integration Hub spokes or plugins that are preconfigured and are callable from interfaces such as, AI Agent Studio and Virtual Agent.

Spoke or plugin	AI agent
Now Assist for Integration Hub	Meeting scheduler AI agent **Important:** To use this AI agent, ensure that you have activated the Microsoft Exchange Online Spoke and configured the client credential alias. To generate Zoom URL for the meeting, you must activate and configure the Zoom Spoke.
Box Spoke	Box document management AI agent
	Box document sharing AI agent
	Box folder management AI agent
	Box group management AI agent
	Box legal hold management AI agent
	Box metadata management AI agent
	Box retention policy management AI agent
	Box user management AI agent
Coupa Spoke	Coupa approval management AI agent
	Coupa catalog management AI agent
	Coupa contract management AI agent
	Coupa inventory management AI agent
	Coupa invoice management AI agent
	Coupa item management AI agent
	Coupa primary data management AI agent
	Coupa purchase order management AI agent
	Coupa requisition management AI agent
	Coupa sourcing management AI agent
	Coupa supplier management AI agent
	Coupa user management AI agent
Docusign eSignature Spoke	Docusign eSignature account management AI agent
	Docusign eSignature bulk envelopes management AI agent

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Spoke or plugin	AI agent
	Docusign eSignature document management AI agent
	Docusign eSignature document signature AI agent
	Docusign eSignature envelope management AI agent
	Docusign eSignature group management AI agent
	Docusign eSignature templates management AI agent
	Docusign eSignature user management AI agent
F5 BIG-IP Spoke	F5 BIG-IP pool management AI agent
	F5 BIG-IP server management AI agent
GitHub Spoke	GitHub branch management AI agent
	GitHub issue management AI agent
	GitHub repository management AI agent
	GitHub source code management AI agent
GitLab Spoke	GitLab branch management AI agent
	GitLab group management AI agent
	GitLab issue management AI agent
	GitLab merge request management AI agent
	GitLab package management AI agent
	GitLab pipeline management AI agent
	GitLab project management AI agent
	GitLab source code management AI agent
	GitLab token management AI agent
Google Calendar Spoke	Google Calendar access control list management AI agent
	Google Calendar event management AI agent
	Google Calendar list management AI agent
	Google Calendar metadata management AI agent
Google Chat spoke	Google Chat member management AI agent
	Google Chat message management AI agent
	Google Chat space management AI agent
Google Cloud Storage Spoke	Google Cloud Storage bucket access control management AI agent

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Spoke or plugin	AI agent
	Google Cloud Storage bucket management AI agent
	Google Cloud Storage object access control management AI agent
	Google Cloud Storage object management AI agent
Google Docs Spoke	Google Docs document management AI agent
Google Drive Spoke	Google Drive file and folder management AI agent
	Google Drive permission management AI agent
Google Meet Spoke	Google Meet artifacts management AI agent
	Google Meet conference management AI agent
	Google Meet participant management AI agent
	Google Meet space management AI agent
Google Tasks Spoke	Google Tasks AI Agents
	Google Tasks Task Management AI Agents
	Google Tasks Tasklist Management AI Agents
GovNotify Spoke	GovNotify message management AI agent
Jenkins Spoke	Jenkins View Management AI Agents
	Jenkins Job Management AI Agents
	Jenkins Configuration Management AI Agents
	Jenkins User Management AI Agents
	Jenkins Build Management AI Agents
Jira Spoke	Jira audit management AI agent
	Jira group management AI agent
	Jira issue management AI agent
	Jira project management AI agent
	Jira sprint management AI agent
	Jira story management AI agent
	Jira user management AI agent
	Jira utility management AI agent
Jira Service Management Spoke	Jira Service Management organization management AI agent
	Jira Service Management request management AI agent

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Spoke or plugin	AI agent
	Jira Service Management service desk management AI agent
Kubernetes Spoke	Kubernetes endpoint management AI agent
	Kubernetes namespace management AI agent
	Kubernetes node management AI agent
	Kubernetes pod management AI agent
	Kubernetes secret management AI agent
	Kubernetes service management AI agent
	Kubernetes volume management AI agent
Microsoft Active Directory v2 Spoke	Microsoft Active Directory computer management AI agent
	Microsoft Active Directory group management AI agent
	Microsoft Active Directory object management AI agent
	Microsoft Active Directory user authentication AI agent
	Microsoft Active Directory user management AI agent
Microsoft Entra ID Spoke (formerly Microsoft Azure Active Directory spoke)	Microsoft Entra ID group management AI agent
	Microsoft Entra ID license management AI agent
	Microsoft Entra ID user management AI agent
Microsoft Azure DevOps Boards Spoke	Microsoft Azure DevOps Boards core process management AI agent
	Microsoft Azure DevOps Boards work item management AI agent
Microsoft Dynamics CRM Spoke	Microsoft Dynamics CRM account management AI agent
	Microsoft Dynamics CRM case management AI agent
	Microsoft Dynamics CRM contact management AI agent
	Microsoft Dynamics CRM lead management AI agent
	Microsoft Dynamics CRM opportunity management AI agent
	Microsoft Dynamics CRM record management AI agent

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Spoke or plugin	AI agent
Microsoft Exchange Online Spoke	Microsoft Exchange Online calendar management AI agent
	Microsoft Exchange Online room management AI agent
	Microsoft Exchange Online metadata retrieval management AI agent
	Microsoft Exchange Online meeting scheduler AI agent
	Microsoft Exchange Online mail manager
Microsoft OneDrive Spoke	Microsoft OneDrive drive management AI agent
	Microsoft OneDrive file management AI agent
	Microsoft OneDrive folder management AI agent
	Microsoft OneDrive permission management AI agent
	Microsoft OneDrive sharing management AI agent
Microsoft Security Response Center Spoke	Microsoft Security Response Center security manager
Microsoft SharePoint Online Spoke	Microsoft SharePoint Online change management AI agent
	Microsoft SharePoint Online file management AI agent
	Microsoft SharePoint Online folder management AI agent
	Microsoft SharePoint Online group management AI agent
	Microsoft SharePoint Online list item management AI agent
	Microsoft SharePoint Online list management AI agent
	Microsoft SharePoint Online search management AI agent
	Microsoft SharePoint Online site management AI agent
	Microsoft SharePoint Online user management AI agent
Microsoft Teams Graph Spoke	Microsoft Teams application management AI agent
	Microsoft Teams calendar management AI agent

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Spoke or plugin	AI agent
	Microsoft Teams channel management AI agent
	Microsoft Teams chat management AI agent
	Microsoft Teams notification management AI agent
	Microsoft Teams team management AI agent
Miro Spoke	Miro board item management AI agent
	Miro board management AI agent
	Miro team management AI agent
	Miro user management AI agent
Okta Spoke	Okta application access management AI agent
	Okta application management AI agent
	Okta group management AI agent
	Okta group membership management AI agent
	Okta logs management AI agent
	Okta password management AI agent
	Okta user management AI agent
Oracle HCM Cloud Spoke	Oracle HCM Cloud compensation management AI agent
	Oracle HCM Cloud feedback management AI agent
	Oracle HCM Cloud goals management AI agent
	Oracle HCM Cloud human capital management AI agent
	Oracle HCM Cloud jobs management AI agent
	Oracle HCM Cloud payroll management AI agent
PagerDuty Spoke	PagerDuty audit management AI agent
	PagerDuty business service management AI agent
	PagerDuty escalation policy management AI agent
	PagerDuty extension management AI agent
	PagerDuty incident management AI agent
	PagerDuty notification management AI agent
	PagerDuty schedule management AI agent

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Spoke or plugin	AI agent
	PagerDuty service management AI agent
	PagerDuty tag management AI agent
	PagerDuty team management AI agent
	PagerDuty user management AI agent
SAP Ariba Spoke	SAP Ariba approvals procurement management AI agent
	SAP Ariba approvals sourcing management AI agent
	SAP Ariba invoice management AI agent
	SAP Ariba procurement export management AI agent
	SAP Ariba sourcing event management AI agent
SAP Concur Spoke	SAP Concur expense entry management AI agent
	SAP Concur expense report management AI agent
	SAP Concur itinerary management AI agent
	SAP Concur payment request management AI agent
	SAP Concur purchase order management AI agent
	SAP Concur receipt management AI agent
Slack Spoke	Slack user manager
	Slack notification manager
	Slack conversation manager
Smartsheet Spoke	Smartsheet attachment management AI agent
	Smartsheet cell history AI agent
	Smartsheet column management AI agent
	Smartsheet cross sheet reference management AI agent
	Smartsheet folder management AI agent
	Smartsheet group management AI agent
	Smartsheet row management AI agent
	Smartsheet sharing management AI agent
	Smartsheet sheet management AI agent
	Smartsheet user management AI agent
SuccessFactors Spoke	SuccessFactors employee management AI agent

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Spoke or plugin	AI agent
	SuccessFactors hr foundational data AI agent
	SuccessFactors jobs management AI agent
	SuccessFactors payroll management AI agent
	SuccessFactors todos AI agent
	SuccessFactors user management AI agent
X Spoke (formerly Twitter Spoke)	X tweet management AI agent
Workday HR Spoke	Workday HR absence management AI agent
	Workday HR approval management AI agent
	Workday HR feedback management AI agent
	Workday HR goals management AI agent
	Workday HR payroll management AI agent
	Workday HR performance management AI agent
	Workday HR resource management AI agent
Wrike Spoke	Wrike approvals management AI agent
	Wrike attachment management AI agent
	Wrike comment management AI agent
	Wrike folder and project management AI agent
	Wrike group management AI agent
	Wrike task management AI agent
	Wrike user management AI agent
Zoom Spoke	Zoom chat management AI agent
	Zoom cloud recording management AI agent
	Zoom meeting management AI agent
	Zoom user management AI agent

Meeting scheduler AI agent

Now Assist for Integration Hub application provides standalone AI agent that mimics human-like intelligence to perform tasks in your ServiceNow instance. Meeting scheduler AI agent that can be used to organize Zoom or Teams meetings and create regular calendar events.

This AI agent retrieves details of available rooms, details of the relevant users you want to invite such as, email address and timezone, finds an available time slot, creates a calendar event, and generates a Zoom URL for the meeting. The logged-in user who runs the AI agent is marked as the meeting's organiser or host. This AI agent can create 3 types of events:

- A regular calendar event: This is a meeting placeholder with no URL and location.
- Teams event: This a meeting where attendees can join Microsoft Teams meeting.
- Zoom event: This a meeting where attendees can join the meeting using Zoom URL.

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Important: To use this AI agent, ensure that you have activated the Microsoft Exchange Online Spoke and configured the client credential alias. To generate Zoom URL for the meeting, you must activate and configure the Zoom Spoke.

In this example, Manish (the logged-in user) uses the Meeting scheduler AI agent from Now Assist panel to schedule a meeting with Vivek and provides details about the date, place, and meeting agenda. In this case, the AI agent schedules the meeting with most relevant user (based on collaboration and organizational context) named Vivek. If the AI agent is not able to retrieve details of the most relevant user from Microsoft Exchange Online, details of all users whose names match Vivek are retrieved from the ServiceNow User table [sys_user] and displayed, and logged-in user Manish can choose the required user.

AI agent then displays the list of available time slots. Manish can select the feasible time slot. You can also view the AI steps. If a time slot at the mentioned time is unavailable, AI agents expands the search window to 2 days and displays the list of available slots.

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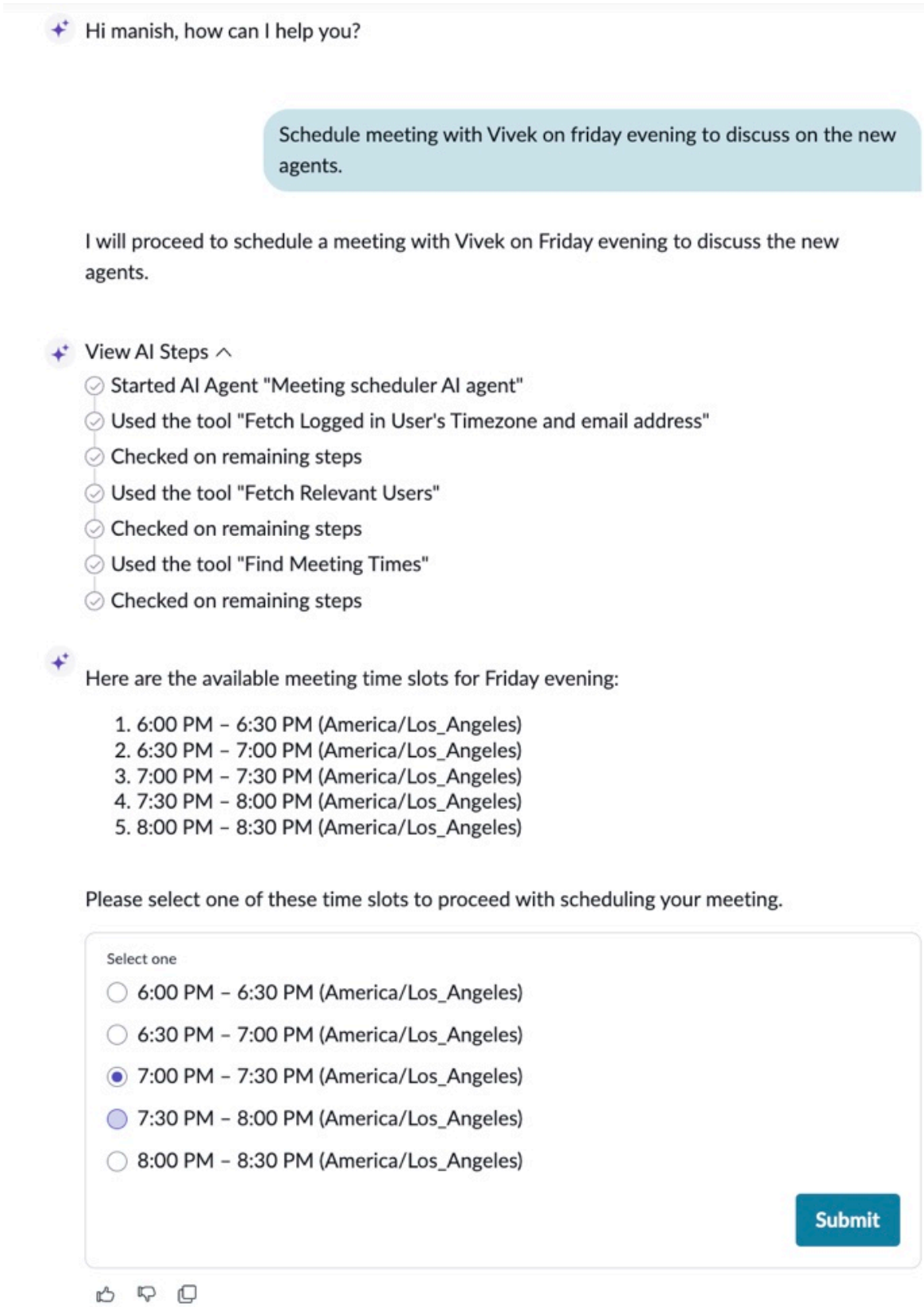

Manish can review the meeting details and proceed with scheduling the meeting.

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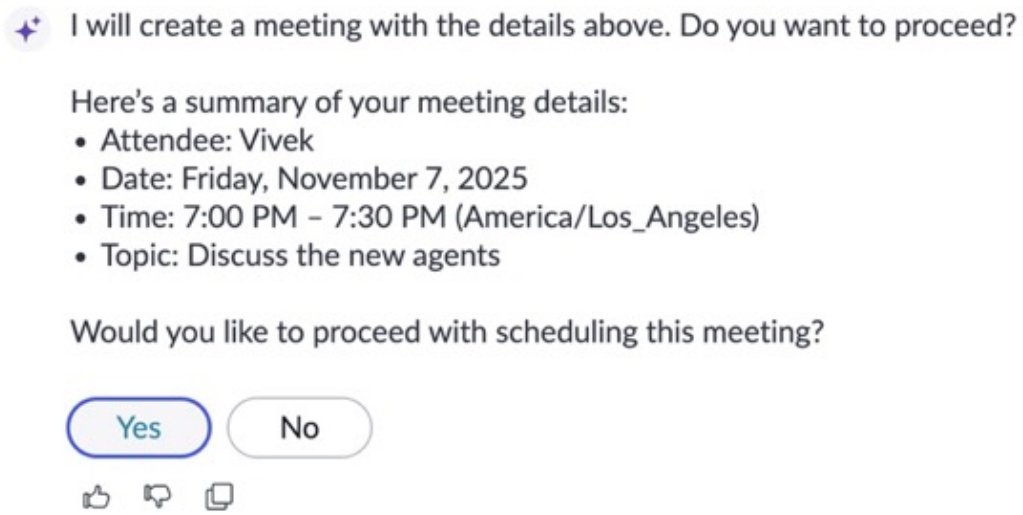
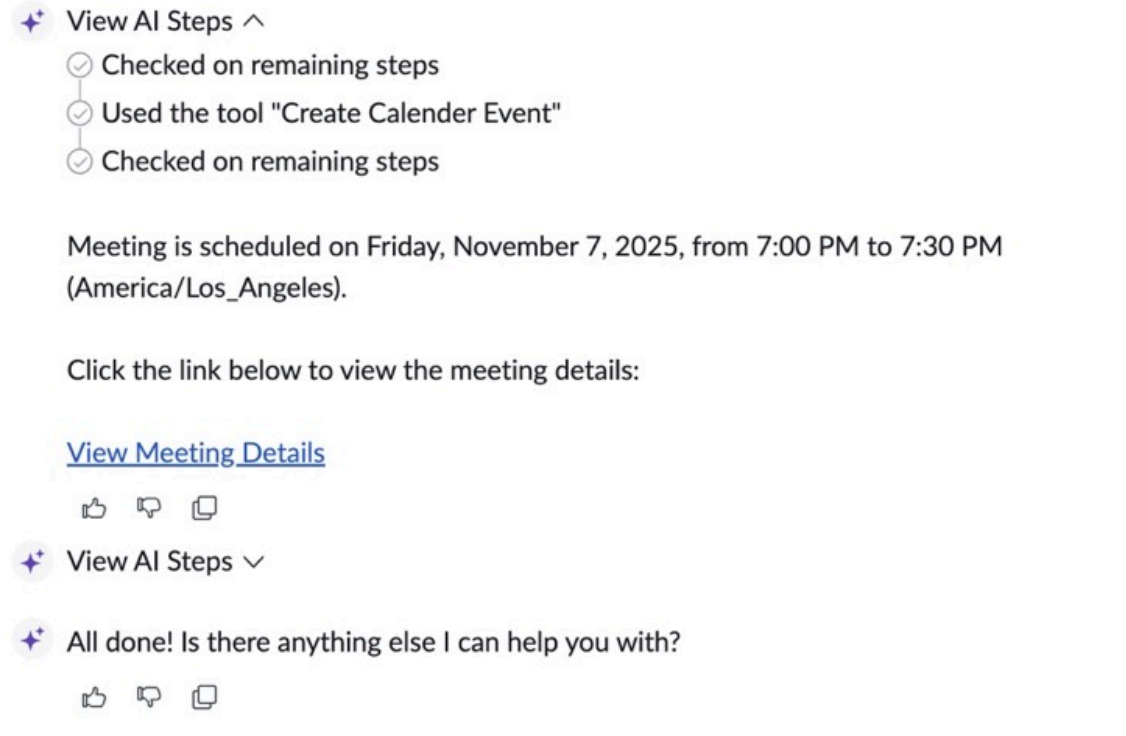


Once the meeting is created, the details are displayed.



The event is added to your Outlook calendar and you can also view the meeting details in Outlook.

Using AI agent, Manish can also modify the meeting by adding room of the required capacity and in a specified location, adding more attendees, changes date or time, and so on.

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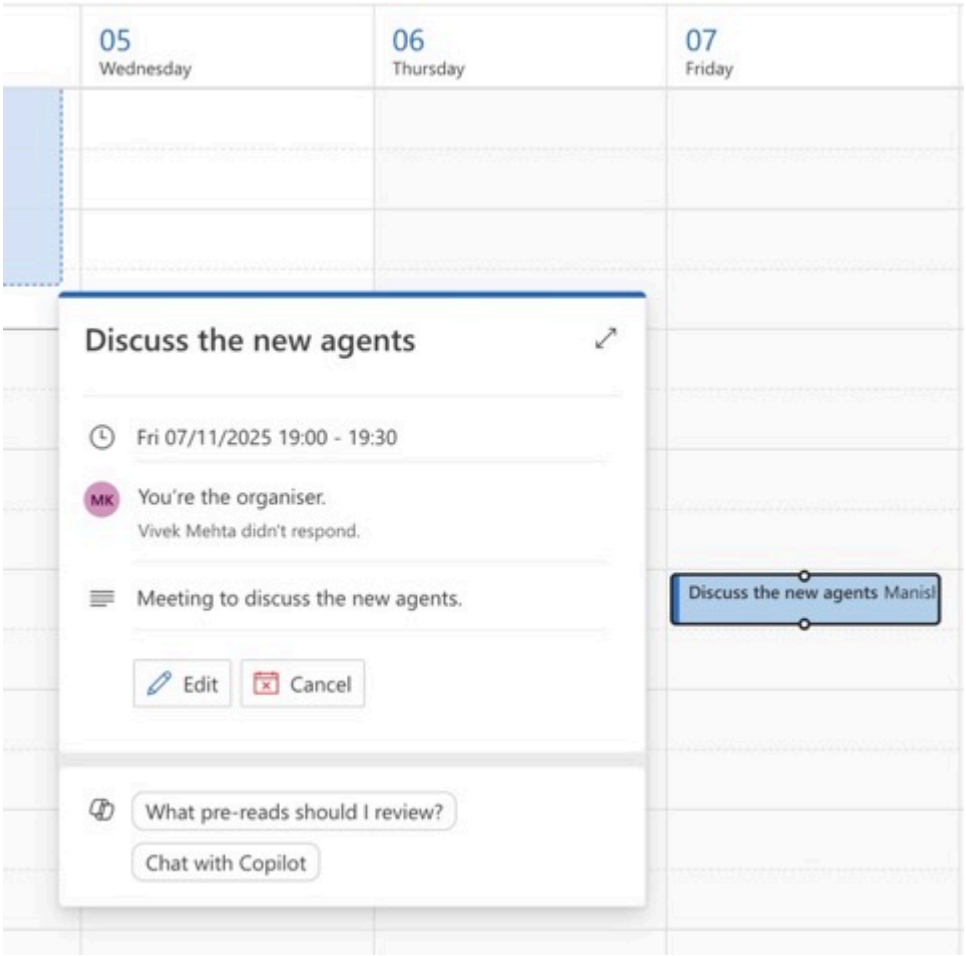

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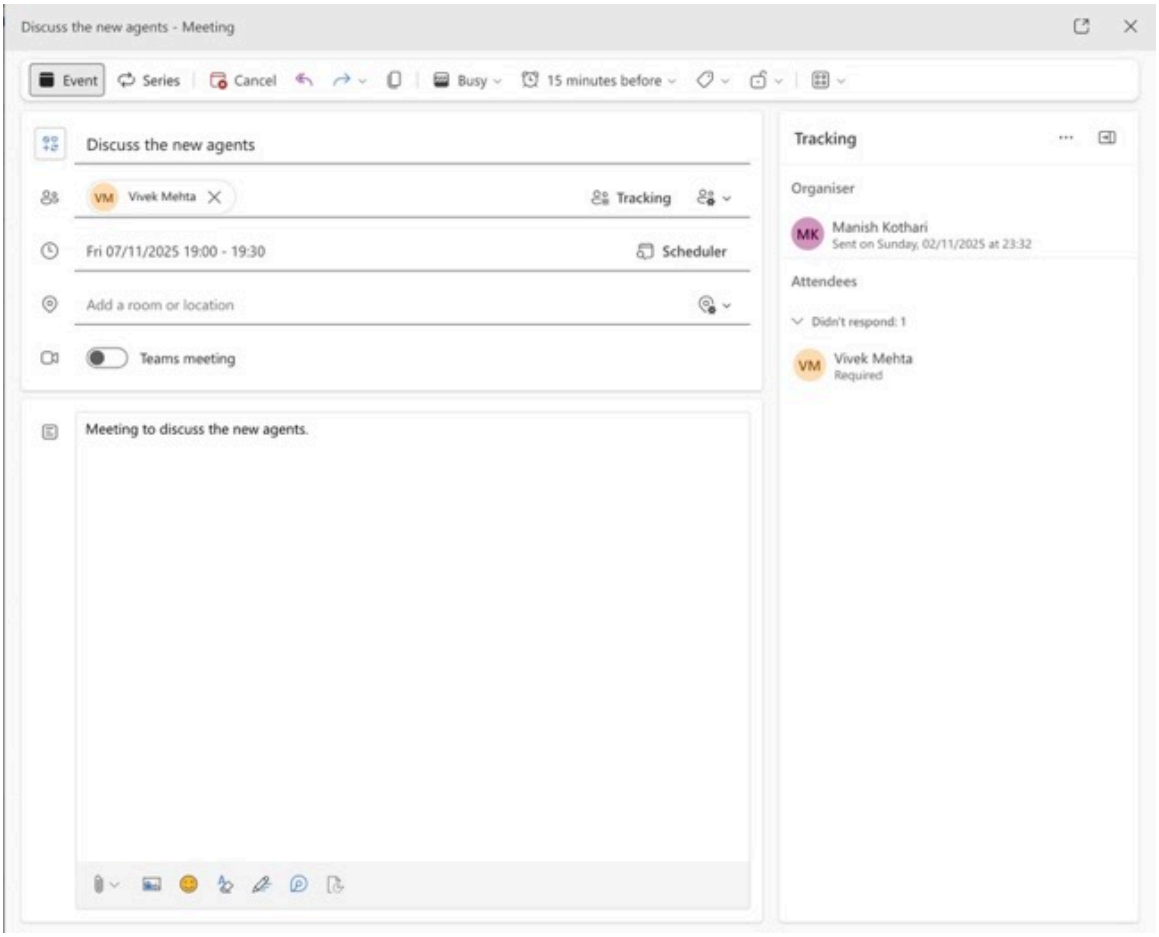

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: Ensure that the user running an AI agent has the required roles and permissions to access data or perform operations on data in the table that is associated with the AI agent.

Integration Hub solutions

Automate typical business processes with Integration Hub solutions. Solutions combine pre-built flows, actions, and other integration-specific content into one package, for quicker, simpler process automation.

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Available solutions

Access Management Automation

Automates access management request fulfilment using the Service Catalog or Service Portal. The catalog items and flows support requests in Okta, Microsoft Entra ID, and Microsoft Active Directory.

Client Software Distribution using Integration Hub

Use Client Software Distribution (CSD) to distribute software from the Service Catalog using third-party management systems.

Client Software Distribution 2.0 application

Client Software Distribution 2.0 application (CSD 2.0) application enables administrators to distribute software from the service catalog using third-party management systems.

Cloud Deployment Automation

Automates the deployment and provisioning of the AWS CloudFormation services using Service Catalog or Service Portal.

Microsoft AD Spoke for Password Reset

The Microsoft AD Spoke for Password Reset extends the ServiceNow Password Reset solution to provide password management into Microsoft Active Directory environments.

Microsoft Azure AD Spoke for Password Reset

The Microsoft Entra ID Spoke for Password Reset extends the ServiceNow Password Reset solution to provide password management into Microsoft Azure Active Directory environments.

Password Reset integration with Google Directory

Enables end users to reset their Google passwords using Password Reset and Google Directory spoke.

Password Reset integration with Okta

Use Okta to manage users, passwords, and groups.

Retry Handler Framework

Framework that retries a failed HTTP request when the API rate limits are exceeded and the 429 Too Many Requests status code is returned. The retry-after time HTTP header is used to retry the request again after that specified retry-after time.

ServiceNow Kafka Consumer

Integrates your ServiceNow instance with Kafka Consumer and stores data in the ServiceNow tables.

Client Software Distribution using Integration Hub

Use Client Software Distribution (CSD) to distribute software from the Service Catalog using third-party management systems.

Create all the records necessary to deploy software from Service Catalog requests, including software models and catalog items. You can use the CSD application to automate the

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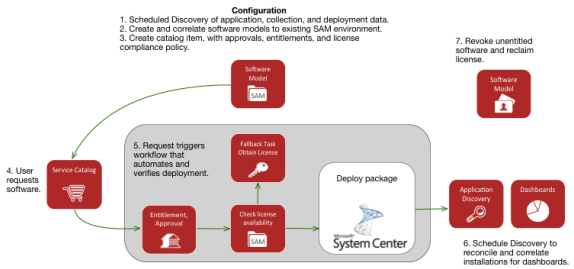
deployment and revocation of software from an SCCM host using the Microsoft SCCM spoke. You can define lease periods for software distributed from the Service Catalog and allow lease extensions in some cases, pending approvals. Deployment is accomplished using Integration Hub flows, subflows, and actions.

Integrates with Software Asset Management to manage license counts for deployed software.

CSD process flow using SCCM



Request client software distribution

Client software distribution requires the Orchestration - Client Software Distribution plugin (com.snc.orchestration.client_sf_distribution), which is available by request with a subscription to Integration Hub.

Before you begin

Role required: admin

About this task

The Client Software Distribution plugin activates the System Center Configuration Manager plugin that contains the Microsoft SCCM spoke actions to deploy or revoke software using an SCCM server. For additional plugin dependencies, see Plugins installed with client software distribution.

Note: The Client Software Distribution plugin runs in its own application scope.

Procedure

1. Navigate to **All** > **System Definition** > **Plugins**.
2. Click **Request Plugin**.
3. On the form, fill in the fields.

Field	Description
Target Instance	Instance on which to activate the plugin.
Plugin Name	Name of the plugin to activate.
Specify the date and time you would like this plugin to be enabled	Date and time that must be at least two business days from the current time.

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Field	Description
	Note: Plugins are activated in two batches each business day in the Pacific time zone, once in the morning and once in the evening. If the plugin must be activated at a specific time, enter the request in the **Reason/ Comments** field.
Reason/Comments	Information that would be helpful for the ServiceNow personnel who are activating the plugin. For example, if you need the plugin activated at a specific time instead of during one of the default activation windows, specify it in the comments.

4. Click **Submit**.

Components installed with client software distribution

Several types of components are installed with client software distribution (CSD).

Tables installed

These tables are installed with the Client Software Distribution plugin (com.snc.orchestration.client_sf_distribution).

Client software distribution tables

Table	Description
Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item]	Contains all catalog items created for client software distribution. This table extends the Catalog Item [sc_cat_item] table.
Client Software Distribution Software Request [sn_client_sf_dist_req_software]	Contains all requested software, and their statuses.
Client Software Distribution Application [sn_client_sf_dist_application]	Contains all discovered CSD applications.
Client Software Distribution Provider [sn_client_sf_dist_provider]	Contains all software distribution providers.
Client Software Distribution Extension Key [sn_client_sf_dist_extension_key]	Contains the predefined CSD extension keys.
Client Software Distribution Extension Point [sn_client_sf_dist_extension_point]	Contains the customization script for the extension keys.
Client Software Distribution Software Configuration [sn_client_sf_dist_software_config]	Base table for all software provider configurations.
SCCM Server Instance [sn_client_sf_dist_cmdb_ci_sccm_server]	Contains all SCCM server instances. This table extends the Configuration Item [cmdb_ci] table.

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Client software distribution tables (continued)

Table	Description
SCCM Application [sn_client_sf_dist_sccm_application]	Contains all discovered SCCM applications. This table extends the Client Software Distribution Application [sn_client_sf_dist_application] table.
SCCM Application Catalog Item [sn_client_sf_dist_sccm_app_cat_item]	Contains all catalog items created for SCCM applications. This table extends the Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item] table.
SCCM Collection [sn_client_sf_dist_sccm_collection]	Contains all discovered SCCM collections. Contains all discovered SCCM collections.
SCCM Deployment [sn_client_sf_dist_sccm_deployment]	Contains all discovered SCCM deployments. Contains all discovered SCCM deployments.
SCCM Configuration [sn_client_sf_dist_sccm_config]	Contains the SCCM application, install and uninstall collections, and Discovery model. This table extends the Client Software Distribution Software Configuration [sn_client_sf_dist_software_config]

Plugins installed

These plugins are installed with the Client Software Distribution plugin, if they are not already active.

For instructions on requesting activation of Client Software Distribution (CSD) see Request client software distribution.

Plugins for Integration Hub - Client Software Distribution

Plugin	Description
Orchestration - System Center Configuration Manager (com.snc.orchestration.sccm_mgnt)	Installs the custom SCCM Orchestration activities that do work on the SCCM target host.
Orchestration - Asset Lease Management (com.snc.orchestration.asset_lease_management)	Installs the lease functionality for software distributed through the Service Catalog. This includes starting, stopping, and extending leases.
Service Catalog Scoped API (com.glideapp.servicecatalog.scoped.api)	Installs the API to support application creation in the Service Catalog.
Software Asset Management Core (com.snc.sam.core)	Provides the base tables for software asset management. Includes software installations, usages, suite calculations, and discovery models.
ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)	Enables execution of IntegrationHub actions and flows.
Flow Designer support for the Service Catalog (com.glideapp.servicecatalog.flow_designer)	Provides support for Workflow Studio in Service Catalog.
Microsoft SCCM Spoke for IntegrationHub (com.sn.sccm.spoke)	Provides actions in Workflow Studio that a Process Analyst can use to automate the

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Plugins for Integration Hub - Client Software Distribution (continued)

Plugin	Description
	management of user collections, device collections, and application deployments.
Software Asset Management Spoke (com.sn_sam_spoke)	Provides actions in Workflow Studio for Software Asset Management activities.
Responsive Dashboards (com.glideapp.dashboard)	Creates, modifies, and shares dashboards using responsive and dynamic widget layouts.
Outbound Tracking (com.glide.outbound_tracking)	Tracks outbound requests.

Roles installed

These roles are installed with the Client Software Distribution plugin.

Roles for Integration Hub - Client Software Distribution

Role title [name]	Description	Contains Roles
Client software distribution admin [sn_client_sf_dist.csd_admin]	Administrator role for managing client software distribution application.	• sam • agent_admin • report_admin • catalog_admin • itil • workflow_admin

Script includes installed

These script includes are installed with the Client Software Distribution plugin.

Script includes for Client Software Distribution

Script include	Description
CSDExtensionPoint	Execute the CSD provider's specific code
CSDUtil	Utility functions for the CSD application.
RefQualsCSD	Reference qualifier filter. This script provides the filter functions for the CSD providers, devices, SCCM application, install collections, and uninstall collections.
SCCMCatItemHandler	Sets the field values of specific SCCM catalog items. These values are the SCCM catalog item table name, catalog item name, SCCM provider, and SCCM software configuration.
SoftwareCatItemCreator	Creates software catalog items.
CSDCatItemHandler	Base class for CSD catalog item creation. This script is used by the Create Catalog Item UI action to create and application catalog.

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Script includes for Client Software Distribution (continued)

Script include	Description
CSDDemoDataUtil	Populates demo data.
CSDDemoDataUtilAjax	Populates demo data.

Properties installed

Properties for client software distribution (CSD) manage the installation status of requested software deployments and configure scheduled Discoveries.

To access CSD properties, navigate to **Client Software Distribution** > **Properties**. The following properties are available:

Client software distribution properties

Property	Name	Description
Status check expiration interval (days)	sn_client_sf_dist.softwareInstallExpDays	Controls how many days the system waits before ignoring the software installation status. The default time limit for installing software is 30 days before the system stops checking the installation status of a deployment. Installation statuses are: • **Not installed**: User has not installed requested software prior to the expiration of the configured time limit. • **Installed**: Software was installed within the configured time limit. • **Status check expired**: Time limit has expired for the user to install the requested software. The system no longer checks the status of this deployment. • **Revoked**: Software was revoked by the administrator. • **Type**: integer • **Default value**: 30
Reconcile software installation status interval (hours)	sn_client_sf_dist.softwareInstallIntervalHour	Determines when the scheduled job runs that determines the installation status. By default, the system checks the installation status every hour. • **Type**: integer • **Default value**: 24

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Client software distribution properties (continued)

Property	Name	Description
Set scheduled application Discovery interval (days).	sn_client_sf_dist.discoveryExeDay	Sets the repeat interval for the scheduled job that runs application Discovery. By default, Discovery runs at midnight on the day set with this value. • **Type**: integer • **Default value**: 5
Set lease execution schedule job interval (minutes)	sn_client_sf_dist.lease_execution_interval	Interval in which the CSD Lease Schedule scheduled job checks for requested software leases to start, stop, or extend. • **Type**: integer • **Default value**: 1
Set time prior to lease end to notify requester (days)	sn_client_sf_dist.lease_end_notification	Determines how many days prior to the end of a software lease to notify the requester. If lease extensions are allowed, ensure that this period provides enough time for the approval process to complete before the lease expires. • **Type**: integer • **Default value**: 5

Flows and subflows installed

These flows and subflows are installed with the Client Software Distribution plugin.

Flows installed with client software distribution

Flow	
Order Client Software	Schedules the installation of an ordered application on the selected device. The request requires approvals based on the user input in the catalog item configuration.
Deploy Client Software	Deploys a software by executing provider-specific subflow. Creates catalog tasks if there is a failure in the execution of the provider subflow.

Subflows installed with client software distribution

Subflow	Description
Discover And Store SCCM Data	Retrieves lists of applications, collections, and deployments from SCCM servers using Microsoft SCCM spoke actions. An administrator runs this subflow from a UI action in a SCCM Server Instance record.

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Subflows installed with client software distribution (continued)

Subflow	Description
Deploy SCCM Application	Triggered by the Order Client Software flow to deploy software through SCCM server. This subflow adds either the user or the device into the SCCM collection.
Revoke Client Software	Begins the software revocation process for software deployed by an external provider. Administrators run this subflow from a UI action on the Requested Software record and the Installed Software Not Entitled record. This subflow triggers the appropriate provider subflow that performs the actual revocation. For example, this subflow triggers the Revoke SCCM Application subflow for applications in SCCM uninstall collections.
Revoke SCCM Application	Revokes SCCM applications that are members of an uninstall collection. The Revoke Client Software subflow triggers this subflow to revoke software deployed by an SCCM server. This subflow moves either the user or the device from the SCCM collection into the appropriate uninstall collection.
CSD Lease End Notification	Notifies user about the lease end date of the software and send link to extend lease end date.
CSD Deploy Software Post Processing	Performs post processing after the software deployment is successful. The Deploy Client Software flow triggers this subflow.
CSD Lease End Notification	Notifies user about the lease end date of the software and sends link to extend lease end date.
Prepare Revocation Data	Prepare data required for the revocation flow.

Create licenses and counters for distributed software

Licenses and software counters are associated with the software model and must be created if you want to track the license for software deployed by client software distribution (CSD).

Before you begin

Role required: sam or admin

You can create software licenses and counters in Software Asset Management for software items deployed from the service catalog by CSD. CSD depends on the software counter result to determine if the license is available for the requested software. If the license **Valuation** is greater than 0, and the license type is **Not allocated**, CSD assumes that the license is available for the software.

Procedure

1. Navigate to **All** > **Software Asset** > **Software Licenses**.
2. Add a new software license for the software model you used in CSD.
3. Navigate to **Software Asset** > **Reconciliation** > **Software Counters**.
4. Create a software counter for the software model you created.
5. Run the counter to retrieve the software license information.

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Client software distribution ordering process

Software deployed by Client Software Distribution (CSD) can be ordered from the service catalog by individual users or by approved users on behalf of others.

Client Software Distribution catalog items have different options, depending on how ordering is configured.

Lease start and end dates

All software deployed by CSD requires users to specify the beginning date for the lease. This is enforced by the Asset Lease Management plugin that is activated automatically with CSD. The system pre-populates the **Lease start** field with the current date and time.

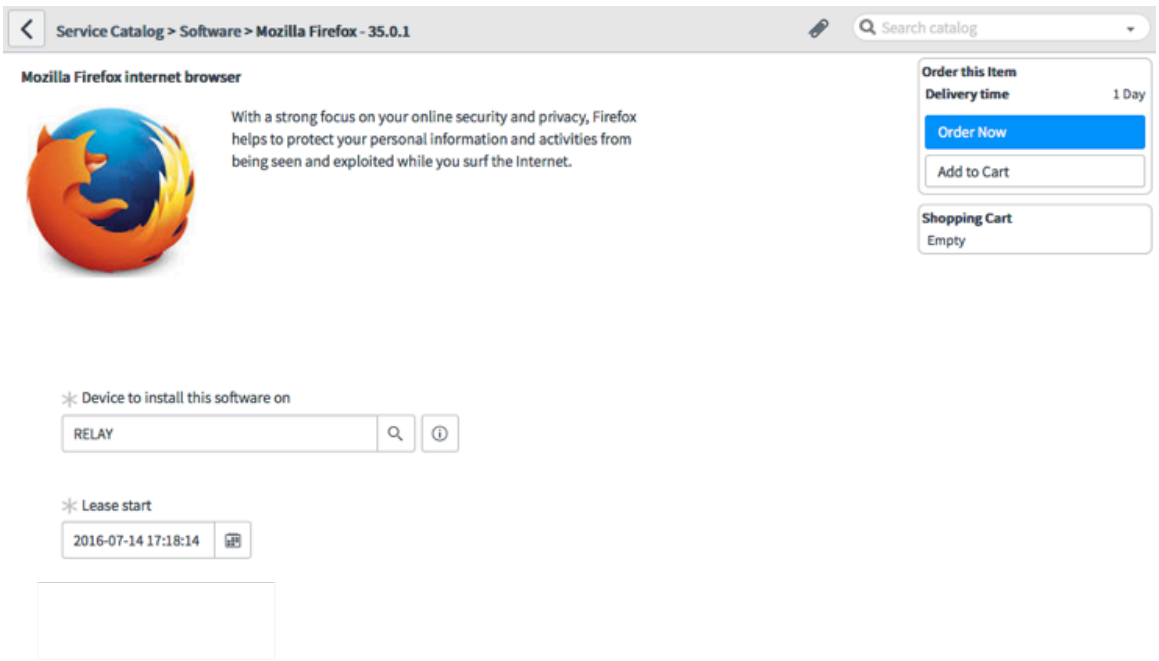
If the catalog item is configured for revocation (uninstall), the form displays the **Lease end** field, which allows the requester to define an end date and time for the lease. The system validates user input in these fields to ensure that the dates selected define a future window. The **Lease end** field is not mandatory and can be left blank to order software with no end date.

Note: For systems deploying software from Microsoft System Center Configuration Management (SCCM), the **Lease end** field is only available if the Define an SCCM configuration specifies an uninstall collection.

Software offered only to the logged in user

If the software catalog item is configured with the **Order on behalf of** check box cleared, the **User** field does not appear on the order form. The logged in user selects the device on which to deploy the software from the **Device to install this software on** field. Only those devices assigned to the logged in user appear in the list.

In this example, a user has logged into the service catalog to order Firefox for the assigned computer. User selects the machine from a list of devices and selects the date and time the lease should begin. This software is deployed through Microsoft System Center Configuration Management (SCCM), but does not have an uninstall collection configured and cannot be revoked automatically by the system. As a result, the **Lease end** field is not available.



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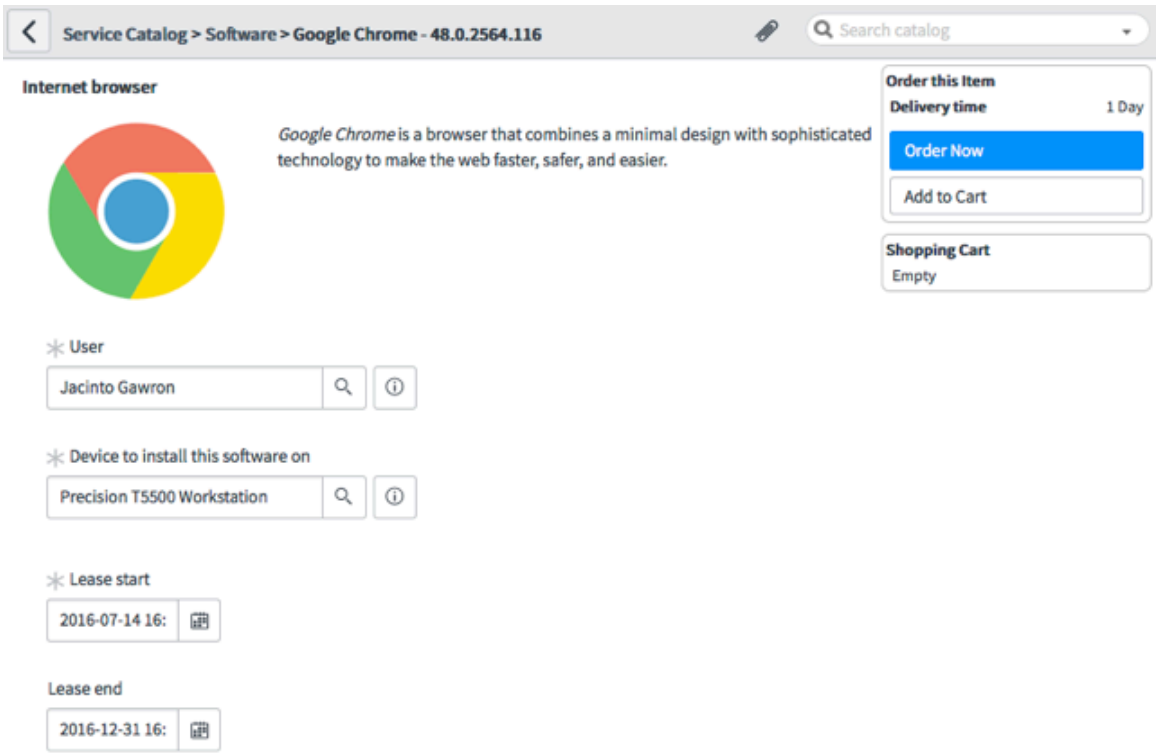
Software ordered on behalf of another user

If the software catalog item is configured with the **Order on behalf of** check box selected, the **User** field appears on the form. The logged in user can select any user from this field. The **Device to install this software on** field only lists the devices assigned to the user selected in the **User** field. If an approval is required for software ordered on behalf of another user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requester is the named user's manager.

In this example, a manager is ordering Google Chrome for a contractor. The manager selects the contractor from the **User** field and then chooses a computer from the list of devices assigned to the contractor. This software has an SCCM uninstall collection configured, which allows the manager to select an end date for the lease that coincides with the end of the user's contract. When the lease expires, SCCM automatically uninstalls the software from the device.



Extend a software lease

Users of software deployed by Client Software Distribution (CSD) can request the extension of a lease window, if the software is revocable by a software distribution system.

Before you begin

Role required: Any system user

About this task

If your software has a lease end date defined, and the software status is **Installed**, you can request an extension of the lease, pending any approvals your organization requires.

Procedure

1. Navigate to **All** > **Service Catalog** > **My Requested Software**.
   The list shows only the software you have requested from the service catalog.
2. Select the record for the installed software whose lease you want to extend.
3. Under **Related Links** click **Extend Lease**.

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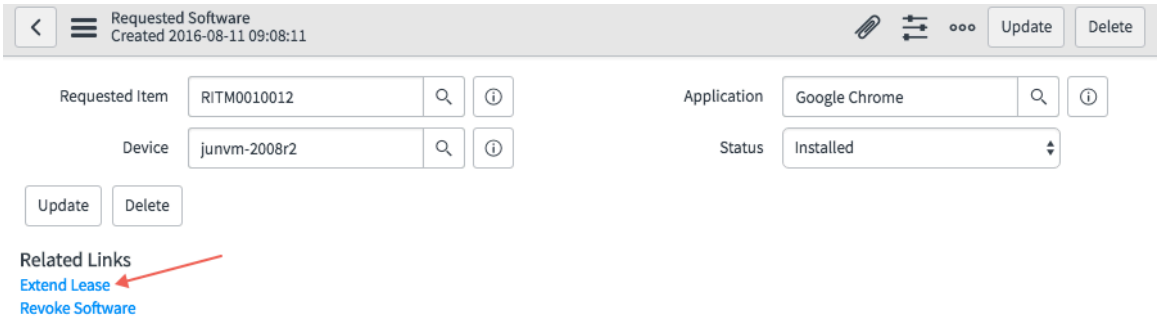
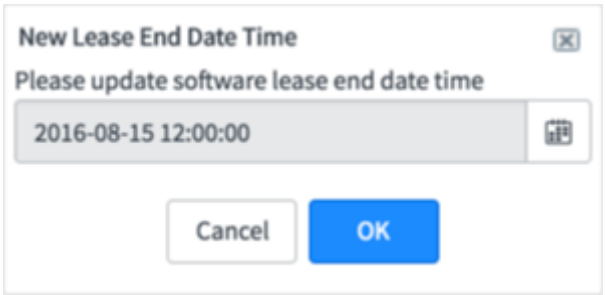


4. In the dialog box that appears, select a new lease end date in the calendar and click **OK**. You must select a date later than the current date.



If the lease extension is subject to manager approval, you are notified of the decision. If the request is approved, a notification shows the new lease end date. If the new end date is within 5 days (the default notification period) of the date when you made the request, CSD sends an immediate end-of-lease notification.

Important: If lease extensions in your organization require approval, make sure the approver is available and has enough time to process your extension request. If the extension cannot be approved before the original end date expires, the software is revoked.

Client software distribution from SCCM

Use Client Software Distribution (CSD) to deploy and revoke software deployments from Microsoft System Center Configuration Management (SCCM) and manage distributions on SCCM hosts.

The Microsoft SCCM spoke contains actions that CSD uses to deploy software from a service catalog request and manage user and device collections on SCCM servers. In addition, CSD can manage license counts for deployed software using ServiceNow Software Asset Management, revoke software deployed by SCCM without user interaction, and manage lease periods.

Configuring SCCM

Follow the SCCM configuration procedures in the order shown.

Note: Ensure that user must be able to establish remote PowerShell sessions with the MECM server. The spoke scripts use *`Microsoft.PowerShell32`* configuration for creating sessions. For user permissions, see User permissions in Microsoft Learn.

Configure the Application Administrator role on the SCCM server

To deploy software using ServiceNow® Client Software Distribution (CSD), ensure that an SCCM administrative user has the correct permissions to deploy software and that PowerShell is properly configured.

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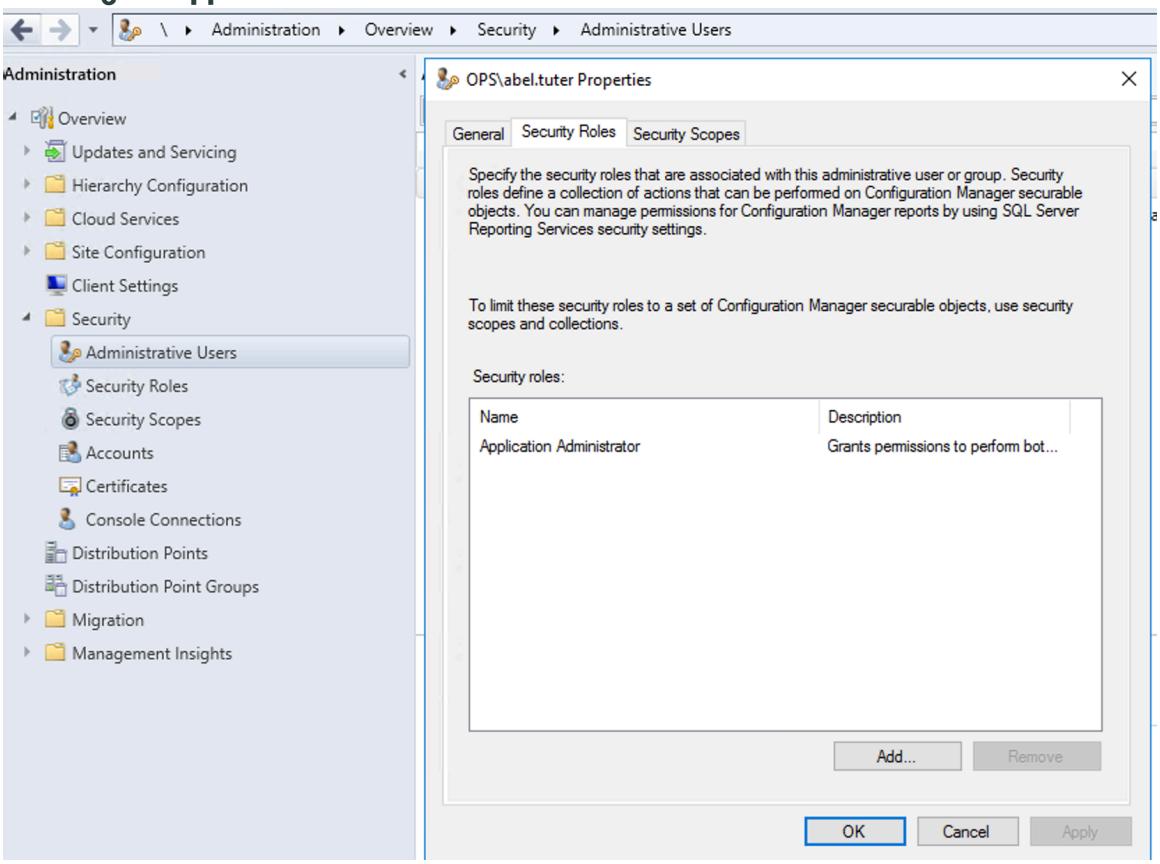
Before you begin
Role required: SCCM Application Administrator.

About this task
These instructions are for Microsoft 2012 R2 Server.

Procedure
1. In the System Center Configuration Manager console, navigate to **Administration** > **Security** > **Administrative Users**.
2. Right-click the user to whom you want to grant the Application Administrator role.
3. Select **Properties** from the drop-down menu.
4. In the Properties dialog box, select the **Security Roles** tab.
5. Ensure that the user has the Application Administrator role.
6. If the user does not already have this role, click **Add**, select this role from the list, and click **OK**.

Granting the Application Administrator role on the SCCM server



7. Log into SCCM as the user with the Application Administrator role.
8. Open the menu from the upper left corner of the console and select **Connect via Windows PowerShell**.

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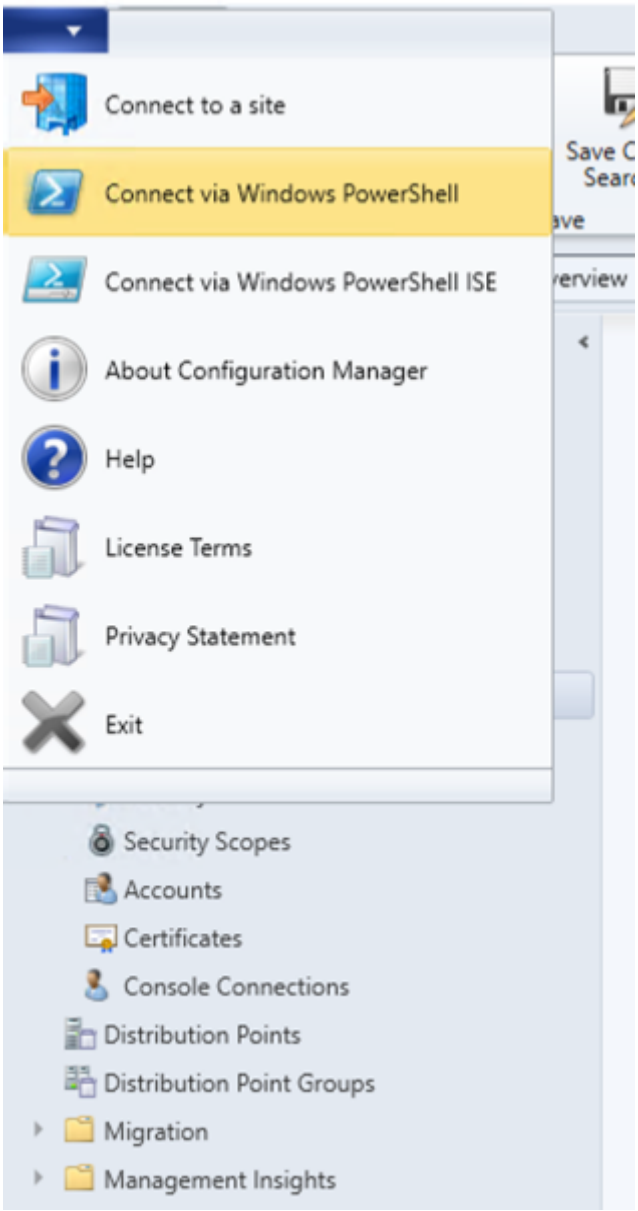
Connect to PowerShell



9. Ensure that the user can access the CM console.
   This action establishes the environment path to PowerShell for the logged in Application Administrator user.

Update the SCCM cmdlet libraries

Ensure that the System Center Configuration Manager SCCM Cmdlet Library is up-to-date.

Before you begin

Role required: Either current user or system administrator, depending on settings.

About this task

The System Center Configuration Manager SCCM Cmdlet Library installs and updates the Windows PowerShell module for SCCM. SCCM checks for library updates on a daily basis. Out-of-date libraries can cause Discovery of the SCCM server to fail, because the system cannot parse the SCCM activity output. This warning message appears in the ECC queue input records for the SCCM GET activities:

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```
WARNING: An update to the System Center 2012 Configuration
 Manager Cmdlet
Library is available. Please go to
'http://go.microsoft.com/fwlink/?LinkId=528947' to download the
 latest version.
Running cmdlet version: 5.0.8231.1004 Latest cmdlet version:
 5.0.8328.1155
```

Download the latest version of the cmdlet library from http://go.microsoft.com/fwlink/?LinkId=528947. For installation instructions, see https://technet.microsoft.com/en-us/library/dn958404(v=sc.20).aspx.

If you elect to use an earlier version library, use this procedure to disable the CM update check, which allows Discovery to proceed without issues.

Procedure

1. Log into the SCCM console as an administrator.
2. Open the menu from the upper left corner of the console.
3. Select **Connect via Windows PowerShell**.
4. Run one of these commands to disable the update check:
   - **Per-user**: *`Set-CMCmdletUpdateCheck -CurrentUser -IsUpdateCheckEnabled 0`*
   - **Per-system**: *`Set-CMCmdletUpdateCheck -System -IsUpdateCheckEnabled 0`*

   Important: The per-system cmdlet must run in an elevated Windows PowerShell session.
5. Run the *`Get-CMCmdletUpdateCheck`* command to refresh the console and check the settings.
6. Ensure that the value of the *`IsEnabled`* configuration variable has changed to **False**. This indicates that the warning for an out of date cmdlet library is disabled for the users specified.
7. To re-enable the update check, run the *`-IsUpdateCheckEnabled 1`* command for either the current user or for the system.

Configure the MID Server for SCCM activities

To use a MID Server with Microsoft System Center Configuration Management (SCCM) activities, configure it to communicate with the SCCM server.

Before you begin

Role required: admin.

Procedure

1. In the navigation filter, enter **cmdb_ci_dns_name.list**.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of the SCCM server in the **Name** field.
4. Right-click in the form header and select **Save**.
5. In the **IP Address** related list, click **New**.

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6. In the **IP Address** field, enter the IP address of the SCCM server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.
8. Leave the **Netmask** field blank.
9. Click **Submit**.

Create Connection and Credential alias for SCCM deployments

Microsoft System Center Configuration Manager (SCCM) requires the appropriate credentials to deploy applications using the Client Software Distribution application.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin

About this task

Client software distribution requires Windows credentials that have administrative rights on the SCCM server.

Procedure

1. Navigate to **All** > **Connections & Credentials** > **Connection & Credential Aliases**.
2. Click **New**.
3. On the form, fill in the fields.

Connection & Credential Aliases form

Field	Description
Name	Name to uniquely identify the alias. For example, `CSD Alias`.
ID	System generated unique ID.
Application	Application scope that contains this record.
Type	Alias type. Select **Connection and Credential**.
Connection type	Connection type. Select **Basic**.
Support Multiple Active Connections	Option to specify if the alias supports multiple active connections.
Default Retry Policy	Default retry policy associated with **Connection Alias**.
Configuration Template	Template that defines the inputs required to set up the spoke.

4. Right-click the form header, and click **Save**.
5. Click the **Create New Connection & Credential** related link.
6. On the form, fill in the fields.

Create Connection and Credential form

Field	Description
SCCM Server Instance Name	Name to uniquely identify the SCCM server.

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Field	Description
Host	Fully qualified domain name of the target host where the SCCM server is installed.
Credential Name	Credential record associated with the connection and credential alias.
User Name	User name with access to the target Windows host.
Password	Password for the account.

7. Click **Create**.

Result
Connection record and SCCM Server Instance are created and associated with the connection and credential alias.

Retrieve SCCM data for client software distribution

Retrieve the collections and the list of applications available for deployment from your SCCM servers.

Before you begin
Role required: sn_client_sf_dist.csd_admin or admin

Before starting this procedure:

- Set up your Microsoft System Center Configuration Manager (SCCM) server, create the applications and collections, and configure the deployments you need. For information, see your SCCM documentation.
- Configure the Application Administrator role on the SCCM server with the Application Deployment Manager role on the SCCM server.
- Set up the MID Server to communicate with the SCCM server.
- Add Powershell credentials to the ServiceNow Credentials [discovery_credentials] table for the SCCM user who has the Application Deployment Manager role.

About this task
To populate the Client Software Distribution application with SCCM data:

Procedure
1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Server Instance**.
2. Click **New**.
3. In the SCCM Server Instance form, identify the server by name and select the connection and credential alias.

   Note: Leave the **Fully qualified domain name** field empty.

4. Click **Submit**.

   The new SCCM server appears in the list.

5. Open the new SCCM record and click **Discover now** under **Related links**.

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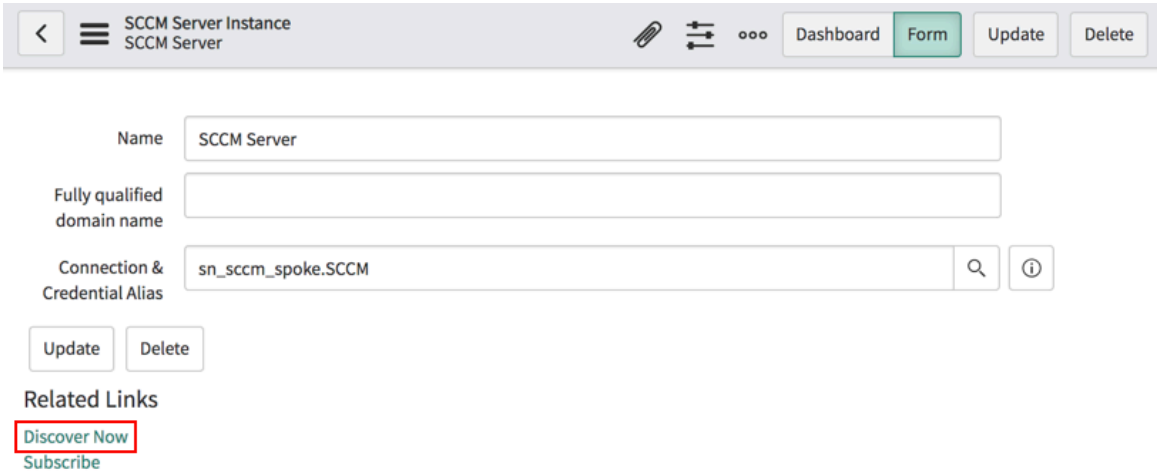
The system runs the Discover SCCM flow that retrieves the application, collection, and deployment data from the SCCM server.



SCCM server Discovery for client software distribution

Discovery flow populates ServiceNow tables with collection, application, and deployment data retrieved from SCCM servers.

Users run the **Discover SCCM** flow from an SCCM Server Instance record to populate the following ServiceNow tables:

SCCM data populated in ServiceNow tables

Table	Fields
SCCM Application [sn_client_sf_dist_sccm_application]	• name • publisher • version • model • sccm_server
SCCM Collection [sn_client_sf_dist_sccm_collection]	• name • type • sccm_server
SCCM Deployment [sn_client_sf_dist_sccm_deployment]	• application • collection • type

Note: For details about the actions used in this flow to extract data from an SCCM server, see Microsoft SCCM spoke .

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Set up a software model for an SCCM application

Using the applications discovered on the SCCM server, set up a software model used by the Software Asset Management application to manage licenses.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin
Before creating software models, you must discover the applications available for deployment on the SCCM server. See Retrieve SCCM data for client software distribution for details.

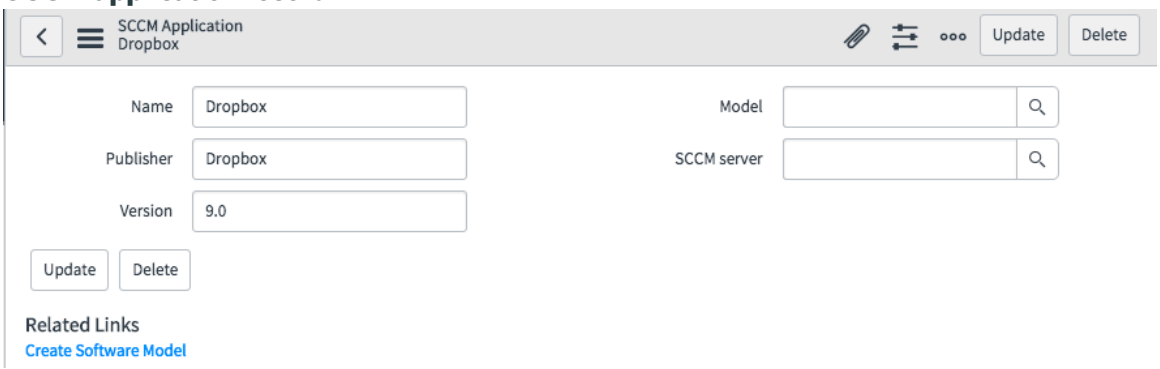
About this task

You can link an SCCM application to an existing software model or create a new model.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
   A list of applications discovered on the SCCM server appears.
2. Open an SCCM application record.
3. To link to an existing model, click the magnifying glass icon in the **Model** field and select a model from the list.

SCCM application record



4. To create a model, click **Create Software Model** under **Related Links**.

   a. Complete the software model fields.
   See for details.

   b. Click **Submit**.
   The view returns to the SCCM Applications form.

Define an SCCM configuration

To create catalog items for SCCM software deployment or to configure your instance to revoke software through SCCM, you must first associate that software with a collection through an SCCM configuration.

Before you begin

Before you create an SCCM configuration record, make sure you have discovered the SCCM applications, collections, and deployments and set up the necessary software models.

Role required: sn_client_sf_dist.csd_admin or admin.

About this task

The SCCM configuration process associates software with SCCM collections. To deploy software from an SCCM server, the user or device must be a member of an SCCM collection associated

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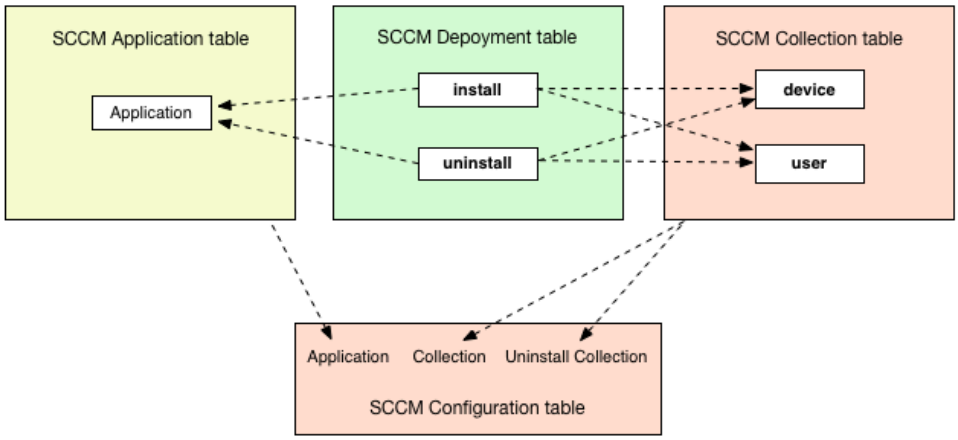
with an **install** deployment. Client Software Distribution (CSD) allows you to revoke unentitled software using an SCCM server when that software can be removed using an **uninstall** collection. Users requesting revokable software from the Service Catalog also have the ability to define lease start and stop dates and request lease extensions.

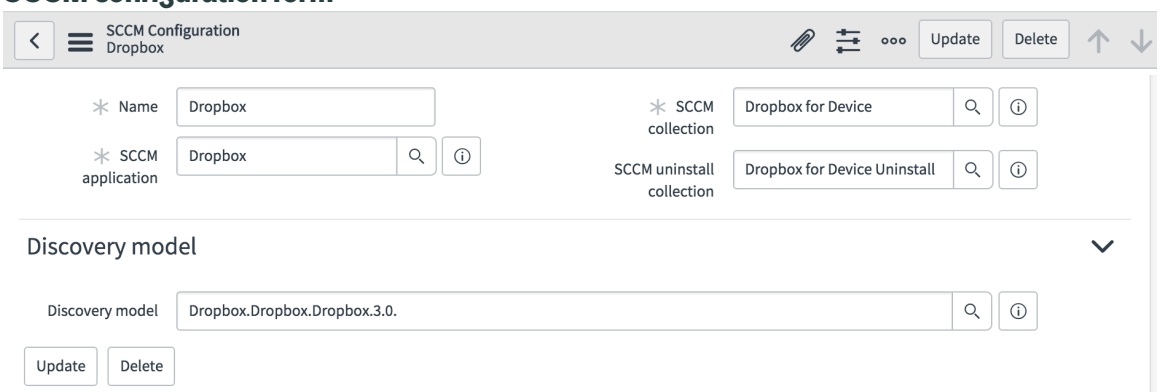
SCCM table references



Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
2. Open an application that has a configured software model.
3. Under **Related Links**, click **Create Software Configuration**.
4. Complete the form, using the fields in the table.

SCCM configuration form



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SCCM configuration fields

Field	Description
Name	Recognizable name for this SCCM software configuration.
SCCM application	Name of an application hosted on the SCCM server.
SCCM collection	Name of the collection associated with the **install** deployment for the selected application on the SCCM server. Only those collections associated with the application are available for selection.
SCCM uninstall collection	Name of the collection associated with the **uninstall** deployment for the selected application on the SCCM server. You must specify an uninstall collection to: ○ Define a lease end date for deployed software. ○ Allow lease extensions. ○ Revoke software from a user's machine.
Discovery model	Discovery model that links the unentitled software installation with the SCCM configuration. From the SCCM configuration record, Client Software Distribution can determine which collection to use to revoke the software. Unentitled software is software found on the user's machine that the user is not entitled to use.

Create a catalog item for an SCCM application

Create a catalog item for an application you want to offer for distribution from the service catalog using the applications discovered on the SCCM server.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin
Before creating a catalog item, you must link the application to a software model and create at least one software configuration.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
   A list of applications discovered on the SCCM server appears.
2. Open a record for an SCCM application.
3. Under **Related Links**, click **Create Catalog Item**.
   A new SCCM Application Catalog Item record appears with preconfigured information. .

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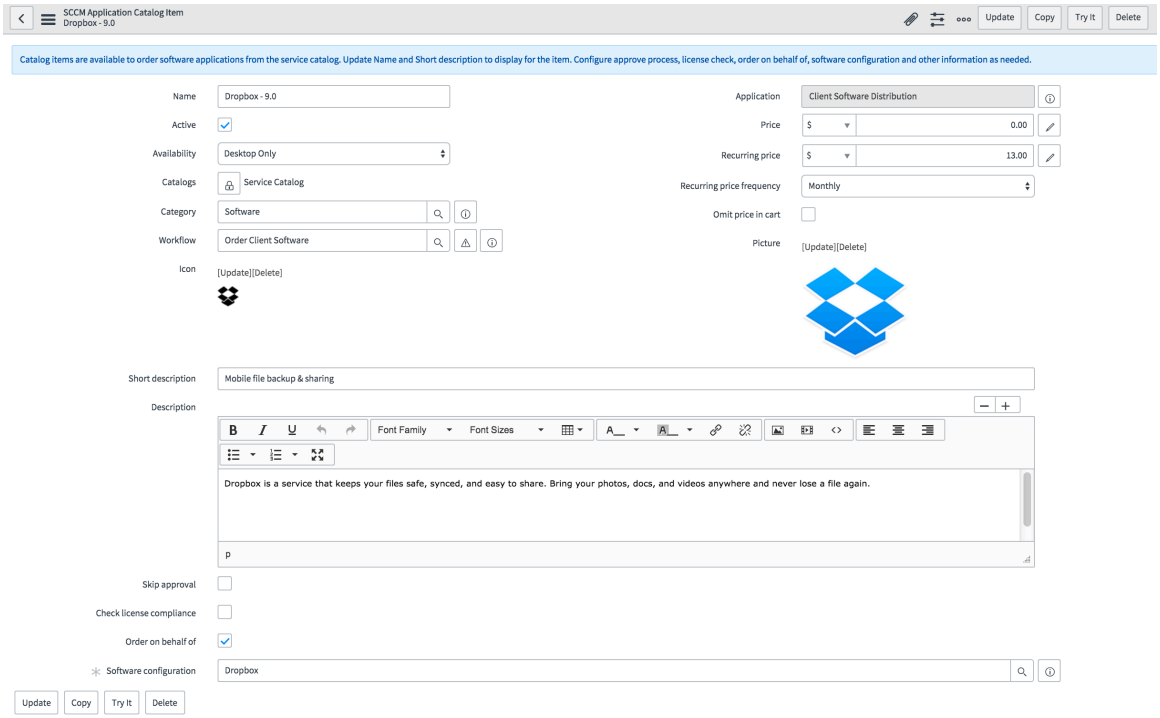

4. Add price information and complete the following fields added to the Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item] table by the Client Software Distribution plugin:

SCCM fields in the catalog item form

Field	Description
Skip approval (skip_approval)	Check box that allows skipping approval for this item by the requester's manager when a user orders it from the service catalog. Use this field in conjunction with the **Order on behalf of** field to ensure that software ordered by a logged in user on behalf of another user is subject to approval. By default, this check box is cleared, requiring manager approval for all new catalog items. **Note:** There are two levels of approval possible. By default, all category items require group approval for items in excess of $1000. If that approval is given or skipped, the system evaluates the **Skip approval** check box to determine if the software item requires approval by the requester's manager.
Check license compliance (check_license_compliance)	Check box that forces the system to determine if deploying this item is allowed under the current license.
Order on behalf of	Check box that allows the logged-in user to order this software from the service catalog for another user. This permits service desk personnel to order SCCM deployments for other users in the system. By default, this feature is enabled. To prevent unauthorized users from ordering software, ensure that approvals are required for this type of deployment by clearing the **Skip approval** check box.

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Field	Description
	If an approval is required for software ordered on behalf of a user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requestor is the named user's manager. Software items requested from the service catalog on behalf of a different user require the following information: ○ **User**: User selected for deployment. This field is automatically populated with the name of the logged in user. You can select another user from the list. ○ **Device to install this software on**: Device belonging to the selected user on which to deploy the software. Only devices belonging to that user appear in the choice list. ○ **Lease start**: Date and time to deploy the software. This is the start time for the lease. A lease can be open-ended or have a lease end time.
SCCM configuration	Name of the Define an SCCM configuration for this application. This record defines the collection and uninstall collection for this application. This configuration is required for all deployments, revocations, and leases performed by the SCCM server.

5. If the catalog item requires approval because of cost, be sure to configure an approval group in the**Approved By Group** related list.
   By default, the Service Catalog Request flow runs when an item costing more than $1000 is ordered and looks for an appropriate approval group. If no approval group is configured for the item, this flow skips approval altogether and ends. The system then runs the Order Client Software flow, which evaluates the **Skip approval** check box to determine if approval by the requester's manager is required.
6. Click **Update**.
   The view returns to the SCCM Applications list.
7. To see all client software distribution (CSD) catalog items, navigate to **Client Software Distribution** > **Maintain Items** > **Software Items**.

SCCM deployment process

Order an SCCM application from a client software distribution (CSD) catalog item in the service catalog triggers the Order Client Software flow.

This process deploys an SCCM application to a user or device through a service catalog order:

1. If the **Skip approval** check box is cleared in the software catalog item, the Order Client Software flow sends the catalog request to the requesting user's manager for approval.
2. If the **Check license compliance** check box is selected in the software catalog item, the flow performs a software license check. If there is no license available, the flow creates a catalog task to procure more licenses and assigns the task to the CSD Administrators group.
3. The Order Client Software flow triggers the Deploy SCCM Application flow as a subflow. This subflow adds either the user or the device to the SCCM collection using the Add to User Collection or Add to Device Collection actions in the Microsoft SCCM Spoke.
4. If the software configuration specifies **SCCM uninstall collection** in the software catalog item, the Deploy SCCM Application subflow checks if the user or device exists in the uninstall

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collection. The flow uses the Is Device in Collection or Is User in Collection in the Microsoft SCCM Spoke. If the user or device exists in the uninstall collection, the flow removes the device or user. The subflow uses the Remove from Device Collection or Remove from User Collection action in the Microsoft SCCM Spoke before adding it to the SCCM install collection.

Client software distribution validation process

After SCCM deploys software to a target computer, client software distribution (CSD) detects the installation and validates its status.

Client software distribution uses the following methods for detecting software installed on the target machine:

- **Discovery**: CSD is configured to leverage Discovery to detect software installations. You can run Discovery manually at any time, or by a scheduled job.
- **Microsoft SCCM Integration**: You can import SCCM data into the CMDB using the features in the Integration - Microsoft SCCM plugin if Discovery is not active on the instance.

The instance uses the data gathered by Discovery or the SCCM integration plugin to populate the Software Installation [cmdb_sam_sw_install] table. To validate installations using this data, CSD runs a scheduled job called Reconcile Requested Software that uses CSD property settings. This process reconciles the software installation data accumulated in the CMDB and makes these status updates:

- **Not installed** to **Installed**: The user has installed the requested software within the time limit configured in the *sn_client_sf_dist.softwareInstallExpDays* property.
- **Not installed** to **Status check expired**: The time limit has expired for the user to install the requested software. The system stops checking for installation when the time limit expires.

SCCM software revocation

Revoke software without any user interaction using Microsoft System Center Configuration Manager (SCCM) if the software configuration specifies an SCCM uninstall collection, even if the software was installed by some other process or user.

Revoke software deployed through the service catalog

Software deployed by SCCM can be revoked, but only when the status of software is **Installed** and the application associated with the software configuration has an uninstall collection configured.

Before you begin

- Create an Define an SCCM configuration for the application that names an appropriate uninstall collection.
- Associate the CSD catalog item for the application with the SCCM configuration that specifies the uninstall collection.

Role required: sn_client_sf_dist.csd_admin or admin

A subflow called Revoke SCCM Application moves either the user or the device from its respective collection and adds it to the appropriate uninstall collection. When SCCM performs an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Reports** > **Requested Software**.
2. Open the record for the SCCM software package you want to revoke.

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The package must have a **Status** of **Installed** to be revocable.

3. Under **Related Links**, click **Revoke software**.

   This action runs the Revoke Client Software flow, which triggers the Revoke SCCM Application subflow that moves the user or device from the install collection to the uninstall collection. When SCCM performs an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Revoke unentitled software

Revoke software using Microsoft System Center Configuration Manager (SCCM) that a user is not entitled to use even if the software was installed by some other process or user.

Before you begin

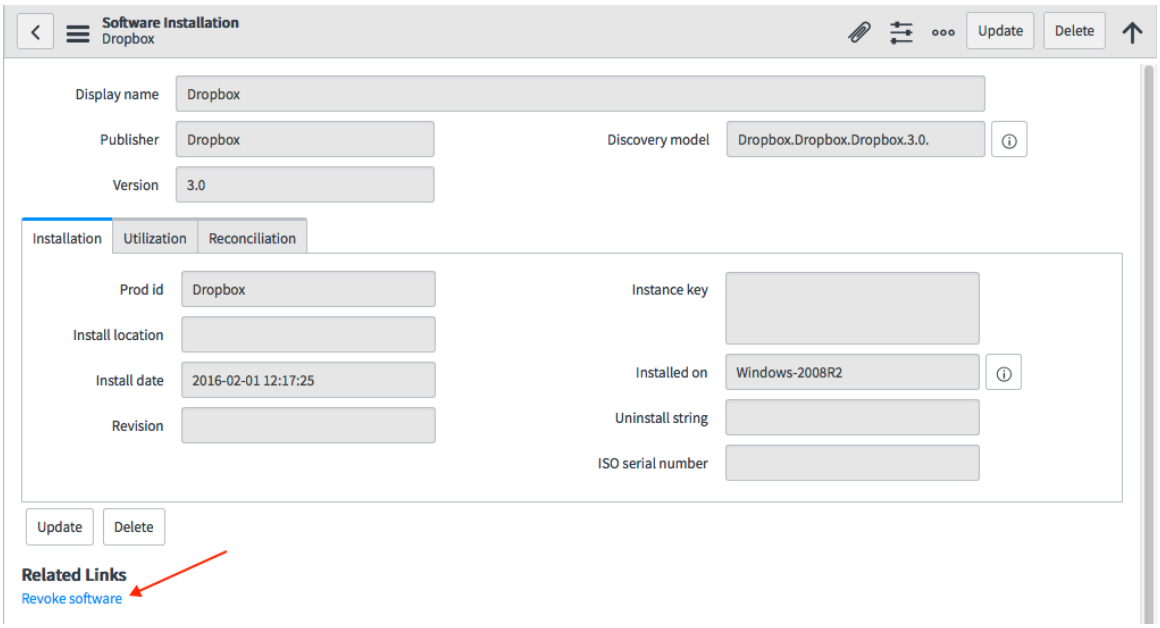
To revoke software using SCCM, you must create an Define an SCCM configuration for the application, in which the appropriate software Discovery model is defined. See Software discovery models Discovery models and software installations.

Role required: sn_client_sf_dist.csd_admin or admin

Client Software Distribution (CSD) uses Software Asset Management to identify unentitled software installations. Discovery detects the software on the user's machine, and SAM determines if the user or device is entitled to use that software. This might include software that was not installed through a catalog request or software that the user installed without approval. If the software installation's Discovery model is associated with an SCCM software configuration that has an uninstall collection defined, then an administrator can use CSD to revoke that software from the user's machine without involving the user.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Reports** > **Installed Software Not Entitled**.
2. Select the record for the installation that has unentitled users.
3. Under **Related Links**, click **Revoke software**.
   This action runs the Revoke Client Software flow, which triggers the Revoke SCCM Application subflow that moves the user or device from the install collection to the uninstall collection. When SCCM performs an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.



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SCCM software revocation flow

The Revoke SCCM Application flow moves a user or device from an install collection to an uninstall collection to revoke software installed from Microsoft System Center Configuration Manager (SCCM).

For the revocation subflow to run, the software package must have a status of Client software distribution validation process and must be pre-configured for an appropriate uninstall collection. See Revoke software deployed through the service catalog for configuration instructions. When an administrator initiates the revocation process, the system launches the Revoke SCCM Application subflow to move the user or device collection associated with installation to the appropriate SCCM uninstall collection. When the SCCM server performs a policy check, it finds the additions to the user or device uninstall collection and revokes the software package associated with that collection.

The subflow employs two custom actions in the Microsoft SCCM Spoke, Remove from User Collection and Remove from Device Collection, to remove either the user or the device from its original collection. The subflow then adds the user or device to the appropriate uninstall collection on the SCCM server with the Add to User Collection or Add to Device Collection activity.

Note: This subflow is triggered by the Revoke Client Software subflow.

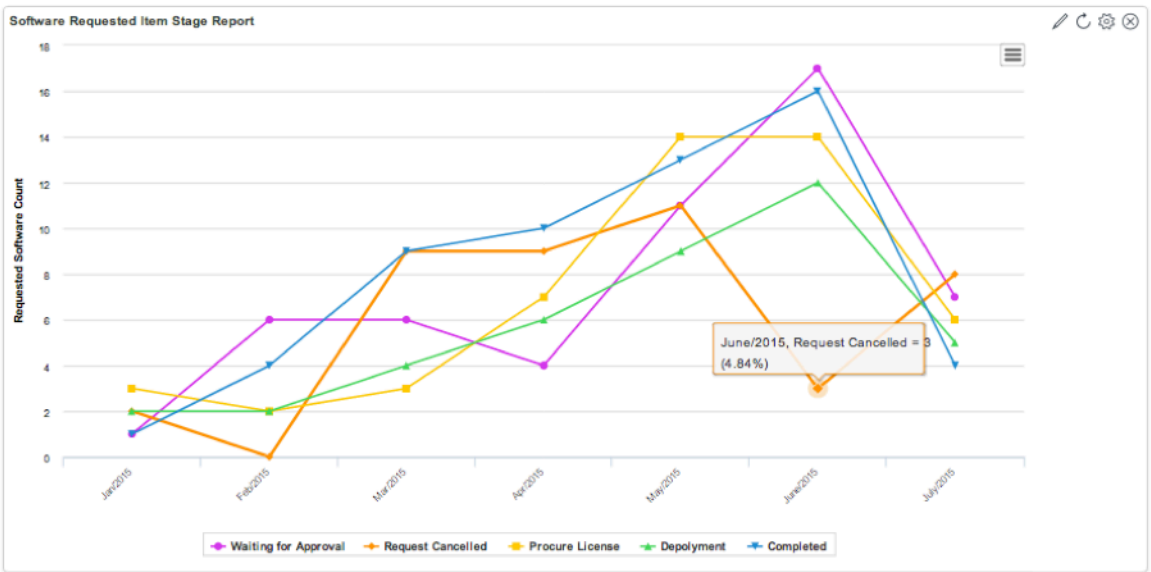
Client software distribution dashboard

The CSD dashboard provides a collection of visual reports for the Client Software Distribution application.

CSD dashboard

To access the CSD dashboard, navigate to **Client Software Distribution** > **Requested Software** > **Dashboard**.

Sample report from CSD dashboard



Client software distribution reports

Report	Description
Open Tasks	Displays all open tasks grouped by the requested item's stage value.

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Client software distribution reports (continued)

Report	Description
	• *Type*: Create a basic list report • *Table:* Catalog Task [sc_task]
Top 10 Applications Installed	Displays the top 10 applications installed by request count. • **Type**: Create a bar report • **Table**: Requested Software [sn_client_sf_dist_req_software]
Total Software Request Item Over Time	Displays the total software items requested each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Requests Completed Report	Displays the total of software requests completed each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Installed Software Not Entitled	Displays installed software that users or devices are not entitled to use. This can be software deployed through CSD or by another process that does not comply with licensing. This report is on a Software Asset Management table. • **Type**: Create a basic list report • **Table**: Software Installation [cmdb_sam_sw_install]
Software Installation Status	Displays the count of requested software, grouped by installation status, for each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Software Requested Item Stage Report	Displays the sum of all requested items, grouped by the requested item's stage, for each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
License Counts Available	Displays the license counts for all available applications. • **Type**: Create a basic list report • **Table**: SCCM Application Catalog Item [sn_client_sf_dist_sccm_app_cat_item]

Usage Overview dashboard

Navigate to **Client Software Distribution** > **Usage Overview** to view the current transaction count for your instance.

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Client software distribution extension framework

Client software distribution (CSD) provides built-in extension points for integrating a ServiceNow instance with client software distribution providers, such as Casper, Altiris, or LANDesk.

Important: The use of CSD extension points is an advanced procedure intended for use by experienced ServiceNow AI Platform developers only. Instructions for customizing your instance to deploy and revoke software from a software distribution provider can be found in the CSD Extension Implementation Guide.

Configure client software distribution providers

Identify the provider and specify the flows, subflows. and extension points for a customized software distribution process.

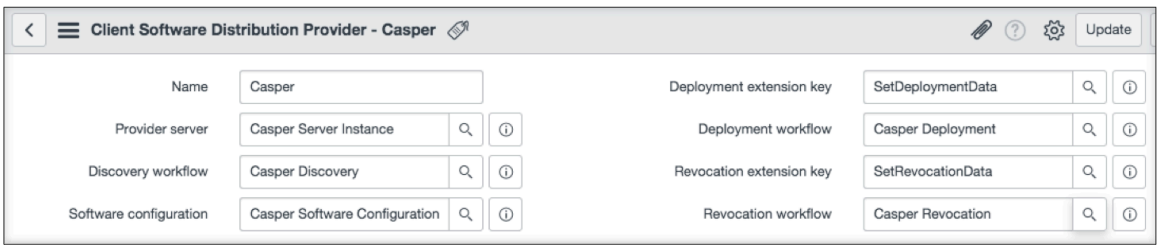
Before you begin

Perform the development tasks described in the CSD Extension Implementation Guide before attempting this procedure.

Role required: sn_client_sf_dist.csd_admin, admin

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Extensions** > **Providers**.
2. Click **New**.
3. Complete the form using the fields in the table.



Client software distribution provider fields

Field	Description
Name	Descriptive name of the provider.
Provider server	Table name of the provider server. You must create this table as an extension of the Configuration Item [cmdb_ci] table. For example, you might call your table Casper Server Instance [cmdb_ci_casper_server_instance].
Discover And Store SCCM Data subflow	Subflow that discovers the provider server and returns the data from that server back to the instance. This is the subflow you create with custom activities that query the provider server.
Software configuration	Table name of the software configuration for this provider. You create this table as an extension of the Client Software Distribution Software Configuration [sn_client_sf_dist_software_config] table. For example, you might create a table

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Field	Description
	called Casper Software Configuration [sn_client_sf_dist_casper_sf_config].
Deployment extension key	The **SetDeploymentData** key provided with CSD. This key sets up the data for the software ordering and deployment flow.
Deploy Client Software flow	Flow that deploys software from the provider server. This is the flow you created with custom activities that tells the provider where to deploy an application requested from the service catalog.
Revocation extension key	The **SetRevocationData** key provided with CSD. This key sets up the data for installation revocation.
Revoke SCCM Application subflow	Subflow that revokes an installation from a provider server. This is the subflow you created with custom activities that tells the provider which application to remove from a device.

Client software distribution extension keys

Client software distribution (CSD) extension keys allow you to customize the deployment and revocation of software from distribution providers.

These pre-defined keys allow you to generate input variables for flows that deploy and revoke software from external distribution providers:

- **SetDeploymentData**: Sets the software order information and generates the input variables for the deployment flow.
- **SetRevocationData**: Generates the input variables for the revocation flow.
- **CheckRevocable**: Specifies the conditions that determine if an installation can be revoked. If the software configuration associated with the installed software allows uninstallation, the installed software can be revoked.

Client software distribution extension points

The client software distribution (CSD) extension points create the customization code for the specific provider and the extension keys.

The purpose of the extension points is to associate extension keys with a specific provider, and then create a script that sets input variables for your custom deployment and revocation flows. Another extension point script tells CSD if the provider has the capability to revoke software. If this is the case, CSD enables the UI action that triggers revocation from the provider.

SetDeploymentData

The script associated with this extension key must set the *csdExtensionResult* object with these attributes:

- *deploymentWorkflowInputs* : Object that specifies the deployment flow input variables.
- *softwareModel*: Software model sys_id.

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- *deploymentType*: An integer. Use **1** for deployment to a user and **2** for deployment to a device.
- *softwareApplication*: Software application sys_id.

CheckRevocable

The script associated with this extension key gets the input parameter *csdExtensionInputs.softwareConfiguration*, which is a Client Software Distribution record in the Software Configuration [sn_client_sf_dist_software_config] table. All providers' software configurations are extended from this table, but may have different attributes.

This script must set the *csdExtensionResult* object to **true** or **false**, depending on whether the software configuration specifies uninstallation.

SetRevocationData

The script associated with this extension key gets the input parameter *csdExtensionInputs.softwareConfiguration*, which is a Client Software Distribution record in the Software Configuration [sn_client_sf_dist_software_config] table. All providers' software configurations are extended from this table, but may have different attributes.

The script must set the *csdExtensionResult* object with these attributes:

- *revocationWorkflowInput* : Object that specifies the revocation flow input variables.
- *softwareModel*: Software model sys_id.
- *deploymentType*: An integer. Use **1** for deployment to a user and **2** for deployment to a device.

Client Software Distribution 2.0 application

Client Software Distribution 2.0 application (CSD 2.0) application enables administrators to distribute software from the service catalog using third-party management systems.

CSD 2.0 enables an administrator to create all the records necessary to deploy software from service catalog requests, including software models and catalog items. You can use the CSD 2.0 application to automate the deployment and revocation of software from a third-party software provider using the custom flows. You can define lease periods for software distributed from the Service Catalog and allow lease extensions in some cases, pending approvals. Deployment is accomplished using provider-specific spoke flows, subflows, and actions. For example, deployment is accomplished using Microsoft Endpoint Configuration Manager spoke.

CSD 2.0 also integrates with Software Asset Management (SAM Professional or SAM Foundation) to manage license information of the deployed software.

Note: CSD 2.0 is different from Client Software Distribution using Integration Hub. CSD 2.0 is available on ServiceNow Store.

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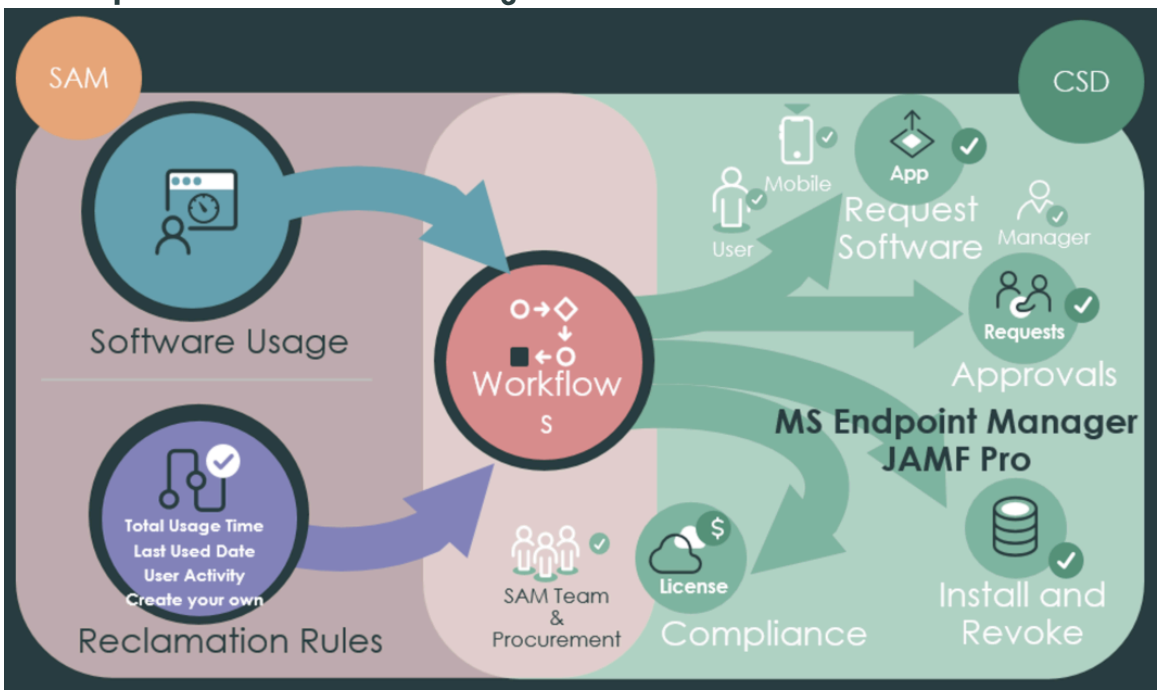
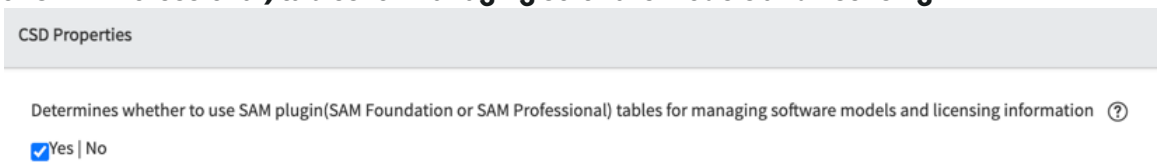
CSD 2.0 process flow when CSD is integrated with SAM



Note: To integrate CSD 2.0 with SAM, navigate to **Client Software Distribution 2.0** > **Properties** and select the check box for **Determines whether to use SAM plugin(SAM Foundation or SAM Professional) tables for managing software models and licensing information**.



Important considerations

Ensure that you are aware of these differences between CSD and CSD 2.0:

	CSD	CSD 2.0
Supported providers	Microsoft System Center Configuration Management (SCCM).	Microsoft Endpoint Configuration Manager, Jamf, and Microsoft Intune.
Procedure to add new provider	User must write extension point scripts.	User can use subflows in Workflow Studio. This is easier than writing extension point scripts in CSD.
License compliance check and entitlements	Tightly coupled with the SAM license data.	Flexibility to choose either the SAM tables or CSD 2.0 tables.
Data discovery	Microsoft SCCM provider uses PowerShell cmdlets for data discovery.	Microsoft Endpoint Configuration Manager spoke is updated to use the REST protocol for data discovery. This improves the performance and reduces

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	CSD	CSD 2.0
		load on MID Server as REST supports pagination.
Software revocation	CSD can revoke software requested using the CSD catalog. CSD can also uninstall software using SCCM when revocation is triggered from the reclamation candidates for SCCM provider.	CSD 2.0 can revoke software requested using the CSD 2.0 catalog. CSD 2.0 can also uninstall software using Microsoft Endpoint Configuration Manager, Microsoft Intune, and Jamf when revocation is triggered from the reclamation candidates.

Application version

CSD 2.0 v1.7.4 is the latest version.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This application provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Catalog item creation AI agent	Automates the creation of catalog items for applications provided by service providers like Microsoft Intune and Jamf. The agent also manages software models, configurations, group associations, and catalog item generation. **Note:** This version of CSD 2.0 supports Microsoft Intune and Jamf providers only.
Microsoft Endpoint Configuration Manager collection creation management AI agent	Creates collections in Microsoft Endpoint Configuration Manager. The agent prompts

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AI agent	Description
	for required collection details, validates inputs, and requests confirmation before creating the collection. The agent also handles common errors and reports the outcome of the operation.
Microsoft Endpoint Configuration Manager collection deletion management AI agent	Deletes collections in Microsoft Endpoint Configuration Manager. The agent collects the required inputs, checks for dependencies, and requests confirmation before deletion. The agent also attempts to resolve dependencies automatically and reports the result.
Microsoft Endpoint Configuration Manager collection membership addition AI agent	Adds collections as deployment targets for applications in Microsoft Endpoint Configuration Manager. The agent gathers the required information, confirms the action, and handles errors that occur during the operation.
Microsoft Endpoint Configuration Manager collection membership removal AI agent	Removes device or user members from collections in Microsoft Endpoint Configuration Manager. The agent guides users through the required inputs, confirms the action before execution, and handles errors during the process.
Microsoft Endpoint Configuration Manager application targets addition AI agent	Adds device or user targets to collections in Microsoft Endpoint Configuration Manager. The agent prompts for the required details, validates inputs, requests confirmation, and reports the result of the operation.
Microsoft Endpoint Configuration Manager application targets removal AI agent	Removes collections as targets from applications in Microsoft Endpoint Configuration Manager. The agent gathers the required inputs, confirms the action, and handles errors while performing the removal.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Note: To access data or perform operations on data in the table that is associated with the AI agent, users must have the CSD Admin role.

Available sample agentic workflows

Install Now Assist for Integration Hub and start using the available sample agentic workflows and AI agents. For more information, see Now Assist for Integration Hub.

In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. Use the available sample agentic workflow in AI Agent Studio so that AI agents can coordinate to solve complex problems. To modify the available sample agentic workflow as per your requirement, see Modify an agentic workflow.

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Sample agentic workflow	Description	AI agents used	Always ON by default?
Microsoft Endpoint Configuration Manager Collection Management Agentic Flow	Manages Microsoft Endpoint Configuration Manager device and user collections and their application assignments. This agentic workflow interprets user requests, separates them into discrete collection and deployment tasks, and coordinates the required operations to create or delete collections, manage membership, and assign or remove application targets in a controlled, sequential manner.	• Microsoft Endpoint Configuration Manager collection deletion management AI agent • Microsoft Endpoint Configuration Manager application targets removal AI agent • Microsoft Endpoint Configuration Manager collection membership addition AI agent • Microsoft Endpoint Configuration Manager collection creation management AI agent • Microsoft Endpoint Configuration Manager application targets addition AI agent • Microsoft Endpoint Configuration Manager collection membership removal AI agent	No **Note:** To activate the workflow, see Activate an agentic workflow template.

Request the CSD 2.0 application

Client Software Distribution 2.0 application plugin (com.sn.csd) is available on ServiceNow Store and can be used with a subscription to Integration Hub.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

The CSD 2.0 application can be integrated with Microsoft Endpoint Configuration Manager using the Microsoft Endpoint Configuration Manager spoke flow, subflows, and actions to deploy or revoke software using an Endpoint server.

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Note:

- The CSD 2.0 plugin runs in its own application scope.
- If you're having trouble installing the app, ensure that these dependent plugins are installed:
  - Complex Object (com.glide.cobject)
  - ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
  - Flow Designer support for the Service Catalog (com.glideapp.servicecatalog.flow_designer)
  - Service Catalog Scoped API (com.glideapp.servicecatalog.scoped.api)
- See Legal schedules - IntegrationHub overview for more information about the required Integration Hub subscription.

Components installed with CSD 2.0

Several types of components are installed with the CSD 2.0 application.

Tables installed

These tables are installed with the Client Software Distribution 2.0 application plugin (com.sn.csd).

CSD 2.0 tables

Table	Description
Client Software Distribution Provider [sn_csd_provider]	Contains all software distribution providers.
CSD Catalog Item Fulfillment Configuration [sn_csd_cat_item_fulfilment_config]	Contains additional configuration information required for ordering a catalog item using CSD 2.0.
Client Software Distribution Software Configuration [sn_csd_software_config]	Base table for all software provider configurations.
Client Software Distribution Lease Execution [sn_csd_lease_execution]	Contains scripts that are scheduled to run the subflows and flows associated with deployment, revocation, and lease management.
Device Entitlement [sn_csd_entitlement_asset]	Contains information about the license allocation for devices.
Client Software Distribution Application [sn_csd_application]	Base table for all software provider applications.
Client Software Distribution Lease Manager [sn_csd_lease_manager]	Links the requested item with the required lease execution and schedule.
User Entitlement [sn_csd_entitlement_user]	Contains information about the license allocation for users.
License Entitlement [sn_csd_entitlement]	Parent table for the device and user entitlement tables.
Client Software Distribution Lease Schedule [sn_csd_lease_schedule]	Contains the schedule entries for deployment, lease and revocation.

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CSD 2.0 tables (continued)

Table	Description
Software Entitlement [sn_csd_license]	Contains licensing information of the required software model.
Software Model [sn_csd_software_product_model]	Contains details of the required software. The. details include display name, manufacturer, and so on.
Requested Software [sn_csd_req_software]	Contains all requested software, and their statuses.

Roles installed

These roles are installed with the CSD 2.0 application.

Roles for Integration Hub - CSD 2.0

Role title [name]	Description
CSD Admin [sn_csd.CSD Admin]	Administrator role for managing CSD 2.0.
CSD User [sn_csd.CSD User]	Role to order catalog items from the catalog using CSD 2.0 and to perform actions such as revoke software, extend lease, and so on.

Properties installed

Properties for CSD 2.0 manage the installation status of requested software deployments and configure scheduled Discoveries.

To access CSD 2.0 properties, navigate to **Client Software Distribution 2.0** > **Properties**. The following properties are available:

Client software distribution properties

Property	Name	Description
Status check expiration interval (days). Configure the number of days the system should wait before ignoring the software installation status.	sn_csd.softwareInstallExpDay	Controls how many days the system waits before ignoring the software installation status. The default time limit for installing software is 30 days before the system stops checking the installation status of a deployment. • **Type**: integer • **Default value**: 30 Installation statuses are:

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Client software distribution properties (continued)

Property	Name	Description
		• **Not installed**: User has not installed requested software prior to the expiration of the configured time limit. • **Installed**: Software was installed within the configured time limit. • **Status check expired**: Time limit has expired for the user to install the requested software. The system no longer checks the status of this deployment. • **Revoked**: Software was revoked by the administrator. • **Not Synced**: Installation status is not synchronized with the status in the server. **Note:** If SAM is used along with CSD 2.0, the status is updated automatically. Else, the admin should change the status manually.
Reconcile software installation status interval (hours). Set the repeat interval for the scheduled job that determines the installation status.	sn_csd.softwareInstallIntervalHour	Determines when the scheduled job runs that determines the installation status. By default, the system checks the installation status every hour. • **Type**: integer • **Default value**: 24
Set scheduled application Discovery interval (days).	sn_csd.discoveryExeDay	Sets the repeat interval for the scheduled job that runs application Discovery. By default, Discovery runs at midnight on the day set with this value. • **Type**: integer • **Default value**: 5
Set lease execution schedule job interval (minutes)	sn_csd.lease_execution_interval	Interval in which the CSD Lease Schedule scheduled job checks for requested software leases to start, stop, or extend. • **Type**: integer • **Default value**: 1

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Client software distribution properties (continued)

Property	Name	Description
Set time prior to lease end to notify requester (days).	sn_csd.lease_end_notification	Determines how many days prior to the end of a software lease to notify the requester. If lease extensions are allowed, ensure that this period provides enough time for the approval process to complete before the lease expires. • **Type**: integer • **Default value**: 5
Determines whether to use SAM plugin(SAM Foundation or SAM Professional) tables for managing software models and licensing information	sn_csd.useSAMPlugin	Option to use SAM plugin along with CSD 2.0 and choose SAM tables.

Flows, subflows, and actions

These flows, subflows, and actions are with the CSD 2.0 application.

Flows available with CSD 2.0

Flow	
Order Client Software	Schedules the installation of an ordered application on the selected device. The request requires approvals based on the user input in the catalog item configuration.
Deploy Client Software	Deploys a software by executing provider-specific subflow. Creates catalog tasks if there is a failure in the execution of the provider subflow.

Subflows available with CSD 2.0

Subflow	Description
Assign License	Creates an entitlement record.
Client Software Lease Extend	Extends the lease end date of the required software.
CSD Deploy Software Post Processing	Performs post processing after the software deployment is successful.
CSD Lease End Notification	Notifies user about the lease end date of the software and send link to extend lease end date.

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Subflows available with CSD 2.0 (continued)

Subflow	Description
Delete Lease Records	Deletes the lease schedule, lease execution, and lease manager records associated with the requested item.
Deploy Application Template	Flow template for the Deploy Application flow.
Look up Configuration Data Template	Flow template for the Look up Configuration Data flow.
Revoke Application Template	Flow template for the Revoke Application flow.
Revoke License	Removes the specified entitlement record.
Revoke Client Software	Revokes software from the provider server.
Look Up Applications	Returns the list of application details found for each software provider.
Look up SAM Software Models	Returns the list of SAM software models related to the specified application.
Configure SAM Software Model	Configures the SAM software model of the specified application.
Configure CSD Software Model	Configures the CSD software model of the specified application.

Actions available with CSD 2.0

Action	Description
Get CSD Record URL	Generates link for the requested software.
Is Date Empty	Verifies if the input date is empty.
License Validation	Checks the license availability and retrieves the license information if available.
Update Lease End on Requested Item	Updates the lease end date of the requested item record.

Create licenses for distributed software using CSD 2.0

Licenses are associated with the software model and must be created if you want to track the license for software deployed by CSD 2.0.

Before you begin

Role required: sn_csd.CSD Admin

You can create software licenses in CSD 2.0 for software items deployed from the service catalog by CSD 2.0. CSD 2.0 depends on the allocations available to determine if the license is available for the requested software. If **Allocations Available** is greater than 0, CSD 2.0 assumes that the license is available for the software.

Procedure

1. Navigate to **Client Software Distribution 2.0** > **Software Entitlements**.
2. Click **New**.

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3. On the form, fill these values.

Field	Description
Display Name	Name to identify the license record.
Software Model	Software model from the CSD 2.0 table.
Rights	Total number rights.
Allocation Type	Type of license entitlement. **Note:** ○ For Microsoft Endpoint Configuration Manager: ▪ If **Install Collection** specified in **Software Configuration** (that is linked with catalog item) is of type **Device**, the license check is performed on software entitlements with **Allocation Type** as **Device**. ▪ If **Install Collection** specified in **Software Configuration** (that is linked with catalog item) is of type **User**, the license check is performed on software entitlements with **Allocation Type** as **User**. ○ For : ▪ If **Group** specified in **Software Configuration** (that is linked with catalog item) is of type **Mobile** or **Computer**, the license check is performed on software entitlements with **Allocation Type** as **Device**. ▪ If **Group** specified in **Software Configuration** (that is linked with catalog item) is of type **User**, the license check is performed on software entitlements with **Allocation Type** as **User**.

4. Click **Submit**.
   The license is created with the required rights.

Create entitlements for distributed software using SAM

Entitlements are associated with the software model and must be created if you want to track the license for software deployed by CSD 2.0 using SAM.

Before you begin

Role required: sam_admin or sam_user
For information about software reconciliation, see Software reconciliation for compliance.

Client software distribution ordering process

Software deployed by CSD 2.0 can be ordered from the service catalog by individual users or by approved users on behalf of others.

CSD 2.0 catalog items have different options, depending on how ordering is configured.

Lease start and end dates

All software deployed by CSD 2.0 requires users to specify the beginning date for the lease.

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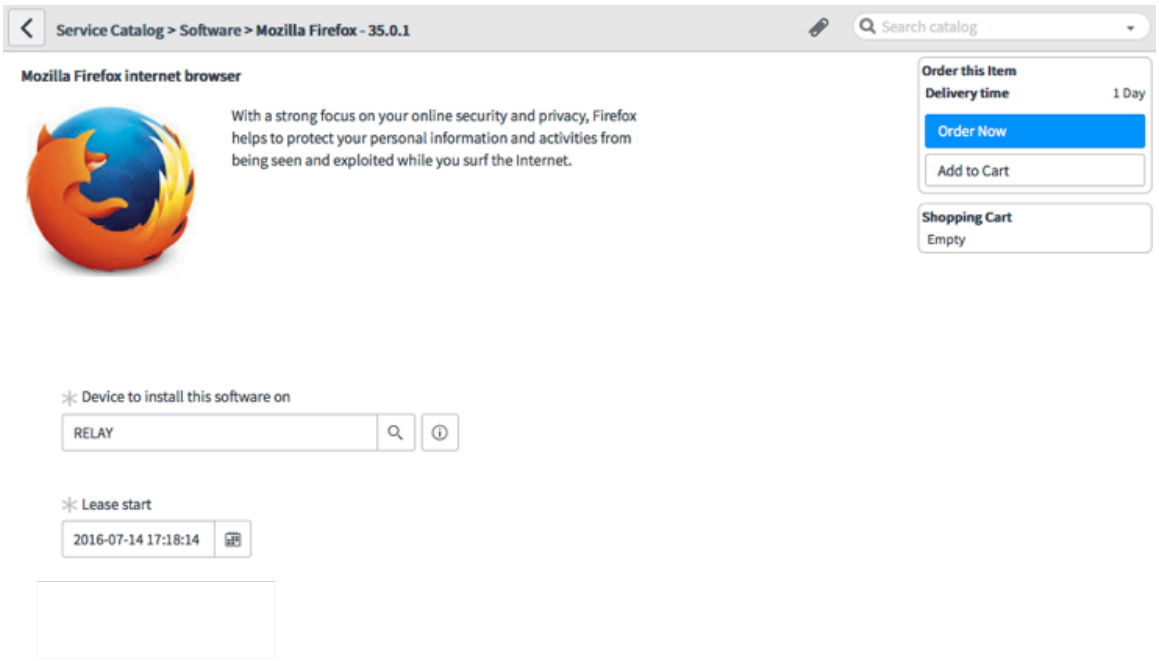
If the catalog item is configured for revocation (uninstall), the form displays the **Lease end** field, which allows the requester to define an end date and time for the lease. The system validates user input in these fields to ensure that the dates selected define a future window. The **Lease end** field is not mandatory and can be left blank to order software with no end date.

Software offered only to the logged in user

If the software catalog item is configured with **Access Type** as **Restricted**, the **User** field does not appear on the order form. The logged in user selects the device on which to deploy the software from the **Device to install this software on** field. Only those devices assigned to the logged in user appear in the list.

In this example, a user has logged into the service catalog to order Google Chrome for the assigned computer. User selects the machine from a list of devices and selects the date and time the lease should begin.



Software ordered on behalf of another user

If the software catalog item is configured with **Access Type** as **Delegated**, the **User** field appears on the form. The logged in user can select any user from this field. The **Device to install this software on** field only lists the devices assigned to the user selected in the **User** field. If an approval is required for software ordered on behalf of another user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requester is the named user's manager.

In this example, a manager is ordering Google Chrome for a contractor. The manager selects the contractor from the **User** field and then chooses a computer from the list of devices assigned to the contractor. This software has a Microsoft Endpoint Configuration Manager uninstall collection configured, which enables the manager to select an end date for the lease that coincides with the end of the user's contract. When the lease expires, Microsoft Endpoint Configuration Manager automatically uninstalls the software from the device.

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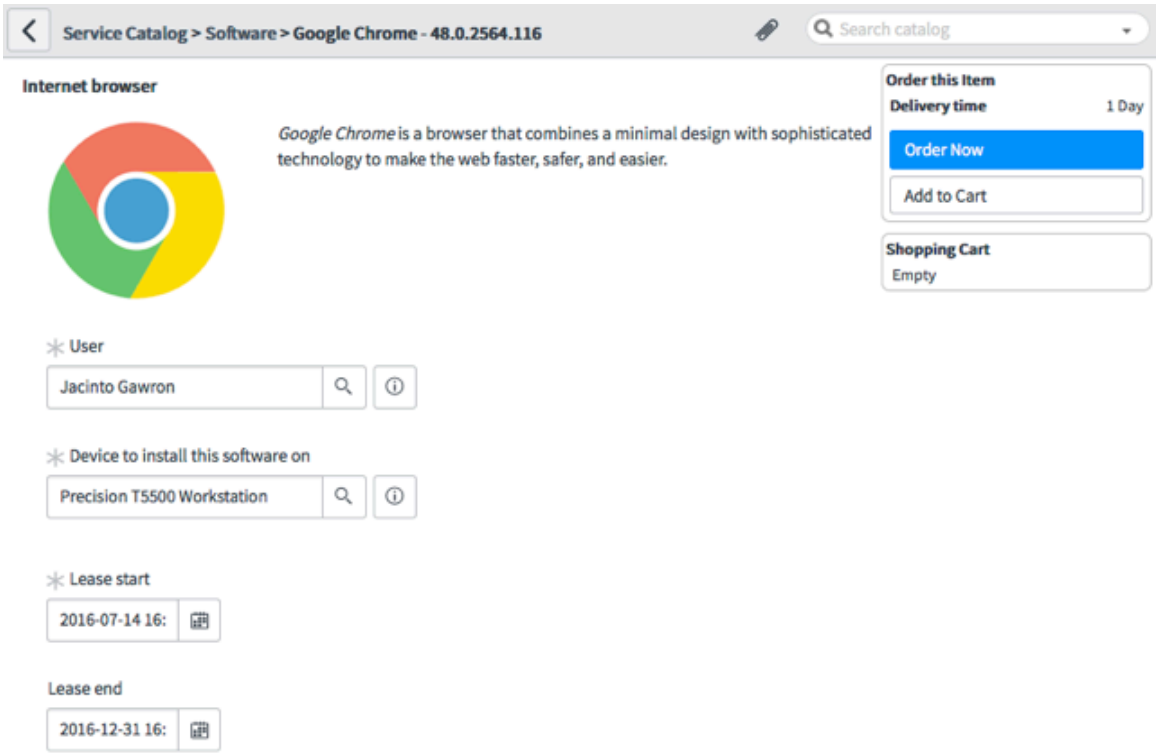

Note:

- For Jamf, the device must have its serial number populated in the device table.
- For Microsoft Endpoint Configuration Manager, the name must be populated.



Extend a software lease

Users of software deployed by CSD 2.0 can request the extension of a lease window, if the software is revocable by a software distribution system.

Before you begin

Role required:

Note: Ensure that the user has one of the two mentioned set of roles.

- itil and sn_csd.CSD Admin
- itil and sn_csd.CSD User

About this task

If your software has a lease end date defined, and the software status is **Installed** or **Not Synced**, you can request an extension of the lease, pending any approvals your organization requires.

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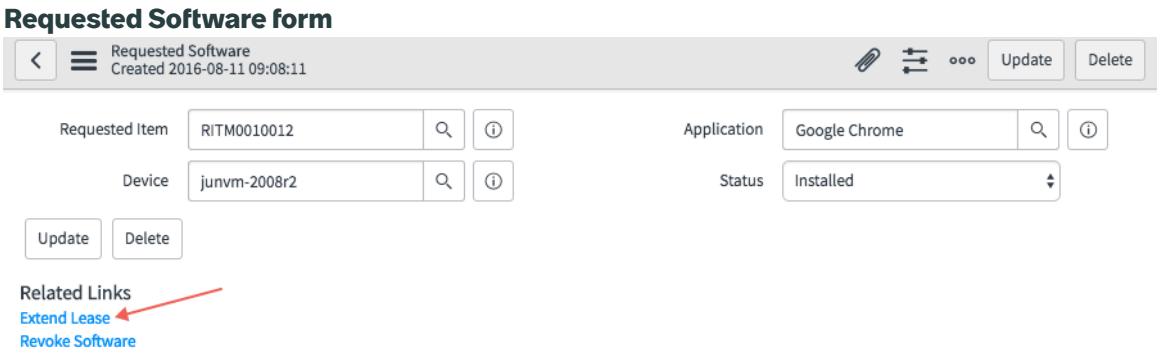
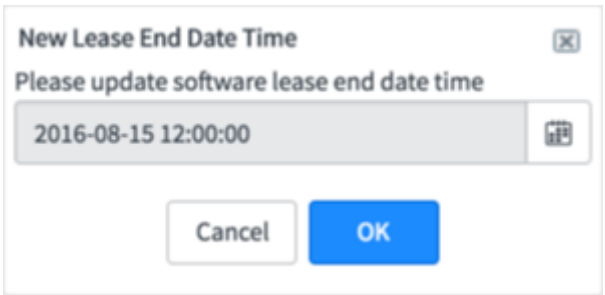
Procedure

1. Navigate to **Client Software Distribution 2.0** > **Requested Software**.
   The list shows only the software you have requested from the service catalog.
2. Select the record for the installed software whose lease you want to extend.
3. Under **Related Links** click **Extend Lease**.



4. In the dialog box that appears, select a new lease end date in the calendar and click **OK**.
   You must select a date later than the current date.



If the lease extension is subject to manager approval, you are notified of the decision. If the request is approved, a notification shows the new lease end date. If the new end date is within 5 days (the default notification period) of the date when you made the request, CSD 2.0 sends an immediate end-of-lease notification.

Important: If lease extensions in your organization require approval, make sure the approver is available and has enough time to process your extension request. If the extension cannot be approved before the original end date expires, the software is revoked.

CSD 2.0 for Microsoft Endpoint Configuration Manager

Use the CSD 2.0 along with the Microsoft Endpoint Configuration Manager spoke to deploy and revoke software deployments from Microsoft Endpoint Configuration Manager and manage distributions on hosts.

To use the Microsoft Endpoint Configuration Manager spoke with CSD 2.0, you must activate Microsoft Endpoint Configuration Manager spoke and CSD 2.0.

The Microsoft Endpoint Configuration Manager spoke contains actions that CSD 2.0 uses to deploy software from a service catalog request and manage user and device collections on Microsoft Endpoint Configuration Manager servers. In addition, CSD 2.0 can manage license counts for deployed software, revoke software deployed by Microsoft Endpoint Configuration Manager without user interaction, and manage lease periods.

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Note: For systems deploying software from Microsoft Endpoint Configuration Manager, the **Lease end** field is only available if the configuration specifies an uninstall collection.

Verify the Microsoft Endpoint Configuration Manager spoke records

Verify that the spoke is integrated with CSD 2.0 after setting up and configuring the Microsoft Endpoint Configuration Manager spoke and create server instance record to use Microsoft Endpoint Configuration Manager spoke with CSD 2.0.

Before you begin

- Activate the Microsoft Endpoint Configuration Manager spoke and set up the spoke. For more information about the spoke setup, see Set up the Microsoft Endpoint Configuration Manager spoke.
- Activate the CSD 2.0 application.
- Role required: admin

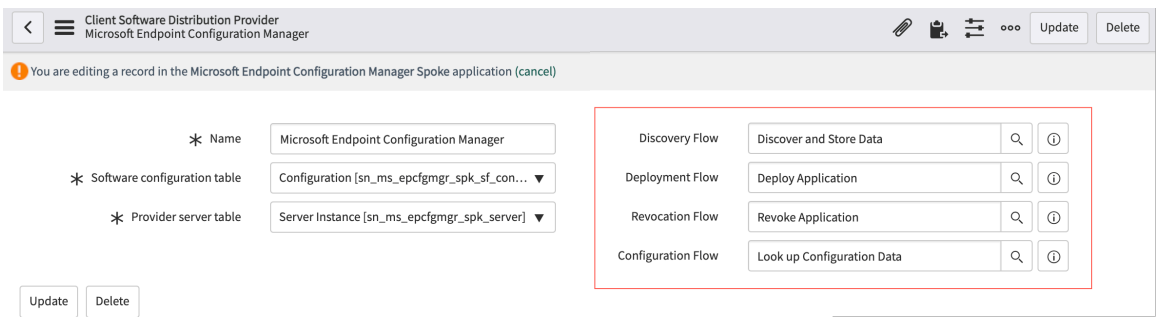
Procedure

1. Verify that these modules are available.
   - Applications
   - Configurations
   - Server Instances
   - Deployments
   - Collections
2. Navigate to **System Definition** > **Tables** and verify that these table are available.
   - Deployment [sn_ms_epcfgmgr_spk_deployment]
   - Configuration [sn_ms_epcfgmgr_spk_sf_config]
   - Collection [sn_ms_epcfgmgr_spk_collection]
   - Server Instance [sn_ms_epcfgmgr_spk_server]
   - Application [sn_ms_epcfgmgr_spk_application]
3. Verify that the flows are configured correctly in the provider record.

   a. Navigate to **Client Software Distribution 2.0** > **Providers**.

   b. Open the record **Microsoft Endpoint Configuration Manager**.

   c. Verify that the flows are configured correctly in the record.



Note: You can configure the default flows as per your requirement.

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Store details of the provider server

Create a server instance record to discover applications and store details of the provider server.

Before you begin

Role required: admin

Procedure

1. Navigate to **Microsoft Endpoint Configuration Manager** > **Server instances**.
2. Click **New**.
3. On the form, fill there values.

Field	Description
Name	Name to identify the server instance record.
Powershell Connection & Credential Alias	Powershell connection and credential alias you had configured while setting up the Microsoft Endpoint Configuration Manager spoke. For example, **Microsoft Endpoint Configuration Spoke**.
JDBC Connection & Credential Alias	JDBC connection and credential alias you had configured while setting up the Microsoft Endpoint Configuration Manager spoke. For example, **Microsoft Endpoint Configuration JDBC**.

Note: You can use only the default connection and credential alias records that have been shipped along with the Microsoft Endpoint Configuration Manager Spoke.

4. Right-click the form header and click **Submit**.
5. Click the **Discover Now** related link to discover all applications and retrieve data from the server.
   The Discover and Store Data subflow is triggered. Data is retrieved and in stored in the Microsoft Endpoint Configuration Manager Spoke tables.

Set up a software model for the Microsoft Endpoint Configuration Manager application

Using the applications discovered on the Microsoft Endpoint Configuration Manager server, set up a software model to manage licenses.

Before you begin

Role required:

Note: Ensure that the user has one of the two mentioned set of roles.

- sn_ms_epcfgmgr_spk.Microsoft Endpoint Manager Admin and sn_csd.CSD Admin
- admin

Before creating software models, you must discover the applications available for deployment on the Microsoft Endpoint Configuration Manager server. See CSD 2.0 for Microsoft Endpoint Configuration Manager for more information.

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About this task
You can link a Microsoft Endpoint Configuration Manager application to an existing software model or create a new model.

Procedure
1. Navigate to **Microsoft Endpoint Configuration Manager** > **Applications**.
   A list of applications discovered on the Microsoft Endpoint Configuration Manager server appears.
2. Open an application record.
3. To link to an existing model, click the magnifying glass icon in the **CSD software model** field and select a model from the list.
4. To create a model, click **Create Software Model** under related link.
   a. Complete the software model fields.
   b. Click **Submit**.
      The view returns to the Microsoft Endpoint Configuration Manager Applications list.

Define the Microsoft Endpoint Configuration Manager configuration

Associate that software with a collection through a Microsoft Endpoint Configuration Manager configuration to create catalog items for Microsoft Endpoint Configuration Manager software deployment or to configure your instance to revoke software through Microsoft Endpoint Configuration Manager.

Before you begin
Before you create a Microsoft Endpoint Configuration Manager configuration record, make sure you have discovered the Microsoft Endpoint Configuration Manager applications, collections, and deployments, and set up the necessary software models.

Role required: sn_ms_epcfgmgr_spk.Microsoft Endpoint Manager Admin or admin

About this task
The Microsoft Endpoint Configuration Manager configuration process associates software with Microsoft Endpoint Configuration Manager collections. To deploy software from a Microsoft Endpoint Configuration Manager server, the user or device must be a member of a Microsoft Endpoint Configuration Manager collection associated with an install deployment. CSD 2.0 enables you to revoke unentitled software using the Microsoft Endpoint Configuration Manager server when that software can be removed using an uninstall collection. Users requesting revokable software from the Service Catalog also have the ability to define lease start and stop dates and request lease extensions.

Procedure
1. Navigate to **Microsoft Endpoint Configuration Manager** > **Configurations**.
2. Click **New**.
3. On the form, fill these values.

Field	Description
Name	Name to identify the Microsoft Endpoint Configuration Manager software configuration record.

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Field	Description
Application	Name of an application hosted on the Microsoft Endpoint Configuration Manager server.
Install Collection	Name of the collection associated with the install deployment for the selected application on the Microsoft Endpoint Configuration Manager server. Only those collections associated with the application are available for selection.
Uninstall Collection	Name of the collection associated with the uninstall deployment for the selected application on the Microsoft Endpoint Configuration Manager server. Only those collections associated with the application are available for selection. You must specify an uninstall collection to: ○ Define a lease end date for deployed software. ○ Enable lease extensions. ○ Revoke software from a user's machine.

4. Click **Submit**.

Create a catalog item for the Microsoft Endpoint Configuration Manager application

Create a catalog item for an application you want to offer for distribution from the service catalog using the applications discovered on the Microsoft Endpoint Configuration Manager server.

Before you begin

Role required:

Note: Ensure that the user has one of the two mentioned set of roles.

- sn_ms_epcfgmgr_spk.Microsoft Endpoint Manager Admin, catalog_admin, and sn_csd.CSD Admin
- admin

Before creating a catalog item, you must link the application to a software model and create at least one software configuration.

Procedure

1. Navigate to **Microsoft Endpoint Configuration Manager** > **Applications**.
   A list of applications discovered on the Microsoft Endpoint Configuration Manager server appears.
2. Open a record for the Microsoft Endpoint Configuration Manager application.
3. Click the **Create Catalog Item** related link.
4. On the form, fill the required values.

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Field	Description
Name	Name to identify the record.
Access Type	If **Delegated** is selected, enables the logged-in user to order this software from the service catalog for another user. This permits service desk personnel to order Microsoft Endpoint Configuration Manager deployments for other users in the system. By default, this feature is disabled. To prevent unauthorized users from ordering software, ensure that approvals are required for this type of deployment by clearing the **Skip approval** check box. If an approval is required for software ordered on behalf of a user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requestor is the named user's manager. Software items requested from the service catalog on behalf of a different user require the following information: ○ **User**: User selected for deployment. This field is automatically populated with the name of the logged in user. You can select another user from the list. ○ **Device to install this software on**: Device belonging to the selected user on which to deploy the software. Only devices belonging to that user appear in the choice list. ○ **Lease start**: Date and time to deploy the software. This is the start time for the lease. A lease can be open-ended or have a lease end time. If **Restricted** is selected, the **User** field is not displayed on the order form.

5. Right-click the form header and click **Save**.
6. **Optional:** In the **CSD Catalog Item Fulfillment Configuration** tab, open the default record and provide these values as per your requirement.

Field	Description
Software configuration	Name of the configuration record for this application. This record defines the collection and uninstall collection for this application. This configuration is required for all deployments, revocations, and leases performed by the Microsoft Endpoint Configuration Manager server.
Skip approval (skip_approval)	Check box that allows skipping approval for this item by the requester's manager when a user orders it from the service catalog. Use this field in conjunction with the **Access Type** field to ensure that software ordered by a logged in user on behalf of another user is subject to approval. By default, this check box is cleared, requiring manager approval for all new catalog items.

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Field	Description
	Note: There are two levels of approval possible. By default, all category items require group approval for items in excess of $1000. If that approval is given or skipped, the system evaluates the **Skip approval** check box to determine if the software item requires approval by the requester's manager.
Check license compliance (check_license_compliance)	Check box that forces the system to determine if deploying this item is allowed under the current license.

Note: If the catalog item requires approval because of cost, be sure to configure an approval group in the**Approved By Group** related list. By default, the Service Catalog Request flow runs when an item costing more than $1000 is ordered and looks for an appropriate approval group. If no approval group is configured for the item, this flow skips approval altogether and ends. The system then runs the Order Client Software flow, which evaluates the **Skip approval** check box to determine if approval by the requester's manager is required.

7. Click **Update**.
   Catalog item is created and is available for ordering from Service Catalog.
8. **Optional:** To see all CSD 2.0 catalog items, navigate to **Client Software Distribution 2.0** > **Software Items**.

Note: If you are unable to see any of the mentioned fields or tabs, configure the table's form view or related lists accordingly.

Deployment process

Order an application from a CSD 2.0 catalog item in the service catalog triggers the Order Client Software flow.

This process deploys an application to a user or device through a service catalog order:

1. If the **Skip approval** check box is cleared in the software catalog item, the Order Client Software flow sends the catalog request to the requesting user's manager for approval.
2. If the **Check license compliance** check box is selected in the software catalog item, the flow performs a software license check from SAM or CSD 2.0 depending on your configuration. If there is no license available, the flow creates a catalog task to procure more licenses and assigns the task to the CSD Administrators group.

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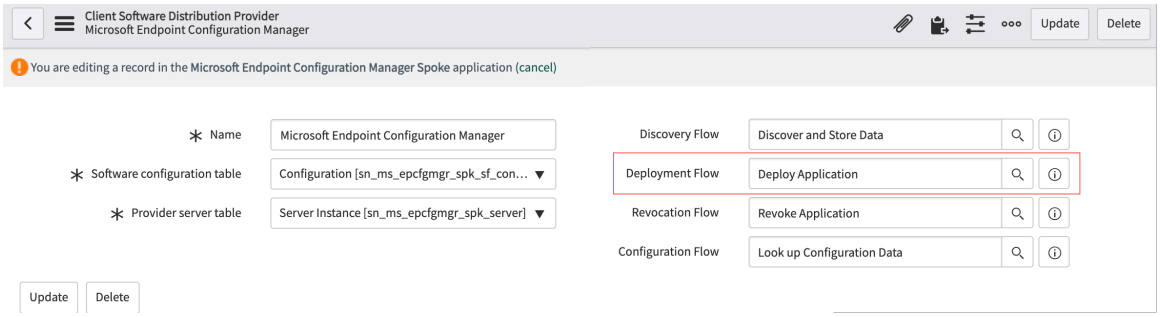
3. The Order Client Software flow triggers the Deploy Client Software flow that in turn triggers the provider-specific **Deployment Flow** that is specified in the provider record.



CSD 2.0 for Jamf

Use the CSD 2.0 along with the Jamf spoke to deploy and revoke software deployments from Jamf and manage distributions on hosts.

To use the Jamf spoke with CSD 2.0, you must activate Jamf spoke and CSD 2.0.

The Jamf spoke contains actions that CSD 2.0 uses to deploy software from a service catalog request and manage user and device collections on Jamf servers. In addition, CSD 2.0 can manage license counts for deployed software using ServiceNow Software Asset Management, revoke software deployed by Jamf without user interaction, and manage lease periods.

Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This application provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance. The agents guide you through the required details, confirms actions for safety, and attempts to handle errors while performing operations.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Jamf group membership addition AI agent	Enables users to add members to static groups in Jamf.
Jamf group deletion management AI agent	Enables users to delete groups in Jamf.
Jamf application targets addition AI agent	Enables users to add static groups as targets to applications in Jamf.

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AI agent	Description
Jamf application targets removal AI agent	Enables users to remove static groups as targets from applications in Jamf.
Jamf group creation management AI agent	Enables users easily and deterministically create groups in Jamf.
Jamf group membership removal AI agent	Enables users to remove members from static groups in Jamf.

Note:

- To access data or perform operations on data in the table that is associated with the AI agent, users must have the CSD Admin role.
- Ensure that you install the latest version of Jamf spoke.
- To use the AI agents, ensure that you are using the default connection that is available with the Jamf spoke.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Available sample agentic workflows

Install Now Assist for Integration Hub and start using the available sample agentic workflows and AI agents. For more information, see Now Assist for Integration Hub.

In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. Use the available sample agentic workflow in AI Agent Studio so that AI agents can coordinate to solve complex problems. To modify the available sample agentic workflow as per your requirement, see Modify an agentic workflow.

Available sample agentic workflow includes:

Sample agentic workflow	Description	AI agents used	Always ON by default?
Jamf Group Management Agentic Flow	Sample agentic workflow that coordinates between multiple AI agents to handle tasks across various functionalities in Jamf.	• Jamf group creation management AI agent • Jamf group membership removal AI agent • Jamf application targets removal AI agent • Jamf application targets addition AI agent	No **Note:** To activate the workflow, see Activate an agentic workflow template.

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Sample agentic workflow	Description	AI agents used	Always ON by default?
		• Jamf group membership addition AI agent • Jamf group deletion management AI agent	

Verify the Jamf spoke records

Verify that the spoke is integrated with CSD 2.0 after setting up and configuring the Jamf spoke and create server instance record to use Jamf spoke with CSD 2.0.

Before you begin

- Activate the Jamf spoke and set up the spoke. For more information about the spoke setup, see Set up the Jamf spoke.
- Activate the CSD 2.0 application.
- Role required: admin

Procedure

1. Verify that these modules are available.
   - Applications
   - Configurations
   - Server Instances
   - Deployments
   - Collections
2. Navigate to **System Definition** > **Tables** and verify that these table are available.
   - Configuration [sn_jamf_spoke_sf_config]
   - Server Instance [sn_jamf_spoke_server]
   - Policy [sn_jamf_spoke_policy]
   - Application [sn_jamf_spoke_application]
   - Group [sn_jamf_spoke_group]
   - Jamf Credential [sn_jamf_spoke_jamf_credential]
3. Verify that the flows are configured correctly in the provider record.

   a. Navigate to **Client Software Distribution 2.0** > **Providers**.

   b. Open the record **Jamf**.

   c. Verify that the flows are configured correctly in the record.

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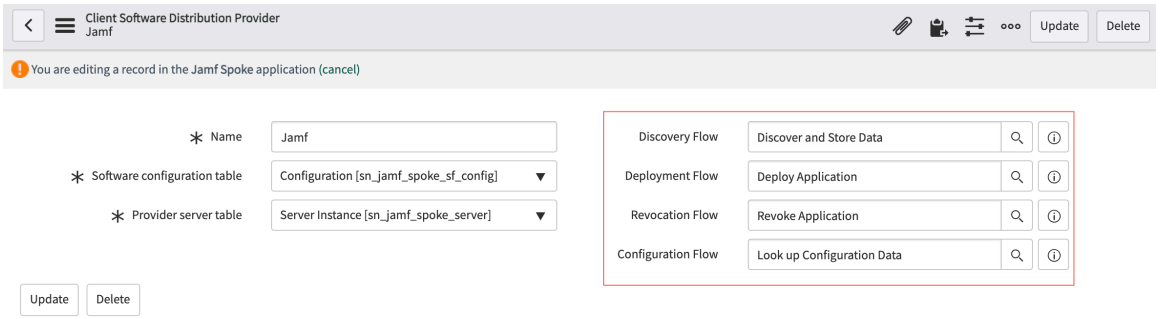

Note: You can configure the default flows as per your requirement.

Store details of the Jamf server

Create a server instance record to discover applications and store details of the Jamf server.

Before you begin

Role required: admin

Procedure

1. Navigate to **JAMF** > **Server instances**.
2. Click **New**.
3. On the form, fill there values.

Field	Description
Name	Name to identify the server instance record.
Connection & Credential Alias	Connection and credential alias you had configured while setting up the Jamf spoke. For example, **Jamf**.

Note: You can use only the default connection and credential alias records that have been shipped along with the Jamf Spoke.

4. Right-click the form header and click **Submit**.
5. Click the **Discover Now** related link to discover all applications and retrieve data from the server.
   The Discover and Store Data subflow is triggered. Data is retrieved and in stored in the Jamf Spoke tables.

Set up a software model

Using the applications discovered on the Jamf server, set up a software model to manage licenses.

Before you begin

Before creating software models, you must discover the applications available for deployment on the Jamf server. See CSD 2.0 for Jamf for more information.

Perform these steps when you set up a software model for the Jamf application and policy.

Role required: Ensure that the user has one of the two mentioned set of roles.

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- sn_jamf_spoke.jamf_admin and sn_csd.CSD Admin
- admin

About this task
You can link a Jamf application to an existing software model or create a new model.

Procedure
1. Determine whether you are setting up a software model for the application or the policy.
   - If you are setting up a software model for the Jamf application, navigate to **Jamf** > **Applications**.
   - If you setting up a software model for the Jamf policy, navigate to **Jamf** > **Policies**.

   A list of applications or policies discovered on the Jamf server appears.
2. Open the required record.
3. Link to an existing model by clicking the magnifying glass icon in the **CSD software model** field and selecting a model from the list.
4. Create a model by clicking **Create Software Model** under related link.

   a. Complete the software model fields.

   b. Click **Submit**.
   The view returns to the Jamf Applications list.

Define the Jamf configuration

Associate that software with a group through a Jamf configuration to create catalog items for Jamf software deployment or to configure your instance to revoke software through .

Before you begin
Before you create a Jamf configuration record, make sure you have discovered the Jamf applications, groups, and deployments, and set up the necessary software models.

Role required: sn_jamf_spoke.jamf_admin or admin

About this task
The Jamf configuration process associates software with Jamf groups. To deploy software from a Jamf server, the user or device must be a member of a Jamf group associated with an install deployment. CSD 2.0 enables you to revoke unentitled software using the Jamf server when that software can be removed using the installation group by removing user or device from it. Users requesting revokable software from the Service Catalog also have the ability to define lease start and stop dates and request lease extensions.

Perform these steps for the Jamf applications and policies.

Procedure
1. Navigate to **Jamf** > **Configurations**.
2. Click **New**.
3. On the form, fill these values.

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Field	Description
Name	Name to identify the Jamf software configuration record.
Group	Name of the group associated with the selected application on the Jamf server. Same group can be used for both installation and uninstallation. Only those groups associated with the application are available for selection.

4. Click **Submit**.

Create a catalog item for the Jamf application

Create a catalog item for an application you want to offer for distribution from the service catalog using the applications discovered on the Jamf server.

Before you begin

Role required: Ensure that the user has one of the two mentioned set of roles.

- sn_jamf_spoke.jamf_admin, catalog_admin, and sn_csd.CSD Admin
- admin

Before creating a catalog item, you must link the application to a software model and create at least one software configuration.

Perform these steps for the Jamf applications and policies.

Procedure

1. Create a catalog item for the application or the policy.
   - If you are creating a catalog item for the Jamf application, navigate to **Jamf** > **Applications**.
   - If you are creating a catalog item for the Jamf policy, navigate to **Jamf** > **Policies**.

   A list of applications or policies discovered on the Jamf server appears.
2. Open the required record.
3. Click the **Create Catalog Item** related link.
4. On the form, fill the required values.

Field	Description
Name	Name to identify the record.
Access Type	If **Delegated** is selected, enables the logged-in user to order this software from the service catalog for another user. This permits service desk personnel to order Jamf deployments for other users in the system. By default, this feature is disabled. To prevent unauthorized users from ordering software, ensure that approvals are required for this type of deployment by clearing the **Skip approval** check box. If an approval is required for software ordered on behalf of a user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requestor is the named user's manager.

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Field	Description
	Software items requested from the service catalog on behalf of a different user require the following information: ○ **User**: User selected for deployment. This field is automatically populated with the name of the logged in user. You can select another user from the list. ○ **Device to install this software on**: Device belonging to the selected user on which to deploy the software. Only devices belonging to that user appear in the choice list. ○ **Lease start**: Date and time to deploy the software. This is the start time for the lease. A lease can be open-ended or have a lease end time. If **Restricted** is selected, the **User** field is not displayed on the order form.

5. Right-click the form header and click **Save**.
6. **Optional:** In the **CSD Catalog Item Fulfillment Configuration** tab, open the default record and provide these values.

Field	Description
Software configuration	Name of the configuration record for this application. This record defines the collection and uninstall collection for this application. This configuration is required for all deployments, revocations, and leases performed by the Jamf server.
Skip approval (skip_approval)	Check box that allows skipping approval for this item by the requester's manager when a user orders it from the service catalog. Use this field in conjunction with the **Access Type** field to ensure that software ordered by a logged in user on behalf of another user is subject to approval. By default, this check box is cleared, requiring manager approval for all new catalog items. **Note:** There are two levels of approval possible. By default, all category items require group approval for items in excess of $1000. If that approval is given or skipped, the system evaluates the **Skip approval** check box to determine if the software item requires approval by the requester's manager.
Check license compliance (check_license_compliance)	Check box that forces the system to determine if deploying this item is allowed under the current license.

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Note: If the catalog item requires approval because of cost, be sure to configure an approval group in the**Approved By Group** related list. By default, the Service Catalog Request flow runs when an item costing more than $1000 is ordered and looks for an appropriate approval group. If no approval group is configured for the item, this flow skips approval altogether and ends. The system then runs the Order Client Software flow, which evaluates the **Skip approval** check box to determine if approval by the requester's manager is required.

7. Click **Update**.
   Catalog item is created and is available for ordering from Service Catalog.
8. **Optional:** To see all CSD 2.0 catalog items, navigate to **Client Software Distribution 2.0** > **Software Items**.

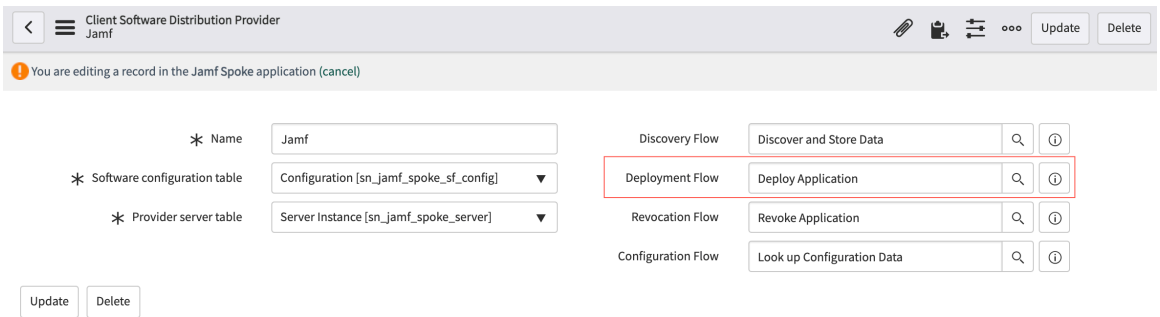
Note: If you are unable to see any of the above fields or tabs, configure the table's form view or related lists accordingly.

Deployment process

Order an application from a CSD 2.0 catalog item in the service catalog triggers the Order Client Software flow.

This process deploys an application to a user or device through a service catalog order:

1. If the **Skip approval** check box is cleared in the software catalog item, the Order Client Software flow sends the catalog request to the requesting user's manager for approval.
2. If the **Check license compliance** check box is selected in the software catalog item, the flow performs a software license check from SAM or CSD 2.0 depending on your configuration. If there is no license available, the flow creates a catalog task to procure more licenses and assigns the task to the CSD Administrators group.
3. The Order Client Software flow triggers the Deploy Client Software flow that in turn triggers the provider-specific **Deployment Flow** that is specified in the provider record.



CSD 2.0 for Microsoft Intune

Use the CSD 2.0 along with the Microsoft Intune spoke to deploy and revoke software deployments, and manage distributions on hosts.

To use the Microsoft Intune spoke with CSD 2.0, you must activate Microsoft Intune spoke and CSD 2.0.

The Microsoft Intune spoke contains actions that CSD 2.0 uses to deploy software from a service catalog request and manage user and devices on Microsoft Intune servers. In addition, CSD 2.0 can manage license counts for deployed software using ServiceNow Software Asset Management, revoke software deployed by Microsoft Intune without user interaction, and manage lease periods.

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Available AI agents

Install Now Assist for Integration Hub and start using the available AI agents. For more information, see Now Assist for Integration Hub.

This application provides standalone AI agents that mimic human-like intelligence to perform tasks in your ServiceNow instance. The agents guide you through the required details, confirms actions for safety, and attempts to handle errors while performing operations.

- In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. See Create an agentic workflow for information about adding AI agents to create agentic workflows as per your requirement and provide the required trigger.

  You can also search for other available AI agents and add them to your agentic workflow. See Find AI agents for more information.

- You can create a clone of the required spoke AI agent and customize it as per your requirement. See Duplicate an AI agent for more information about creating a clone.
- See AI Agent Studio (legacy) for information about AI agents.

Available AI agents include:

AI agent	Description
Microsoft Intune application assignment deletion AI agent	Enables users to delete application assignments in Intune.
Microsoft Intune group deletion management AI agent	Enables users to delete groups in Microsoft Intune.
Microsoft Intune application assignment creation AI agent	Enables users to create application assignments in Intune.
Microsoft Intune group membership removal AI agent	Enables users to remove members (Devices, Users, or Owners) from groups in Microsoft Intune.
Microsoft Intune group membership addition AI agent	Enables users to add members (devices, users, and owners) to groups in Intune.
Microsoft Intune group creation management AI agent	Enables users to create groups in Microsoft Intune.

Note:

- To access data or perform operations on data in the table that is associated with the AI agent, users must have the CSD Admin role.
- Ensure that you install the latest version of Microsoft Intune spoke.
- To use the AI agents, ensure that you are using the default connection that is available with the Microsoft Intune spoke.

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

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Available sample agentic workflows

Install Now Assist for Integration Hub and start using the available sample agentic workflows and AI agents. For more information, see Now Assist for Integration Hub.

In the ServiceNow agentic system, you can create an agentic workflow that comprises of a set of large language model (LLM) instructions along with one or more standalone AI agents to execute an objective. Use the available sample agentic workflow in AI Agent Studio so that AI agents can coordinate to solve complex problems. To modify the available sample agentic workflow as per your requirement, see Modify an agentic workflow.

Available sample agentic workflow includes:

Sample agentic workflow	Description	AI agents used	Always ON by default?
Microsoft Intune Group Management Agentic Flow	Sample agentic workflow that coordinates between multiple AI agents to handle tasks that span across various functionalities in Microsoft Intune.	• Microsoft Intune application assignment creation AI agent • Microsoft Intune application assignment deletion AI agent • Microsoft Intune group membership addition AI agent • Microsoft Intune group creation management AI agent • Microsoft Intune group membership removal AI agent • Microsoft Intune group deletion management AI agent	No **Note:** To activate the workflow, see Activate an agentic workflow template.

Configure group assignments

Configure group assignments for all the applications you want to deploy.

Before you begin
Role required: admin

Procedure

1. Log in to Microsoft Endpoint Manager admin center as an admin.
2. Navigate to **Apps** > **All apps**.
3. Click the application you want to deploy.
4. Click **Properties** under **Manage**.

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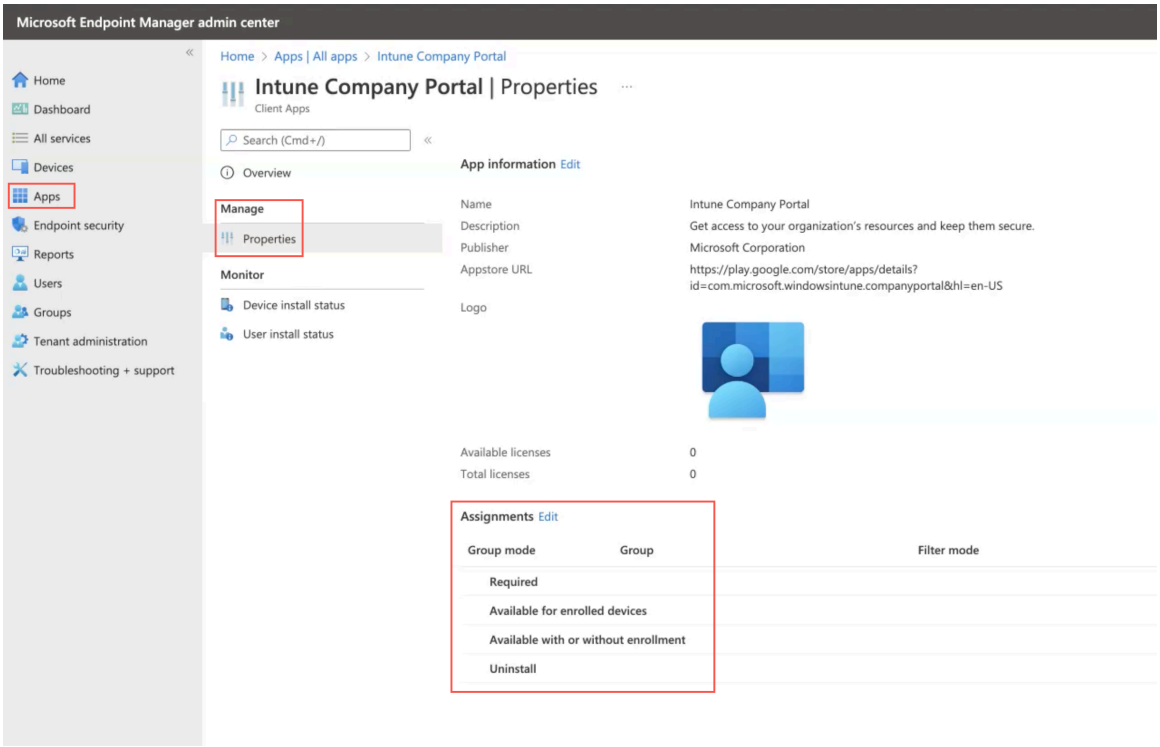
5. Under **Assignments**, perform assignments for the groups you want to deploy.



Verify the Microsoft Intune spoke records

Verify that the spoke is integrated with CSD 2.0 after setting up and configuring the Microsoft Intune spoke and create server instance record to use Microsoft Intune spoke with CSD 2.0.

Before you begin

- Activate the Microsoft Azure Active Directory spoke spoke and set up the spoke. For more information about the spoke setup, see Set up Microsoft Entra ID spoke.
- Activate the Microsoft Intune spoke and set up the spoke. For more information about the spoke setup, see Set up the Microsoft Intune spoke.
- Activate the CSD 2.0 application.
- Role required: admin

Procedure

1. Verify that these modules are available.
   - Applications
   - Configurations
   - Server Instances
   - Deployments
   - Groups
2. Navigate to **System Definition** > **Tables** and verify that these table are available.
   - Configuration [sn_ms_intune_spoke_sf_config]
   - Deployment [sn_ms_intune_spoke_deployment]
   - Server Instance [sn_ms_intune_spoke_server]

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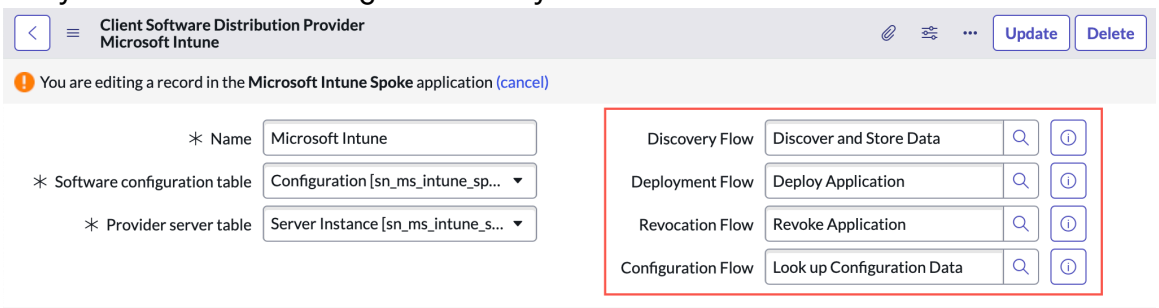
- Application [sn_ms_intune_spoke_application]
- Group [sn_ms_intune_spoke_group]

3. Verify that the flows are configured correctly in the provider record.

   a. Navigate to **Client Software Distribution 2.0** > **Providers**.

   b. Open the record **Microsoft Intune**.

   c. Verify that the flows are configured correctly in the record.



Note: You can configure the default flows as per your requirement.

Store details of the Microsoft Intune server

Create a server instance record to discover applications and store details of the Microsoft Intune server.

Before you begin

Role required: admin

Procedure

1. Navigate to **Microsoft Intune** > **Server instances**.
2. Click **New**.
3. On the form, fill there values.

Field	Description
Name	Name to identify the server instance record.
Connection & Credential Alias	Connection and credential alias you had configured while setting up the Microsoft Intune spoke. For example, **Microsoft_Intune**.

Note: You can use only the default connection and credential alias records that have been shipped along with the Microsoft Intune Spoke.

4. Right-click the form header and click **Submit**.
5. Click the **Discover Now** related link to discover all applications and retrieve data from the server.
   The Discover and Store Data subflow is triggered. Data is retrieved and in stored in the Microsoft Intune Spoke tables.

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Set up a software model

Using the applications discovered on the Microsoft Intune server, set up a software model to manage licenses.

Before you begin

Role required: Ensure that the user has one of the two mentioned set of roles.

- sn_ms_intune_spoke.microsoft_intune_admin and sn_csd.CSD Admin
- admin

Before creating software models, you must discover the applications available for deployment on the Microsoft Intune server.

Perform these steps when you set up a software model for the Microsoft Intune application.

About this task

You can link a Microsoft Intune application to an existing software model or create a new model.

Procedure

1. Navigate to **Microsoft Intune** > **Applications**.
   A list of applications discovered on the Microsoft Intune server appears.
2. Open the required record.
3. To link to an existing model, click the magnifying glass icon in the **CSD software model** field and select a model from the list.
4. To create a model, click **Create Software Model** under related link.

   a. Complete the software model fields.

   b. Click **Submit**.
   The view returns to the Microsoft Intune Applications list.

Define the Microsoft Intune configuration

Associate that software with a group through a Microsoft Intune configuration to create catalog items for Microsoft Intune software deployment or to configure your instance to revoke software through Microsoft Intune.

Before you begin

Before you create a Microsoft Intune configuration record, make sure you have discovered the Microsoft Intune applications, groups, and deployments, and set up the necessary software models.

Role required: sn_ms_intune_spoke.microsoft_intune_admin or admin

About this task

The Microsoft Intune configuration process associates software with Microsoft Intune groups. To deploy software from a Microsoft Endpoint Configuration Manager server, the user or device must be a member of a Microsoft Intune group associated with an install deployment. CSD 2.0 enables you to revoke unentitled software using the Microsoft Intune server when that software can be removed using an uninstall group. Users requesting revokable software from the Service Catalog also have the ability to define lease start and stop dates and request lease extensions.

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Procedure

1. Navigate to **Microsoft Intune** > **Configurations**.
2. Click **New**.
3. On the form, fill these values.

Field	Description
Name	Name to identify the Microsoft Intune software configuration record.
Application	Name of an application hosted on the Microsoft Intune server.
Install Group	Name of the group associated with the install deployment for the selected application on the Microsoft Intune server. Only those groups associated with the application are available for selection.
Uninstall Group	Name of the group associated with the uninstall deployment for the selected application on the Microsoft Intune server. Only those groups associated with the application are available for selection. You must specify an uninstall collection to: ○ Define a lease end date for deployed software. ○ Enable lease extensions. ○ Revoke software from a user's machine.
Deployment Type	Entity for which software deployment or revocation is needed.

4. Click **Submit**.

Create a catalog item for the Microsoft Intune applications

Create a catalog item for an application you want to offer for distribution from the service catalog using the applications discovered on the Microsoft Intune server.

Before you begin

Role required: Ensure that the user has one of the two mentioned set of roles.

- sn_ms_intune_spoke.microsoft_intune_admin, catalog_admin, and sn_csd.CSD Admin
- admin

Before creating a catalog item, you must link the application to a software model and create at least one software configuration.

Procedure

1. Navigate to **Microsoft Intune** > **Applications**.
   A list of applications discovered on the Microsoft Intune server appears.
2. Open a record for the Microsoft Intune application.

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3. Click the **Create Catalog Item** related link.
4. On the form, fill the required values.

Field	Description
Name	Name to identify the record.
Access Type	If **Delegated** is selected, enables the logged-in user to order this software from the service catalog for another user. This permits service desk personnel to order Microsoft Intune deployments for other users in the system. By default, this feature is disabled. To prevent unauthorized users from ordering software, ensure that approvals are required for this type of deployment by clearing the **Skip approval** check box. If an approval is required for software ordered on behalf of a user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requestor is the named user's manager. Software items requested from the service catalog on behalf of a different user require the following information: ○ **User**: User selected for deployment. This field is automatically populated with the name of the logged in user. You can select another user from the list. ○ **Device to install this software on**: Device belonging to the selected user on which to deploy the software. Only devices belonging to that user appear in the choice list. ○ **Lease start**: Date and time to deploy the software. This is the start time for the lease. A lease can be open-ended or have a lease end time. If **Restricted** is selected, the **User** field is not displayed on the order form.

5. Right-click the form header and click **Save**.
6. **Optional:** In the **CSD Catalog Item Fulfillment Configuration** tab, open the default record and provide these values as per your requirement.

Field	Description
Software configuration	Name of the configuration record for this application. This record defines the install group and uninstall group for this application. This configuration is required for all deployments, revocations, and leases performed by the Microsoft Intune server.
Skip approval (skip_approval)	Check box that allows skipping approval for this item by the requester's manager when a user orders it from the service catalog. Use this field in conjunction with the **Access Type** field to ensure that software ordered by a logged in user on behalf of another user is subject to approval. By default, this check box is cleared, requiring manager approval for all new catalog items.

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Field	Description
	Note: There are two levels of approval possible. By default, all category items require group approval for items in excess of $1000. If that approval is given or skipped, the system evaluates the **Skip approval** check box to determine if the software item requires approval by the requester's manager.
Check license compliance (check_license_compliance)	Check box that forces the system to determine if deploying this item is allowed under the current license.

Note: If the catalog item requires approval because of cost, be sure to configure an approval group in the**Approved By Group** related list. By default, the Service Catalog Request flow runs when an item costing more than $1000 is ordered and looks for an appropriate approval group. If no approval group is configured for the item, this flow skips approval altogether and ends. The system then runs the Order Client Software flow, which evaluates the **Skip approval** check box to determine if approval by the requester's manager is required.

7. Click **Update**.
   Catalog item is created and is available for ordering from Service Catalog.
8. **Optional:** To see all CSD 2.0 catalog items, navigate to **Client Software Distribution 2.0** > **Software Items**.

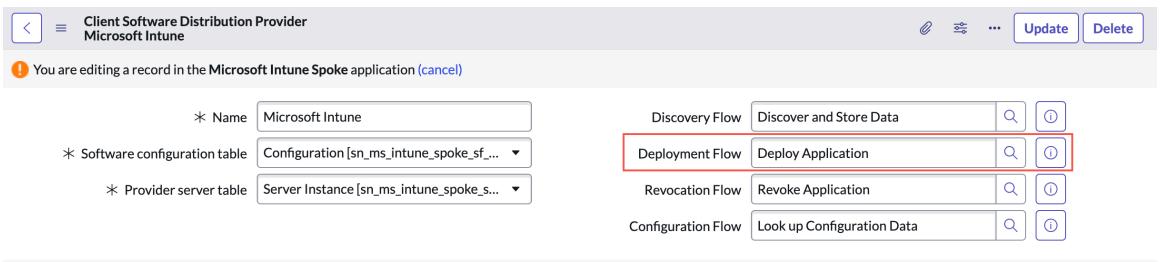
Note: If you are unable to see any of the mentioned fields or tabs, configure the table's form view or related lists accordingly.

Deployment process

Order an application from a CSD 2.0 catalog item in the service catalog triggers the Order Client Software flow.

This process deploys an application to a user or device through a service catalog order:

1. If the **Skip approval** check box is cleared in the software catalog item, the Order Client Software flow sends the catalog request to the requesting user's manager for approval.
2. If the **Check license compliance** check box is selected in the software catalog item, the flow performs a software license check from SAM or CSD 2.0 depending on your configuration. If there is no license available, the flow creates a catalog task to procure more licenses and assigns the task to the CSD Administrators group.
3. The Order Client Software flow triggers the Deploy Client Software flow that in turn triggers the provider-specific **Deployment Flow** that is specified in the provider record.



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CSD 2.0 validation process

After Microsoft Endpoint Configuration Manager deploys software to a target computer, CSD 2.0 detects the installation and validates its status.

Note: This is applicable only if you are using SAM.

CSD 2.0 uses the following methods for detecting software installed on the target machine:

- Discovery: CSD 2.0 is configured to leverage Discovery to detect software installations. You can run Discovery manually at any time, or by a scheduled job.
- Microsoft Endpoint Configuration Manager Integration: You can import provider data into the CMDB using the features in the Integration - Microsoft Endpoint Configuration Manager plugin if Discovery is not active on the instance.

The instance uses the data gathered by Discovery or the Microsoft Endpoint Configuration Manager integration plugin to populate the Software Installation [cmdb_sam_sw_install] table. To validate installations using this data, CSD 2.0 runs a scheduled job called Reconcile Requested Software that uses CSD property settings. This process reconciles the software installation data accumulated in the CMDB and makes these status updates:

- **Not installed** or **Not Synced** to **Installed**: The user has installed the requested software within the time limit configured in the *sn_csd.softwareInstallExpDays* property.
- **Not installed** or **Not Synced** to **Status check expired**: The time limit has expired for the user to install the requested software. The system stops checking for installation when the time limit expires.

Software revocation

Revoke software without any user interaction if the software can be revoked and has a lease end date using the provider-specific revocation flow.

Revoke software deployed through the service catalog

Software deployed by the software provider can be revoked when the application associated with the software configuration has an uninstall collection configured. CSD 2.0 can revoke software requested using the CSD 2.0 catalog. CSD 2.0 can also uninstall software using Microsoft Endpoint Configuration Manager, Microsoft Intune, and Jamf when revocation is triggered from the reclamation candidates.

Before you begin

- Create a provider-specific configuration record for the application that names an appropriate uninstall collection.
- Associate the CSD 2.0 catalog item for the application with the provider configuration that specifies the uninstall collection.

Role required: itil, sn_csd.CSD Admin, or sn_csd.CSD User

Procedure

1. Navigate to **Client Software Distribution 2.0** > **Requested Software**.
2. Open the record for the software package you want to revoke.
   The package must have a **Status** of **Installed** or **Not Synced** to be revocable.
3. Under **Related Links**, click **Revoke software**.

   Note: This action runs the Revoke Client Software flow, which triggers the provider-specific Revoke Application subflow.

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Integrate CSD 2.0 with other software providers

Integrate CSD 2.0 with client software distribution providers, such as Casper, Altiris, or LANDesk.

Note: Extending CSD 2.0 is an advanced procedure intended for use by experienced ServiceNow AI Platform developers only.

Create provider tables

Identify and create tables to store discovered data from the provider server.

For example, Application, Collection, and Deployment tables are provided with the Microsoft Endpoint Configuration Manager spoke. Similarly, create tables to store the discovered data. You must create your application table that extends the Client Software Distribution Application (sn_csd_application) table.

- Create a provider server table that extends the Configuration Item [cmdb_ci] table.
- Create a software configuration table that extends Client Software Distribution Software Configuration [sn_csd_software_config] table.

Create subflows

Create subflows in Workflow Studio to discover and store data, and deploy application.

Create these subflows in Workflow Studio as per your requirement.

- Discover and Store Data Subflow:

  Subflow to discover the provider server, retrieve the data from provider server, and store that data in the ServiceNow instance. This data should be stored in the tables you had earlier created for storing the server data.

- Deploy Application Subflow:

  Subflow to deploy software from the provider server. This subflow provides information to the provider regarding deploying an application requested from the service catalog.

- Revoke Application Subflow:

  Subflow to revoke an installation from the provider server. This subflow that provides information to the provider regarding the user or device from which the application should be removed.

- Look up Configuration Data Subflow:

  Subflow to retrieve configuration data for the specified requested item or software configuration record.

The Deploy Application Template, Look up Configuration Data Template, and Revoke Application Template subflows are provided with CSD 2.0. You can use these subflows as reference and create subflows as per your requirement.

Create a provider record

Create a provider record to configure the flows.

Before you begin

Role required: admin

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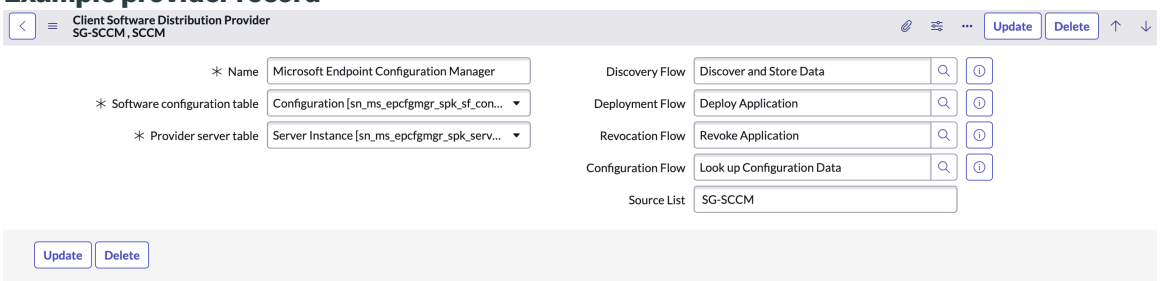
Procedure

1. Navigate to **Client Software Distribution 2.0** > **Providers**.
2. Click **New**.
3. On the form, fill these values.

Field	Description
Name	Name to identify the provider record.
Software configuration table	Software configuration table you had created. This table extends Client Software Distribution Software Configuration [sn_csd_software_config] table.
Provider server table	Provider server table you had created. This table extends the Configuration Item [cmdb_ci] table
Discovery Flow	Subflow you had created to discover the provider server, retrieve the data from provider server, and store that data in the ServiceNow instance.
Deployment Flow	Subflow you had created to deploy software from the provider server.
Revocation Flow	Subflow you had created to revoke an installation from the provider server.
Configuration Flow	Subflow you had created to retrieve configuration data for the specified requested item or software configuration record.
Source List	List of discovery sources separated by a comma.

Example provider record



4. Click **Save**.

Create UI actions

Create UI actions to discover data, create software model, create software configuration, and create catalog item.

Before you begin

Role required: admin

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About this task

See UI actions for more information about creating a UI action.

Procedure

1. Create a UI action to discover data.

   a. Navigate to **System Definition** > **UI Actions**.

   b. Click **New**.

   c. On the form, fill these values.

Field	Description
Name	Name to identify the UI action record. For example, `Discover Now`.
Table	Provider server table you had created. This table extends the Configuration Item [cmdb_ci] table.
Script	Script to run when the UI action is executed. For example, enter `sn_csd.CSDUtil.startDiscovery(current);`

   d. Specify other fields as per your requirements.

   e. Click **Save**.

2. Create a UI action to create and link software model to your provider application or software.

   a. Navigate to **System Definition** > **UI Actions**.

   b. Click **New**.

   c. On the form, fill these values.

Field	Description
Name	Name to identify the UI action record. For example, `Create Software Model`.
Table	Application table you had created. This table extends the Client Software Distribution Application (sn_csd_application) table.

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Field	Description
	Note: You can use either SAM or CSD 2.0 software model and license tables. Depending upon how the `Determines whether to use SAM plugin(SAM Foundation or SAM Professional) tables for managing software models and licensing information` system property (*sn_csd.useSAMPlugin*) is configured, use the corresponding software model table.
Condition	Defines the conditions that restrict when the UI action appears. For example, if software model is associated with the application or software, you may want to hide this UI action. So, enter `(gs.getProperty("sn_csd.useSAMPlugin") == 'true' && current.model=="" && (GlidePluginManager().isActive("com.snc.sa || GlidePluginManager().isActive("com.snc.sam || (gs.getProperty("sn_csd.useSAMPlugin") == 'false'&& current.csd_model=="").`

Script	Script to run when the UI action is executed. For example, enter
	`var newModel = '';`
	`var tableName = '';`
	`if (gs.getProperty("sn_csd.useSAMPlugin") == 'true' && current.model == "" && (GlidePluginManager().isActive("com.snc.sams") || GlidePluginManager().isActive("com.snc.samp.core"))) {`
	`tableName = 'cmdb_software_product_model';`
	`} else {`
	`tableName = 'sn_csd_software_product_model';`
	`}`
	`newModel = new sn_csd.CSDModelUtil().generateModel(current, tableName);`

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Field	Description
	`if (newModel != '') gs.setRedirect(tableName + ".do?sys_id=" + newModel);`

d. Specify other fields as per your requirements.

e. Click **Save**.

3. Create a UI action to create software configuration.

a. Navigate to **System Definition** > **UI Actions**.

b. Click **New**.

c. On the form, fill these values.

Field	Description
Name	Name to identify the UI action record. For example, `Create Software Configuration`.
Table	Application table you had created. This table extends the Client Software Distribution Application (sn_csd_application) table. **Note:** You can use either SAM or CSD 2.0 software model and license tables. Depending upon how the `Determines whether to use SAM plugin(SAM Foundation or SAM Professional) tables for managing software models and licensing information` system property (*`sn_csd.useSAMPlugin`*) is configured, use the corresponding software model table.
Condition	Defines the conditions that restrict when the UI action appears. For example, you may want to show the UI action only if the software model is configured. So, enter `(gs.getProperty("sn_csd.useSAMPlugin") == 'true' && current.model!="" && (GlidePluginManager().isActive("com.snc.sa || GlidePluginManager().isActive("com.snc.sam || (gs.getProperty("sn_csd.useSAMPlugin")`

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Field	Description
	`== 'false' && current.csd_model!="").`

Script	Script to run when the UI action is executed. For example, enter
	`var softwareConfig = createConfig(current); action.setRedirectURL(softwareConfig);`
	`function createConfig(appGr) { var gr = new GlideRecord("<Provider-software-configuration-table>"); gr.initialize(); gr.application = appGr.sys_id; gr.name = appGr.display_name; gr.insert(); return gr; }`
	In this example, replace `<Provider-software-configuration-table>` with the provider server table you had created. This table extends the Configuration Item [cmdb_ci] table.

d. Specify other fields as per your requirements.

e. Click **Save**.

4. Create a UI action to create catalog item.

a. Navigate to **System Definition** > **UI Actions**.

b. Click **New**.

c. On the form, fill these values.

Field	Description
Name	Name to identify the UI action record. For example, `Create Catalog Item`.
Table	Application table you had created. This table extends the Client Software Distribution Application (sn_csd_application) table.

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Field	Description
	Note: You can use either SAM or CSD 2.0 software model and license tables. Depending upon how the `Determines whether to use SAM plugin(SAM Foundation or SAM Professional) tables for managing software models and licensing information` system property (*sn_csd.useSAMPlugin*) is configured, use the corresponding software model table.
Condition	Defines the conditions that restrict when the UI action appears. For example, you may want to show this UI action only if software model is configured and there is at least one software configuration. So, enter `sn_csd.CSDUtil.isCSDSoftwareModelAndConfig("<provider software configuration table>", "<internal name of software configuration table's column that refers to provider's application table>")`.

Script	Script to run when the UI action is executed. For example, enter
	`var catItemHandler = new sn_csd.CSDCatItemHandler(current);`
	`var catItem = catItemHandler.createCatalogItem(current);`
	
	`//first parameter - provider's software configuration table`
	`//second paramter - internal name of software configuration table's column that refers to the provider's application table`
	`var sfConfig = catItemHandler.getSoftwareConfig('<provider software configuration table>', '<internal name of software configuration table's column that refers to provider's application table>);`

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Field	Description

	`var gr = new GlideRecord('sn_csd_cat_item_fulfilment_config');`
	`gr.initialize();`
	`gr.cat_item = catItem.sys_id;`
	`gr.provider = '<provider's Sys ID from sn_csd_provider table record>'; //provider's Sys ID from sn_csd_provider table record`
	`gr.software_config = sfConfig; //populating software configuration`
	`gr.insert();`
	`action.setRedirectURL(catItem);`

d. Specify other fields as per your requirements.

e. Click **Save**.

Retry Handler Framework

Framework that retries a failed HTTP request when the API rate limits are exceeded and the 429 Too Many Requests status code is returned. The retry-after time HTTP header is used to retry the request again after that specified retry-after time.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Spoke requirements

Note: The Retry Handler Framework app is available only as a part of Microsoft Exchange Online Spoke or Journey Accelerator app.

- Install Journey Accelerator app
- Microsoft Exchange Online spoke

Spoke flows

The Retry Handler Framework provides sample flows to demonstrate automating the Journey Accelerator tasks. To customize a sample flow, copy it to a new application scope. Available sample flows include:

Flow	Description
Renew Subscriptions	Retrieves all the subscription records and renews the subscriptions that are about to expire.

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Flow	Description
	Note: Subscriptions that have Being Deleted as status, will not be considered for renewal.
Clean up Queue Records	Removes the records from Request Retry Queue based on state, execution status, and last updated time.
Scheduled Job	Processes records from the Request Retry Queue table.

Spoke subflows

The Retry Handler Framework provides sample subflows to demonstrate automating Journey Accelerator tasks. To customize a sample subflow, copy it to a new application scope. Available sample subflows include:

Subflow	Description
Calendar Synchronization	Retrieves the events from Exchange Online Calendar Events Transformed Data table and updates the events in Microsoft Exchange Online Events table. Checks if a valid subscription exists. Creates a subscription if the subscription does not exist. **Note:** You must update the required details in the Exchange Online Calendar Events Transformed Data table before synchronizing events data.
Create or Update Subscription Record	Checks if a subscription with the specified details exists in Microsoft Exchange Online. If the subscription exists, then the subscription record is updated. Otherwise, a subscription is created in Microsoft Exchange Online and an associated record is created.
Delete Calendar Scheduling Event	Deletes the specified event in Microsoft Exchange Online and the associated record from events tables, attachments, records from event attendees and event to subscription m2m tables.
Event Lifecycle Management	Retrieves the event details and updates the record details of the event, attendees, and event to subscription m2m tables.
Look up and Update Attachments to Event Record	Retrieves the specified event's attachments from Microsoft Exchange Online and updates the retrieved details to the specified event's record.
Look up and Update Calendar Scheduling Change	Retrieves the event details from Microsoft Exchange Online and updates the details to the specified event's record. If a subscription already does not exist, this subflow creates a subscription and links it with the event record. If an event does not exist in Microsoft Exchange Online, all the related local records are deleted.
Look up Calendar Details	Retrieves the calendar details. **Note:** This subflow cannot be reused as it is a part of the Event Lifecycle Management subflow.

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Subflow	Description
Look up Event Details	Retrieves the event details. **Note:** This subflow cannot be reused as it is a part of the Update Calendar Scheduling Event subflow.
Recreate Removed Subscription	Recreates a removed webhook subscription using the details from the associated subscription record.
Renew Subscription	Renews a webhook subscription if a renewal is required based on the specified inputs.
Subscription Lifecycle Management	Demonstrates the process of subscription management for webhook subscriptions. This subflow creates an event and checks if a webhook subscription exists. If a webhook subscription does not exist, the subflow creates a webhook subscription, event, attendees, event to subscription m2m table records.
Sync up Events	Syncs the calendar view with the Exchange Online Calendar Events Transformed Data table. Use this subflow to manage missed life-cycle notifications for subscriptions. **Note:** You must update the Exchange Online Calendar Events Transformed Data table with the required information before syncing events data.
Update Calendar Scheduling Event	Updates the properties of an event object in Microsoft Exchange Online and the associated records in the events table.

Note: Look up and Update Attachments to Event Record, Look up Calendar Details, Look up Event Details, Renew Subscription subflows are hidden from subflow picker.

ServiceNow Kafka Consumer

Integrates your ServiceNow instance with Kafka Consumer and stores data in the ServiceNow tables.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Integration Hub subscription

Important: Starting with the Brazil release, the ServiceNow Kafka Consumer plugin is being prepared for future deprecation. It will no longer be activated on new instances and will be hidden from the plugin catalog, but remains supported for existing deployments. For new implementations, Stream Connect is the recommended path forward.

This spoke requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

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Supported versions

This spoke was built for Confluent REST Proxy API v2.

Spoke dependencies

If you're having trouble installing the app, ensure that these dependent plugins are installed:

- Confluent Kafka REST Proxy Spoke
- ServiceNow IntegrationHub Runtime (com.glide.hub.integration.runtime)
- ServiceNow IntegrationHub Action Step - RTE (com.glide.hub.action_step.rte)

Note: Some of these plugins are licensable features and require appropriate licenses, if used outside the spoke implementation.

Connection and credential alias requirements

Integration Hub uses aliases to manage connection and credential information. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. If the connection or credential information changes, you don't need to update any actions that use the connection. For more information, see Connections and Credentials.

ServiceNow Kafka Consumer uses the connection and credential alias of the Confluent Kafka REST Proxy Spoke.

Configure ServiceNow Kafka Consumer

Retrieve events pertaining to the specified topics and store it in the required ServiceNow tables.

Before you begin

- Request Integration Hub subscription.
- Activate and set up the Confluent Kafka REST Proxy Spoke.
- Activate ServiceNow Kafka Consumer.
- Define entities and mapping between entities. For information, see Robust Import Set Transformers.
- Role required: import_admin

Procedure

1. Navigate to **All** > **Process Automation** > **Kafka Consumer**.
2. Click **New**.
3. On the form, fill these values.

Field	Description
Name	Name to identify the record.
Broker Connection Alias	Connection alias of the Confluent Kafka REST Proxy Spoke.
Topic	Topic from which you want to retrieve the events.

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Field	Description
Robust Transformer Definition	Robust Transformer Definition that is used for the event transformation and data storage in ServiceNow tables. For information, see Robust Import Set Transformers.
Offset Starting Point	Value of the Kafka Consumer auto.offset.reset. This specifies what the Kafka Consumer should do when there is no initial offset or if the current offset does not exist any more on the server. See the Kafka 2.7 documentation for more information.
Partitions per group	Number of partitions per consumer thread.
Page size (bytes)	Maximum size of a request.
Page limit	Maximum number of requests per iteration.
Embedded Format	Format of the Kafka message for the topic.
Request timeout (ms)	Value of the Kafka Consumer consumer.request.timeout.ms. This specified the maximum amount of time the client waits for the response of a request. See the Kafka 2.7 documentation for more information.
Stop Upon Transform Errors	Option to stop listening when transformation errors are encountered.
Verbose transformation	Option to log all the imported events to import set and produce additional debug logs for transformation.

Note: You must create one Kafka Consumer record for each topic.

4. Click the **Start Sink Listener** related link.
   The Kafka Partition Group Listener States table is populated with the topic partition data.
5. **Optional:** If you want to stop listening, click the **Start Sink Listener** related link.
6. Navigate to **System Scheduler** > **Scheduled Jobs**.
7. Open the record, **Kafka Consumer Trigger**.
8. From the **Trigger Type** list, select **Interval**.
9. Click **Update**.

Data Stream actions and pagination

Send REST, SOAP, or JDBC requests from Workflow Studio to APIs that return a stream of response data larger than 10 MB, or that return paginated results. Parse stream data into a series of complex object outputs and use the data pills in other actions in a flow.

For example, create a Data Stream action to import a large quantity of employee data from a third-party HR site. The Data Stream action sends a REST request to the third-party site and processes the response to populate records in the User [sys_user] table.

Note: Data Stream actions require an Integration Hub subscription. For more information, see Legal schedules - Integration Hub overview.

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Benefits

Data Stream actions offer these benefits.

- Parse and format a stream of response data larger than 10 MB.
- Automatically send multiple requests to APIs that paginate results, if applicable.
- Can be used in Integration Hub - Import and to create a data source.
- Enable flow designers to process large requests without complex coding or configuration.
- Enable flow designers to process each object within a data stream using **For each** flow logic. For example, you might create a Data Stream action that imports document data from a third-party site. When you add the action to a flow, Workflow Studio automatically adds the action to a **For each** flow logic block, enabling flow designers to easily create a record in ServiceNow for each object in the data stream. See Use a Data Stream action in a flow.
- Enable flow designers to reuse Data Stream actions in multiple flows, using the same source of data in multiple ways.

Running a Data Stream action

There are two ways to run a Data Stream action.

From a flow

You can process each object within a data stream using **For each** flow logic. For example, you might create a Data Stream action that imports document data from a third-party site. When you add the action to a flow, Workflow Studio automatically adds the action to a **For each** flow logic block, enabling flow designers to easily create a record in ServiceNow for each object in the data stream. See Use a Data Stream action in a flow.

From a script

You can start a Data Stream using the executeDataStreamAction() method in the FlowAPI class. For more information, see FlowAPI.

Action outline

Data Stream actions follow a set structure. Follow prompts to add and remove steps from the action outline. You cannot manually add steps to a Data Stream action.

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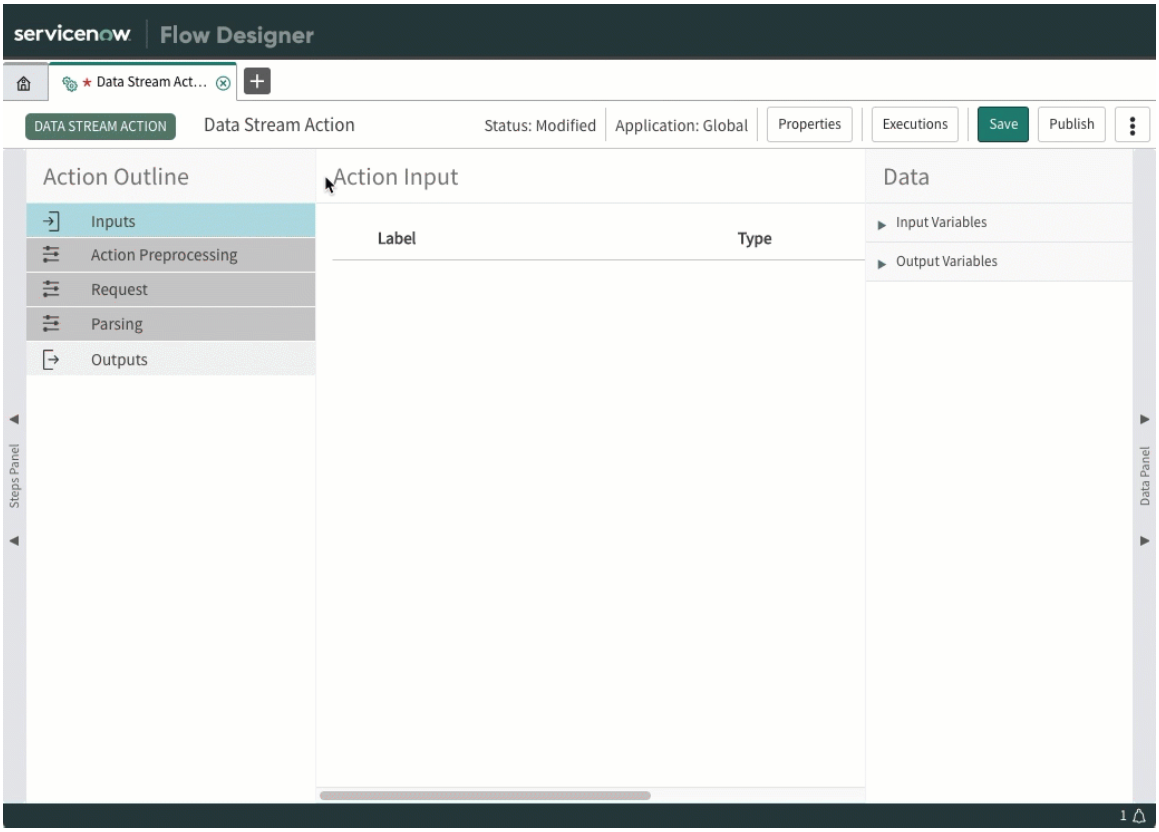
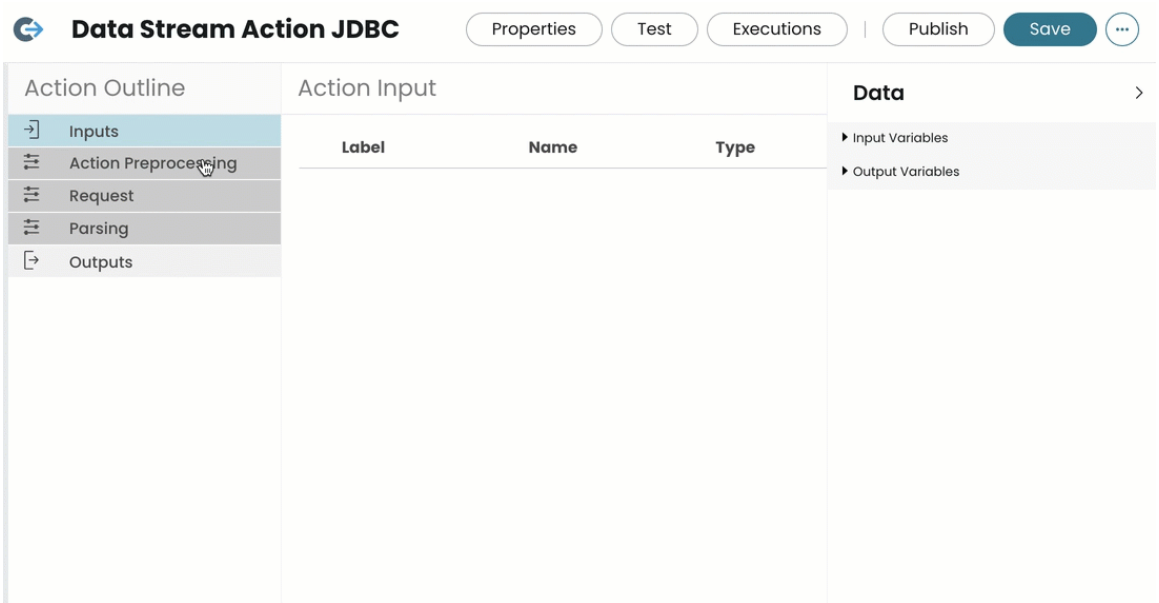
REST and SOAP Data Stream actions



JDBC Data Stream action



Note: Clearing an option in a configuration page removes the step from the Data Stream outline and deletes all data associated with the step.

Action error evaluation

Use error evaluation to catch step errors and specify the error behavior of each step you add to a data stream action. You can also create your own error conditions by specifying when an action returns an error state as well as the status codes and messages they return.

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Retry policies

Use the **Fixed Interval** retry strategy for Data Stream actions. With a fixed interval strategy, a retry attempt is made after a specified time interval. For Data Stream actions, the maximum time interval is 30 seconds. The retry strategies **Exponential Backoff** and **Honor "Retry-After" Header** aren't supported. For details on retry policies, see Retry policies.

Action Preprocessing

Use the Action Preprocessing category to retrieve connection and credential details or to run a preprocessing script.

Select **Retrieve connection info** to retrieve connection and credential details to use in your action. Selecting this option adds the Get Connection Info step as the first step in the action preprocessing. For more information, see Get Connection Info step.

Select **Enable preprocessing script** to run a preprocessing script before the action sends the initial API request. For example, validate action inputs or set default values. Selecting this option adds a script step to the Data Stream action. For more information, see Script step.

Preprocessing executes once per action, before the first API request.

This is an optional Data Stream action component that runs on either the instance or a MID Server.

Request

Use the Request category to configure how the action sends API requests. The Request section executes once per page of results. Request components provide these configuration options.

Pagination Setup step

Request results in batches. Once one page of data is processed, the Data Stream action runs the request section again to return the next set of results. Use the pagination setup step to set up pagination options required by the API. Configure the Pagination Setup step manually, or select a pre-built template to apply common configurations. For example, apply the **Limit / Offset** template to specify the number of items you want returned per page (limit), and the starting number for the first item (offset). After applying a template, update the values to ensure that the configuration complies with the API's requirements.

Note: For licensing purposes, each request counts as one transaction, including each request for the next page of results.

The value of the reserved, read-only `getNextPage` variable determines whether to request another page of results. As long as the `getNextPage` variable is true and the previous page contains data, the action continues to send requests for the next page.

Note: You must explicitly set the value to true in the script or it will default to false.

This is an optional Request component that only runs on the instance.

Note: Pagination isn't applicable to the JDBC step.

Script step

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Run a script before every request for the next page of results. Use this script for data validation and transformation when calling a paginated API. For example, generate a JSON payload for the next page request. Selecting this option adds a script step to the Data Stream action. For more information, see Script step.

This is an optional Request component that runs on either the instance or a MID Server.

REST or SOAP step

Send a REST or SOAP request to a third-party API. Select a data format to add an associated step to the Data Stream action. For more information, see REST step and SOAP step.

This is a mandatory Request component that runs on either the instance or a MID Server.

JDBC step

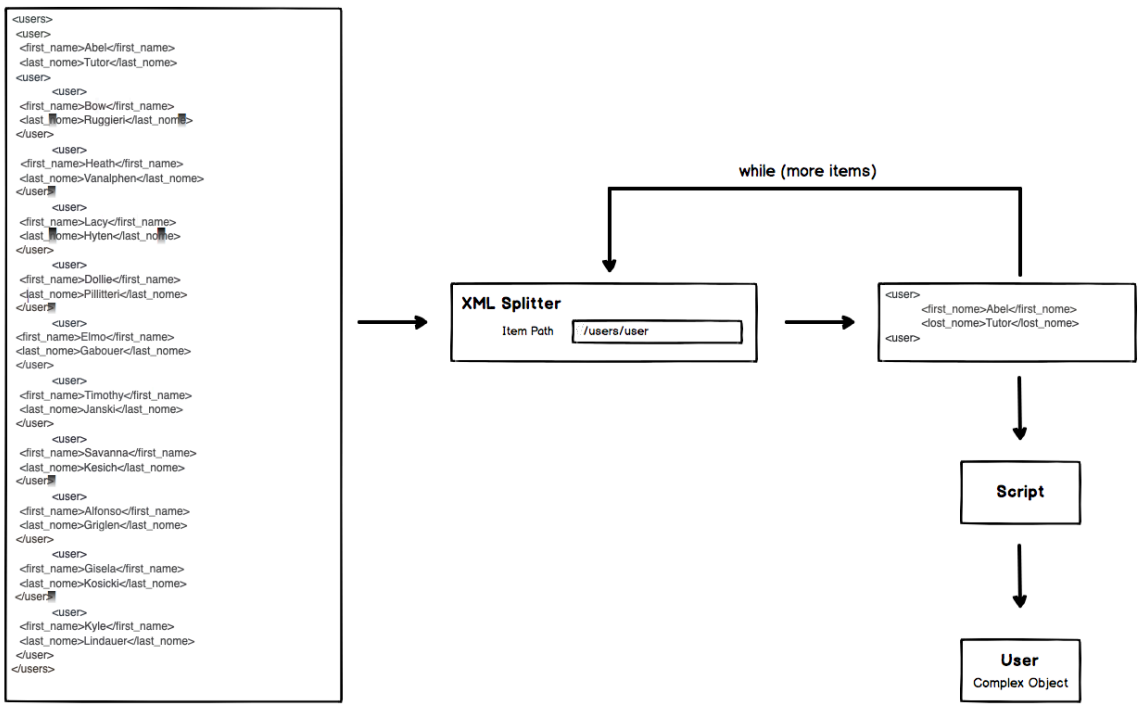
Send a JDBC request to a third-party API. Use transform script to format data and add an associated step to the Data Stream action. For more information, see JDBC step and Test JDBC step. All data is retrieved and pagination is not needed.

This is a mandatory Request component that runs on a MID Server.

Parsing in REST and SOAP steps

Use the Parsing category to configure how the action separates data stream elements into complex data objects. Use the Splitter step to identify and separate items from an XML or JSON stream, and use the Script Parser step to transform each item into a complex object. The Parsing section executes once per item in the stream. You can access outputs from previous steps in your data stream action using the `fd_data` object, excluding:

- REST or SOAP step Response Body, Stream, or Error Message outputs
- Splitter step outputs



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For more information about complex data, see Complex data. Parsing components provide these configuration options.

Splitter step

Identify the parent node in the response stream to map to a complex object. For example, identify a user element in an XML payload to create a complex object for each user in the response stream.

Select a splitter type to identify and separate repeated items in an XML or JSON data stream.

- **JSON**: Identifies objects from a stream of JSON data. Use a JSONPath expression to identify a JSON array containing repeated data.
- **XML**: Identify objects from a stream of XML data. Use an XPath expression to identify an XML element containing repeated data.

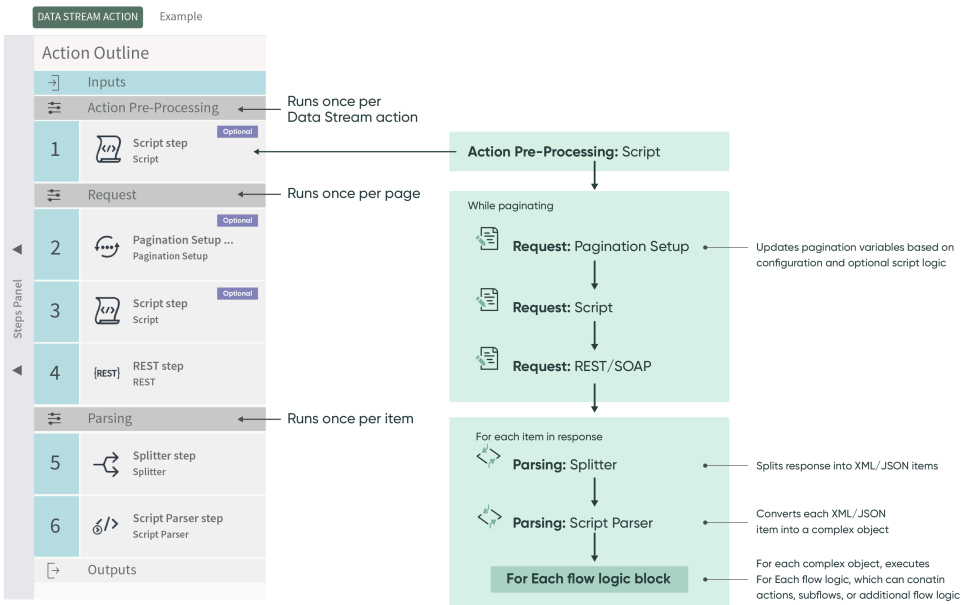
This is a mandatory Parsing component that only runs on the instance.

Script Parser step

Use JavaScript and ServiceNow APIs to map items in the response stream to a complex object output represented by the `targetObject` global object. For example, map incident record elements identified in the splitter step to a complex object containing incident fields. If the data stream includes siblings to the item identified in the splitter step that you do not want mapped to a complex object, include conditions to exclude those items. You can skip items in the stream by adding `outputs.state = 'SKIP'` wherever needed to the script section of the Script Parser step.

This is a mandatory Parsing component that only runs on the instance.

REST and SOAP Data Stream action overview



Generate the parsing phase for REST-based Data Stream actions

You can automatically configure the splitter step, script parser step, and outputs for REST-based Data Stream actions. The Test REST step functionality in REST-based Data Stream actions

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executes a request to the configured REST endpoint, analyzes the response payload, and automatically sets up the parsing and output components.

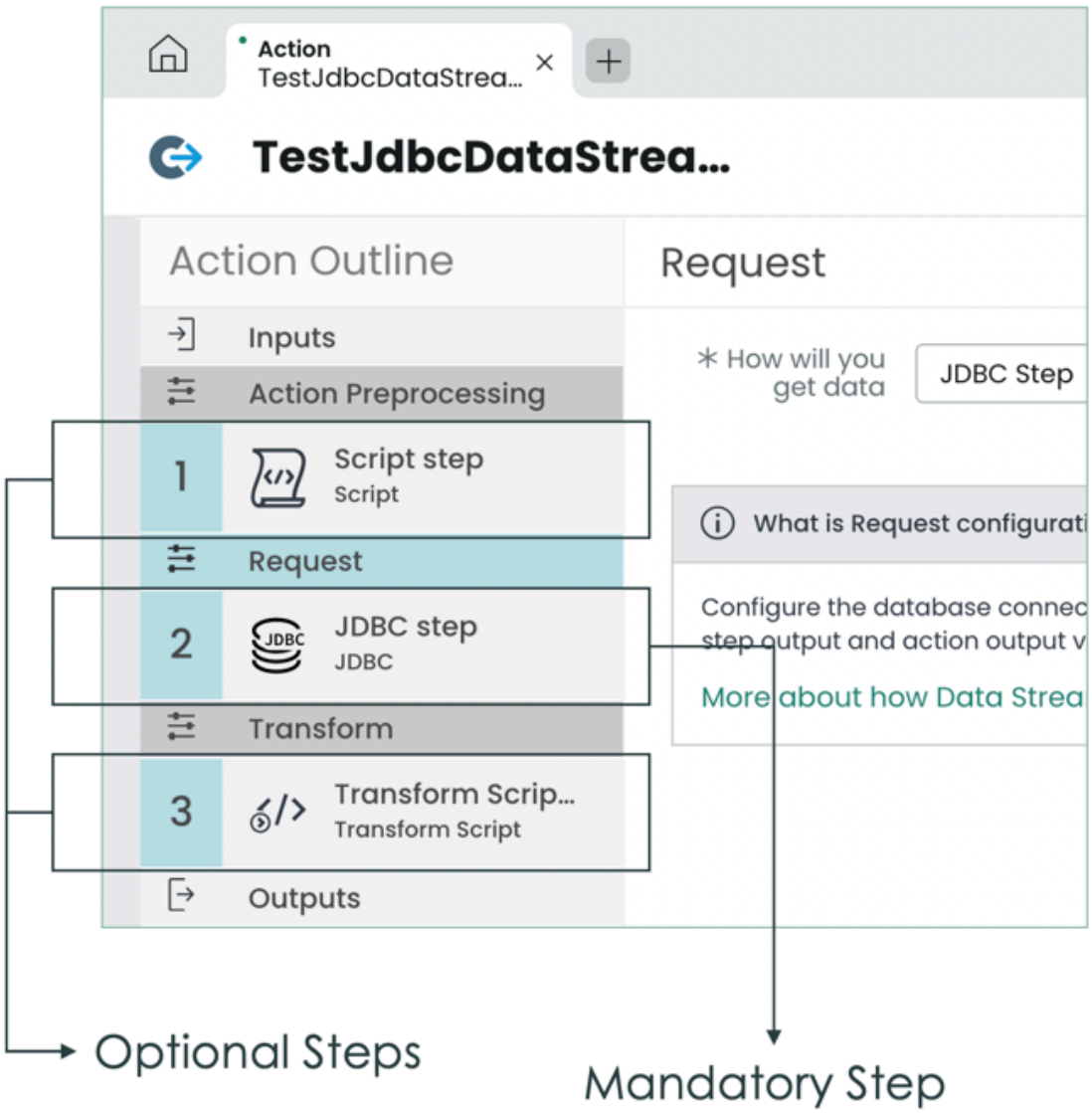
When a REST step is added to the Request section of a Data Stream action, you can use the REST step's **Test REST Step** button to auto-generate the Parsing section and Outputs. The Parsing section includes the splitter step and parser step. Auto-generating also puts complex object output in the Outputs section.

Transform script in JDBC step

JDBC data stream action doesn't require pagination. Also, splitter and parser steps aren't required.

The JDBC step generates a complex object for each of the retrieved record. Hence, action preprocessing and transform script in the JDBC data stream action are optional. When using the transform script, action designer must specify the internal name of the table columns in the transform script.

JDBC Data Stream action overview



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JDBC operations and MID Server timeouts

For JDBC operations, execute the Data Stream Action asynchronously and poll the Attachments [sys_attachment] table for results.

The MID Server processes the SQL statement, while the instance/main thread waits for context payloads to be inserted into the attachment table to query the next record.

You can adjust timeout values for JDBC operations with the following properties.

com.snc.process_flow.datastream.payload.timeout.seconds

The amount of time the instance waits for the payload to be available from the JDBC execution in the MID Server. A bounded property with a minimum value of 0 seconds and a maximum value of 7200 seconds. The default time is 600 seconds.

com.snc.process_flow.datastream.async_child.timeout.seconds

The amount of time allocated for the execution of a child plan in the MID Server.A bounded property with a minimum value of 0 seconds and a maximum value of 7200 seconds. The default time is 60 seconds.

Data Stream outputs in SOAP and REST steps

When designing a Data Stream action, you must create a single output of type Object or Dynamic Object. The Script Parser step maps items in the stream to this object using the `targetObject` global object.

At runtime, the system splits and parses the stream of response data according to the Data Stream configuration. Each item in the stream maps to the complex object structure defined by the Script Parser step and the object output, resulting in a large series of complex objects. For more information about complex data, see Complex data.

Data Stream outputs in JDBC step

The output of JDBC steps is a complex object stream. Entire data is retrieved in one request only.

Note:

- You can only retrieve data and can't update or delete records using the JDBC data stream action.
- The fields, **Maximum Row** and **Maximum Payload Size (KB)** that are available in JDBC step aren't available in the JDBC data stream action.

Execution details in REST and SOAP steps

View the configuration and runtime results for each item processed by a Data Stream action. Select a record number to see its configuration and runtime details. By default, the execution details include requests for the last 1000 items. To change the number of items in the execution details, update the *com.snc.process_flow.reporting.datastream.item.lastn* system property.

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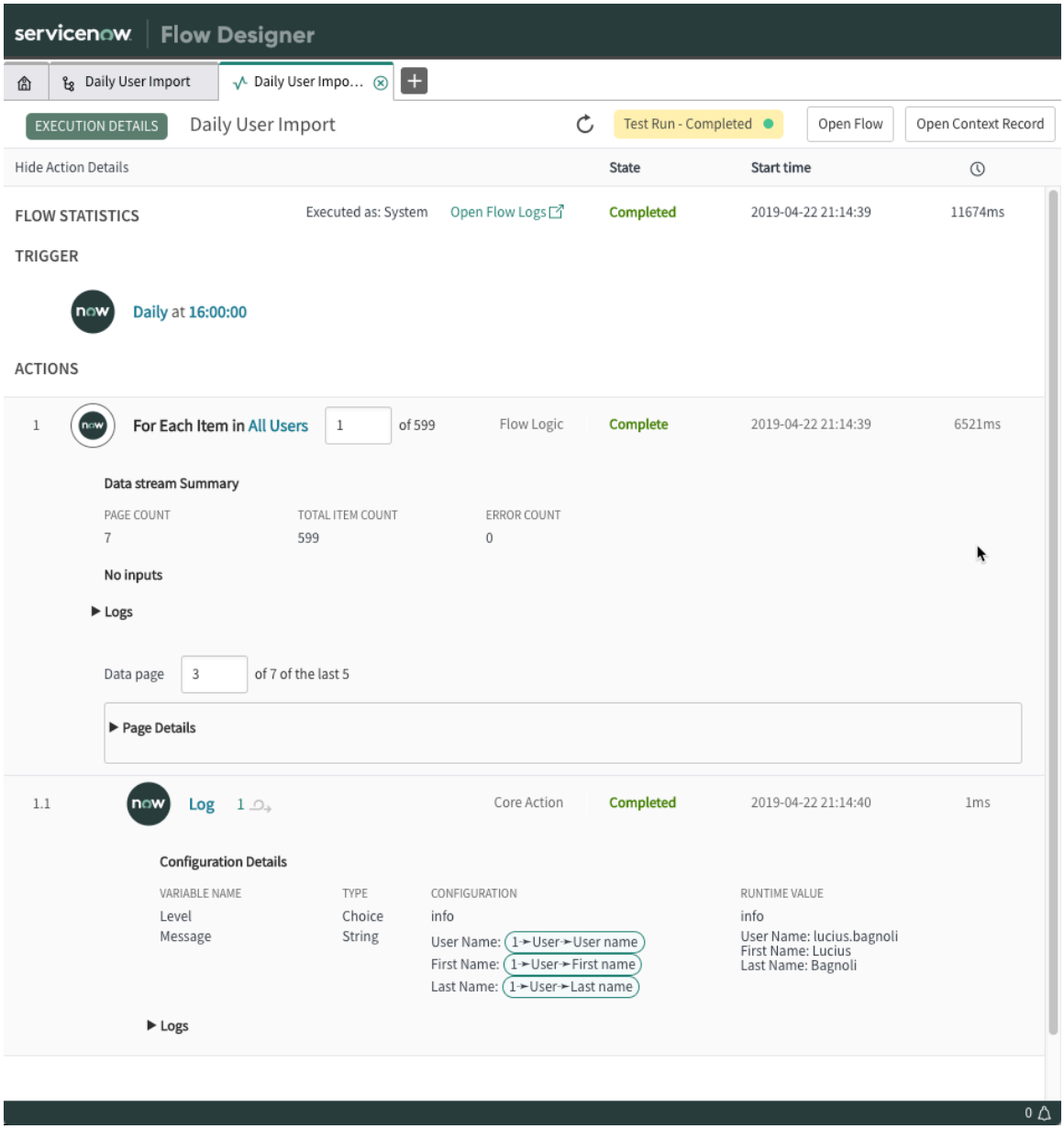

Data stream summary

View an overview of the execution that includes this information.

- **Page count**: Number of pages returned by a paginated API.
- **Total item count**: Number of items in the response stream mapped to complex object outputs.
- **Error count**: Number of errors encountered.

Page details

View runtime data for each step within the Data Stream action. Select a page to view runtime details for each request to a paginated API. By default, the execution details include requests for the last five pages. To change the number of requests in the execution details, update the *com.snc.process_flow.page.reporting.lastn* system property. Set the value to `0` to remove pages from the execution details and `-1` to include all pages.

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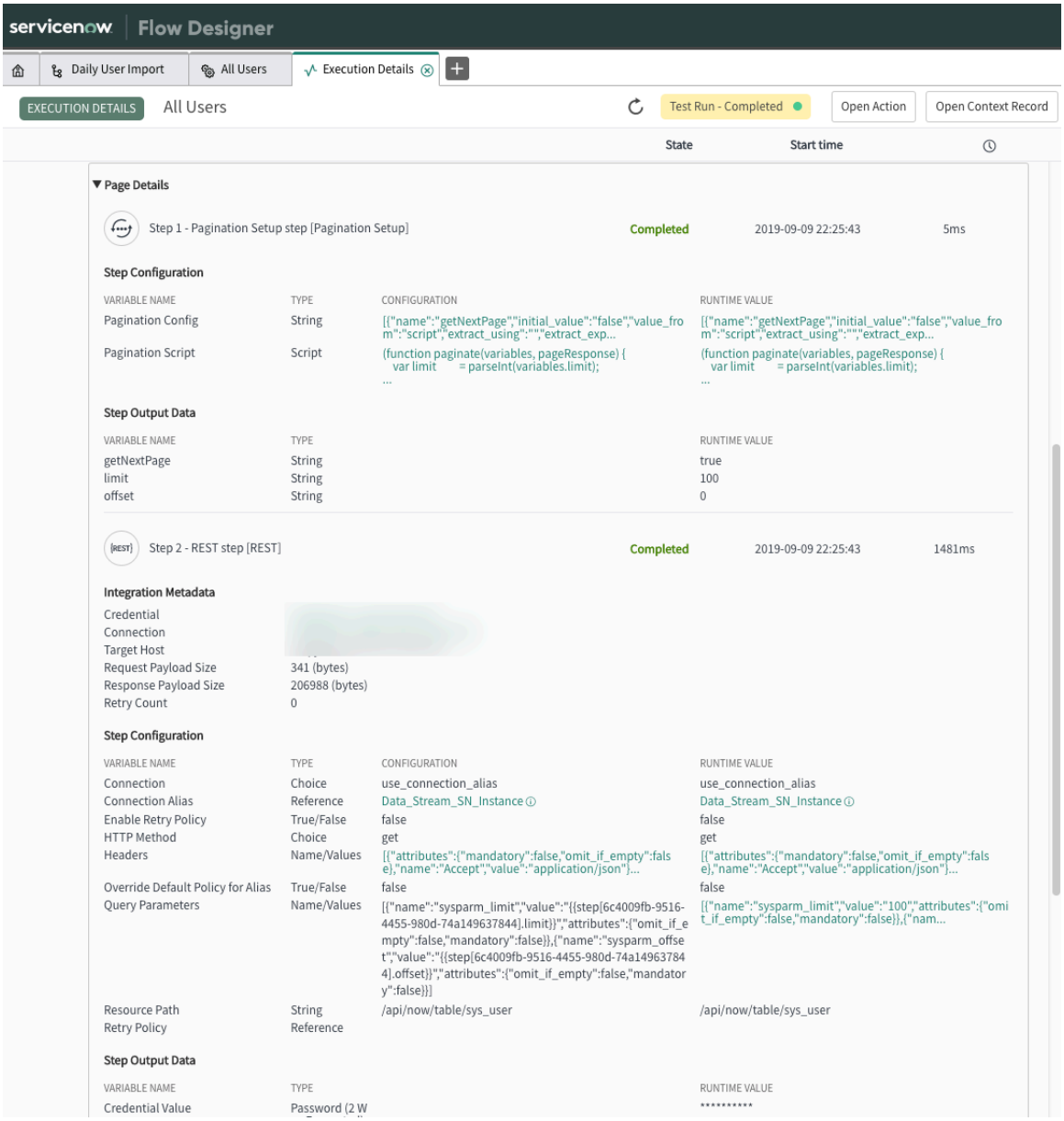
Note: Including all pages can affect performance and is not recommended.



Execution details in JDBC step

Construction of the output complex object schema isn't needed for the JDBC data stream action. You can test the query and see the query result. See Test JDBC step for more information. Configure the MID Server properties *`mid.jdbc.datastream.max.record.size`* and *`mid.jdbc.datastream.fail.when.attachement.limit.exceeded`* to retrieve data as per your requirement. See MID Server properties for more information.

Data Stream action design considerations

Follow these considerations when creating a Data Stream action and when adding a Data Stream action to a flow to prevent errors and performance issues.

Considerations when creating a Data Stream action

Create Data Stream actions with these considerations in mind.

Write pagination logic according to third-party requirements

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Evaluate and understand the format required by your third-party endpoint. For example, you may need to write a script that sets the built-in `getNextPage` variable to true as long as there is a `nextPage` token in the response. If the response does not contain the token, then set the variable to false. Access variables in script using bracket or dot notation. For example, `variables['getNextPage']`. This variable only accepts the Boolean data type. The default value is false.

Ensure that preprocessing scripts do not call a MID Server or pause the action.

Data Stream actions require a constant connection to the response stream. They do not support preprocessing scripts that pause the action to call a MID Server or pause the action to wait for a condition or duration. A preprocessing script that pauses the action for any reason returns an error message.

Convert pagination variable data types to perform math operations

Pagination variables only support the string data type. To perform math operations, you must convert the value to an integer, perform any required operations, then convert it back to a string.

```
variables['offset'] = (parseInt(variables['offset']) +
 parseInt(variables['limit'])).toString();
```

Ensure that the pagination script has an end condition

Avoid infinite loops in pagination requests by creating a condition that sets the `getNextPage` variable to false. Cancel any long-running flows. Always test Data Stream actions before using them in production.

Clear configuration page options carefully

Clearing an option in a configuration page removes the step from the Data Stream outline and deletes all data associated with the step.

Consider the size of each page returned

When configuring pagination options, try to ensure that the size of each page returned is under one GB. This ensures that flow designers who use the action won't encounter size limit issues when retrieving data from a MID Server. If the action returns more than one GB of data per page, the flow designer may need to increase the attachment size limit. For more information, see MID Server support for Data Stream actions.

Note:

- Nesting Data Stream actions is not supported.
- When using the retry policy, ensure that you are aware of these considerations:
  - Only a fixed time interval strategy is honoured for the data stream actions.
  - The total delay (count multiplied by the interval) can't exceed 30 seconds. For example, if you want retry for a maximum of 3 times, the maximum delay for each retry is 10 seconds.
  - Data stream step doesn’t go into the waiting state during retry.

Considerations when adding a Data Stream action to a flow

Add a Data Stream action to a flow with these considerations in mind.

Do not add actions with wait conditions to a Data Stream For Each logic block

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You cannot add an action that pauses the flow to a Data Stream For Each flow logic block. Data Stream actions require a constant connection to the response stream. For example, you cannot use the Ask for Approval or Wait for Condition actions within Data Stream For Each flow logic.

Some actions and steps always pause a flow and cannot be added to Data Stream For Each flow logic blocks. However, some actions and steps may pause the flow depending on how they are configured. Check the action configuration to ensure it does not pause the flow at runtime.

Always pauses the flow (unsupported with Data Stream actions)	Ask for Approval action
	Ask for Approval step
	Wait for Condition action
	Wait for Condition step
May pause the flow depending on configuration	Create Catalog Task action
	Create Task action
	Create Task step

Do not add actions that run on the MID Server to a Data Stream For Each logic block

Some actions and steps always run on a MID Server and cannot be added to Data Stream For Each flow logic blocks. However, some actions and steps may run on a MID Server depending on how they are configured. Check the action configuration to ensure it does not run on the MID Server at runtime.

Always runs on a MID Server (unsupported with Data Stream actions)	JDBC step
	PowerShell step
	SSH step
May run on a MID Server depending on configuration	REST step
	Script step
	SOAP step

Turn off reporting when consuming a large number of records in the For Each logic block

Iterating over a large number of records can be resource intensive, especially when the For Each logic block includes complex actions for each iteration. To avoid performance issues, turn off reporting using the `com.snc.process_flow.reporting.level` system property. For more information, see Workflow Studio flow system properties.

MID Server support for Data Stream actions

Get data through a ServiceNow® MID Server when running a Data Stream action.

When selected, the MID Server retrieves the data and sends each page to the instance as an attachment to process.

Important: When running the Data Stream action within flow, the actions in the **For Each** block always run on the instance.

These steps can run on either the MID Server or the instance:

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- Action Preprocessing Script
- Request Script step
- REST or SOAP step

Note: Avoid shifting the execution environment between the instance and the MID Server multiple times. For example, you might configure the Request Script step to run on the MID Server, but the REST step to run on the instance. In this case, the system shifts environments between the instance and MID Server for every page of data, which may degrade performance.

To learn more about running a step on a MID Server, see Integration steps.

Size limits

If your system encounters a timeout or size limit issue, try making one of these adjustments:

Increase the REST transaction quota rule

If the connection between the instance and the MID Server slows down, you may encounter a timeout while waiting for a response from the REST step. Increase the default timeout by updating the *REST Attachment API request timeout* transaction quota rule.

- Default: 60 seconds
- Maximum: 300 seconds

Increase the instance timeout

By default, the instance waits for 600 seconds to retrieve a single page of data from a MID Server. If you encounter a timeout when running a Data Stream action through a MID Server, change this default by increasing the *datastream_alternative_env_fetch_page_timeout_seconds* system property.

- Default: 600 seconds
- Maximum: 7200 seconds

Increase attachment size

The MID Server sends each page of data to the instance as an attachment. If a page of data is large, it may exceed the allowed attachment size. Increase the allowed size by updating the *com.glide.attachment.max_size* system property.

- Default: 1024 MB
- Maximum: None

JDBC operations and MID Server timeouts

For JDBC operations, execute the Data Stream Action asynchronously and poll the Attachments [sys_attachment] table for results.

The MID Server processes the SQL statement, while the instance/main thread waits for context payloads to be inserted into the attachment table to query the next record.

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You can adjust timeout values for JDBC operations with the following properties.

com.snc.process_flow.datastream.payload.timeout.seconds

The amount of time the instance waits for the payload to be available from the JDBC execution in the MID Server. A bounded property with a minimum value of 0 seconds and a maximum value of 7200 seconds. The default time is 600 seconds.

com.snc.process_flow.datastream.async_child.timeout.seconds

The amount of time allocated for the execution of a child plan in the MID Server.A bounded property with a minimum value of 0 seconds and a maximum value of 7200 seconds. The default time is 60 seconds.

Create a Data Stream action

Create a reusable action to process a stream of response data within a flow.

Before you begin

- Set up an application in Guided Application Creator to store Workflow Studio content.
- Disable any conflicting business rules or workflows before creating an action.
- Role required: action_designer or admin

About this task

Creating a custom application to contain your Workflow Studio content enables you to deploy it using the application repository or the ServiceNow Store.

Note: Clearing an option in a configuration page removes the step from the Data Stream outline and deletes all data associated with the step.

Procedure

1. Navigate to **All** > **Flow Designer** > **Designer**.
2. Click the **Actions** tab and select **Data Stream**.
3. Fill in the Action Properties and click **Submit**.

Field	Description
Action name	Enter a unique name for your data stream action.
Description	Description of the data stream action.
Application	Application scope of the data stream action.
Domain	Domain scope of the data stream action. For more information about domain separation, see Domain separation explained.
Additional properties	
Accessible From	Accessible from all application scoped or only within the specified application scope.
Category	Defined category within the application scope for an action. Beginning with the Xanadu release, you can create a custom category to organize your data stream actions.
Protection	Select whether the data stream action is read-only. You can only select a value when you create the data stream action in an application scope you own. The default value is None.

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Field	Description
Action annotation	Help text that appears under the data stream action title in Workflow Studio to help data stream action authors understand what the data stream action does when used in a flow.

An empty Data Stream action opens.

4. Define action inputs to make data available to the action steps.

   a. Select **+ Create Input** and complete the fields.
   Inputs are represented as data pills in the right-hand pane.

   For more information about action inputs, see Workflow Studio - Building custom actions.

5. Click **Action Preprocessing** in the Data Stream outline and configure the desired options.

   a. Select **Retrieve connection info** to add the Get Connection Info step as the first step in the action preprocessing.
   The Get Connection Info step enables you to retrieve connection and credential details to use in your action. For more information, see Get Connection Info step.

   b. Select **Enable preprocessing script** to run a preprocessing script before the action sends the initial API request. For example, validate action inputs or set default values. Preprocessing executes once per action, before the first API request.

   Selecting this option adds a script step to the Data Stream action. For more information, see Script step.

   Important: Data Stream actions require a constant connection to the response stream. They do not support preprocessing scripts that pause the action to call a MID Server or pause the action to wait for a condition or duration. A preprocessing script that pauses the action for any reason returns an error message.

6. Click **Request** in the Data Stream outline and configure the desired options.

   a. In the **How will you get data** field, select **REST Step**, **SOAP Step**, or **JDBC Step** to add the associated step to the Data Stream action.

   For more information, see REST step, SOAP step, and JDBC step .

   This section can run on either the MID Server or the instance. The environment is determined by the **Use MID server** field in the associated Connection [sys_connection] record.

   Note:

   - If you are using the JDBC step, you must test it. Upon successful execution, you can use the result to create the step output and data stream action output.
   - If you are using the REST step or SOAP step, you must manually create the data stream action output.

   b. Select **Enable pagination** to request results in batches. Once one page of data is processed, the Data Stream action runs the request section again to return the next set of results. This option adds a Pagination Setup step to the Data Stream outline.

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Note: For a JDBC step, pagination is not applicable. Each page can retrieve up to 1 GB data and one request can retrieve up to 8 GB data.

c. Select **Run a script before each request** to run a script before every request for the next page when calling a paginated API.

Example
For example, write a script to transform variable data types from the initial response before sending a request for the next page.

Selecting this option adds a script step to the Data Stream action. For more information, see Script step.

Note: For a JDBC step, this is not applicable.

This section can run on either the MID Server or the instance. The environment is determined by the script step's **Required Runtime** field.

Important: Avoid shifting the execution environment between the instance and the MID Server multiple times. For example, you might configure the Request Script step to run on the MID Server, but the REST step to run on the instance. In this case, the system shifts environments between the instance and MID Server for every page of data, which may degrade performance.

7. **Optional:** If pagination is enabled, configure the Pagination Setup step.
Configure the Pagination Setup step manually, or select a pre-built template to apply common configurations. For example, apply the **Limit / Offset** template to specify the number of items you want returned per page (limit), and the starting number for the first item (offset). After applying a template, update the values to ensure that the configuration complies with the API's requirements.

a. Create pagination variables.
For example, if the third-party API takes a `limit` parameter in the request, create the `limit` variable and set the initial value to limit the number of results per page. The initial value is only used in the first request. `getNextPage` is a reserved, read-only variable. As long as the `getNextPage` variable is true and the previous page contains data, the action continues to send requests for the next page.

b. In the **Next Value From** field, define how pagination variables receive a value for subsequent requests.

(Optional) Choose from:

- **Script**: Write a Pagination Variables Script to define how variables are populated. Pagination variables only support the string data type. To perform math operations, you must convert the value to an integer, perform any required operations, then convert it back to a string.
- **Response Body**: Use a value in the response from the previous request to populate the variable. If the response is JSON format, set **Extract value using** to **JSONPath Expression** and provide the path to the value in the **Expression** field. If the response is XML format, set **Extract value using** to **XPath Expression** and provide the path to the value.

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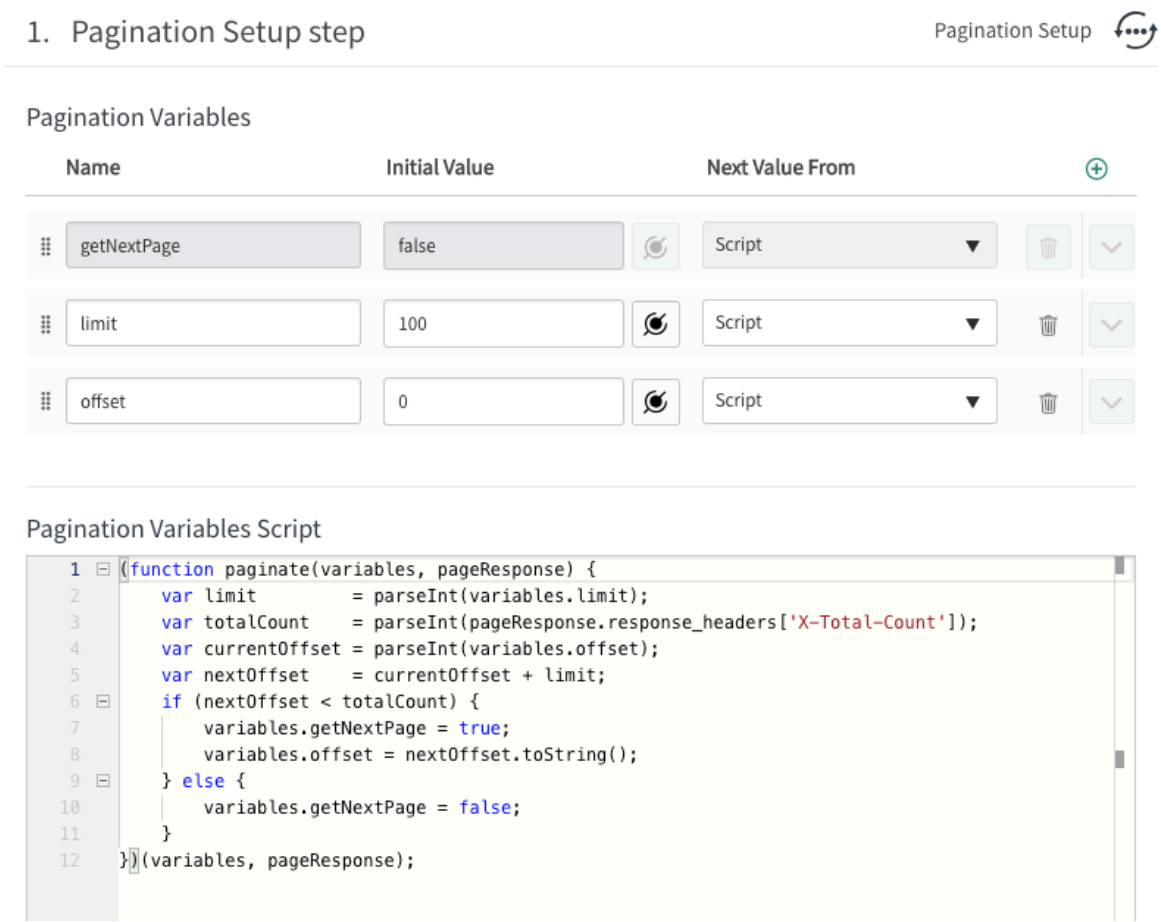
Example
In this example, the `getNextPage` variable is true until the `nextOffset` variable reaches the total count value returned in the API response header. As long as the `getNextPage` variable is true and the previous page contains data, the action continues to send requests for the next page. This example includes a common limit/offset pagination configuration. The third-party APIs that your Data Stream action interacts with may use a page token or other method.



Important: Avoid infinite loops in pagination requests by creating a condition that sets the `getNextPage` variable to false. Cancel any long-running flows. Always test Data Stream actions before using them in production.

8. Click **Parsing** in the Data Stream outline and configure the desired options.

   Note: For a JDBC step, this is not applicable.

   a. In the **How will you identify each record** field, select **JSON/XML Splitter** to add a Splitter step to the Data Stream outline.

   b. In the **How will you parse each item into an object** field, select **Script Parser** to add a Script Parser step to the Data Stream outline.

9. Configure the Splitter step.

   This step identifies the parent node in the response stream to map to a complex object. For example, identify a user element in an XML payload to create a complex object for each user in the response stream.

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Note: For a JDBC step, this is not applicable.

a. In the **Source Format** field, select the format returned by the Request section.

- **JSON**: Identifies objects from a stream of JSON data. Use a JSONPath expression to identify a JSON array containing repeated data.
- **XML**: Identify objects from a stream of XML data. Use an XPath expression to identify an XML element containing repeated data.

b. In the **Item Path** field, define the absolute path to the item in the data stream you want to map to an object.

JSON

Identify the absolute path to an array of objects as a JSONPath expression. For example, use `$.result` to separate each item in a JSON `result` array into a `result` object.

Note: If you select an array at the root node of a JSON data stream, the system displays the absolute path as `$.*` in execution details and error messages.

XML

Identify the absolute path to a repeating data object as a XPath expression. For example, use `/result` to separate each instance of a `result` XML element into a `result` object.

Note: The Splitter step ignores XML namespaces.

Example

For example, suppose the REST Step returns a stream of JSON data. The item path `$.response.result.companies` returns each item in the `companies` array.

```
{
  "response": {
    "result": {
      "companies": [
        {
          "name": "company1"
        },
        {
          "name": "company2"
        },
        {
          "name": "company3"
        }
      ],
      "metadata": {
        "token": 1558666526
      }
    }
  }
}
```

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Example
For example, suppose the REST Step returns a stream of XML data. The item path `/response/result/companies/company` returns each `company` element from the XML data.

```
<response>
  <result>
    <companies>
      <company>
        <!-- company 1 info -->
      </company>
      <company>
        <!-- company 2 info -->
      </company>
      <company>
        <!-- company 3 info -->
      </company>
      <company>
        <!-- company 4 info -->
      </company>
      <batch>10645C53D4BED73YQ</batch>
    </companies>
    <metadata>
      <timestamp>1558666526</timestamp>
    </metadata>
  </result>
</response>
```

10. In the Script Parser step, use JavaScript and ServiceNow APIs to map items in the response stream to a complex object output represented by the `targetObject` global object.

    For example, map incident record elements identified in the splitter step to a complex object containing incident fields. If the data stream includes siblings to the item identified in the splitter step that you do not want mapped to a complex object, include conditions to exclude those items.

    Note: For a JDBC step, this is not applicable.

    You can access outputs from previous steps in your data stream action using the *`fd_data`* object, excluding:

    - REST or SOAP step Response Body, Stream, or Error Message outputs.
    - Splitter step outputs.

    Example
    An example script that parses a JSON response.

```
(function parse(inputs, outputs) {
    var record = JSON.parse(inputs.sourceItem);
    outputs.targetObject.id=record.number;
    outputs.targetObject.name=record.short_description;
})(inputs, outputs)
```

    Example
    An example script that parses an XML response.

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```
(function parse(inputs, outputs) {
    var xmlDoc = new XMLDocument(inputs.sourceItem, false);
    outputs.targetObject.id =
 xmlDoc.getNodeText("/result/number");
    outputs.targetObject.name =
 xmlDoc.getNodeText("/result/short_description");
})(inputs, outputs)
```

11. **Optional:** If you selected the JDBC step, click **Transform**.
    After successfully testing the JDBC step, click **Use Result** to create the step output and data stream action output. You can use this result or customize it using the transform script.
    a. Select the **Enable Transform Script** check box to transform and customize the default data stream output.
12. Create a complex object output.

    Note: For a JDBC step, this is not applicable.

    a. Select **Outputs** in the Action Outline and click **+** to create an output.

    b. Update the **Label** field to represent the object.

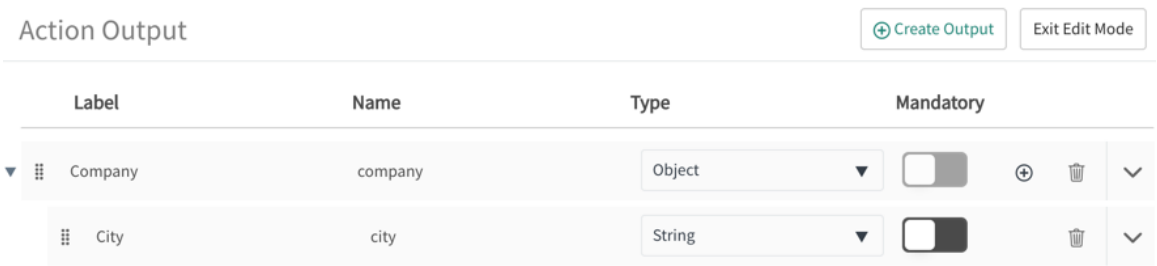
    Example
    For example, if the action parses a stream of company records, add the **Company** label.

    c. Update the **Type** field to **Object**.
    This is the complex object output represented by the `targetObject` global object in the Script Parser step.

    d. Add child fields to the complex object using the **+** icon.

    e. Make the name of each child field more user-friendly so that you can meaningfully refer to it in script.

    The value in the **Name** field is the internal name used in the Script Parser step.
    For example, to refer to the City output in the Script Parser step, you would use `outputs.targetObject.city`.



Warning: After saving the Data Stream action, you cannot change values in the **Name** field.

13. Click **Save**.
    Workflow Studio saves a draft of the action.

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What to do next
Test a Data Stream action.

Generate the Parsing phase for REST-based Data Stream actions

Automatically configure the splitter step, script parser step, and outputs for REST-based Data Stream actions. The Test REST step functionality in REST-based Data Stream actions executes a request to the configured REST endpoint, analyzes the response payload, and automatically sets up the parsing and output components.

Before you begin
Role required: action_designer or admin

About this task
When a REST step is added to the Request section of a Data Stream action, you can use the REST step's **Test REST Step** button to auto-generate the Parsing section and Outputs. The Parsing section includes the splitter step and parser step. Auto-generating also puts complex object output in the Outputs section. To learn more about the parts of a Data Stream action, see Data Stream actions and pagination.

Note: Auto-generating the Parsing phase only applies to REST steps within a Data Stream action. It doesn't apply to other types of steps, such as SOAP or JDBC steps. For REST steps outside of a Data Stream action, the **Run Test** button tests the step.

To auto-generate the Parsing section requires the following.

- The response body must be valid JSON. You can't auto-generate if the response is not JSON, if the JSON is empty or invalid.
- The response body must not contain any errors. The response status code can't be 400-599.
- The object in the response body must contain an array of objects. A valid array of objects is required to parse the data and set the parsing and output components.

The following procedure starts in the REST step of a Data Stream action. For step-by-step instructions on creating a Data Stream action, see Create a Data Stream action.

Procedure

1. Navigate to the REST step in your Data Stream action and fill out the fields.
   For field descriptions, see REST step.
2. Select the **Test REST step** button.
3. In the Test REST Step box, select **Run Test**.
4. In the REST Step box, review the results of the test.
5. If the results are what you expect, select **Continue**.
   - If the Parsing phase can't be generated because of an issue, such as invalid JSON, there will be an error message in the Test REST Step box. Select **Cancel**, address the issue, and try again.
   - If there are no issues, and there aren't already configurations for the splitter step, parser step, or Outputs, the Parsing phase and Outputs are automatically generated.
   - If there are no issues, and there are already configurations for the splitter step, parser step, or Outputs, the Choose which overrides to apply window opens. You can choose to override the splitter step, parser step, Outputs, or a combination of the three. You must select at least one check box to continue. After making your selection(s), select **Create Steps**. The selected sections will be regenerated.

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Result
The splitter step, parser step, and outputs are automatically generated. All three can be edited if needed.

Test a Data Stream action

Test your Data Stream action to ensure that it works the way you expect before you add it to a flow.

Before you begin
- Create a Data Stream action
- Role required: action_designer or admin

About this task
Testing a Data Stream action returns the first 20 items by default. To change this value, add the *com.glide.hub.action_type.datastream.test_max_iterations* system property with a value between one and 50.

Procedure
1. Open the Data Stream action you want to test.
   a. Navigate to **Flow Designer** > **Designer**.
   b. Select the Actions tab.
   c. Select the row for the Data Stream action you want to test.
2. Select **Test**.
   The system displays the Test Action dialog. The contents of the Test Action dialog depend on the Data Stream action inputs.
3. In the Test Action dialog, provide values for any action inputs and select **Run Test**.
4. Open the Execution Details to ensure that the action executed as expected.
   The Execution Details **Runtime Value** returns the first 20 items returned by the Data Stream action.

What to do next
Use a Data Stream action in a flow.

Use a Data Stream action in a flow

Data Stream actions use the **For each** flow logic option to process stream data in a flow. For example, suppose that you want to use a Data Stream action that imports document data from a third-party site. When added to a flow, the action appears as a **For each** flow logic block, enabling flow designers to easily create a record in ServiceNow for each object in the data stream.

Before you begin
Data Stream actions require an Integration Hub subscription. For more information, see Legal schedules - Integration Hub overview.

Role required: flow_designer or admin.

Procedure
1. Open the flow you want to add the Data Stream action to.
2. Add the Data Stream action to the flow.
   The action appears as a **For Each** flow logic block.

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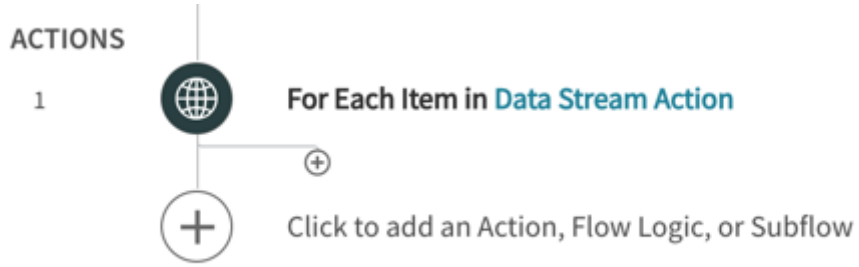

3. Add a child action within the **For Each** flow logic block.

   This action runs on each object within the data stream.

   Note: You cannot add an action that pauses the flow to a Data Stream For Each flow logic block. Data Stream actions require a constant connection to the response stream. For example, you cannot use the Ask for Approval or Wait for Condition actions within Data Stream For Each flow logic. For more information, see Data Stream action design considerations.



4. Click **Save**.
   Workflow Studio saves a draft of the flow, trigger, and actions.

What to do next

Test the flow until it is ready to be activated.

Note: The system only triggers active flows.

Conditional and event-driven inbound integration

Integration Hub enables both conditional and event-driven inbound integration with third-party applications.

Set up an inbound integration with a third-party application by setting up flows and endpoints that external webhooks in the third-party application use. Set up a conditional and event-driven flow by selecting an external trigger from the new trigger picker and then setting the actions from the action picker on Workflow Studio. After that, set up endpoints that configure the external webhook from the third-party application. You perform all of these actions on your ServiceNow instance.

For example, you're setting an inbound integration between your ServiceNow instance and a third-party issue-tracking application. When you update a P1 priority issue on the issue-tracking application, an incident database record on the ServiceNow instance should be updated.

To set the integration, configure a flow by selecting an external trigger from the new trigger picker, set the priority as P1, and then setting the actions from the action picker on the Workflow Studio accordingly. The flow accepts the payload from the issue-tracking application and updates the

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incident table. Then, you generate an endpoint on a base system external event source on your ServiceNow instance from the Application tile in the Inbound Connections tab and provide the same endpoint in the external webhook of the issue-tracking application. Now, when you update a P1 issue on the issue-tracking application, its external webhook activates and acts as a trigger for the flow you had set on your ServiceNow instance. Before that, the ServiceNow instance authenticates the webhook based on the type of authentication the issue-tracking application supports. After successful authentication, the webhook triggers the flow and the flow executes.

Set up a flow with external trigger definition

Set up a flow that responds to an event-driven external trigger from a third-party system and executes.

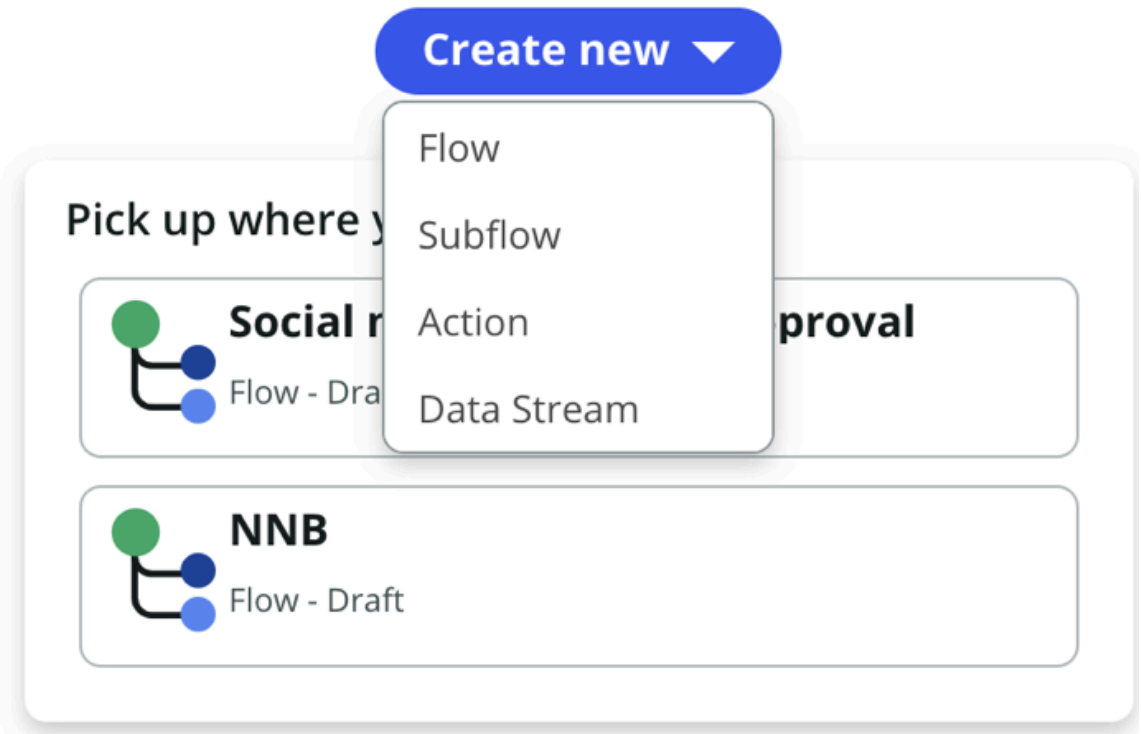
Before you begin

Role required: flow_designer

Subscription required: Integration Hub Enterprise pack

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select **Create New** > **Flow**.



3. Fill out the **Flow properties** form.

Field	Description
Name	Name to uniquely identify your flow. The system creates the internal name of the flow from this name.
Description	Description of your flow.
Application	Application scope to create your flow in. Global is the default.
Protection	Specify if the flow is read-only.

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Field	Description
	Note: This is an optional field with two values: None and Read-only. Choose read-only if the flow is within an application scope that you own.
Run as	Option to specify the user that runs the flow. You can select the system user or the user who initiates the session. Select the user who initiates the session option when updates should come from the user who triggered the flow. For example, use this option when you want the incident record comments to come from the user who started the flow. Settings for the Run as option in a flow don't apply to child subflows. **Note:** By default, flows run as the user who initiates the session. To create a flow that can run with a personal OAuth token, select the user who initiates the session option. If the user who is running the flow has a personal OAuth token, the flow runs with that token. For more information about creating a personal OAuth token, see OAuth 2.0 credentials. When flows run as the user who initiates the session, the system limits flow actions by user Access Control Rule (ACL) restrictions. Ensure that security restrictions don't prevent users who trigger the flow from performing flow actions. Flows run by the initiating user also respect user-specific settings such as date/time formats. **Note:** Inbound email flows ignore this setting and always run as the user who initiates the session. To test access controls for an inbound email flow, impersonate a typical inbound email user and manually trigger the flow.
Run with roles	Roles that the flow runs with. This option is only available when **Run as** is set to **user who initiates the session**.

4. Select **Submit**.

   Note: If this is your first time in Workflow Studio, a welcome screen appears. You can choose to either take the welcome tour or skip the tour.

5. Add a trigger to your flow.

   a. Under the TRIGGER section, select **Add a trigger**.

   b. Under the INSTALLED SPOKES heading, select a spoke from the Trigger list.

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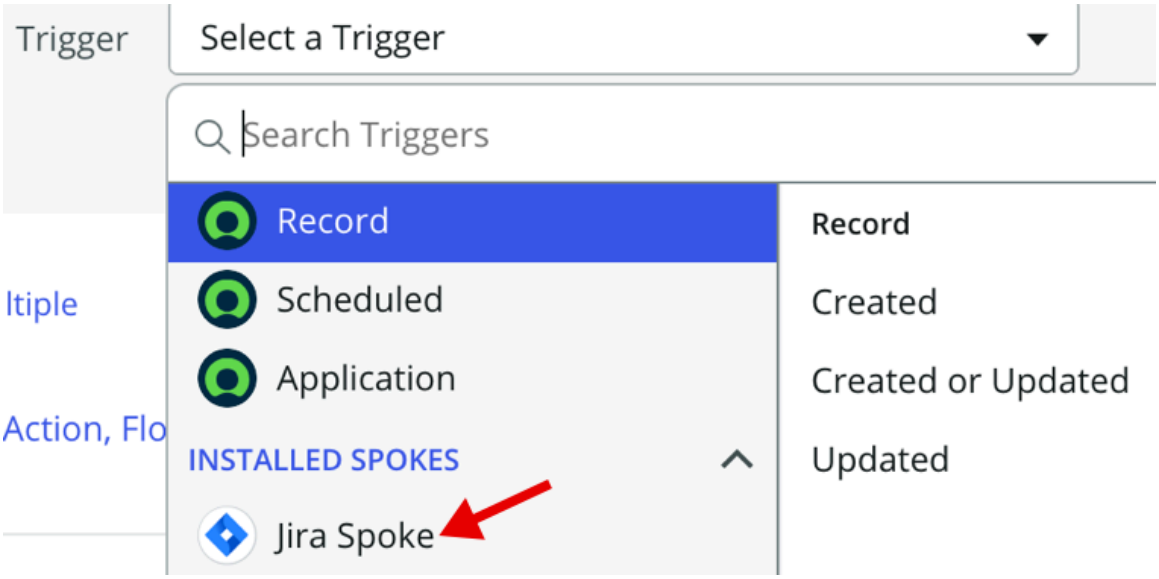
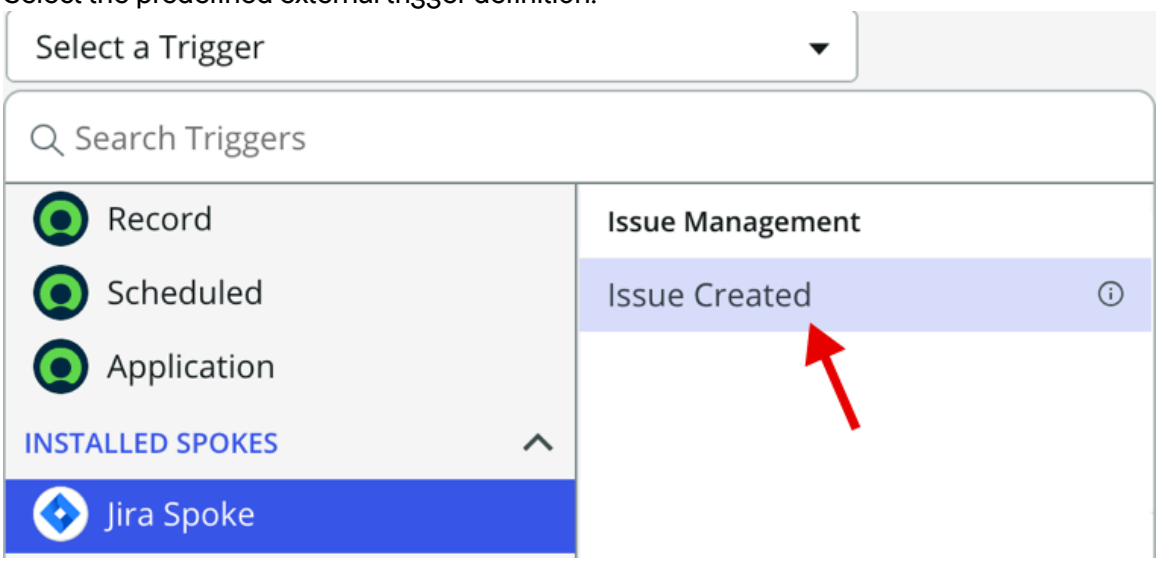
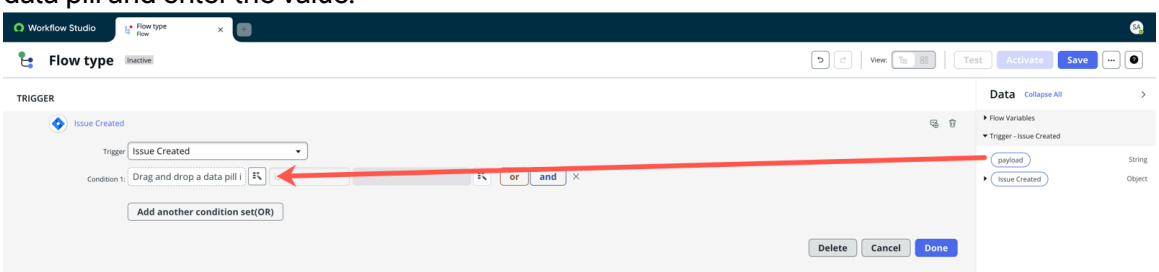


c. Select the predefined external trigger definition.



d. To define the conditions for the flow to execute, in the Condition 1 field, drag the appropriate data pill and enter the value.



e. Optional: To define an extra condition, select **OR** or **AND**.
A condition field is added.

f. Optional: In the condition field, drag the appropriate data pill and enter the value.

g. Select **Done**.
You've set up the trigger.

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6. Set up the actions from the Action Picker.

   a. Under ACTIONS, select ⊕.

   b. Select **Action**.

   c. Under INSTALLED SPOKES, select the spoke and then select the action.
   You can also select an action from the Core Actions.

   d. Provide the details for the action.

   e. Select **Done**.

   You've set up the flow.

Set up external trigger endpoints

Generate an endpoint that the external webhook in the third-party application uses to connect to your ServiceNow instance. You can deactivate or remove the configuration of the endpoint from the connection when you want the endpoint to no longer listen to the external webhook.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: This feature requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Ensure that you've installed the required spoke plugin.

About this task

The connections that enable you to set up endpoints become available as base system contents on your ServiceNow instance when you install the spoke plugin from the ServiceNow store. After that, you can generate endpoints with basic authentication, token, or hash authentication mechanisms based on the type of authentication the third-party application supports. When the webhook attempts to connect with your ServiceNow instance, it's first authenticated with the authentication method set up in the endpoint connection.

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select **Connections**.
3. In the Search all connections field, enter the name of the spoke.

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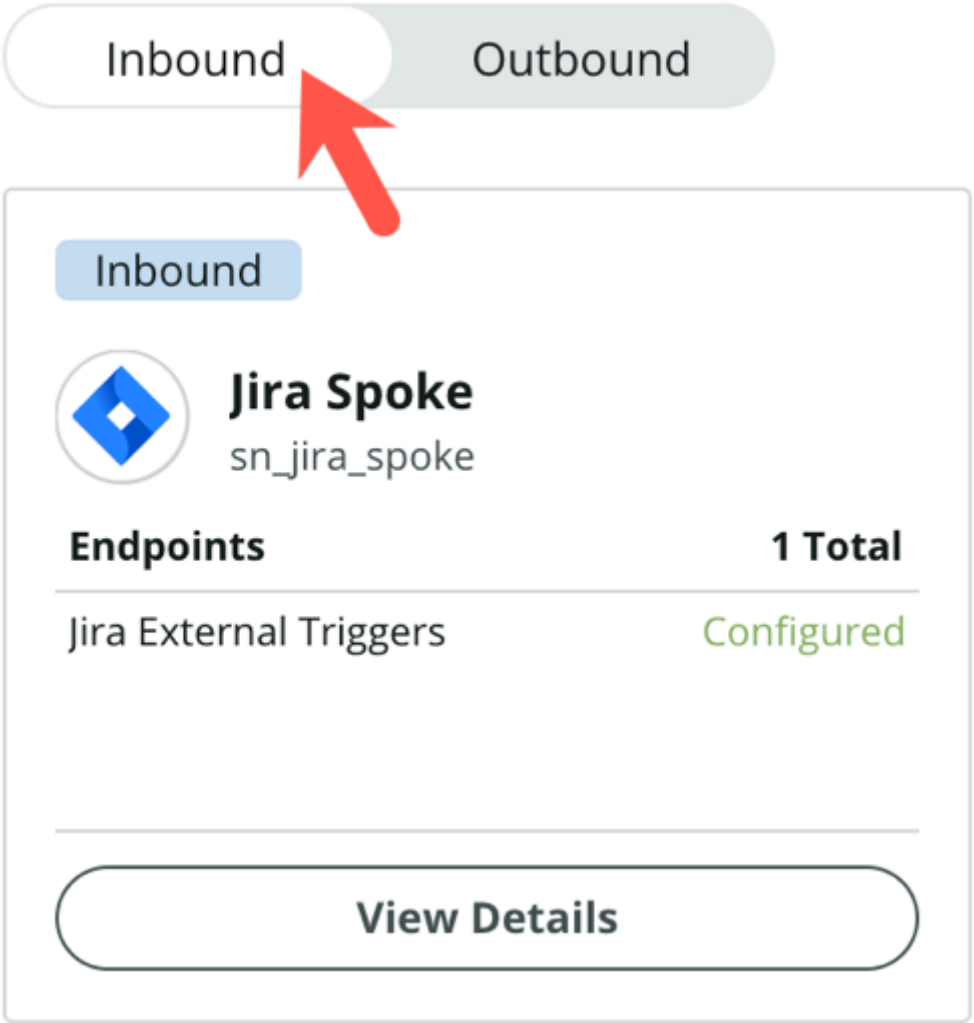
The spoke connection card appears with the **Inbound** tab selected by



default.

4. Select **View Details**.
5. Set up external trigger endpoints with different authentication types.
   a. Manage endpoint with Basic authentication support.
   b. Manage endpoint with Hash message support.
   c. Manage endpoint with Token support.
   d. Manage endpoint with OAuth 2.0 support

Manage endpoint with Basic authentication support

Generate endpoint for webhooks in third-party applications that support basic authentication. The endpoint enables webhooks to connect with your ServiceNow instance. You can deactivate or remove the configuration of the endpoint from the connection when you want the endpoint to no longer listen to the external webhook.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: This feature requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Ensure that you've installed the required spoke plugin.

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Configure endpoint with Basic authentication support

Configure the endpoint that listens to the webhook from a third-party application.

Before you begin

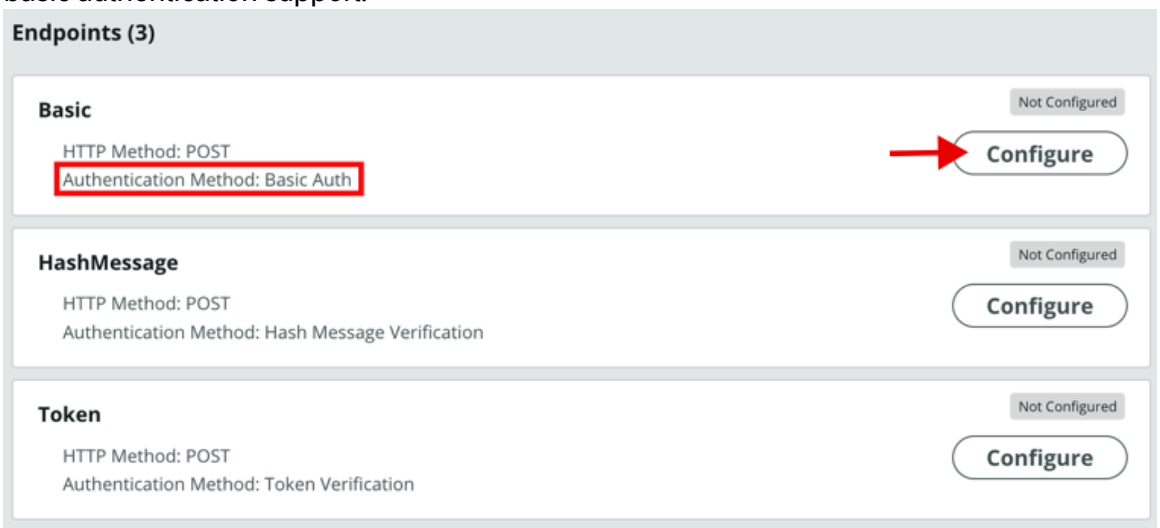
Role required: flow_designer and connection_admin

Subscription required: Integration Hub Enterprise pack

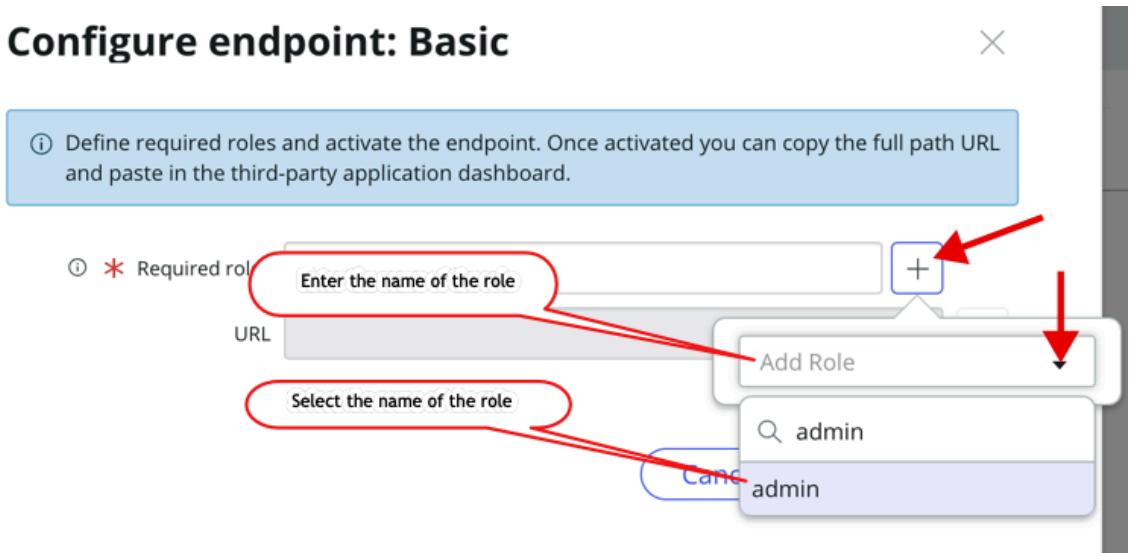
Ensure that you've installed the required spoke plugin.

Procedure

1. Under the Endpoints heading, select **Configure** for the connection to set up an endpoint with basic authentication support.



2. To display the Add Role field, select +.
3. To select one or more roles, select ▾ or enter the name of one or more roles.



4. Select **Activate**.
   The endpoint for the third-party application webhook is generated in the URL field.

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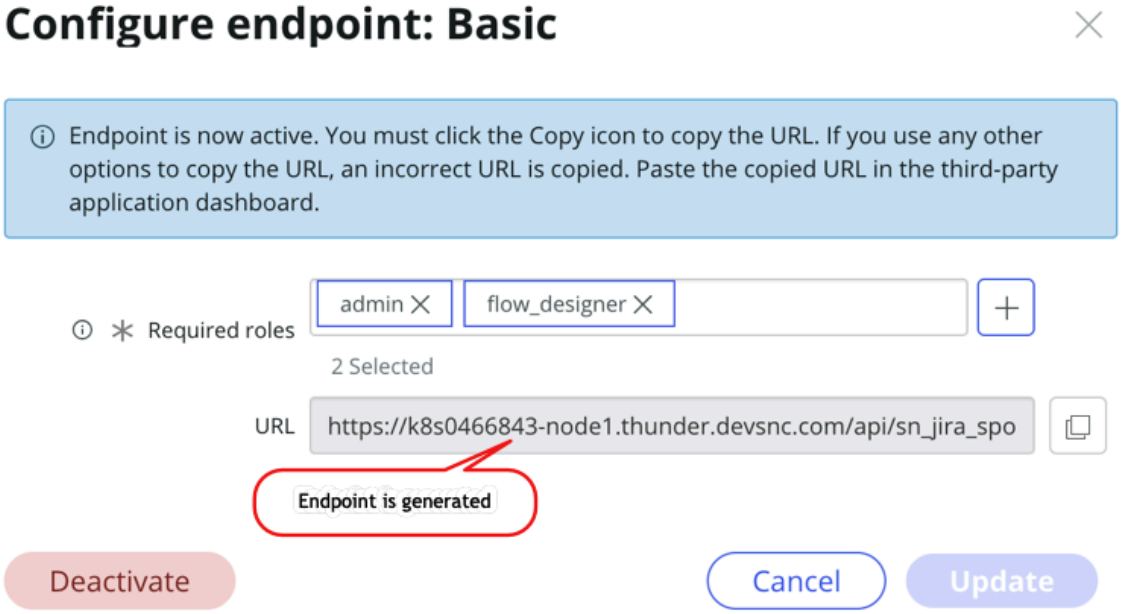

5. To copy the endpoint, select the copy endpoint icon ( )

Tip: Keep the endpoint at a secure place to use later at the third-party application webhook.

Deactivate endpoint with Basic authentication support

Deactivate the endpoint so that it stops listening to a webhook. However, you can activate it again.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: Integration Hub Enterprise pack

Ensure that you've installed the required spoke plugin.

Procedure

1. Select **Deactivate**.
2. To confirm deactivation, select **Deactivate**.
3. To activate again, on the connection record, select **Edit**.
4. Select **Activate**.

Deconfigure endpoint with Basic authentication support

Remove the configuration of the endpoint.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: Integration Hub Enterprise pack

Ensure that you've installed the required spoke plugin.

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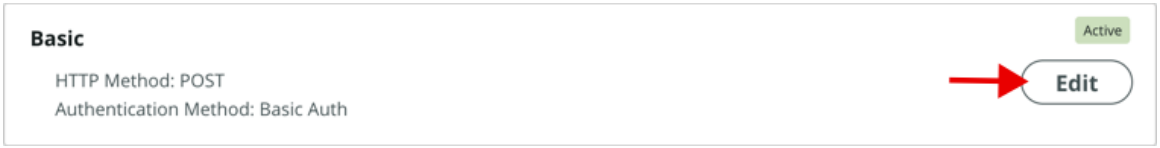
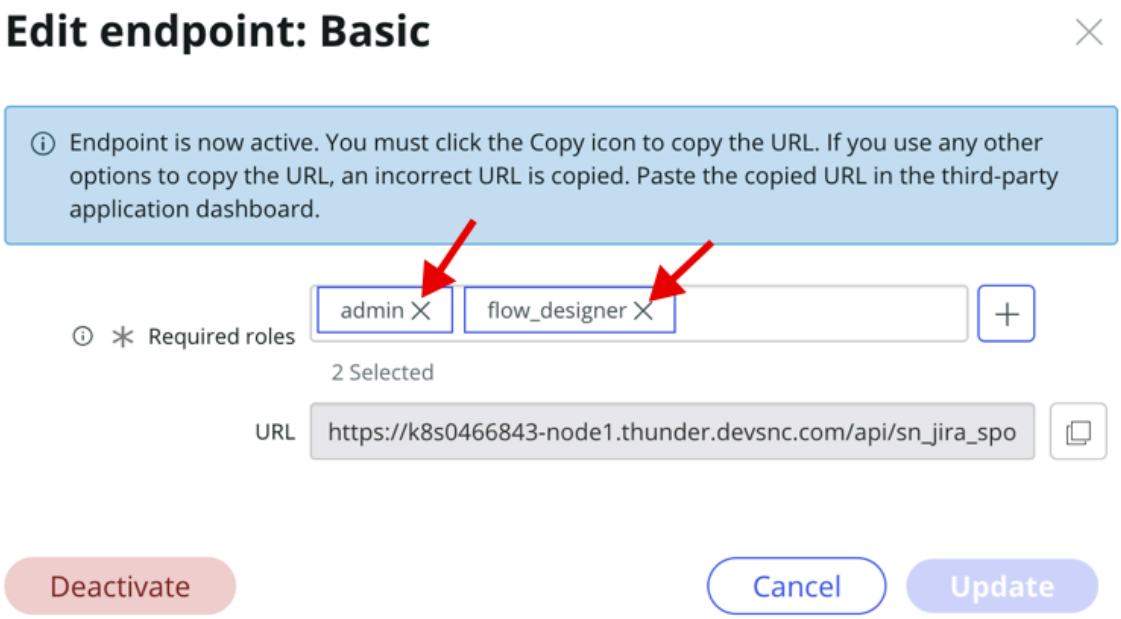
Procedure

1. Select **Edit**.



2. Remove the roles.



3. Select **Update**.
4. Select **Deconfigure**.
   The configuration for the endpoint is removed from the connection.

Manage endpoint with Hash message support

Generate endpoint for webhooks in third-party applications that support hash message authentication. The endpoint enables webhooks to connect with your ServiceNow instance. You can deactivate or remove the configuration of the endpoint from the connection when you want the endpoint to no longer listen to the external webhook.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: This feature requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Ensure that you've installed the required spoke plugin.

Configure endpoint with Hash message support

Configure the endpoint that listens to the webhook.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: Integration Hub Enterprise pack

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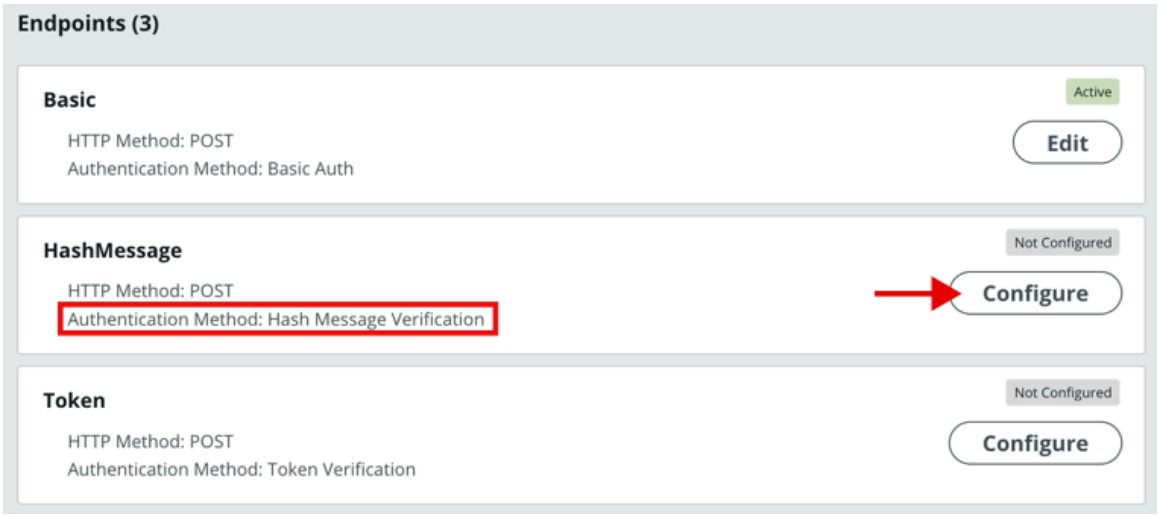
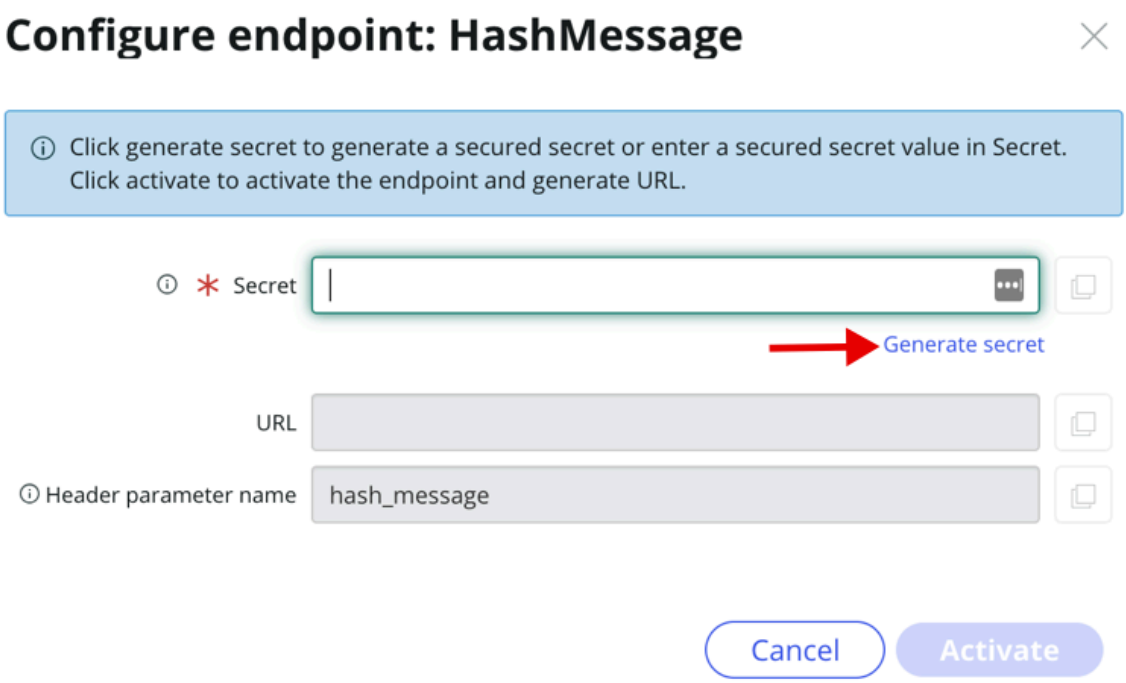
Ensure that you've installed the required spoke plugin.

Procedure

1. Under the Endpoints heading, select **Configure** for the connection to set up an endpoint with hash message authentication support.



2. In the Configure endpoint form, select Generate secret.



The secret is generated in the Secret field.

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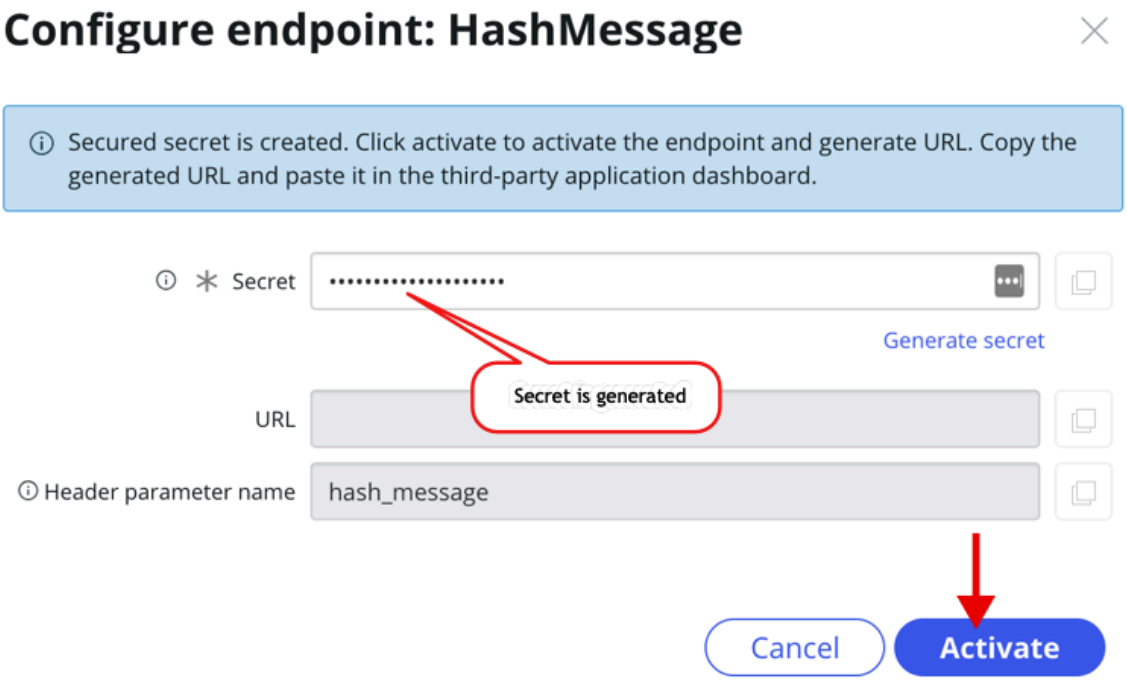
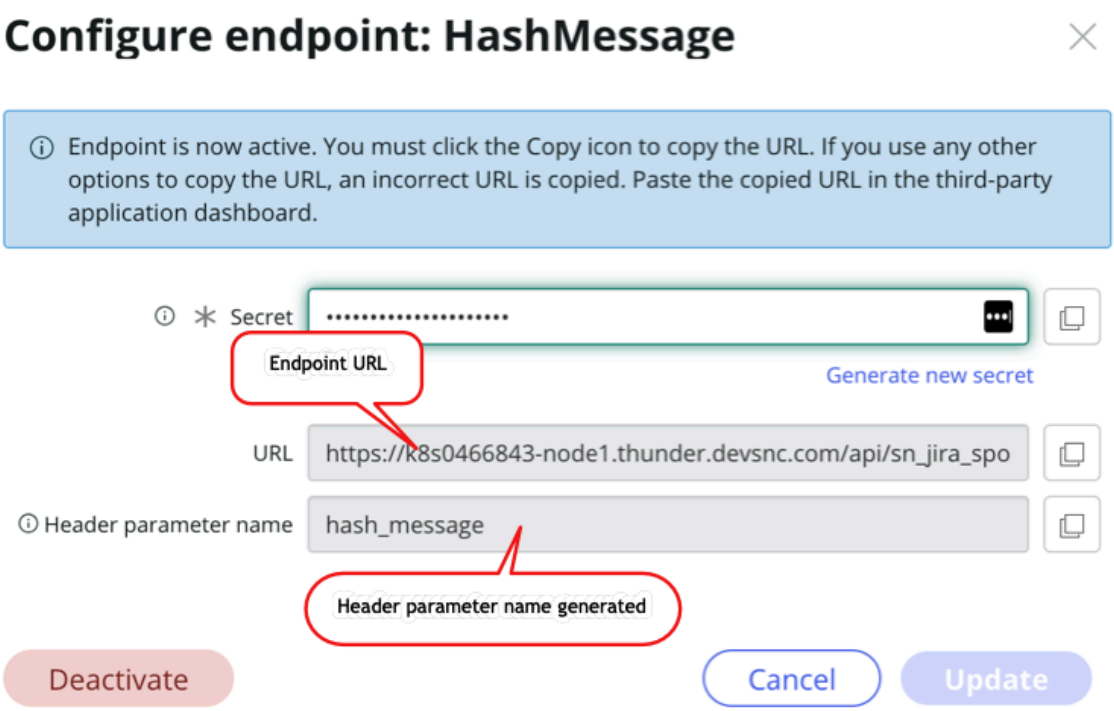
3. To generate the endpoint that the external webhook uses to connect to your ServiceNow instance, select



Activate.
The value in the Header parameter name field becomes available after you generate the



endpoint.

4. To copy the endpoint, select the copy endpoint icon ( )

> **Tip:** Keep the endpoint at a secure place to use later at the third-party application webhook.

Deactivate endpoint with Hash message support

Deactivate the endpoint so that it stops listening to a webhook. However, you can activate it again.

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Before you begin

Role required: flow_designer and connection_admin

Subscription required: Integration Hub Enterprise pack

Ensure that you've installed the required spoke plugin.

Procedure

1. To deactivate the endpoint, do the steps.
2. Select **Deactivate**.
3. To confirm deactivation, select **Deactivate**.
4. To activate again, on the connection record, select **Edit**.
5. Select **Activate**.

Deconfigure endpoint with Hash message support

Remove the configuration of the endpoint.

Before you begin

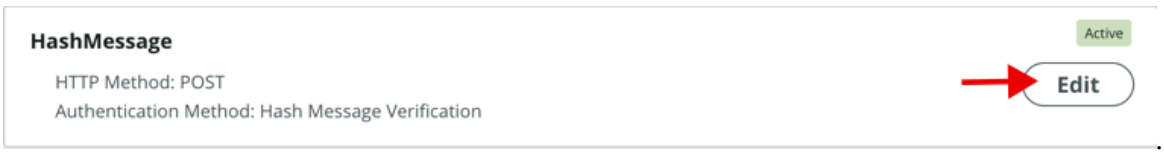
Role required: flow_designer and connection_admin

Subscription required: Integration Hub Enterprise pack

Ensure that you've installed the required spoke plugin.

Procedure

1. Select **Edit**.



   a. Select **Update**.

   b. Select **Deconfigure**.
   The configuration for the endpoint is removed from the connection.

2. Remove the secret.

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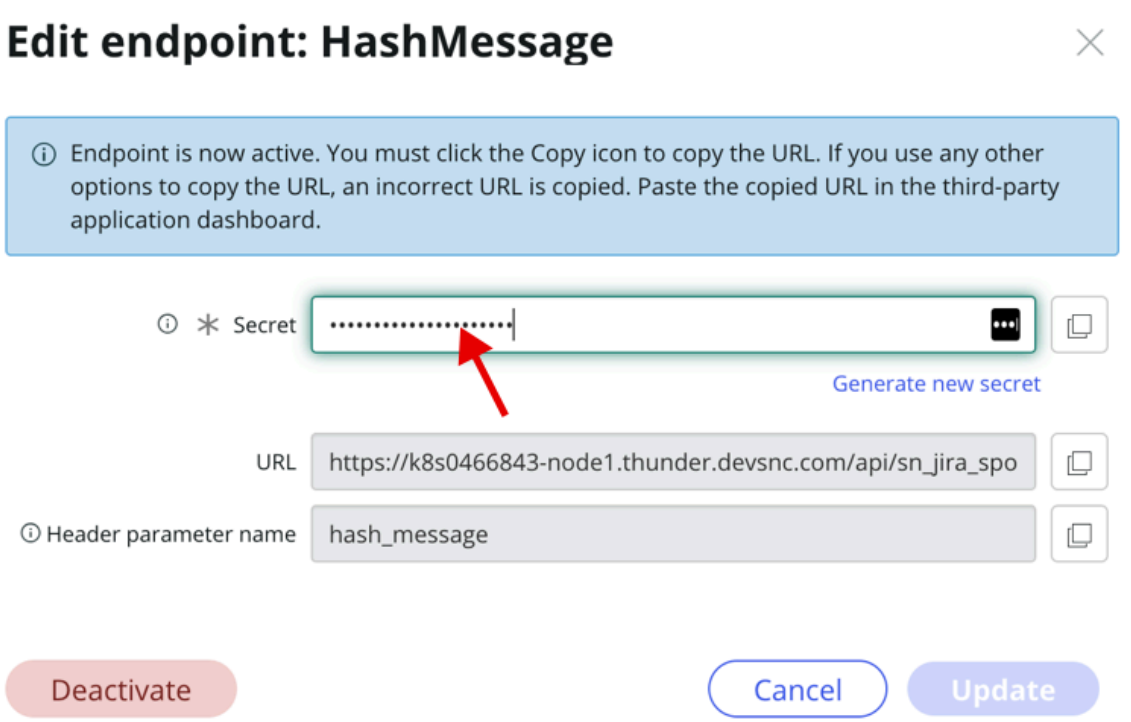

3. Select **Update**.
4. Select **Deconfigure**.

Manage endpoint with Token support

Generate endpoint for webhooks in the third-party applications that support token authentication. The endpoint enables webhooks to connect with your ServiceNow instance. You can optionally remove the configuration of the endpoint from the connection. You can deactivate or remove the configuration of the endpoint from the connection when you want the endpoint to no longer listen to the external webhook.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: This feature requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Ensure that you've installed the required spoke plugin.

Configure endpoint with Token support

Configure an endpoint that listens to the webhook.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: Integration Hub Enterprise pack

Ensure that you've installed the required spoke plugin.

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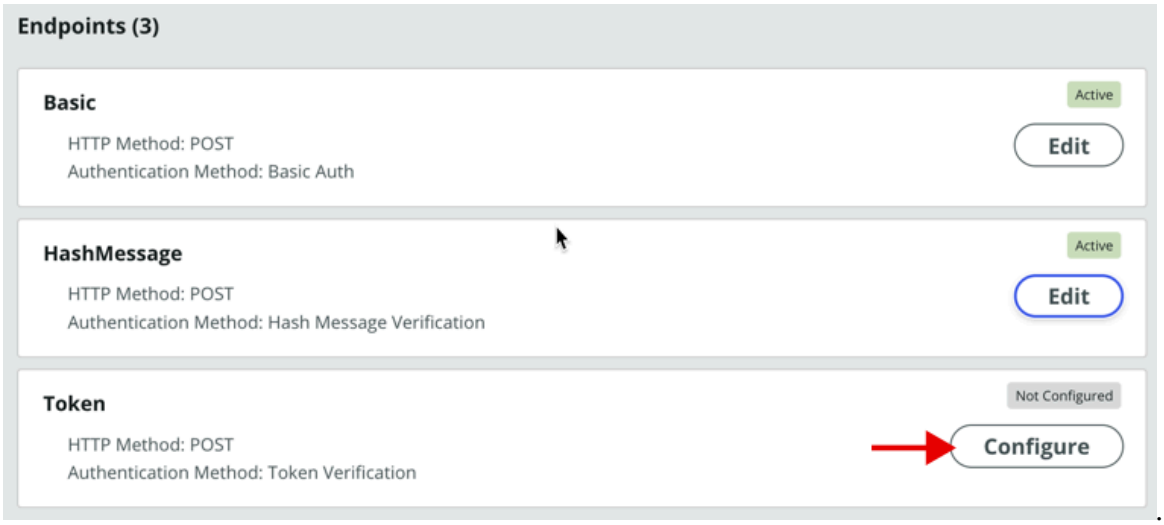
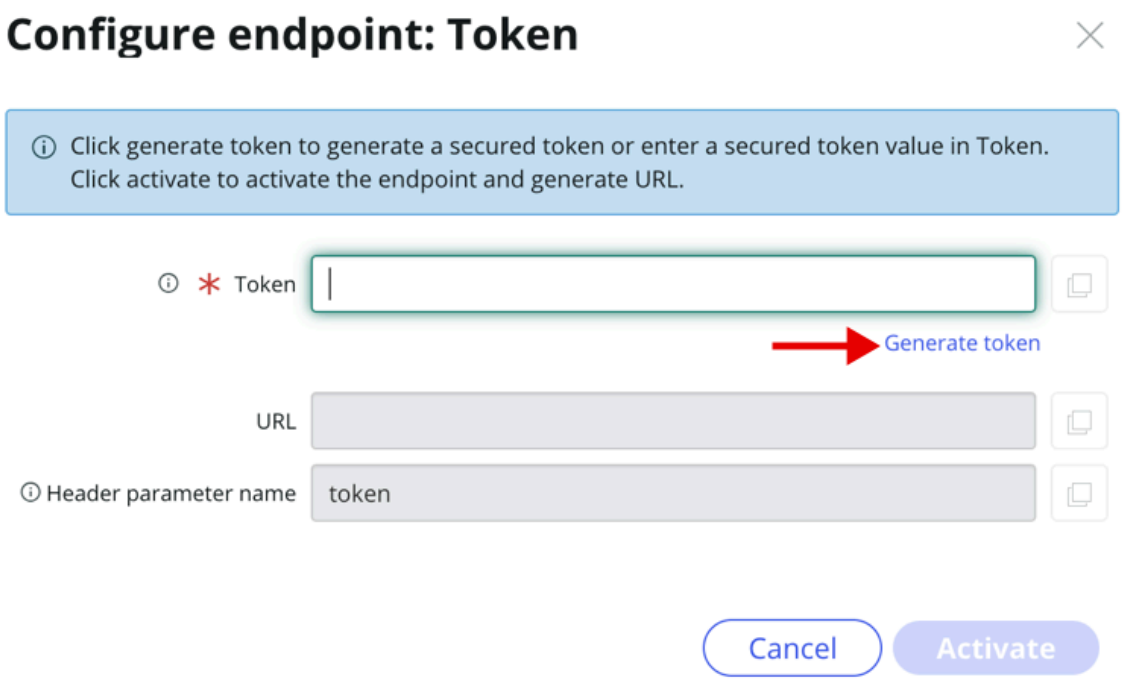
Procedure

1. Under the Endpoints heading, select **Configure** for the connection to set up an endpoint with token authentication support.



2. In the Configure endpoint form, select Generate token.



The token is generated.

3. To generate the endpoint, select **Activate**.

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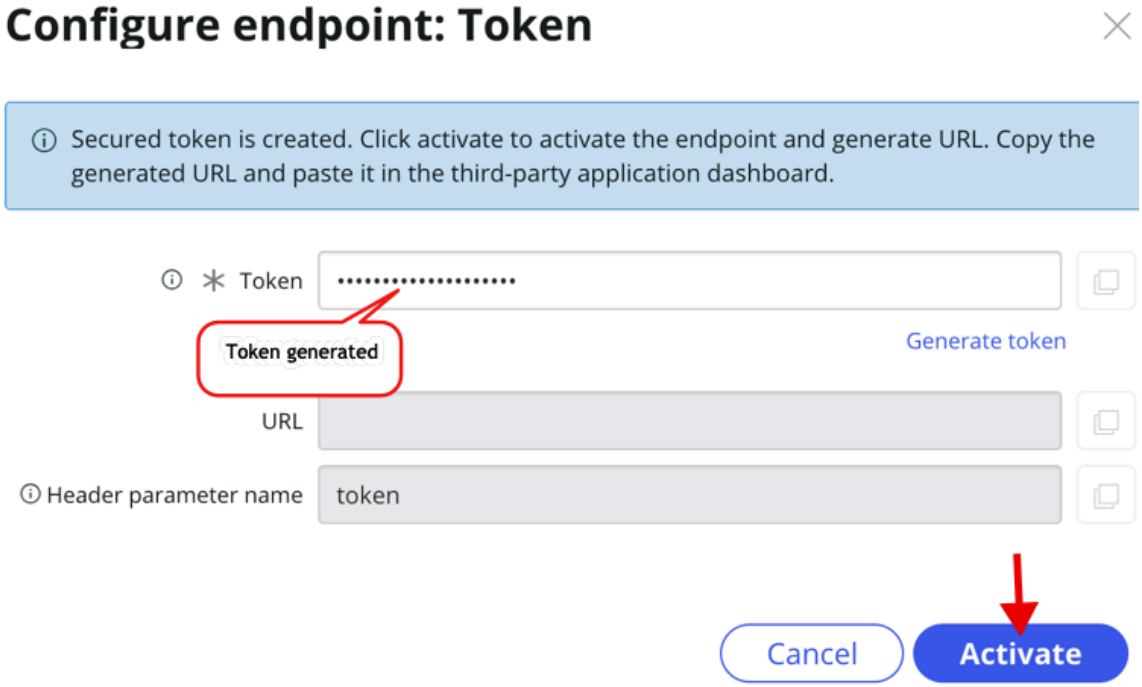
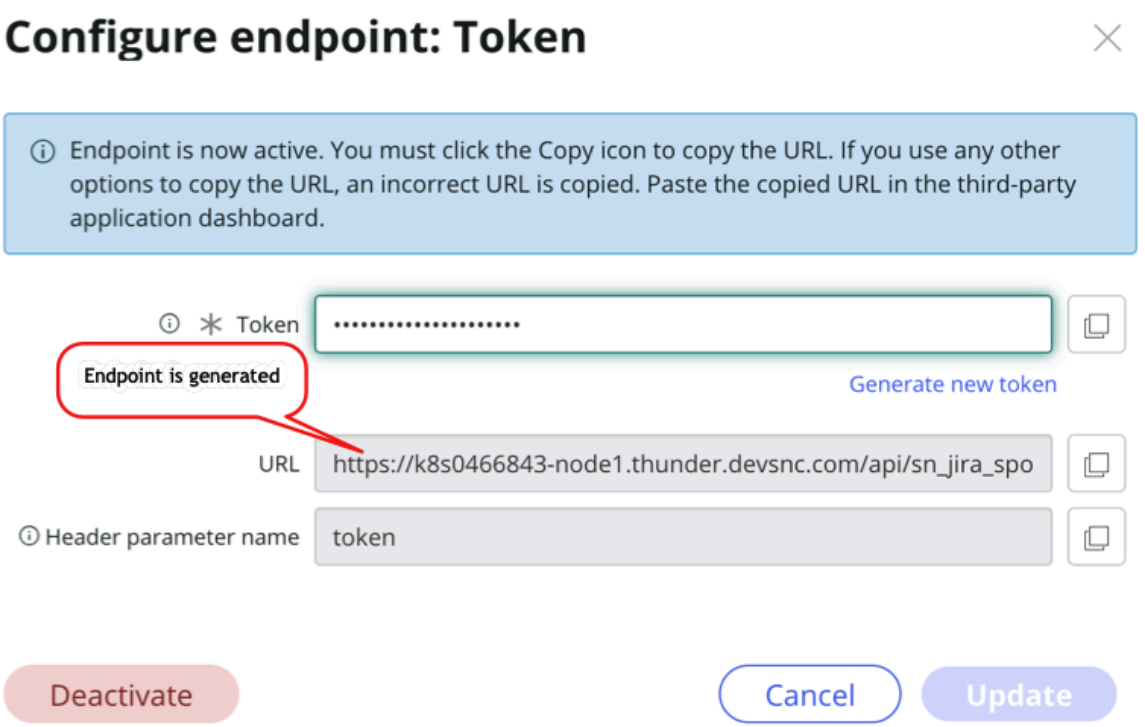


The endpoint URL is generated in the URL field.



4. To copy the endpoint, select the copy endpoint icon ( )

Tip: Keep the endpoint at a secure place to use later at the third-party application webhook.

Deactivate endpoint with Token support

Deactivate the endpoint to disable it from listening to the webhook. You can activate it back.

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Before you begin

Role required: flow_designer and connection_admin

Subscription required: Integration Hub Enterprise pack

Ensure that you've installed the required spoke plugin.

Procedure

1. To deactivate the endpoint, do the steps.
2. Select **Deactivate**.
3. To confirm deactivation, select **Deactivate**.
4. **Optional:** To activate again, on the connection record, select **Edit**.
5. **Optional:** Select **Activate**.

Deconfigure endpoint with Token support

Remove the endpoint configuration.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: Integration Hub Enterprise pack

Ensure that you've installed the required spoke plugin.

Procedure

1. Select **Edit**.



2. Remove the token.

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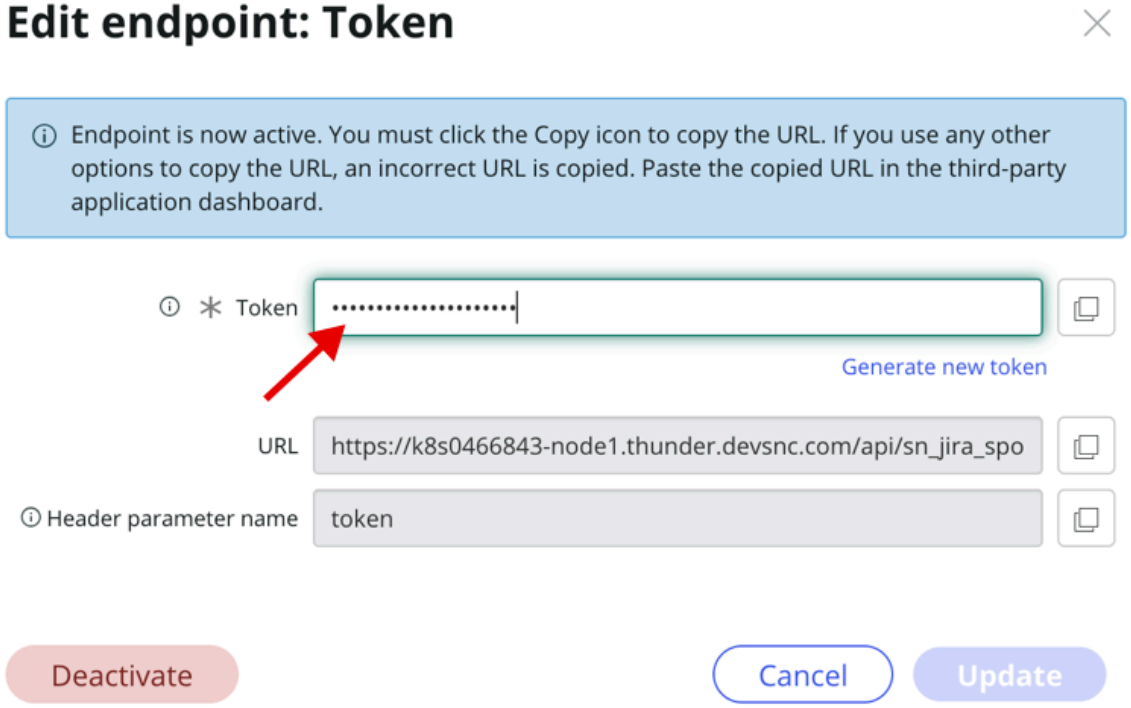

3. Select **Update**.
4. Select **Deconfigure**.
   The configuration for the endpoint is removed from the connection.

Manage endpoint with OAuth 2.0 support

Manage endpoint for webhooks in third-party applications that support the OAuth 2.0 authentication. The endpoint enables webhooks to connect with your ServiceNow instance.

Before you begin

Role required: flow_designer and connection_admin

Subscription required: This feature requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Ensure that you've installed the required spoke plugin.

Ensure that you have created an OAuth application endpoint for the external client applications to access the ServiceNow instance. For more information about creating an inbound OAuth application endpoint, see OAuth Inbound.

- If you want to create an OAuth application endpoint for external client applications to access the ServiceNow instance, see Create an endpoint for clients to access the instance.
- If you want to create an OAuth JWT API endpoint for external clients to access the ServiceNow instance, see Create an OAuth JWT API endpoint for external clients (machine to machine integration).

Configure endpoint with OAuth 2.0 support

Configure endpoint for webhooks in third-party applications that support the OAuth 2.0 authentication.

Before you begin

Role required: flow_designer and connection_admin

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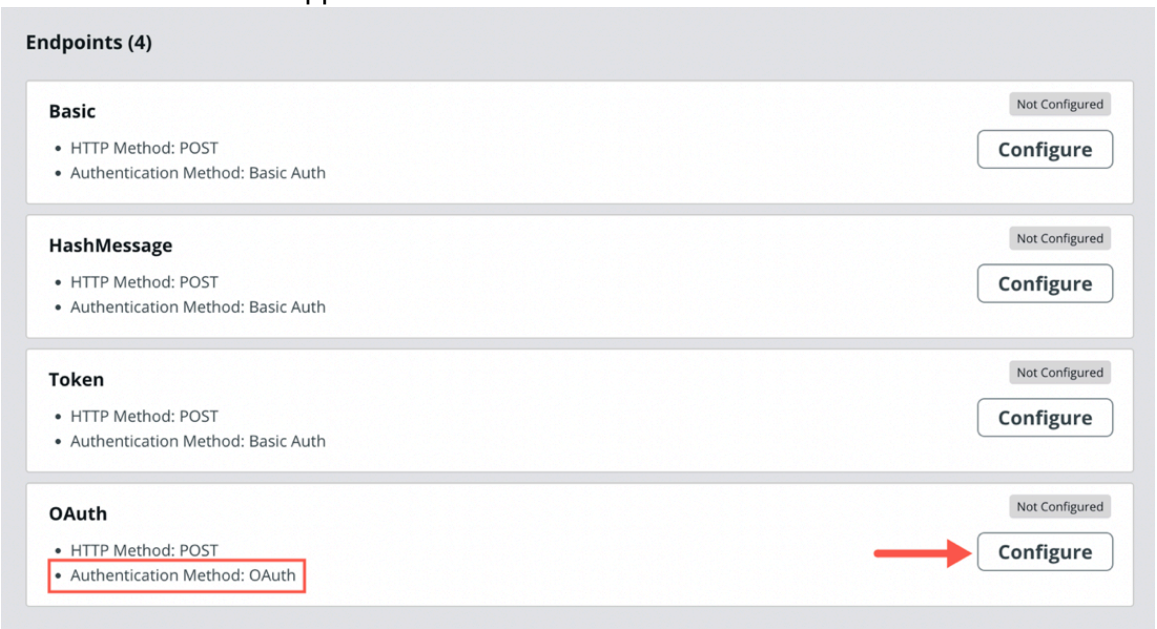
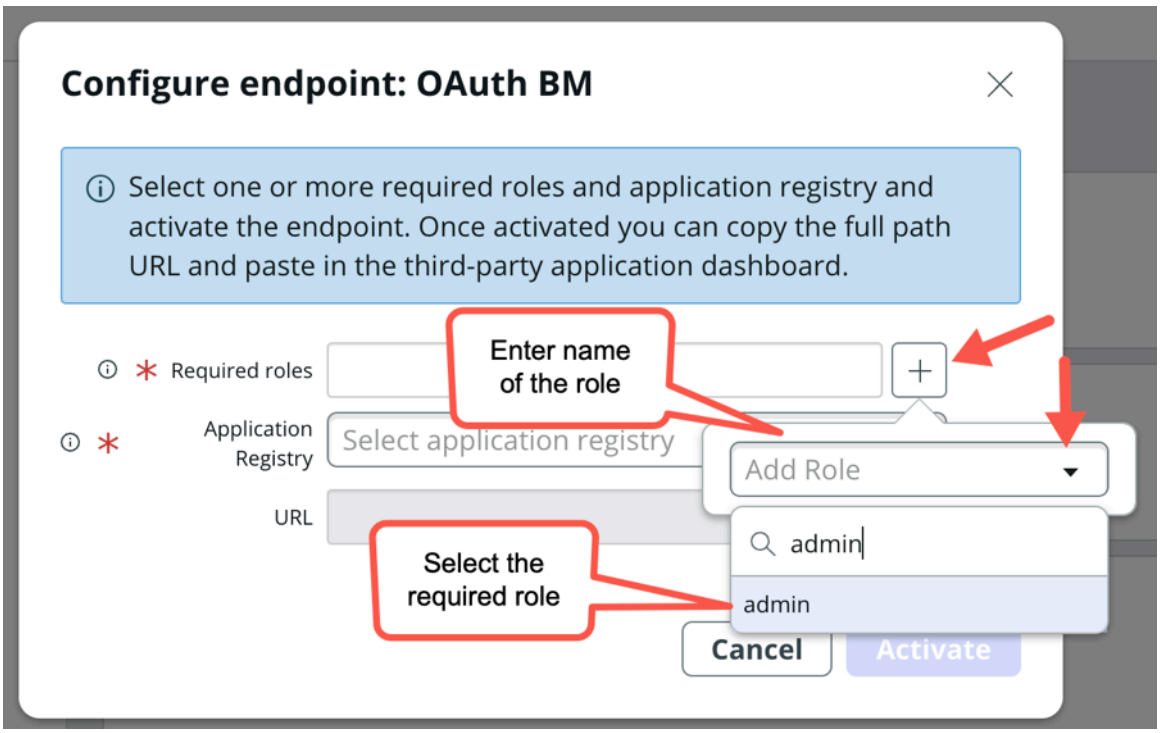
Procedure

1. Under the Endpoints heading, select **Configure** for the connection to set up an endpoint with OAuth authentication support.



2. In the Configure endpoint form, click + to add role in **Required roles**.
To select one or more roles, select ▾ or enter the name of one or more roles.



3. Select the required application registry record.
4. To generate the endpoint, select **Activate**.

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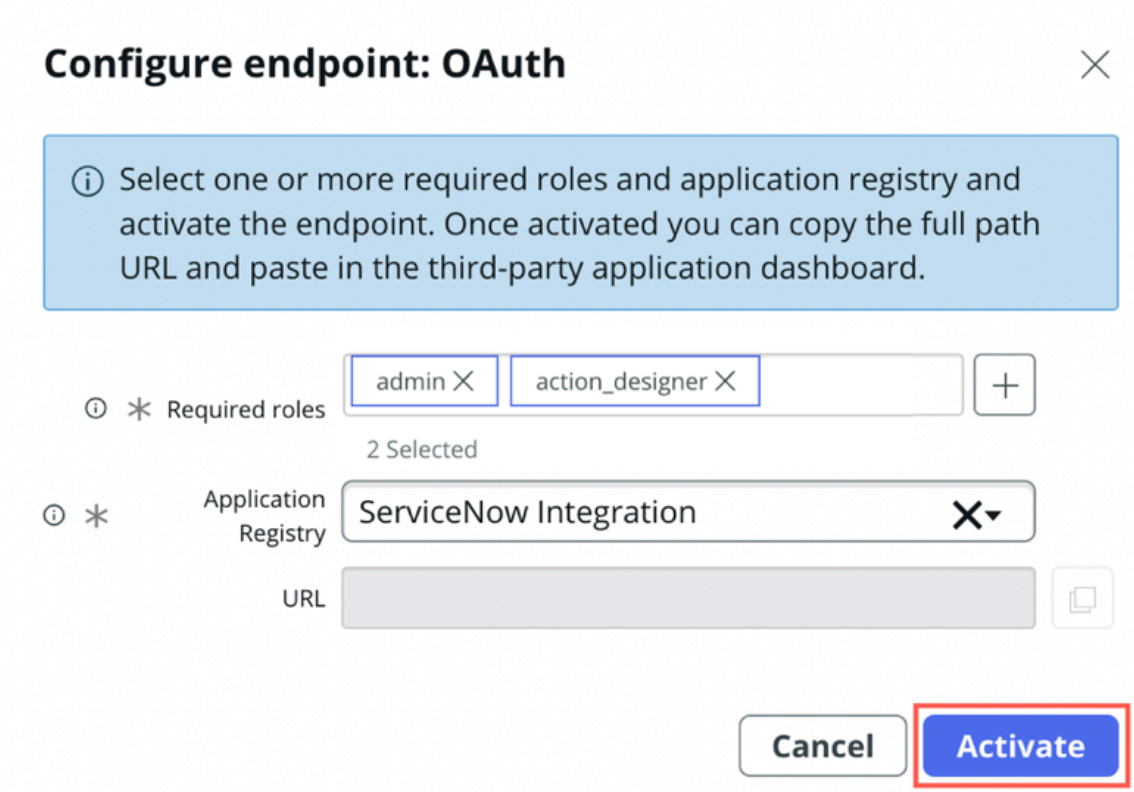
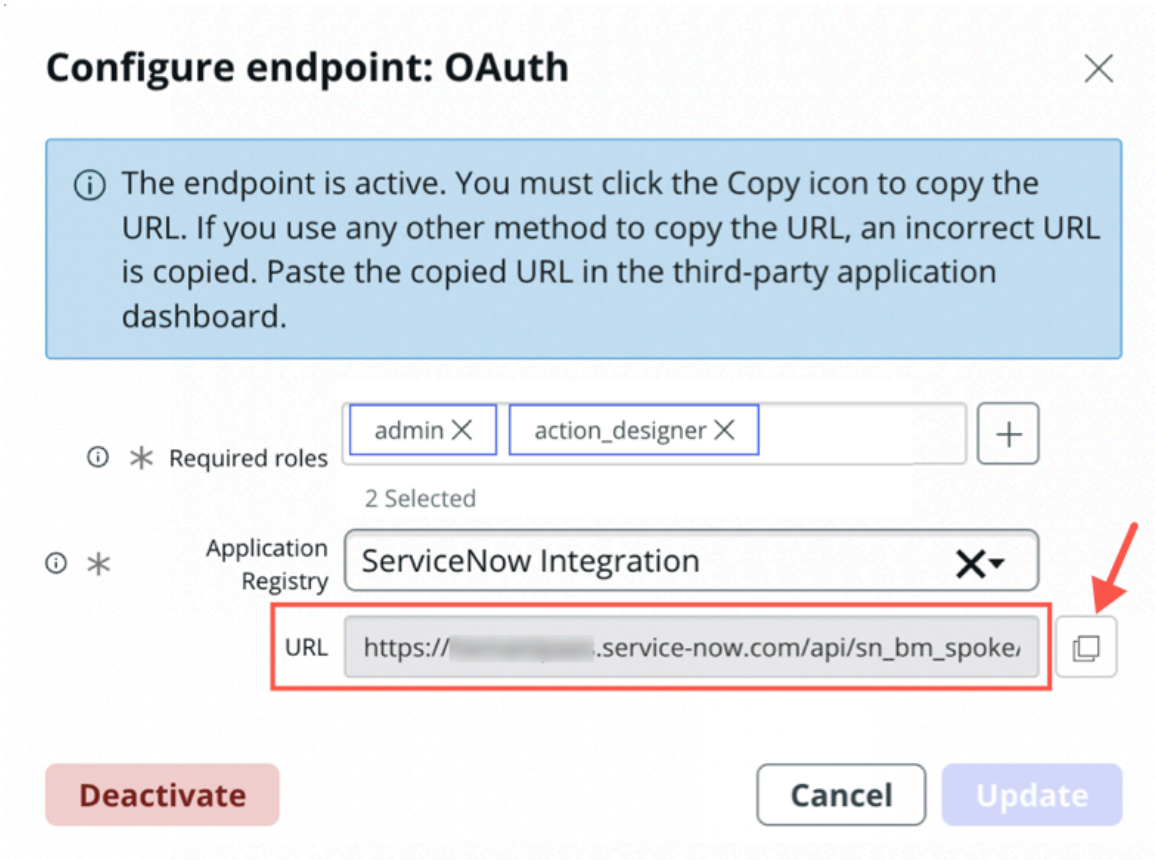


The endpoint URL is generated in **URL**.



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5. To copy the endpoint, select the copy endpoint icon ( )

> **Tip:** Keep the endpoint at a secure place to use later at the third-party application webhook.

Deactivate endpoint with OAuth 2.0 support

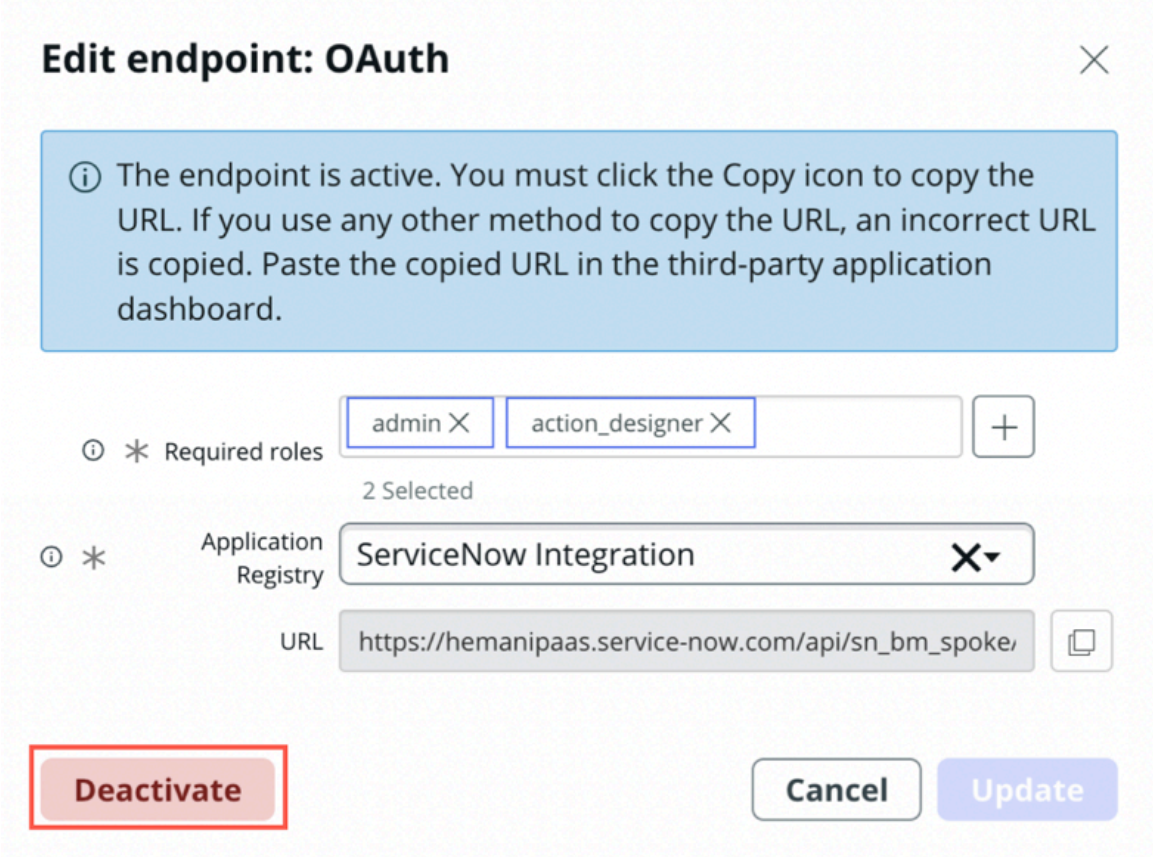
Deactivate an active endpoint with OAuth 2.0 support while retaining the configurations to activate it later when needed.

Before you begin

Role required: flow_designer and connection_admin

Procedure

1. Under the Endpoints heading, for the required endpoint, click **Edit**
2. Click **Deactivate**.



3. To confirm deactivation, select **Deactivate**.

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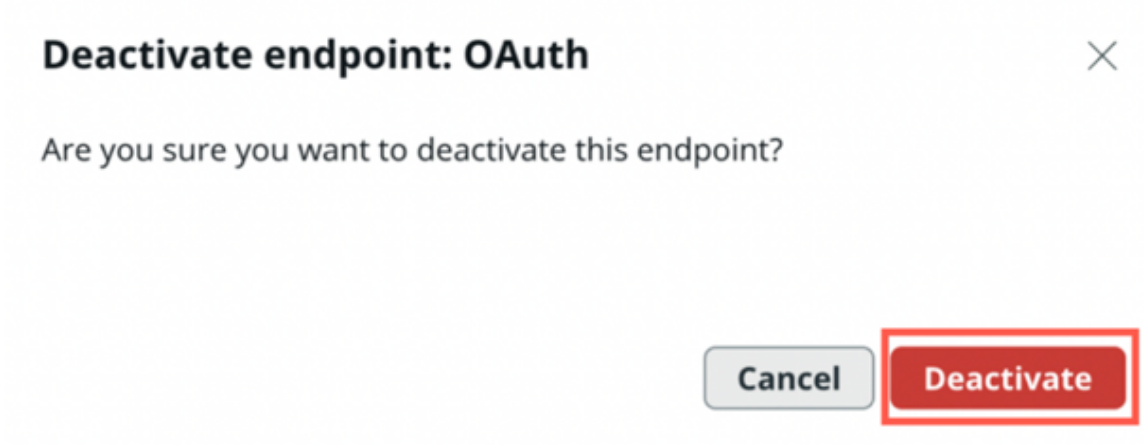
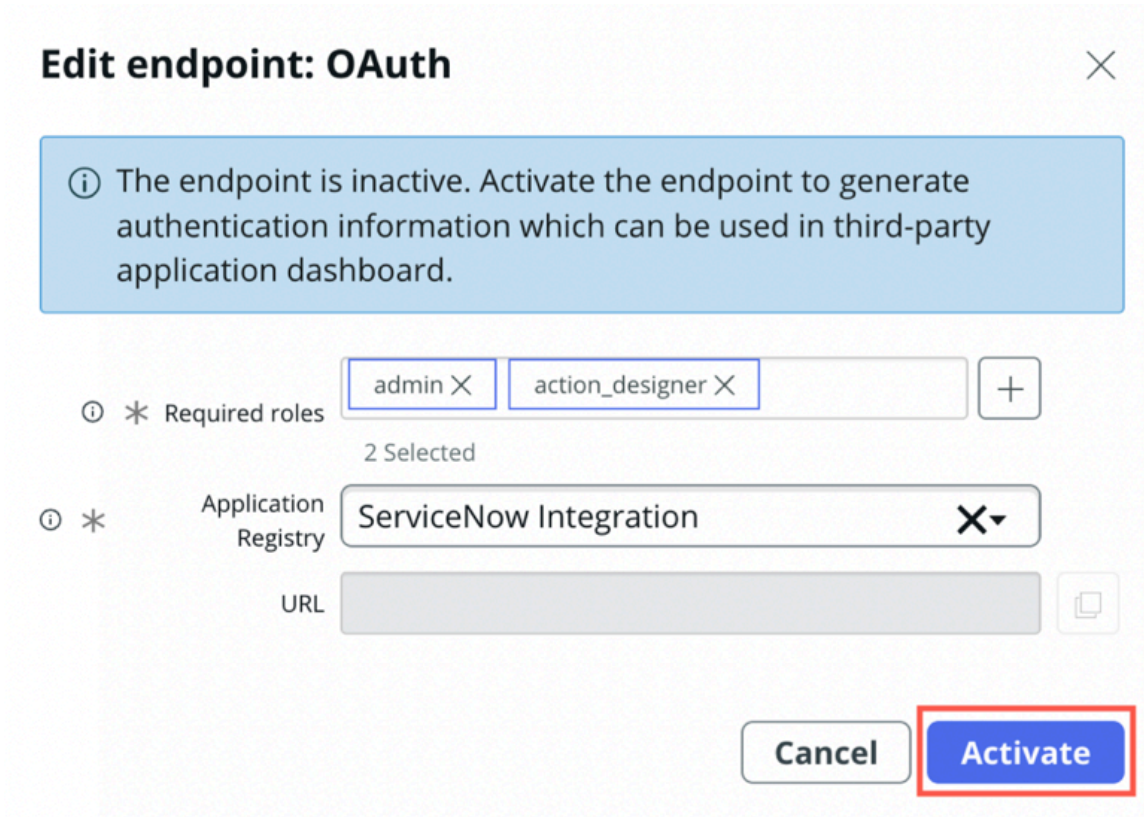


4. To activate again, on the connection record, select **Edit**.
5. Select **Activate**.



Deconfigure endpoint with OAuth 2.0 support

Deactivate an endpoint with OAuth 2.0 support to remove the existing configurations. Activate and configure the endpoint later when needed.

Before you begin

Role required: flow_designer and connection_admin

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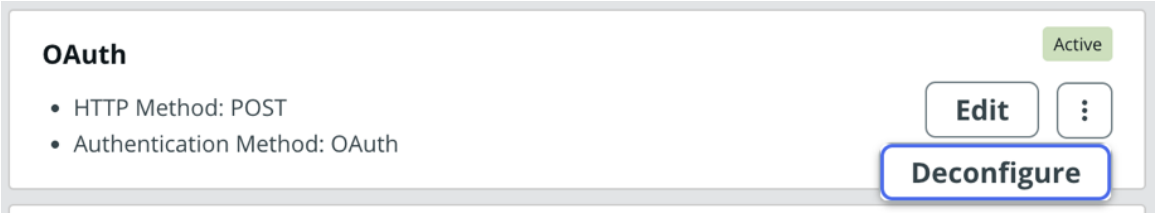
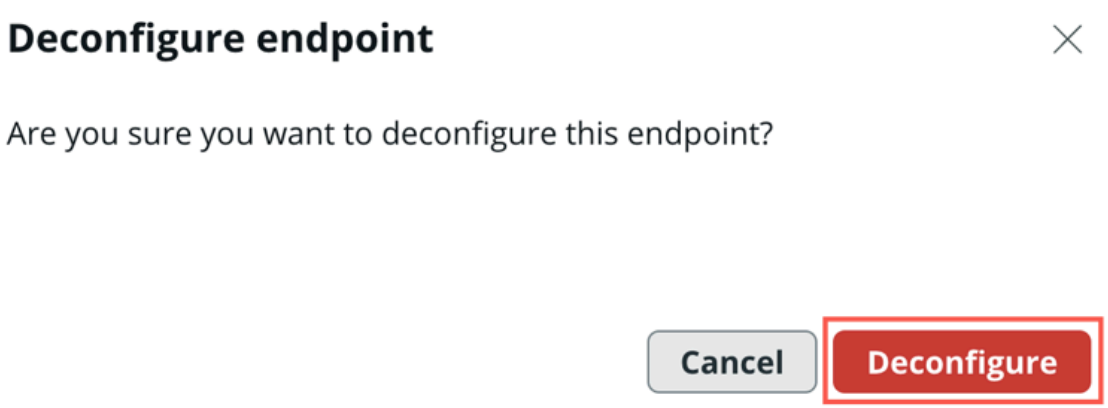
Procedure

1. Under the Endpoints heading, click the more options icon (⋮).



2. Click **Deconfigure**.
3. When prompted, confirm your choice to deconfigure.



The configuration for the endpoint is removed from the connection.

Integration steps

Enable custom actions to integrate with external systems by activating Integration Hub, which adds integration steps to the Workflow Studio interface.

Integration steps can run on the instance or a MID Server. A MID Server is required to communicate with or move data between a ServiceNow instance and external applications, data sources, and services in your network.

Note: Only Flow Designer admin and Connection admin can execute flows using Integration Hub.

Steps that perform operations on record data run on the instance, while steps that integrate with systems in your network run on a MID Server. If a step requires a MID Server to run, the instance delegates flow processing to the appropriate MID Server by sending the process plan in a REST call. The MID Server executes the action or step in the process plan and returns results. View log messages and execution status from the instance or the MID Server.

Available integration steps

These integration steps are available from Workflow Studio - Building custom actions.

Integration step	Description	Step runs from
JDBC step	Create a reusable action to send SQL commands to a relational database.	MID Server

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Integration step	Description	Step runs from
JSON Builder step	Create a JSON payload to use in another step. Enter values or use data pills to produce a dynamic payload. This step supports several data types, including objects and arrays for nested structures.	Instance
Payload Builder step	Enable action designers to easily create name-value pairs in JSON and XML payloads using dynamic data.	• Instance • MID Server
PowerShell step	Run PowerShell scripts on remote machines from your ServiceNow instance through a MID Server.	MID Server
REST step	Send an outbound REST web service request to an external system.	• Instance • MID Server
SOAP step	Enable action designers to send outbound SOAP web service requests to external systems.	• Instance • MID Server
SSH step	The SSH step executes SSH commands on an external *nix system through a ServiceNow® MID Server. The step also stores scripts and commands for the *nix systems.	MID Server
XML parser step	Identify structured data from an XML payload without having to write script. Map incoming XML elements to a complex object output that you can use in other steps or actions. At runtime, values from an XML payload populate the complex object output.	• Instance • MID Server

Training

Complete a step-by-step training on using the REST step in the REST in IntegrationHub developer training.

Connection attributes

Define connection-specific variables that you can use in Integration Hub integration steps. When using an integration step, you must establish a connection with an external system. Use a Connection & Credential alias instead of defining the connection inline. An alias enables you to update the connection details once without having to reconfigure every action. Any action step

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that uses an alias inherits the attributes associated with it. Workflow Studio displays attributes as data pills that you can drag into your action step. For example, you can create a page size attribute that becomes a REST step query parameter. For more information about connection attributes, see Create connection attributes for IntegrationHub.

MID Server connection aliases

Action designers can set MID Server selection attributes using a connection record associated with an alias and associate the alias with an integration step. When the flow runs, the system uses the attributes to determine which MID Server runs the step. Learn more about Introduction to credentials, connections, and aliases.

MID Server and MID Cluster selection

For most integration steps, you can specify a MID Server or MID Cluster for the step to use when it runs. For a MID Server, you can select one you've configured or have the system choose one by selecting **Auto-Select MID Server** from the step's MID Selection list. To learn more about how a MID Server is selected during runtime, see MID Server selection. For MID Clusters, you can select a load-balancing or fail-over cluster for the step. For more information on MID Clusters, see Configure a MID Server cluster. The Payload Builder step and XML Parser step do not support MID Server selection.

When specifying a MID Server, Flow designers should avoid shifting the execution environment from one MID Server to another when a flow runs. Either configure each MID Server to perform operations on multiple endpoints, or provide multiple capabilities to each MID Server in your network. You may need a user with the connection_admin role to update the connection records associated with an action, or a network administrator to update the MID Server network configuration.

Note: If a selected MID Server is part of a cluster, the runtime MID may be different, depending on load. So even if a MID Server is specified at the connection or step level, a different MID Server in the same cluster may be used at runtime.

Design considerations

Design integration steps using the following guidelines.

- Avoid shifting the execution environment between the instance and the MID Server multiple times. Where possible, group similar action steps. For example, group core steps that perform record operations and integration steps that run on the MID Server.
- When creating a spoke that uses an integration step, include a Connection and Credential alias record with the appropriate connection type. Before anyone can use the spoke, a user with the connection_admin role must associate the alias record to a connection record that supports the connection type. If defining the connection inline, use inputs to enable the process analyst to define the connection information when adding the action to a flow.
- The MID Server does not have access to all the values in a GlideRecord object, it only has access to the sys_id reference. Inputs of type Reference do not work on a MID Server. Instead, create action inputs that contain the necessary GlideRecord values.

Roles

To create integration steps, a user must have the action_designer or admin roles. If running steps on a MID Server, the MID Server user must have the connection_admin and credential_admin roles to access the connection and credential information associated with the step.

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JDBC step

Create a reusable action to send SQL commands to a relational database.

Note:

- This step requires an Integration Hub subscription. For more information, see Legal schedules - Integration Hub overview. After the required plugin is activated, the step is visible under Integrations.
- The JDBC step runs only on a ServiceNow® MID Server with JDBC step capabilities.

Roles and availability

The JDBC step is available as an Workflow Studio action step. Users with the action_designer role can create a custom action with one or more action steps.

JDBC operations and MID Server timeouts

For JDBC operations, execute the Data Stream Action asynchronously and poll the Attachments [sys_attachment] table for results.

The MID Server processes the SQL statement, while the instance/main thread waits for context payloads to be inserted into the attachment table to query the next record.

You can adjust timeout values for JDBC operations with the following properties.

com.snc.process_flow.datastream.payload.timeout.seconds

The amount of time the instance waits for the payload to be available from the JDBC execution in the MID Server. A bounded property with a minimum value of 0 seconds and a maximum value of 7200 seconds. The default time is 600 seconds.

com.snc.process_flow.datastream.async_child.timeout.seconds

The amount of time allocated for the execution of a child plan in the MID Server.A bounded property with a minimum value of 0 seconds and a maximum value of 7200 seconds. The default time is 60 seconds.

Sanitizing inputs

Escape all user inputs to eliminate the possibility of a malicious user from executing malicious SQL statements that can result in SQL injection on your target database. When you use data pills in JDBC step SQL statements, sanitize them first using Sanitize SQL transform functions. This transform function category automatically appears when a data pill is dropped into the SQL Statement input.

SQL operations inclusion list

By default, you can run the following SQL operations.

- SELECT
- INSERT
- UPDATE
- DELETE
- SHOW
- DESCRIBE

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To enable only some of these SQL operations that the JDBC step can perform, create a MID Server property, *mid.property.jdbc_operations* and enter the SQL operations, separated by comma. To learn more about MID Server properties, see MID Server properties.

Note: Multiple SQL statements are not allowed. Stored procedures with output parameters are not supported.

Fields

Field	Description
Connection Details	
Connection	Type of connection to use. • **Define Connection Inline**: Define connection information within the action step. • **Use Connection Alias**: Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see Introduction to credentials, connections, and aliases.
Connection Alias	Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when **Use Connection Alias** is selected from the Connection list.
Credential Alias	Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when **Define Connection Inline** is selected from the Connection list.
MID Selection	Option to select a specific MID Server or MID Cluster. Choose any one of the following options. • **Auto-Select MID Server**: Your ServiceNow instance selects the MID Server without manual input. • **Specific MID Server**: Your ServiceNow instance uses MID Server that you specify.

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Field	Description
	• **Specific MID Cluster**: Your ServiceNow instance uses the MID Cluster that you specify. A MID Cluster is a group of MID Servers that enables your ServiceNow instance to handle multiple integrations, and improve integration speed. For more information, see Configure a MID Server cluster. This field is available when **Define Connection Inline** is selected from the Connection list.
MID Cluster	Data pill for the MID Cluster you want to use. This field is available when **Define Connection Inline** is selected from the Connection list, and **Specific MID Cluster** is selected from the MID Selection list.
Database Type	Database type for this connection. The choices are: • **MySQL** • **Oracle** • **SQLServer** • **Custom** The default choice is **Custom**. This field is available when **Define Connection Inline** is selected from the Connection list.
JDBC Driver	Driver to use for this connection when it's not a default database type such as DB2 Universal and Sybase. The database Type is **Custom**. This field is available when **Define Connection Inline** is selected from the Connection list and **Custom** is selected from the Database Type list.
Connection URL	URL that the MID Server uses to connect to the specified database. The URL is created automatically when you save the form, and is read-only for the default databases. This field is available when **Define Connection Inline** is selected from the Connection list and **Custom** is selected from the Database Type list.
MID Application	Application that the MID Server must support to be eligible for selection. This field is available when **Define Connection Inline** is selected from the Connection list.
Capabilities	Capability of the MID Server. Select**JDBC**. This field is available when **Define Connection Inline** is selected from the Connection list.
Connection Timeout	Maximum elapsed time, in seconds, for the activity to wait while attempting to connect to the target database. This field is available when **Define Connection Inline** is selected from the Connection list. **Note:** Avoid setting the **Connection Timeout** value to zero, as this may cause a stale connection.
Query Timeout	Maximum elapsed time, in seconds, that the query is allowed to run without a response. This field is available when **Define Connection Inline** is selected from the Connection list.
JDBC Configuration	

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Field	Description
SQL Statement	SQL statement that the step executes. **Note:** When you use data pills in step SQL statements, sanitize them first using a preprocessing Script step. For more information, see Sanitizing inputs using the escape functions.
Maximum Rows	Maximum number of rows to be returned from the SQL statement. The default value is **1000**.
Maximum Payload Size (KB)	Maximum allowable payload size, in KB, to be returned from the SQL statement. The default payload size is **5120 KB**. The maximum payload size is **10 MB**.
Test JDBC Step	Test the JDBC step. View test results directly in the Test JDBC Step window. For more information, see Test JDBC step.
Retry Policy	
Enable Retry Policy	Option to enable the retry policy. For more information, see Retry policy.
Override Default Policy for Alias	Option to override the default retry policy. This option is not applicable when **Define Connection Inline** is selected from the Connection list.
Retry Policy	Default retry policy associated with **Connection Alias**. If **Override Default Policy for Alias** is selected, you can override the default retry policy and select another existing retry policy based on your requirement.

Action error evaluation

If this step fails

Data type: *Choice*

Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see Action error evaluation.

Test JDBC step

Test the JDBC step before testing or publishing an action that contains the JDBC step.

Before you begin

Role required: admin

About this task

It is mandatory that you test the JDBC step before testing the action. Testing ensures that the relevant complex object output schema is created from table columns, which can be used as data pills in subsequent steps.

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Create an action with a JDBC step .
3. Click **Test JDBC Step**.
   The **Test JDBC Step** pop-up window is displayed.

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4. If the JDBC step takes an action input or output of the previous step as its input, provide required input values in the**Step input pills** field to test the JDBC step.

   Note: Input values in the **Step input pills** fields are not needed when records are updated, inserted, or deleted.

5. Click **Run Test**.
   - When a SELECT query is executed, **Sample Result** is displayed in the **Test JDBC Step** pop-up window. **Sample Result** includes column names, columns types, and the values of the first row.
   - When an UPDATE, INSERT, or DELETE query is executed, a message is displayed mentioning the number of rows affected.
6. To use the sample result as the JDBC step output, click **Use Result**.

   Note: **Use Result** is not displayed when records are updated, inserted, or deleted.

7. To retrieve schema of a different table when a SELECT query is executed in the JDBC step, enter the required value in the **Step input pills** field and click **Run Test**.

Result

When a SELECT query is executed in the JDBC step, **ResultSet** is displayed under **Outputs**. The relevant complex object output is populated. To learn more about complex objects, see Complex data.

What to do next

Test and publish the action.

JSON Builder step

Create a JSON payload to use in another step. Enter values or use data pills to produce a dynamic payload. This step supports several data types, including objects and arrays for nested structures.

Roles and availability

This step requires an Integration Hub subscription. For more information, see Legal schedules - Integration Hub overview. After the required plugin is activated, the step is visible under Integrations.

Available as an Workflow Studio action step. Users with the action_designer role can create a custom action with one or more action steps.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag and drop pills from the Data panel or select them from the pill picker.

Name

Data type: *String*

Name part of a name-value pair. Enter a value or use a data pill to produce a dynamic payload.

Value

Data type: *String*

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Value part of a name-value pair. Enter a value or use a data pill to produce a dynamic payload. You can use a complex object pill to populate a row with an object data type, but doing so deletes any children the complex object pill already has.

Type

Data type: *Choice*

Data type for the name-value pair. If you're using a data pill for the name or value, make sure the data type for the pill matches the data type selected here. The options are:

- **String**
- **Object**
- **Number**
- **Boolean**
- **Array**

For arrays and objects, use the plus icon () to add name-value pairs to the array or object.

In case of empty value

Data type: *Choice*

Option to specify what to do if a name-value pair has an empty or null value.

- **Leave as is**: Keeps the empty or null value as an empty string.
- **Omit property**: Excludes a name-value pair if the value is empty or null.
- **Set as null**: Returns an empty or null value as a null data type.
- **Throw error**: Returns an error if a name-value pair has an empty or null value.

Include Outer Structure

Data type: *True/False*

Option to include the curly braces for a top-level JSON container.

Omit Empty Structure

Data type: *True/False*

Option to omit an empty payload. Empty payloads can occur when you select **Omit property** for the **In case of empty value** input for every name-value pair and all name-value pairs in the payload produce empty values.

Structure

Data type: *Structure*

Read-only payload the step produces.

If this step fails

Data type: *Choice*

Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see Action error evaluation.

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Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your action.

Output

Data type: *String*

JSON payload as a string. If you want to use the payload as an object, you can use the JSON parser step to parse the string.

Step Status

Data type: *Object*

Object data pill containing runtime details about the step. Each step in an action returns a Step Status.

Step Status > Code

Data type: *Integer*

Integer data pill indicating whether the step produced an error. By default, a value of 1 indicates that the step produced an error. A value of 0 indicates that the step ran successfully. You can't customize these codes.

Step Status > Message

Data type: *String*

String data pill containing the error message produced by the step or system operation. You can't customize this message.

Generate a JSON Payload

Automatically generate a JSON payload with the **Add JSON for Payload** button. This button opens the Add Payload script editor where you can enter a JSON payload to be automatically de-serialized into structured input.

There are a few details to be aware of when using the JSON payload generator.

- If the JSON has empty keys, the payload is still generated.
- If there are duplicate keys in the script editor, the last key entry in the object overrides the value of any previous keys with the same name.
- If the root object is an array, the root array is wrapped into a root object.
- If an array contains multiple objects, all the keys in the objects are coalesced into one parent object.

The JSON payload generator doesn’t support the following.

- empty payloads
- non-complex object types
- invalid JSON
- empty root objects, such as an empty array
- payloads larger than 65,000 bytes

Note: Generating a JSON payload overrides any existing structures in the JSON Builder step.

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JSON parser step

Identify structured data from a JSON payload without having to write a script. Map incoming JSON content to a complex object output that you can use in other steps or actions. At runtime, values from a JSON payload populate the complex object output.

To learn more about complex objects, see Complex data.

Note: This step requires an Integration Hub subscription. For more information, see Legal schedules - Integration Hub overview. After the required plugin is activated, the step is visible under Integrations.

Roles and availability

Available as an Workflow Studio action step. Users with the action_designer role can create a custom action with one or more action steps.

Payload size limit

At runtime, JSON parser step supports payloads up to 10 MB. For larger payloads, create a Data Stream action. For more information on Data Stream actions, see Data Stream actions and pagination.

Fields

Field	Description
Source	In the **Source data** field, select or drag a data pill that contains the source JSON payload. For example, a REST step **Response Body** data pill. At runtime, values from the data source populate the complex object output. Under **Source data** and in the scripting window, enter an example payload to generate your complex object. For example, if parsing the response from a REST step that returns a list of users, enter the expected JSON object for a single user. You can create any example JSON payload with the following limitations: • Multidimensional arrays are not supported. • Hyphens, periods, spaces, double colons, and the @ symbol in JSON keys are not supported. • Your example payload can't exceed 2 MB.
Structured Payload View	View your example payload as regular JSON, or toggle **Structured Payload View** to view the payload in a structured node tree. Select a node in the tree to copy the element's JSONPath. If you add new elements in the **Target** field manually, you can paste this JSONPath under an element's advanced options.
Generate Target	Select **Generate Target** to create the step's output structure from your example payload. Your output data structure appears in the **Target** field. Child elements for each object are automatically generated as type String. Alternatively, you can manually create your target complex object by adding elements in the **Target** field.
Target	View or edit the JSON payload's output structure. Create a structured output by clicking **Generate Target**, or manually add elements.

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Field	Description
	Each element contains the following information in the Edit Object view: • **Label**: Data pill label. By default, the system uses the JSON key name. • **Name**: Internal name for the output element. **Note:** Exclamation marks, double colons, the @ symbol, or numbers only aren't valid values for an element's name. • **Type**: Data type, which must be String, Object, Array.String, or Array.Object. The top-level element must be an Object. • **Mandatory**: Toggle to make the element required. This only applies to elements of type String. • **Add child item**: Select the add child item icon (⊕) to add a nested child element. Elements of type Object contain the **Save as Template** advanced option, which allows you to save your object's structure as a complex object template. You can then use this template to define the schema of an Object output for your action. For elements of type String, you can also add a max length, hint, and default value as advanced options. In the Target header, select **Exit Edit Mode** when you're done making changes to your output's structure. You can then select the toggle advanced inputs icon (⌄) to view the **JSONPath** option. The JSONPath is the path to the element. Modify the JSONPath to change how your source data elements map to elements in your output. If manually adding elements, you can copy the JSONPath from a node in your example payload and paste it under an element's advanced options.

JSON parser step example

This example tracks newly created problems from a production instance as defects in a test instance. First, create a new action named *`Parse Problems from Production`*. Add a REST step to retrieve a list of problems from the production instance. Then, add the JSON parser step to parse the REST step's *`Response Body`* and provide a complex object output that represents the Problem [problem] table's schema. Finally, create an action output of type Object named *`Problems from Production`*. Drop the *`root`* data pill from the JSON parser step into this output's value field.

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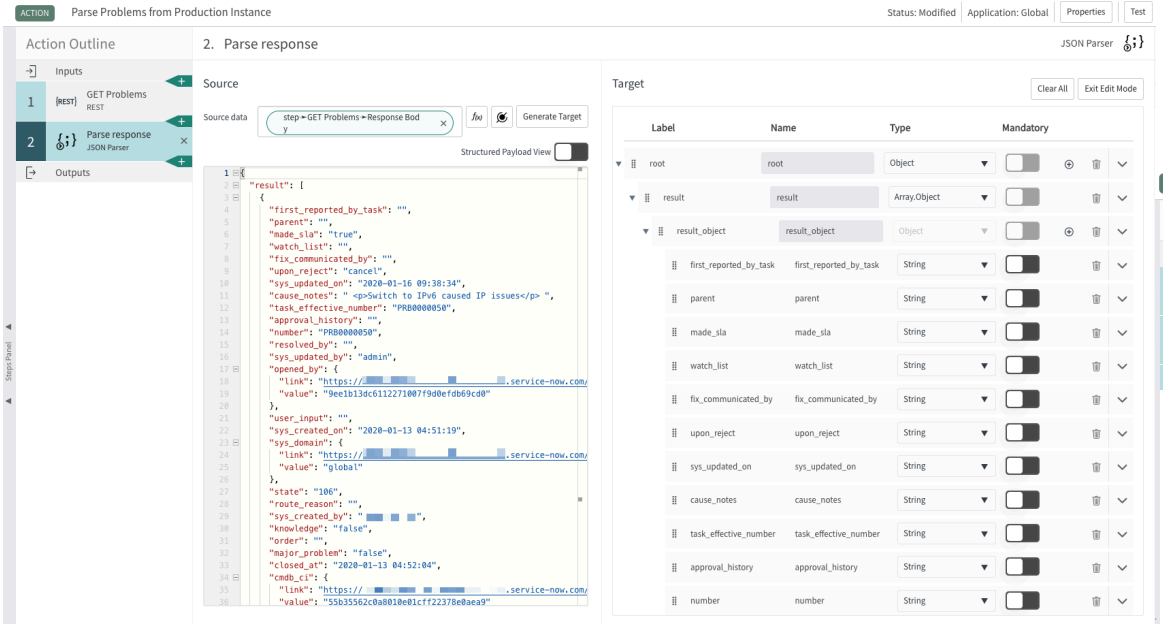
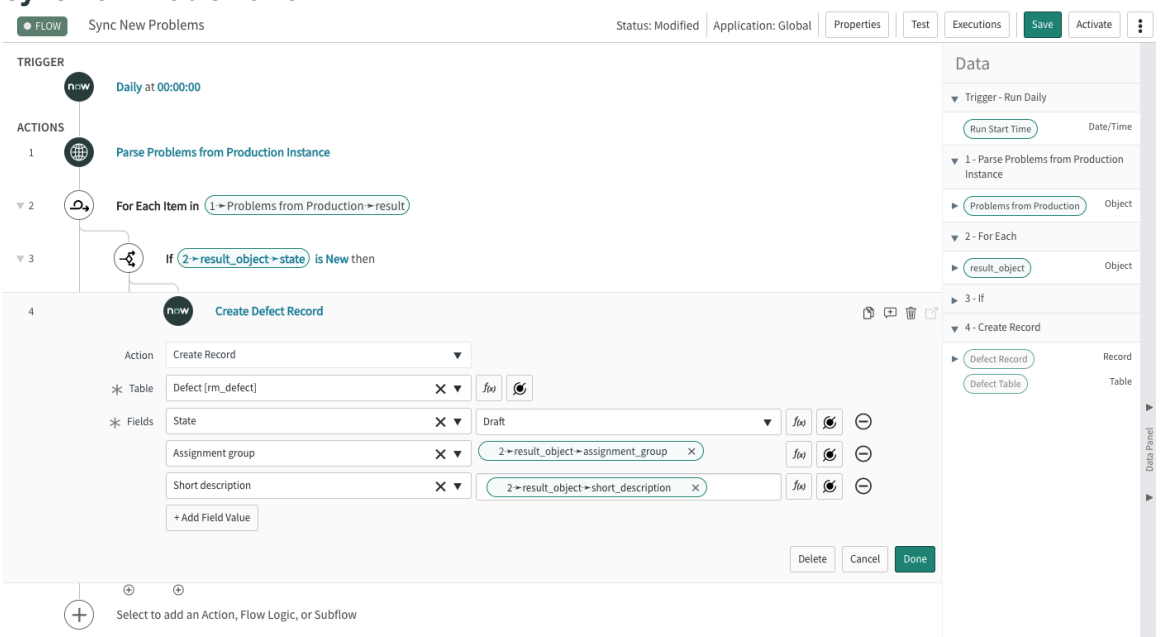
Parse Problems from Production action



Next, create a new flow named *Sync New Problems*, which is triggered daily at midnight. The first action in the flow is the *Parse Problems from Production* action. Then, add a *For Each* flow logic block and drop the **Problems from Production** > **response** data pill into the **Item** field. Within the **For Each** block, add an *If* flow logic block that checks if each problem's state is new, then creates a defect record in the test instance whose assignment group and short description is mapped to each new problem from the production instance.

Sync New Problems flow



Payload Builder step

Enable action designers to easily create name-value pairs in JSON and XML payloads using dynamic data.

Roles and availability

Available as an Workflow Studio action step. Users with the action_designer role can create a custom action with one or more action steps.

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Note: For JSON, this step is deprecated and replaced by the JSON Builder step.

Fields

Fields	Description

Name Value Pairs	The name-value pairs to include in the payload. Click the plus icon to add name-value pairs. Drag data pills into either field to produce dynamic payloads.
	
	The **Name** becomes a key in JSON and an element in XML. For example, suppose you create this name-value pair.
	
	• **Name**: `short_description`
	• **Value**: `[action]->[short_description]`
	
	When the system formats the name-value pair as JSON:
	
	`"short_description": "[action]->[short_description]"`
	
	When the system formats the name-value pair as XML:
	
	`<short_description>[action]->[short_description]</short_description>`

Omit if empty	The option to exclude a name-value pair if the value is empty or null. **Note:** This field is only visible after clicking the down arrow to display advanced options.
Output Format	The payload file format. • **JSON**: Select to format the payload as a JSON document. • **XML**: Select to format the payload as an XML document.
Namespace	The XML namespace to apply to each element. For example, when the namespace is set to `incident`: `<incident:short_description>[action]->[short_description]</incident:short_description>` **Note:** This field is only visible when the **Output Format** is set to **XML**.
Include Outer Structure	The option to include or exclude a top level container appropriate to the output format. When the **Output Format** is JSON, curly braces contain the name-value pairs. When the **Output Format** is XML, a specified XML element contains the name-value pairs. For example, when the system formats the name-value pair as JSON: `{ "short_description": "[action]->[short_description]" }` When the system formats the name-value pair as XML:

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Fields	Description
	<xml> <short_description>[action]->[short_description]</short_description> </xml>
Send Empty Structure	The option to send valid JSON or XML structures when the payload is empty. Enable this option to include JSON or XML structural text in the payload. For example, when the system formats an empty structure as JSON: {} When the system formats an empty structure as XML: <xml></xml> Disable this option to produce an empty payload. Empty payloads can occur when you select the **Omit if empty** option for every name-value pair, and all name-value pairs in the payload produce empty values.
Parent Node	The name of the XML element that contains the name-value pairs. The default parent node element is `xml`. **Note:** This field is only visible when the **Output Format** is set to **XML** and the option to **Include Outer Structure** is enabled.
Preview	The read-only payload the step produces.

Action error evaluation

If this step fails

Data type: *Choice*

Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see Action error evaluation.

PowerShell step

Run PowerShell scripts on remote machines from your ServiceNow instance through a MID Server.

PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications. ServiceNow supports PowerShell 3.0 to 7.4. PowerShell 3.0 does not support Windows 2003 Server.

Note: This step requires an Integration Hub subscription. For more information, see Legal schedules - Integration Hub overview.

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PowerShell version

By default, Integration Hub supports PowerShell versions 3.0 to 5.1. To use a newer version, add the MID Server property *mid.property.ihub.prefer_powershell6Plus* and set it to `true`.

Note: PowerShell version 6.0 or later is not pre-installed on MID Servers. You must install the newer PowerShell version manually. Both the earlier versions (PowerShell 3.0 to 5.1) and the newer versions (PowerShell 6.0 to 7.4) can co-exist on the same MID Server. Test your Integration Hub and custom PowerShell scripts to ensure everything works before upgrading to a newer version of PowerShell.

Roles and availability

Available as an Workflow Studio action step. Users with the action_designer role can create a custom action with one or more action steps.

Fields

Field	Description
Connection	Type of connection to use. • **Define Connection Inline**: Define connection information within the action step. • **Use Connection Alias**: Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see Introduction to credentials, connections, and aliases.
Connection Alias	Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. **Note:** This field is available when **Use Connection Alias** is selected from the Connection list.
Credential Alias	Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The

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Field	Description
	credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. **Note:** This field is available when **Define Connection Inline** is selected from the Connection list.
Host	Specify the fully-qualified domain name of the target host where the system runs the action step. For example, host.domain.com. **Note:** This field is only visible when the **Connection** is **Define Connection Inline**.
Port	Specify the communications port on which the target host listens for connections. For example, 5985. Leave blank to use the default port. **Note:** This field is only visible when the **Connection** is **Define Connection Inline**.
MID Selection	Option to select a specific MID Server or MID Cluster. Choose any one of the following options. • **Auto-Select MID Server**: Your ServiceNow instance selects the MID Server without manual input. • **Specific MID Server**: Your ServiceNow instance uses MID Server that you specify. • **Specific MID Cluster**: Your ServiceNow instance uses the MID Cluster that you specify. A MID Cluster is a group of MID Servers that enables your ServiceNow instance to handle multiple integrations, and improve integration speed. For more information, see Configure a MID Server cluster. This field is available when **Define Connection Inline** is selected from the Connection list.
MID Application	Specify the application the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected application. If you use a data pill for this field, the pill must reference the MID Application's name, not the MID Application record. This field is available when **Define Connection Inline** is selected from the Connection list and **Auto-Select MID Server** is selected from the MID Selection list.
Capabilities	Capabilities the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected capabilities. This field is available when **Define Connection Inline** is selected from the Connection list and **Auto-Select MID Server** is selected from the MID Selection list.
MID Server	Data pill containing a sys_id reference to a MID Server [ecc_agent_list] record. This field is available when **Define Connection Inline** is selected from the Connection list and **Specific MID Server** is selected from the MID Selection list.

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Field	Description
MID Cluster	Data pill for the MID Cluster you want to use. This field is available when **Define Connection Inline** is selected from the Connection list, and **Specific MID Cluster** is selected from the MID Selection list.
Remoting Type	The location where the PowerShell script runs such as the MID or a remote server. • **Explicit Remoting (Most Common)**: Establish a connection with and run the script on a remote server. • **Implicit Remoting (Advanced)**: Run a script on a MID Server while importing necessary modules from a remote server. If selected, define the **Remote name prefix** and **Modules to import** fields. For optimal performance, only import modules necessary to the step. If blank, all available modules are imported from the server. • **Run on a MID Server or have your script establish a remote session**: Run a script directly on a MID Server, or define remoting specifications within the script. This value is the default. **Note:** To invoke a function in a PowerShell script command or PowerShell script file, the command must define the function param block if the function has input parameters. This requirement applies to explicit and implicit remoting. For additional information on param block, see Microsoft's documentation on Windows Powershell parameters at https://technet.microsoft.com/.
Remote name prefix	The file path, excluding file names, to the modules to load from the remote server. **Note:** This field is only visible when the **Remoting Type** is **Implicit Remoting (Advanced)**.
Modules to import	The comma-separated list of modules to import from the remote server at the defined file path. **Note:** This field is only visible when the **Remoting Type** is **Explicit Remoting (Most Common)** or **Implicit Remoting (Advanced)**.
Test PowerShell Step	Button to test the configured credential for the PowerShell step. For more information, see Test a credential for the PowerShell step.
Script type	The type of script to run on the PowerShell host. • **Inline script**: Enter the script to run in the **Command** field of the step. • **MID Server Script File**: Select the PowerShell script to run from the MID Server Script Files [ecc_agent_script_file] table. This is the default value and separates scripting logic from the action, enabling you to update the script without having to modify and redeploy the action.

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Field	Description
MID Server Script	Pre-defined PowerShell script from the MID Server Script Files table [ecc_agent_script_file]. **Note:** This field is only available if the **Script type** is **MID Server Script File**.
Script path	Read-only path to the selected MID Server script. **Note:** This field is only visible when the **Script type** is **MID Server Script File**.
Input variables	The optional name-value pairs that represent the values of PowerShell script variables. You can use action inputs and data from other steps within the PowerShell script. Define the following fields for each variable: • **Name**: The name of the script variable to pass a value to. The name cannot match a reserved or prohibited PowerShell variable. Some variable names are reserved for internal processing and should not be used as input variables. See **Reserved variables** in **PowerShell scripting variables**. • **Type**: The type of PowerShell variable. Select plain text, encrypted, or boolean. If encrypted is selected, the value appears in plain text in this field and is only encrypted when it passes to the ECC Queue. • **Value**: The value to map to the variable. Manually enter a value, or drag a data pill into the field.
Command	The inline PowerShell script to run on the target host. **Note:** This field is only visible when the **Script type** is **Inline script**.

Action error evaluation

If this step fails

Data type: *Choice*

Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see Action error evaluation.

PowerShell scripting variables

To access input variables from the **Command** field, you must call them using special syntax. The syntax you use depends on the value of a system property. If the **Remoting Type** is **Run on a MID Server or have your script establish a remote session**, some reserved variables are available in addition to input variables.

Input variable syntax

By default, prefix variable names with a *$* character. For example, if an input variable is named **message**, use *$message* to access the variable in script.

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If the *mid.powershell.command.script.parameter_passing* parameter is set to false, prefix the variable name with *$env:SNC_*.
For example, if an input variable is named **message**, use *$env:SNC_message* to access the variable in script. To learn more about the *mid.powershell.command.script.parameter_passing* parameter, see MID Server parameters.

Reserved variables

When the **Remoting Type** is **Run on a MID Server or have your script establish a remote session**, the following variables are available for use in script. Reserved variables cannot be used as custom input variable names.

Reserved variable	Description
$computer	Host IP address defined in the Connection alias record.
$cred	Credential object that contains the credentials defined in the connection record. Use this variable with any PowerShell cmdlet that supports the credential parameter. For example, `New-PSSession -credential $cred`.
$log_info	If the *mid.property.powershell.log_info* property is set to true, adds logging information to a PowerShell script.

The following variable names are reserved for internal processing and should not be used as input variables.

- *script*
- *useCred*
- *isMid*
- *isDiscovery*
- *debug*
- *user*
- *password*
- *executingScriptDirectory*
- *midScriptDirectory*
- *hresult*

Configure logging for the PowerShell step

Add log messages to the scripts in your PowerShell step. Use log levels for improved logging and debugging.

Before you begin

To add log messages to your script, you will need to use the *Write-SNCLog* function. This function is defined in the IH\Logging.psm1 module. Use PSScript.ps1 to import this module so inline scripts have access to *Write-SNCLog*. For more information, see MID Server PowerShell files.

Role required: admin

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Procedure

1. Navigate to **All** > **MID Server** > **Properties**.
2. Set *mid.property.powershell.log_info* to **true**.
   This property enables or disables logging. For more information, see PowerShell log property.
3. Set *mid.property.powershell.ih.log_level* to the desired log level.
   The log level specifies the threshold required to log a message. Messages are logged at the specified level or higher. For example, if this property is set to WARN, then messages with a level of WARN or ERROR are logged. Messages with a level of INFO, DEBUG, or TRACE are not logged. The levels, listed from low to high, are:
   - TRACE
   - DEBUG
   - INFO
   - WARN
   - ERROR

   The default value is INFO.
4. **Optional:** Configure a system property so that you can view the logs in the instance.
   a. Navigate to **All** > **Process Automation** > **Flow Designer** > **Properties**.
   b. Find **Specify the log level of system log entries to replicate to the flow log. The system only replicates log entries of the specified level or higher** and set it to **INFO** or **DEBUG**.

   (Optional) After the you build and execute the PowerShell script, the logs are available in the MID agent log. Configuring this property also enables you to view them directly in the instance.

   This step sets the *com.glide.hub.flow_engine.listener_trace.threshold* property. It replicates the logs to the Flow engine log entries [sys_flow_log] table.
5. In your PowerShell script, add log messages and levels with the *Write-SNCLog* function.

Write-SNCLog function and parameters

Name	Description
Write-SNCLog function	Log a message for the PowerShell step. *Write-SNCLog* has two parameters, *-Level* and *-Message*. Both parameters are required, but the parameter names are not. If the names are omitted, the position is used to determine the level and message. Examples: ○ `Write-SNCLog -Level WARN -Message "log warning"` ○ `Write-SNCLog WARN "log warning"` Both of these examples log `WARN: log warning`.
-Level parameter	Specify the level for the log message. Valid values are: ○ ERROR ○ WARN ○ INFO ○ DEBUG ○ TRACE This parameter is required.

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Name	Description
- *Message* parameter	Specify the message to log. Entered as a string. This parameter is required.

6. Continue building your action or flow, then test and run it.

What to do next

The new logs are available in the MID agent log and can be downloaded from the MID Server. For more information, see Download the MID Server files.

If you set the system property to view the logs in the instance, you can see them in the **Flow engine log entries** tab of the Flow engine context record. For more information, see Flow execution details.

Test a credential for the PowerShell step

Test a configured credential in the PowerShell step. Confirm the credential is working before building the rest of your step.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Open the action with the PowerShell step that has the credential you want to test.
   If you don't have a PowerShell step you're already working with, you can Create an action with a new PowerShell step.
3. In the Connection Details section, enter the connection information.
4. Click **Test PowerShell Step**.
5. If the step has data pills as input, provide the required input in the **Step input pills** field.
6. Click **Run Test**.

Result

When the test completes, you can view information about the tested credential in the Test Results section. This section shows the username and target for the credential, its validation status, and any error messages.

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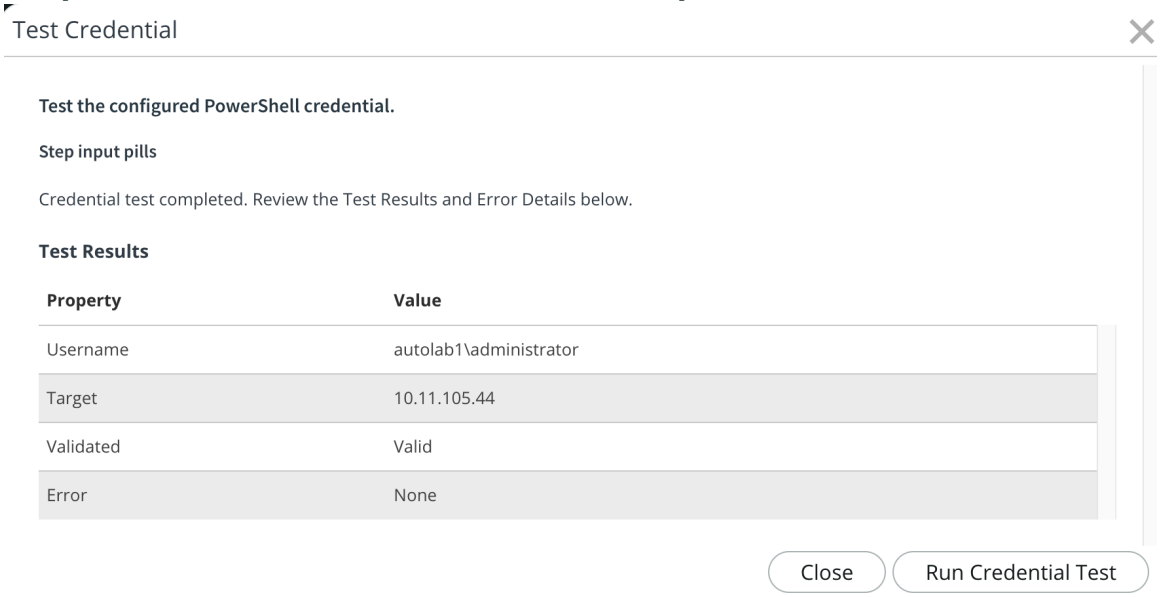
Sample result of credential test in the PowerShell step



REST step

Send an outbound REST web service request to an external system.

Note: REST step is not available in the base system and requires the ServiceNow® Integration Hub subscription. After the required plugin is activated, the step is visible under Integrations.

Outbound REST web service is a platform feature that enables you to retrieve, create, update, or delete data on a web services server that supports the REST architecture.

Roles and availability

Available as an Workflow Studio action step. Users with the action_designer role can create a custom action with one or more action steps.

Fields

Field	Description
Connection	Type of connection to use. • **Define Connection Inline**: Define connection information within the action step. • **Use Connection Alias**: Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see Introduction to credentials, connections, and aliases.
Connection Alias	Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role

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Field	Description
	can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. **Note:** This field is available when **Use Connection Alias** is selected from the Connection list.
Credential Alias	Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. **Note:** This field is available when **Define Connection Inline** is selected from the Connection list.
Use MID	Option to use a ServiceNow® MID Server to run the REST step. Select this check box to display the **MID Application** and **Capabilities** fields. **Note:** The system doesn't log REST request, response, and parameter runtime data sent via a MID server in the same way that Outbound web services logging occurs. Instead, you can view this data in the Flow execution details.
Base URL	Base URL for the REST request. • If **Use Connection Alias** is selected, this field displays the base URL associated with the alias. You can override the base URL by clicking the lock icon (🔒) and entering your own. • If **Define Connection Inline** is selected, enter a base URL for the connection.
Test REST Step	Button to test the REST step. To test, select the **Test REST Step** button. Enter any required input values and select the **Run Test** button. After the test runs, any step outputs or error messages are displayed in the Test Results section of the test window.
Connection Timeout	Number of milliseconds the system waits for a successful host connection. If the step does not make a successful connection during this time, the connection request times out. If **Define Connection Inline** is selected, enter a timeout value for the

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Field	Description
	connection. Leave this field empty to use the system default connection timeout value. **Note:** Avoid setting the **Connection Timeout** value to zero, as this may cause a stale connection.
MID Selection	Option to select a specific MID Server or MID Cluster. Choose any one of the following options. • **Auto-Select MID Server**: Your ServiceNow instance selects the MID Server without manual input. • **Specific MID Server**: Your ServiceNow instance uses MID Server that you specify. • **Specific MID Cluster**: Your ServiceNow instance uses the MID Cluster that you specify. A MID Cluster is a group of MID Servers that enables your ServiceNow instance to handle multiple integrations, and improve integration speed. For more information, see Configure a MID Server cluster. This field is available when **Define Connection Inline** is selected from the Connection list, and **Use MID** is checked.
MID Application	Capabilities the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected capabilities. This field is available when **Define Connection Inline** is selected from the Connection list, **Use MID** check box is enabled, and **Auto-Select MID Server** is selected from the MID Selection list.
Capabilities	Capabilities the MID Server must support to be eligible for selection. The system runs the action step from a MID Server that supports the selected capabilities. This field is available when **Define Connection Inline** is selected from the Connection list, **Use MID** check box is enabled, and **Auto-Select MID Server** is selected from the MID Selection list.
MID Server	Data pill of the required MID Server. This field is available when **Define Connection Inline** is selected from the Connection list, **Use MID** check box is enabled, and **Specific MID Server** is selected from the MID Selection list.
MID Cluster	Data pill for the MID Cluster you want to use. This field is available when **Define Connection Inline** is selected from the Connection list, **Use MID** is checked, and **Specific MID Cluster** is selected from the MID Selection list.
Build Request	Option to create the request manually, import an OpenAPI Specification, or import a REST message. • **Manually**: Create action inputs and complete the REST step form manually. • **From OpenAPI specification**: Import an OpenAPI Specification to generate action inputs and complete the

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Field	Description
	REST step form. For more information, see OpenAPI support in the REST step. • **From REST Message**: Import a Platform REST message. For more information, see Import a REST message into a REST step.
API Source	Option to select an OpenAPI Specification used to construct the request, or select **Import OpenAPI** to import a new OpenAPI Specification. You can import specifications by providing a URL to the YAML or JSON, or copying and pasting content. **Note:** This field is available when you select **From OpenAPI specification** from the Build Request list.
API Operation	Option to select an operation from the list. Available operations are provided by the OpenAPI Specification in the **API Source** field. **Note:** This field is available when you select **From OpenAPI specification** from the Build Request list.
REST Message	Name of the REST message to import. Select a REST message from the list. **Note:** This field is available when you select **From REST Message** from the Build Request list.
REST Message Function	Name of the function to import from REST message. The available options are determined by the HTTP methods associated with the selected REST message. **Note:** This field is available when you select **From REST Message** from the Build Request list.
Import REST Message	Button to import the REST message. **Note:** This field is available when you select a REST message from the **REST Message** field.
Resource Path	Path for the resource.
HTTP Method	HTTP method used to process the request. • **GET** • **POST** • **PUT** • **PATCH** • **DELETE**

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Field	Description
Query Parameters	Name-value pairs to pass to the REST endpoint. You can create these parameters manually, or drag input variables into the parameter fields, and then assign a value. Support REST step requests that contain duplicate query parameter names. If you create a REST request that contains duplicate query parameter names, Workflow Studio adds the query parameters to the request in the same order as you defined them. **Note:** When importing an OpenAPI Specification, the system adds all parameters and headers present in the specification to the REST step. Review the final REST step values and remove parameters you do not want to send in the request. For example, if the API accepts content type headers for both JSON and XML, the system adds both headers to the REST step. Remove one of the headers depending on the content type you want to receive in the response.
Headers	Headers to send with the request. You can create headers manually, or drag input variables into the parameter fields, and then assign a value. Support REST step requests that contain duplicate request headers. If you create a REST request that contains duplicate request headers, the headers are sent in the same order as you defined them. **Note:** When importing an OpenAPI Specification, the system adds all parameters and headers present in the specification to the REST step. Review the final REST step values and remove parameters you do not want to send in the request. For example, if the API accepts content type headers for both JSON and XML, the system adds both headers to the REST step. Remove one of the headers depending on the content type you want to receive in the response.
Request Type	Format of the request. Options include. • **Text**: A request in JSON, XML, or other text format. • **Binary**: A request in a binary file format. • **Multipart**: A request consisting of multiple content types. • **Form URL-Encoded**: A request in a URL-encoded query. **Note:** This field is editable when the **HTTP Method** is **POST**, **PUT**, **PATCH**, or **DELETE**.
Request Body [Text]	Body of the request in JSON or XML format. The flow execution details display the response body as either a link to the embedded text viewer or the sys_id of the attachment record containing the response.

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Field	Description
	Note: This field is editable if you select **Text** from the Request Type list.
Attachment	Attachment record that contains the request. You can look up or create this record in a prior step and define it as an input variable. Create it by using the JSONStreamingBuilder and XMLStreamingBuilder APIs in the Script step. **Note:** This field is available when you select **Binary** from the Request Type list.
Name, Part Type, Value	Content of a multipart request. For each part, specify its name, part type, and value either using the fields individually or using an inline script for all the parts. You can specify the multipart values by clicking the toggle scripting icon ( ) and editing the script. For more information about inline scripting, see Inline scripts. • **Name**:The name of the part. It can be any valid string. • **Part Type**: The type of the part. Select either **Text** or **File**. ○ **Text**:The text for the part. Once **Text** is selected, you can specify the content type. ○ **File**:The file for the part. When **File** is selected, the **Value** must be the sys_id of the attachment record containing the content. You can look up this record in a prior step or define it as an input value. Once **File** is selected, you can specify the file name and content type. ▪ For **Set Filename**, select **From Attachment** to use the attached record's file name, or select **From Filename input** to enter your own. ▪ For **Set Content Type**, select **From Attachment** to use the attached record's content type, or select **From Content Type input** to enter your own. • **Value**: The content of the part. For text, the value is the text content. For a file, the value is the sys_id of the attachment record containing the content. **Note:** These fields are available when you select **Multipart** from the Request Type list.
Name, Value	Content of a form URL-encoded request. Specify each part of the URL-encoded request with a name-value pair using the fields individually or using an inline script for all parts. You can specify the form URL-encoded values inline script by clicking the toggle scripting icon( ) and editing the script. For more information about inline scripting, see Inline scripts.

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Field	Description
	Note: This field is available when you select **Form URL-Encoded** from the Request Type list.
Enable Retry Policy	Option to enable the retry policy. For more information, see Retry policy.
Override Default Policy for Alias	Option to override the default retry policy. This check box is not applicable when **Define Connection Inline** is selected from the Connection list.
Retry Policy	Default retry policy associated with **Connection Alias**. If **Override Default Policy for Alias** is selected, you can override the default retry policy and select another existing retry policy based on your requirement.
Save As Attachment	Option to specify whether to save the response as a record in the Attachment [sys_attachment] table.
Attachment File Name	Name of the attachment created by the REST response. For example, `rest-response.txt`. **Note:** This field is available when **Save As Attachment** is selected.
Attachment File Record	Target record to which the attachment is associated. The target record must be a data pill of type **Record**. For example, a specific incident record. You can look up this record in a prior step or define it as an input variable. The flow execution details display the sys_id of the associated record. **Note:** This field is available when **Save As Attachment** is selected.

Action error evaluation

If this step fails

Data type: *Choice*

Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see Action error evaluation.

REST response size limits

By default, the system limits the size of REST responses that are not saved as attachments to 5 MB. Direct REST responses that exceed this limit generate an error. To support larger response sizes, either save the response as an attachment or increase the response size limit with the *glide.pf.rest.response_payload_max_size* system property. This system property supports a maximum value of 10240 KB, which limits the REST response to 10 MB in size.

Parsing a REST response

REST API calls return data in the Response Body. The response body data is usually structured in JSON or XML format. You can use a Script step to parse the structured data into variables

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to use elsewhere in the action or in a flow. There is also an XML parser step to parse a response body that's in an XML format.

The general strategy to get extracted data from the response is to do the following.

1. Review the response body to select the data to return.
2. Create input and output variables in the Script step.
   - Create an input variable to pass in the Response Body from the REST step.
   - Create output variables to return data from the response.
3. Create a script to parse and map data.
   - Use the `JSON.parse()` method in a Script step to parse a JSON response body.
   - Map the parsed data to the output variables.
4. Create action outputs for the output variables to make the data available to a flow.

For a detailed example, see the section on Parsing a REST Response in the REST in IntegrationHub developer training (Zurich).

Import a REST message into a REST step

Transfer data from an existing Platform REST message into a REST step.

Before you begin

- This import is done from within a REST step in Workflow Studio. To create a REST step, Create an action and add a REST step to it.
- The REST step uses Connection and Credential aliases for authentication details. If your REST message stores authentication details, create a Connection and Credential alias for them. For more information, see Create a Connection and Credential alias.
- Role required: admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. On the Workflow Studio landing page, select **Actions** and open the action that has the REST step you want to use for the import.
3. In the REST step, locate the **Build Request** field and select **From REST Message**.
4. In the **REST Message** field, select the REST message to import.
5. In the **REST Message Function** field, select the function.
   The available options are determined by the HTTP methods associated with the selected REST message.
6. Select the **Import REST Message** button.
   The Import ServiceNow REST Message window displays the data from the selected REST message.
7. Select the **Configure step** button.

Result

The data from the REST message is loaded into the REST step. No future changes to the REST message are copied to the derivative REST steps. Rather than maintain two versions of your REST logic, you should only maintain and update the REST step.

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If the imported REST message has a MID Server configured in any of its functions, the **Use MID** check box in the Connection Details section is checked and a data pill provided for the MID Server.

What to do next

Fill in any other required fields and test the step with the **Test REST step** button.

OpenAPI support in the REST step

Populate REST step fields and action inputs with information imported from an OpenAPI Specification. Import specifications by providing a URL to the YAML or JSON, or copying and pasting content.

Benefits

OpenAPI support in the REST step offers these benefits.

- Use information imported from an OpenAPI Specification to configure REST step operations, HTTP methods, parameters, request body, path, and headers.
- Review available API operations without leaving the Flow Designer interface.
- Generate inputs required for the REST step to send valid requests to an OpenAPI service and add them to the REST step in the correct location.

Note: Always review REST step values imported from an OpenAPI Specification before sending a request. Remove parameters, headers, and inputs that the API does not require.

Generated inputs

When you import an OpenAPI Specification, the system creates any required inputs and adds them to the REST step form where appropriate. At runtime, the system sends a REST request that contains input values provided to the action. For example, if an API requires a name parameter passed in the request, the system creates a **name** input and adds it to the REST step. When you add the action to the flow, name becomes an input to the action.

The system maps OpenAPI data types to Workflow Studio data types. For example, if the OpenAPI Specification requires a user object, then the system creates a complex data object as input. For more information, see Complex data.

Specification size limit

By default, the system can import OpenAPI Specifications up to 10 MB. To increase the import size, update the *glide.rest.openapi.max_request_size* system property. The maximum value is 100 MB.

Specification management

Import an OpenAPI Specification by selecting options in the REST step. For more information, see REST step. Importing an OpenAPI Specification creates a record in the OpenAPIs [sys_openapi] table. You can view or delete specification records directly from this table. To update a specification, delete it and import it again.

Design considerations

Create a REST step from an OpenAPI Specification with these considerations in mind.

Remove unnecessary REST step parameters

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When importing an OpenAPI Specification, the system adds all parameters and headers present in the specification to the REST step. Review the final REST step values and remove parameters you do not want to send in the request. For example, if the API accepts content type headers for both JSON and XML, the system adds both headers to the REST step. Remove one of the headers depending on the content type you want to receive in the response.

Make input labels user-friendly

Ensure that input labels required for the REST step are clear and understandable. Clear labels enable flow designers to easily understand the required inputs when using the action in a flow.

Remove inputs that do not require flow designer configuration

When importing an OpenAPI Specification, the system adds all inputs present in the specification to the action input section. Remove any inputs that do not require a flow designer to configure. For example, if a REST step variable receives a value from another step in the action, an action input is not required.

Avoid changing the API operation

Changing the value of the **API Operation** field removes all values dependent on that operation. If you configure the OpenAPI Specification values in the REST step form, then change the operation, the system does not save your configuration. Values that are entered manually by a user are not affected.

Limitations

Create a REST step from an OpenAPI Specification with these limitations.

Request body media types

The request body only supports JSON and XML-based media types. If the selected operation from the imported OpenAPI Specification contains a request body with a different media type, the system adds a data pill of type String to the **Request body** field.

OpenAPI 3.0 components

OpenAPI 3.0 adds new components to Swagger 2.0 to describe an API in further detail. OpenAPI support in the REST step supports some, but not all of these components. The REST step does not currently support these components.

- Schema Object: oneOf, anyOf properties
- Discriminator Object
- Info object: termsOfService, contact, license fields
- Example Object
- Link Object
- Callback Object
- Security Scheme Object
- Security Requirements Object
- Tag Object
- External Documentation Object
- Server Object

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- Specification extensions
- Recursive references

More information on these components is available in the OpenAPI documentation. See OpenAPI Specification.

SOAP step

Enable action designers to send outbound SOAP web service requests to external systems.

Note: SOAP step is not available in the base system and requires the ServiceNow® Integration Hub subscription. After the required plugin is activated, the step is visible under Integrations.

Roles and availability

- Available as an Workflow Studio action step. Users with the action_designer role can create a custom action with one or more action steps.
- Action designers need the web_service_admin role to perform these web services tasks.
  - Select WSDL
  - Load new WSDL
  - Select a WS-Security policy

Fields

Field	Description
Connection Details	
Connection	The type of connection to use. • **Define Connection Inline**: Define connection information within the action step. • **Use Connection Alias**: Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see Introduction to credentials, connections, and aliases.
Connection Alias	Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action

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Field	Description
	in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. **Note:** This field is available when **Use Connection Alias** is selected from the Connection list.
Credential Alias	Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. **Note:** This field is available when **Define Connection Inline** is selected from the Connection list.
Use MID	Option to use a MID Server to run the SOAP step. Select this check box to display the **MID Selection**,**MID Application**, and **Capabilities** fields. **Note:** This field is available when **Use Connection Alias** is selected from the Connection list.
Endpoint	The URL endpoint for the SOAP request. If **Use Connection Alias** is selected, this field is read-only and displays the endpoint URL associated with alias. If **Define Connection Inline** is selected, enter an endpoint URL for the connection.
Test SOAP Step	Button to test the SOAP step. To test, select the **Test SOAP Step** button. Enter any required input values and select the **Run Test** button. After the test runs, any step outputs or error messages are displayed in the Test Results section of the test window.

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Field	Description
Connection Timeout	Number of milliseconds the system waits for a successful host connection. If the step does not make a successful connection during this time, the connection request times out. If **Define Connection Inline** is selected, enter a timeout value for the connection. Leave this field empty to use the system default connection timeout value. **Note:** Avoid setting the **Connection Timeout** value to zero, as this may cause a stale connection.
MID Selection	Option to select a specific MID Server or MID Cluster. Choose any one of the following options. • **Auto-Select MID Server**: Your ServiceNow instance selects the MID Server without manual input. • **Specific MID Server**: Your ServiceNow instance uses MID Server that you specify. • **Specific MID Cluster**: Your ServiceNow instance uses the MID Cluster that you specify. A MID Cluster is a group of MID Servers that enables your ServiceNow instance to handle multiple integrations, and improve integration speed. For more information, see Configure a MID Server cluster. This field is available when **Define Connection Inline** is selected from the Connection list, and **Use MID** is checked.
MID Cluster	Data pill for the MID Cluster you want to use. This field is available when **Define Connection Inline** is selected from the Connection list, **Use MID** is checked, and **Specific MID Cluster** is selected from the MID Selection list.
Request Details	
Build Envelope	The method to use when building the SOAP envelope. • **From WSDL**: Select this option to display the **Select a WSDL** and **Operation** fields. • **Manually**: Select this option to manually enter or paste WSDL text.
Select a WSDL	The WSDL to use to build the SOAP envelope. Select an existing WSDL record or click **Load New WSDL** to download or manually enter a

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Field	Description
	WSDL file. The selected WSDL populates the values of the **Operation**, **SOAP action**, and **SOAP Envelope** fields. **Note:** This field is available when you select **From WSDL** from the Build Envelope list.
Load New WSDL	Option to download or manually enter a WSDL file.
Operation	The operation to run from the selected WSDL. Each WSDL has its own list of available operations.
SOAP Action	The URL to run the SOAP action. If **Build Envelope** is set to **From WSDL**, this field is read-only and displays the URL to run SOAP action. If **Build Envelope** is set to **Manually**, enter a URL to run the SOAP action.
Request Type	Format of the request. Options include. • **Text**: A request in JSON, XML, or other text format. • **Binary**: A request in a binary file format.
SOAP Envelope	The XML text sent to the endpoint. If **Build Envelope** is set to **From WSDL**, the system adds the necessary XML for the **Operation** that you select. If **Build Envelope** is set to **Manually**, enter the XML text that you want to use. Enter record values in the appropriate SOAP envelope elements. For example, enter an incident short description in the `<short_description>` element. **Note:** This field is available when the **Request Type** is **Text**.
Attachment	Attachment record that contains the request. You can look up or create this record in a prior step and define it as an input variable. Create it by using the JSONStreamingBuilder and XMLStreamingBuilder APIs in the Script step. **Note:** This field is available when the **Request Type** is **Binary**.
Reset Envelope	Option to discard all manual changes that you made to the SOAP envelope. Select this check box to revert the SOAP envelope to its original state.

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Field	Description
	Note: This field is available when you select **From WSDL** from the Build Envelope list.
New WSDL	
Name	The name of the WSDL record you want to create.
Import Method	The method to enter WSDL. • **Download from URL**: Select to display the **WSDL URL**, **User name**, and **Password** fields to retrieve the WSDL from an external source, typically the web service provider. • **Manually Populate WSDL Content**: Select to display the **WSDL Content** field to manually enter or paste WSDL text.
WSDL URL	The URL to the SOAP web service. **Note:** This field is available when you select **Download from URL** from the Import Method list.
User name	The user name to authenticate with the SOAP web service. **Note:** This field is available when you select **Download from URL** from the Import Method list.
Password	The password to authenticate with the SOAP web service. The system always masks passwords in the user interface and prevents exporting them as plain text. **Note:** This field is available when you select **Download from URL** from the Import Method list.
WSDL Content	The XML document describing the SOAP web service and its operations. **Note:** This field is available when you select **Manually Populate WSDL Content** from the Import Method list.
Import	Option to add the SOAP web service WSDL to the instance.
WS-Security	

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Field	Description
Enable WS-Security Policy	Option to restrict the SOAP web service to a security policy. Select this check box to display the **Policy** field.
Policy	The policy record that you want to use to restrict web service connections. Select an existing policy record.
Retry Policy	
Enable Retry Policy	Option to enable the retry policy. For more information, see Retry policy.
Override Default Policy for Alias	Option to override the default retry policy. This check box is not applicable when **Define Connection Inline** is selected from the Connection list.
Retry Policy	Default retry policy associated with **Connection Alias**. If **Override Default Policy for Alias** is selected, you can override the default retry policy and select another existing retry policy based on your requirement.
Advanced Options	
Headers	The name-value pairs to include in the SOAP message as HTTP headers. Use the plus icon to add headers. Add a **Name** and **Value** for each HTTP header.
Headers > **Omit if empty**	Option to exclude a header if the value is empty or null. **Note:** This check box is available after clicking the down arrow to display the advanced options.

Action error evaluation

If this step fails

Data type: *Choice*

Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see Action error evaluation.

SOAP response size limit

The system limits the size of SOAP responses to 5 MB. Direct SOAP responses that exceed this limit generate an error. To support larger response sizes, increase the response size limit with the *glide.pf.soap.response_payload_max_size* system property. This system property supports a maximum value of 10 MB.

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OpenAPI/Postman step

Import the OpenAPI specification or a Postman collection of a third-party outbound REST web service and build an integration to the web service. The request details for the underlying REST API operation are derived from the OpenAPI specification or Postman collection.

For JSON output response body, the system creates a complex data object output from the OpenAPI specification or Postman collection.

Note: OpenAPI/Postman step is not available in the base system and requires the ServiceNow® Integration Hub subscription. After the required plugin is activated, the step is visible under Integrations.

Roles and availability

Available as an Action Designer action step. Users with the action_designer and open_api_admin, or admin roles can create a custom action with one or more action steps.

Fields

Field	Description
Connection Alias	Connection & Credential alias record that the system uses to run the action step. Users with the action_designer and connection_admin, or admin roles can select an associated Connection alias record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases.
Base URL	Base URL from the Connection Alias for the REST request.
Toggle Advanced View	Option to view or hide the request details. When enabled, you can view and configure the resource path, HTTP method, query parameters, headers, and action outputs of the request.
API Source	Option to select an API from the list of available imported APIs.
Import Spec	Option that allows you to import an OpenAPI (v2.0 or v3.0) specification or a Postman collection (version 2.0.0 or 2.1.0). You can import an OpenAPI specification or Postman collection by providing a URL and credentials to the specification or collection, or manually copying and pasting JSON content.

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Field	Description
API Operation	Option to select an operation from the list. Available operations are provided by the OpenAPI Specification or Postman collection in the **API Source** field.
Save As Attachment	Option to specify whether to save the response as a record in the Attachment [sys_attachment] table.
Resource Path	Path for the resource.
HTTP Method	HTTP method used to process the request. • **GET** • **POST** • **PUT** • **PATCH** • **DELETE**
Query Parameters	Name-value pairs to pass to the REST endpoint. You can create these parameters manually, or drag input variables into the parameter fields, and then assign a value. Support REST step requests that contain duplicate query parameter names. If you create a REST request that contains duplicate query parameter names, Workflow Studio adds the query parameters to the request in the same order as you defined them. **Note:** When importing an OpenAPI Specification, the system adds all parameters and headers present in the specification to the REST step. Review the final REST step values and remove parameters you do not want to send in the request. For example, if the API accepts content type headers for both JSON and XML, the system adds both headers to the REST step. Remove one of the headers depending on the content type you want to receive in the response.
Headers	Headers to send with the request. You can create headers manually, or drag input variables into the parameter fields, and then assign a value. Support REST step requests that contain duplicate request headers. If you create a REST request that contains duplicate request

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Field	Description
	headers, the headers are sent in the same order as you defined them. **Note:** When importing an OpenAPI Specification, the system adds all parameters and headers present in the specification to the REST step. Review the final REST step values and remove parameters you do not want to send in the request. For example, if the API accepts content type headers for both JSON and XML, the system adds both headers to the REST step. Remove one of the headers depending on the content type you want to receive in the response.
Attachment	Attachment record that contains the request. You can look up or create this record in a prior step and define it as an input variable. Create it by using the JSONStreamingBuilder and XMLStreamingBuilder APIs in the Script step. **Note:** This field is available when you select **Binary** from the Request Type list.
Enable Retry Policy	Option to enable the retry policy. For more information, see Retry policy.
Override Default Policy for Alias	Option to override the default retry policy. This check box is not applicable when **Define Connection Inline** is selected from the Connection list.
Retry Policy	Default retry policy associated with **Connection Alias**. If **Override Default Policy for Alias** is selected, you can override the default retry policy and select another existing retry policy based on your requirement.

Action error evaluation

If this step fails

Data type: *Choice*

Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see Action error evaluation.

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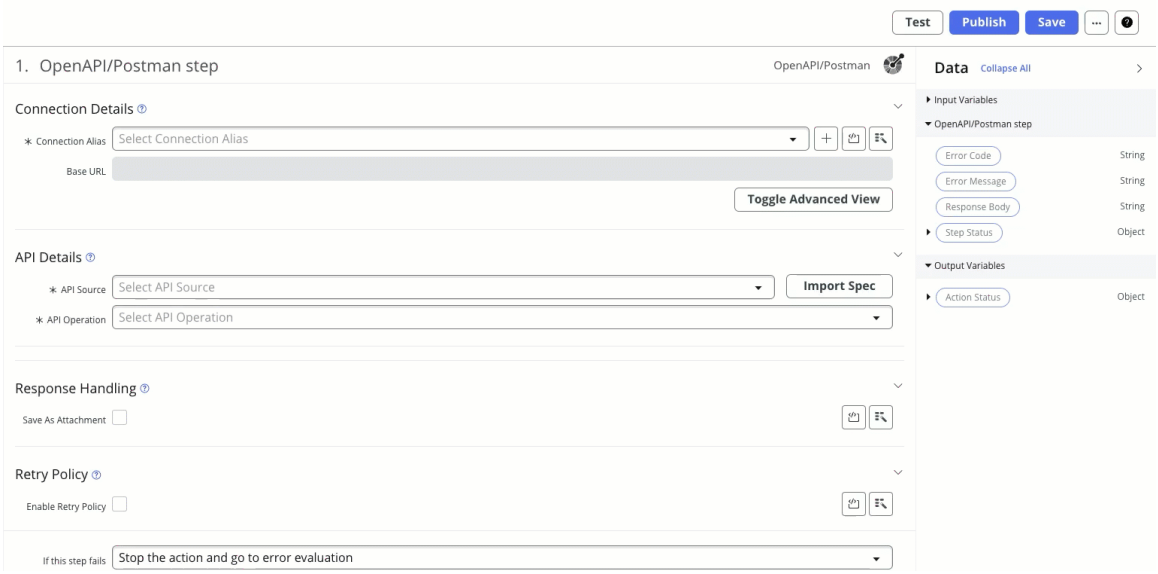

Action error evaluation

If this step fails

Data type: *Choice*

Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see Action error evaluation.

Known limitations

Create a OpenAPI step from an OpenAPI Specification with these limitations.

Request body media types

The request body only supports JSON media types.

Note: A string type output object is created when the OpenAPI schema has additionalProperties or no properties.

OpenAPI 3.0 components

OpenAPI 3.0 adds new components to Swagger 2.0 to describe an API in further detail. OpenAPI support in the OpenAPI step supports some, but not all of these components. The OpenAPI step does not currently support these components.

- Schema Object: additionalProperties properties
- Discriminator Object
- Info object: termsOfService, contact, license fields
- Example Object
- Link Object
- Callback Object
- Security Scheme Object
- Security Requirements Object
- Tag Object

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- External Documentation Object
- Server Object
- Specification extensions
- Recursive references

More information on these components is available in the OpenAPI documentation. See OpenAPI Specification.

Maximum number of operations supported

The number of API operations is limited to 500 by default. However, using the system property *glide.rest.openapi.max_operation_limit*, you can configure the number of operations from 1 through 1000.

SSH step

The SSH step executes SSH commands on an external *nix system through a ServiceNow® MID Server. The step also stores scripts and commands for the *nix systems.

Note:

- This step requires an Integration Hub subscription. For more information, see Legal schedules - Integration Hub overview.
- Integration Hub supports ServiceNow SSH only.

Roles and availability

The SSH step is available as an Workflow Studio action step. Users with the action_designer role can create a custom action with one or more action steps.

Sanitizing inputs

Escape all user inputs to eliminate the possibility of a malicious user executing arbitrary commands on your target server. Escape and validate data pills before the command field uses them by sanitizing arguments using Sanitize shell arguments transform functions. This transform function category automatically appears when a data pill is dropped into the **Command** input.

Fields

Field	Description
Connection Details	
Connection	Type of connection to use. • **Define Connection Inline**: Define connection information within the action step. • **Use Connection Alias**: Define connection information using the Connection Alias table. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using

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Field	Description
	an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see Introduction to credentials, connections, and aliases.
Connection Alias	Connection & Credential alias record that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using an action in multiple environments. Likewise, if the connection information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when **Use Connection Alias** is selected from the Connection list.
Credential Alias	Credential alias that the system uses to run the action step. Users with the flow_designer or admin role can create or select an associated Connection record. Using an alias eliminates the need to configure multiple credentials when using an action in multiple environments. Likewise, if the credential information changes, you don't need to update your custom action. To learn more about connections and credentials, see credentials, connections, and aliases. The credential value is displayed as a Password (2 Way Encrypted) data pill on the data panel. This field is available when **Define Connection Inline** is selected from the Connection list. **Note:** The SSH step requires a credential record that supports either SSH private key credentials or SSH credentials. This step does not support Windows credentials where the **Use MID Server service account** option is selected.
Host	Host name or IP address of the target server. This field is available when **Define Connection Inline** is selected from the Connection list.

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Field	Description
Port	Port number to communicate with the server. This field is available when **Define Connection Inline** is selected from the Connection list. **Note:** Provide valid value between `1` and `65535`. If you provide any other value, the value will be set `22` by default.
MID Selection	Option to select a specific MID Server or MID Cluster. Choose any one of the following options. • **Auto-Select MID Server**: Your ServiceNow instance selects the MID Server without manual input. • **Specific MID Server**: Your ServiceNow instance uses MID Server that you specify. • **Specific MID Cluster**: Your ServiceNow instance uses the MID Cluster that you specify. A MID Cluster is a group of MID Servers that enables your ServiceNow instance to handle multiple integrations, and improve integration speed. For more information, see Configure a MID Server cluster. This field is available when **Define Connection Inline** is selected from the Connection list.
MID Application	Option to use a MID Server to run the SSH step. This field is available when **Define Connection Inline** is selected from the Connection list and **Auto-Select MID Server** is selected from the MID Selection list.
Capabilities	Capability of the MID Server. Select **SSH**. This field is available when **Define Connection Inline** is selected from the Connection list and **Auto-Select MID Server** is selected from the MID Selection list.
MID Server	Data pill of the required MID Server. This field is available when **Define Connection Inline** is selected from the Connection list and **Specific MID Server** is selected from the MID Selection list.
MID Cluster	Data pill for the MID Cluster you want to use. This field is available when **Define Connection Inline** is selected from the Connection list, and **Specific MID Cluster** is selected from the MID Selection list.
SSH Configuration	

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Field	Description
Working Directory	Optional target directory on the target host where the command is run.
Command	Command that runs on the target directory. The command can also include MID Server scripts. See Advanced SSH script options for more information. **Note:** Escape and validate data pills before the command field uses them by sanitizing arguments using a preprocessing Script step. For more information, see Sanitizing arguments using the escape class and function.
Long Running	Option to disable the SSH connection timeout for commands that might take longer than the default time of 120 seconds to run. When selected, the engine detaches from the execution thread until completion.
Sudo Mode	Option to elevate privileges to execute the script.

For more information, see SSH credentials.

Action error evaluation

If this step fails

Data type: *Choice*

Option to continue running the next step or go to error evaluation. To use the step status code or message for a custom action error condition, see Action error evaluation.

Advanced SSH script options

To run a MID Server script on the target host, specify the script type and pass the name of the script into the `${syncFile()}` parameter. The system uses this parameter to locate the named script in the MID Server Script File [ecc_agent_script_file] table and run it on the target host. For example, a bash script can be expressed as:

```
bash ${syncFile("<MID script name>")} argument1 argument2
 argument3
```

A base script (`main_script.bash`) can reference another script (`my_include.bash`) as well as a separate file (`.my_profile`) located on the target host. Both scripts and the file referenced must be synced to the MID Server, using the `${syncFile()}` parameter, to execute properly.

```
source ${syncFile(".my_profile")}
cp ${syncFile("my_include.bash")} /usr/ssmith/my_include.bash
bash ${syncFile("main_script.bash")} one two three four five six
rm /usr/ssmith/my_include.bash
```

A Python example with inline comments might look like this:

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```
set $LIB_DIR=/usr/bin;.
# Sync a file that is referenced inside myF5CreateLBPool.py
cp ${syncFile("specialFunctions.py")} ~/specialFunctions.py
# set up environment variables
source ${syncFile(".python_profile")}
# call script that sets up dependencies on the box from remote
 package repos
python ${syncFile("setupPythonDependencies.py")} pycontrol
# call a script that requires functions from the package as well
 as a function from myIncludedFile
python ${syncFile("myF5CreateLBPool.py")} snow_pool
 myActualValue
# user is responsible for their own cleanup
rm ~/specialFunctions.py
```

To see the list of available MID Server scripts, navigate to **MID Server** > **Script Files**.

XML parser step

Identify structured data from an XML payload without having to write script. Map incoming XML elements to a complex object output that you can use in other steps or actions. At runtime, values from an XML payload populate the complex object output.

To learn more about complex objects, see Complex data.

Note: This step requires an Integration Hub subscription. For more information, see Legal schedules - Integration Hub overview. After the required plugin is activated, the step is visible under Integrations.

Roles and availability

Available as an Workflow Studio action step. Users with the action_designer role can create a custom action with one or more action steps.

Payload size limit

At runtime, XML parser step supports payloads up to 10 MB. For larger payloads, create a Data Stream action. For more information, see Data Stream actions and pagination.

At design time, XML parser step supports sample payloads up to 64,000 characters.

Fields

Field	Description
Source	In the **Source data** field, select or drag a data pill that contains the source XML data. For example, a REST step **Response Body** data pill. At runtime, values from the data source populate the complex object output. Under Source data and in the scripting window, enter an example payload to generate a complex object. For example, if parsing the response from a REST API step that returns a list of users, enter the expected XML for a single user. This field accepts XML with the following limitations:

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Field	Description
	• XML namespaces are not applied to the complex object. More than one namespace in an XML file is not supported and generates an error message. • Multidimensional arrays are not supported. • Some special characters are not supported, such as hyphen and period. Double colons (::) are not supported in attribute values. • Payloads larger than 2 MB cannot be saved and generate an error message. However, if working with a large example, you can generate the complex object and delete the example payload before saving the step.
Structured Payload View	Select a view for the example payload. • **Raw (edit mode)**: Displays editable XML. • **Structured**: Displays XML in a tree view. Click an element in the tree to copy the element XPath. If creating complex data in the **Target** field manually, you can paste the XPath into the target XPath field.
Generate Target	Select **Generate Target** to create the step's output structure from your example payload. Your output data structure appears in the **Target** field. Child elements for each object are automatically generated as type String. Alternatively, you can manually create your target complex object by adding elements in the **Target** field.
Target	View or edit the XML payload's output structure. Create a structured output by clicking **Generate Target**, or manually add elements. Each element contains the following information in the Edit Object view: • **Label**: Data pill label. By default, the system uses the XML element's name. • **Name**: Internal name for the output element. **Note:** Exclamation marks, double colons, the @ symbol, or numbers only aren't valid values for an element's name. • **Type**: Data type, which must be String, Object, Array.String, or Array.Object. The top-level element must be an Object. • **Mandatory**: Toggle to make the element required. This only applies to elements of type String. • **Add child item**: Select the add child item icon (⊕) to add a nested child element. Elements of type Object contain the **Save as Template** advanced option, which allows you to save your object's structure as a complex object template. You can then use this template to define the schema of an Object output for your action. For elements of type String, you can also add a max length, hint, and default value as advanced options.

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Field	Description
	In the Target header, select **Exit Edit Mode** when you're done making changes to your output's structure. You can then select the toggle advanced inputs icon ( ) to view the **XPath** option. The XPath is the path to the element. Modify the XPath to change how source data elements map to complex data variables. If manually adding complex data variables, you can copy the XPath from the **Payload view** field and paste it in a complex data variable XPath field to ensure the correct hierarchy. Conditional XPath expressions are not supported.

REST API trigger

Start a flow from an inbound API call or webhook from an external system. Configure the trigger start conditions without having to write or maintain custom code.

For example, you can create a flow that starts when a third-party IT ticket tracking system sends an inbound request to the instance. You can then parse the data from the inbound REST request into a complex data object and use the values to open an Incident on your instance.

Once you activate the flow, the endpoint that you created appears in the API explorer under the namespace you created. You can use this page to help define the webhook in your third-party system and to test your flow.

To learn more about flow triggers, see Workflow Studio trigger types.

Note:

- Use the REST API Trigger to start flows from REST calls from external systems. To start a flow from a script or API call from the same instance, use a subflow, code snippet, or Workflow Studio API. See API access to Workflow Studio and Create code snippets for flows, sub-flows, and actions.

- ServiceNow has partnered with Boomi to deliver Boomi API Management, a cloud-based platform that enables customers to discover, manage, secure, and monetize their APIs. Boomi supports full lifecycle API management, including governance, analytics, and API security.

  Boomi provides documentation though their own portal, and customers requesting support with Boomi API Management will contact the Boomi support through their standard channels.

  To get started, see the Boomi API Management listing on the ServiceNow® Store, which includes information about entitlements and required plugins, as well as a link to the Boomi API Management documentation.

Available data pills

Depending on how you configure the endpoint, flow designers have access to these data pills from the trigger:

Path Parameters

An object containing path parameters in the inbound request.

Query Parameters

An object containing query parameters in the inbound request.

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Request Headers

An object containing headers in the inbound request.

Request Body

Complex data object that defines the body structure of the inbound request. For more information on complex objects, see Complex data.

When setting up the trigger, define what the inbound data will look like. You can then use the associated data pills within the actions in your flow. When the system receives an inbound request that starts the flow, it uses the runtime values sent in the request.

Create a flow using the REST API trigger

Create a flow that starts when a third-party system sends a REST request to your instance.

Before you begin

Role required: flow_designer or admin.

This feature requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Procedure

1. Open Workflow Studio and create a flow.

   See Create a flow.

   Keep in mind that the scope of your flow is included in the REST endpoint you create.

2. In the **TRIGGER** section, select the **REST API - Asynchronous** trigger.
3. In the **HTTP Method** field, set the HTTP method for the endpoint.
   Options include:
   - POST
   - GET
   - DELETE
   - PUT
   - PATCH
4. Create any path parameters required for the endpoint and add them to the relative path in the **Path** field.
   The relative path to the endpoint is in the format `/api/<flow-application-scope>/<flow-name>/<path-parameters>`.

   You can click **Copy** to copy the full path to the endpoint. Use this path when configuring the endpoint for the REST call in your third-party system.

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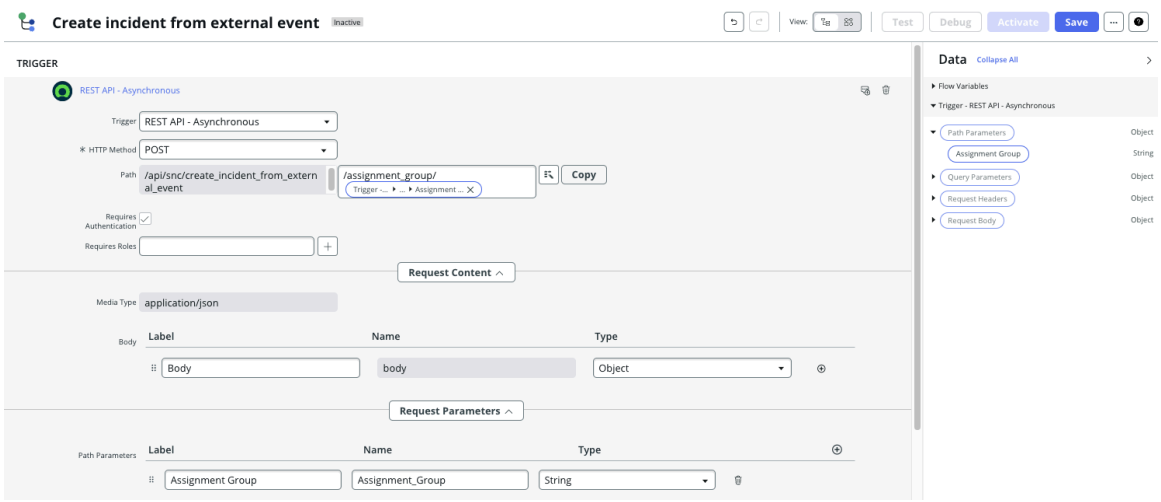
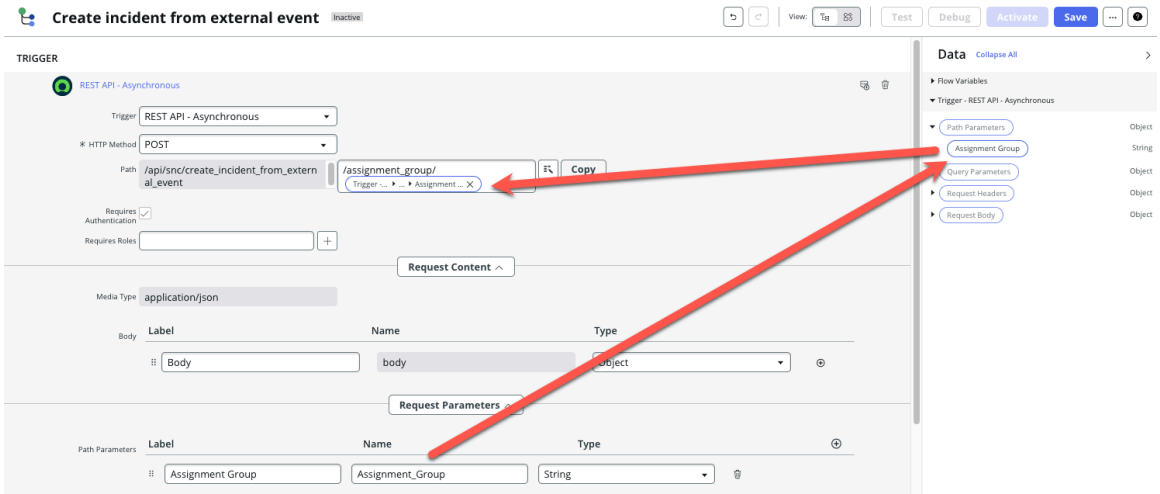


a. Create variables in the **Path Parameters** section.

b. Drag the data pill that represents the path parameter into the empty input in the **Path** field.

This field only accepts data pills from the **Path Parameters** section.



5. Select **Requires authentication** to require authentication headers in the inbound REST request.
6. If **Requires authentication** is selected, add the roles required to authorize the request in the **Requires roles** field.
7. In the **Body** field under the **Request Content** section, create a complex data object that defines the body structure of the inbound request.

   For more information on building a complex object, see Complex data.

   Note: The **Request Content** section only appears when the **HTTP Method** is POST, PUT, or PATCH.

   This example body finds the Description field in an inbound payload that contains ticket information from a third-party ticket-tracking system.

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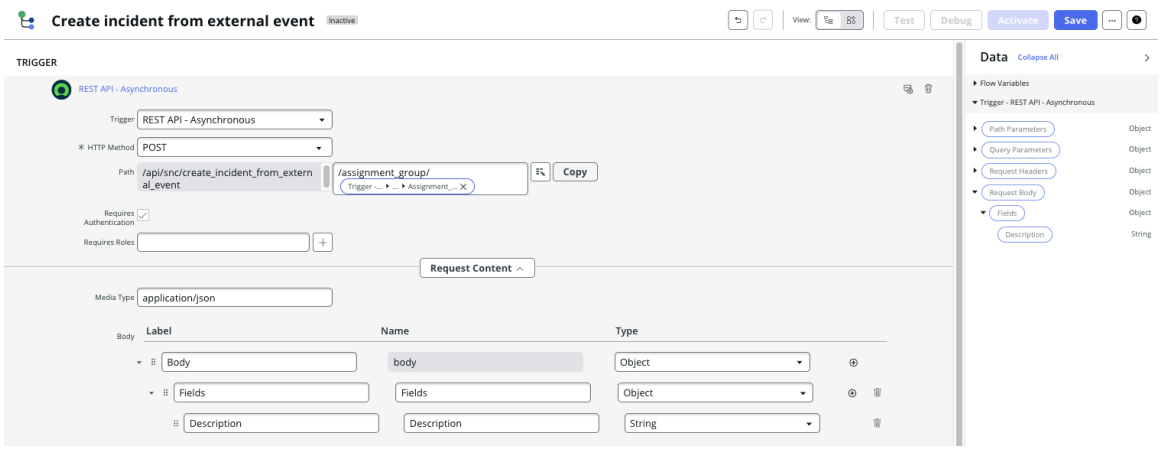
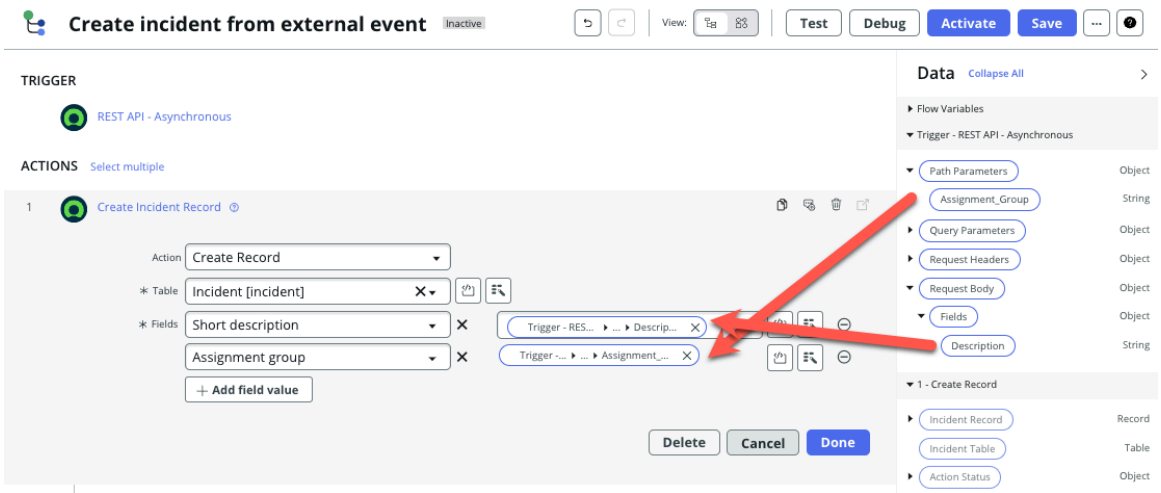


8. In the **Headers** field, define the headers to be sent in the inbound request.
   You can select **Required** to require that the inbound request include them.
9. In the **Query Parameters** field, define the query parameters to be sent in the inbound request.
   You can select **Required** to require that the inbound request include them.
10. Add actions to your flow that execute when the endpoint is called.

    You can use the data pills from the REST API trigger in your flow actions.

    This action creates an Incident record and maps the Description and Assignment Group fields from the incoming payload to the Incident.



11. Test and activate the flow.
    For more information, see Test a flow and Activate a flow.

    Once activated, the endpoint displays in the REST API Explorer. You can use this page to further test your endpoint, or configure the request from your third-party system.

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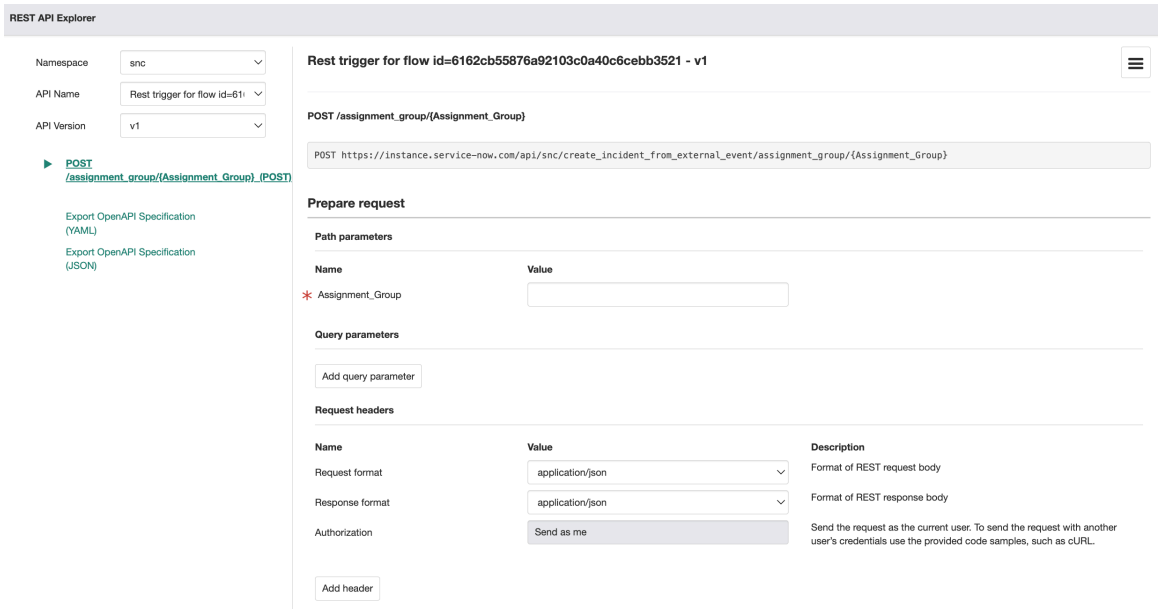

12. Configure the REST request from your third-party system.

Example

For example, you can send this cURL request to trigger the flow defined in previous steps.

```
curl
 "https:your-instance.servicenow.com/api/snc/create_incident_fr
om_external_event/assignment_group/287ebd7da9fe198100f92cc8d1d2
154e" \
--request POST \
--header "Accept:application/json" \
--header "Content-Type:application/json" \
--data "{
fields: {
   description: \"Major outage with data loss\"
   }
}" \
--user 'username':'password'
```

Result

The flow executes and the REST request returns the execution ID.

```
{
  "result": {
    "executionId": "ndoxeRhshDSezldeGfbYlviFSeFnBjCO"
  }
}
```

What to do next

Copy the execution ID in the result and navigate to the Executions tab in Flow Designer. You can filter by execution ID to locate the execution details and view the status of the execution.

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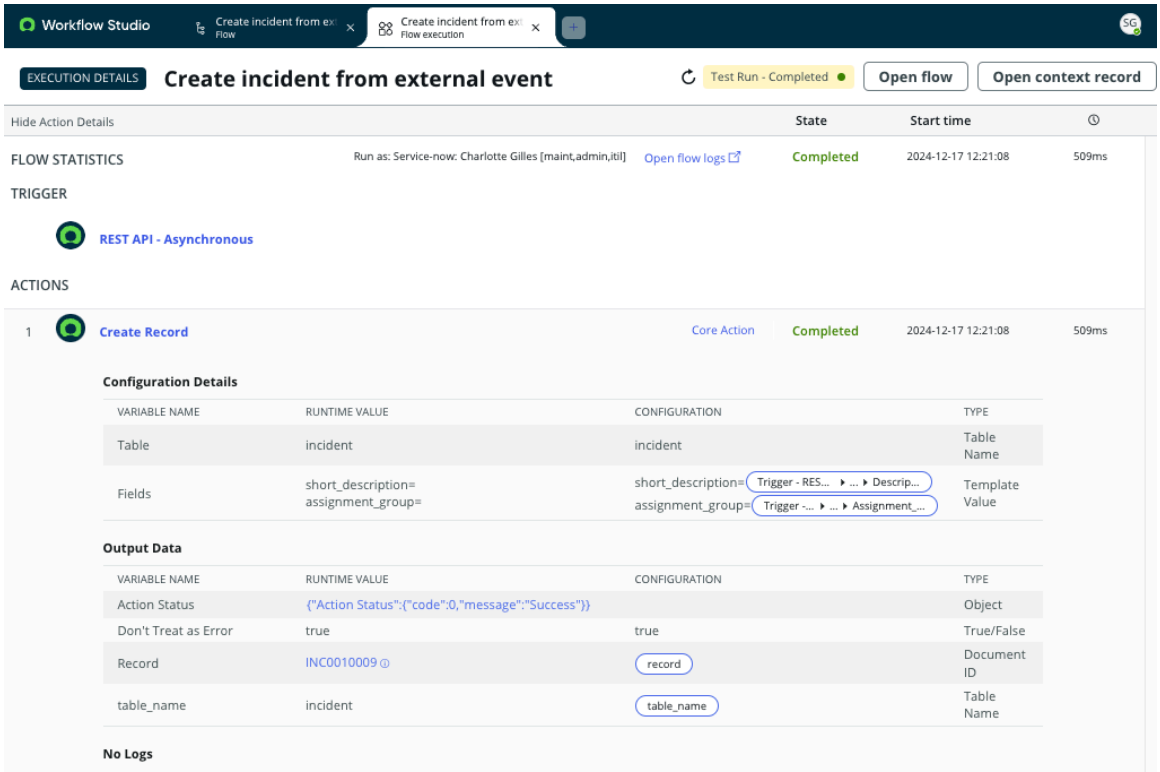

To troubleshoot issues, you can debug the REST query or check the flow execution details. See Debug REST queries and Flow execution details.

Password reset using Integration Hub

Create subflows in Integration Hub to automate and customize the password reset process for users managed by third-party applications such as Okta or Microsoft Entra ID.

Create subflows in Integration Hub to automate password reset processes. Use the Password Reset to enable an end user to use a self-service process to reset or change the password. Alternatively, your organization can implement a process that requires a service desk agent to reset passwords for end users. See Customize password reset processes and integrate third-party credential services for more information.

Password reset Integration Hubusage overview

Navigate to **Password Reset** > **Usage Overview** view the count of password reset transactions performed using Integration Hub for your instance.

Note: Admin must activate the Password Reset - Orchestration Add-on (com.glideapp.password_reset.addon.orchestration) plugin to view the dashboard.

Importing and streaming data in Integration Hub

Import data with Integration Hub - Import or stream data from your Apache Kafka environment with Stream Connect.

Import data with Integration Hub - Import

Integration Hub - Import enables you to configure, run, and schedule your data imports all through a single simplified interface.

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Integration Hub - Import consolidates multiple data integration capabilities into a single environment, eliminating the need to create and manage several forms throughout the platform. Its step-by-step experience guides you through the configuration of data sources, target tables, and data mapping. You can schedule your data imports or run them on demand.

Stream data with Stream Connect

Stream Connect links your Kafka environment to your ServiceNow instance, enabling you to stream data between your instance and your external systems.

Stream Connect is integrated with Workflow Studio, so you can build flows that produce and consume Kafka events. Stream Connect also provides several consumers that enable you to stream and process data with scripts or by using your existing RTE or transform map configurations.

Integration Hub - Import

Automate data import tasks through a consolidated interface that provides a guided, step-by-step experience. Define external data sources, specify target tables, map how source data becomes target data, and schedule regular imports.

Managing imports through Integration Hub simplifies the process of importing data from external sources and transforming it to ServiceNow tables. You can configure, run, and schedule your data imports all through a single interface.

You can access Integration Hub - Import directly through App Engine Studio to build data integrations for your custom applications. For more information, see Adding data in App Engine Studio.

Benefits

Managing your imports through Integration Hub provides these benefits.

- Consolidates multiple data integration capabilities into a single environment, eliminating the need to create and manage several forms throughout the platform.
- Enables you to manage multiple integrations through a single interface.
- Guides you through the configuration of data sources and target tables.
- Enables you to map and transform data from a single simplified interface.
- Enables you to schedule data imports or manually import data on demand.
- Provides usage information about data imports run and details about imported rows, updates, and errors.

Overview of the import process

There are three steps to importing data.

1. **Configure a data source.**

   The data source specifies how and where to get the data to import. In Integration Hub, the data source uses an Excel file, a CSV file, or a Data Stream action to get data from an external source. A Data Stream action sends a REST, SOAP, or JDBC request to an API and returns a stream of data.

2. **Map the data to the target tables.**

   The target tables are the tables that you want to transform the data to. After you've selected the target tables, you can specify how the source data should be

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transformed to them. Creating a data map outlines how to transform the data, the data isn't transformed until you run the import.

3. **Run or schedule the import.**

   After you've configured the data source and determined the data mapping, you can run the import. You can also schedule the import to run later. When the import runs, data is gathered from the source, moved to a staging table, and transformed to the target tables according to the specifications in your mapping.

For more details about how importing data works, see Import sets.

Integration Hub import environment

The Integration Hub import environment includes the following interfaces.

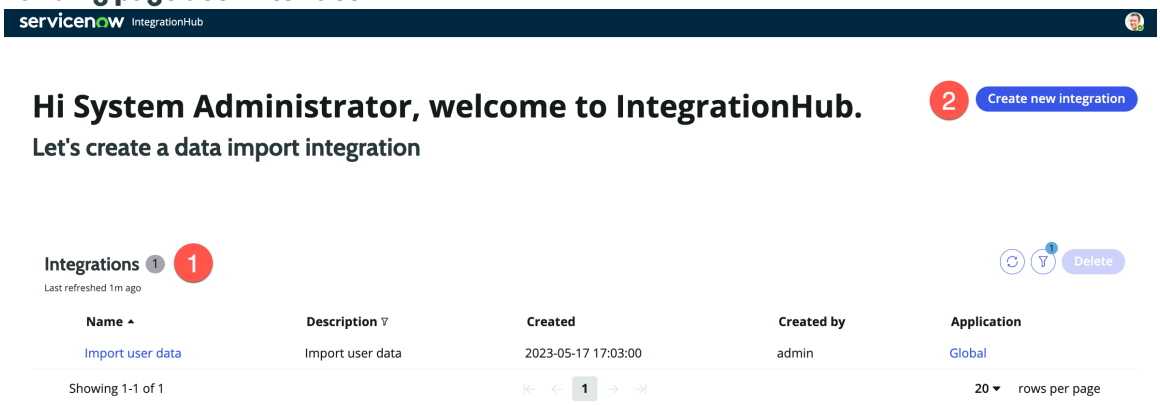
- Landing page
- Source configuration
- Map to target
- Schedule imports
- Execution details

The following sections explain each interface in greater detail.

Landing page

Create and access integrations through the landing page.

Landing page user interface



The landing page has these components.

1. **List of integrations**

   Integrations created through the Integration Hub import interface are accessible here.

2. **Create new integration button**

   Button to start building a new integration.

Source configuration

Define a data source for an import through the source configuration page. The data source must be an Excel file, a CSV file, or a Data Stream action.

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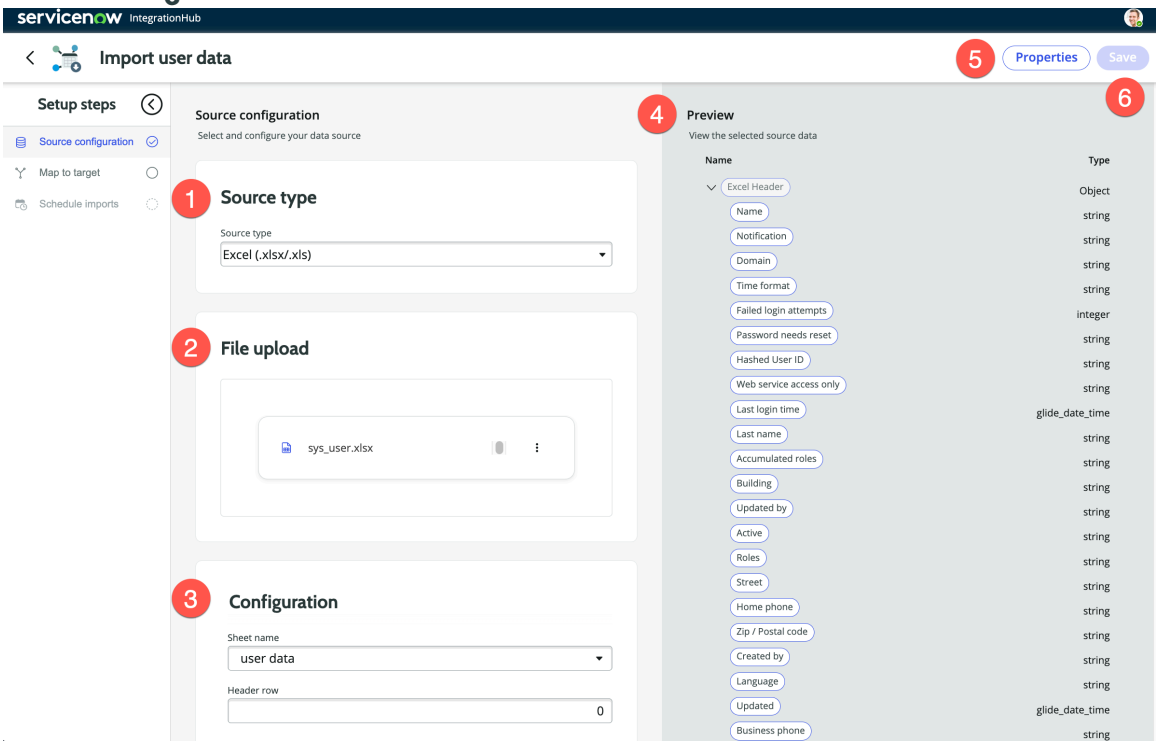
Source configuration section user interface



The source configuration section has these components.

1. **Source type selector**

   Menu to select the data source type. It has the following sections.

   - AD-HOC: Select an Excel or CSV file as a data source.
   - SPOKES: Select a Data Stream action as a data source. Displays active Data Streams organized by spoke and listed alphabetically.

2. **File upload or Connection section (the Connection section isn't shown)**

   If the data source is an Excel or CSV file, the File upload section appears here. You can drag a file over or browse to upload. Accepts XLSX, XLS, CSV, and ZIP files.

   If the data source is a Data Stream action, the Connection section appears here. For Data Stream actions that use a connection alias, you can override the default connection alias with any of its children's aliases. Select the connection alias from the menu. For more information, see Create a Connection and Credential alias.

3. **Configuration section**

   Section to configure the selected data source. The available fields depend on the type of data source that you're using.

   - For an Excel file, you can select the sheet and specify which row number to use for the header.
   - For a CSV file, select the delimiter.
   - For a Data Stream action, enter the inputs for it here. This section only appears if the Data Stream action has inputs. Data Stream actions with inputs have unique inputs, so the fields that appear here depend on which Data Stream action is selected and its configuration. Any default values already configured by the spoke inputs are pre-filled.

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4. Source data structure preview

Section that shows the structure of the source data. For an Excel or CSV file, the preview displays the column headers. For a Data Stream action, it displays the complex object output.

5. Properties button

Button to view the name of the integration, its description, and the application scope. You can edit the name and description at any time. The application scope can't be edited and must be selected when the integration is created.

6. Save button

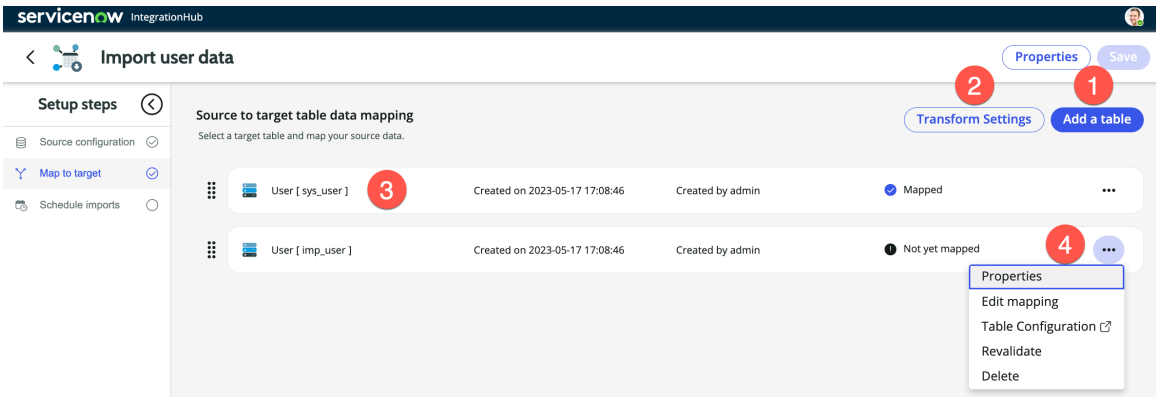
Button to save the source configuration. This button is only enabled when the source configuration is updated. When you select a source type, the structure of the source data is automatically loaded in the Source data structure preview pane. If you edit the source configuration, click **Save** to reload the source data. The data must be previewed at least once before you can map it to a target table.

Map to target

Select the target tables and determine how the source data is mapped to them. Map data by dragging data pills from the source to the target, using the pill picker, or selecting **Automap**. Transform the data in the target tables by applying transform functions.

The Map to target section has two parts. In the first part, select the target tables. In the second part, map the data to the target tables.

Table selection user interface



The table selection section has these components.

1. Add a table

Button to add target tables.

2. Transform Settings

Button to configure the transform settings for your integration. You can specify batch size and empty-field handling, enable verbose mode, or run a script before or after the integration. For more information, see Transform settings.

The **Transform Settings** button doesn't appear until you've added at least one target table.

3. Target table cards

Each card has the name of the target table, its creation details, and whether it's been mapped. Select the card to open the data-mapping interface.

4. Target table drop-down list

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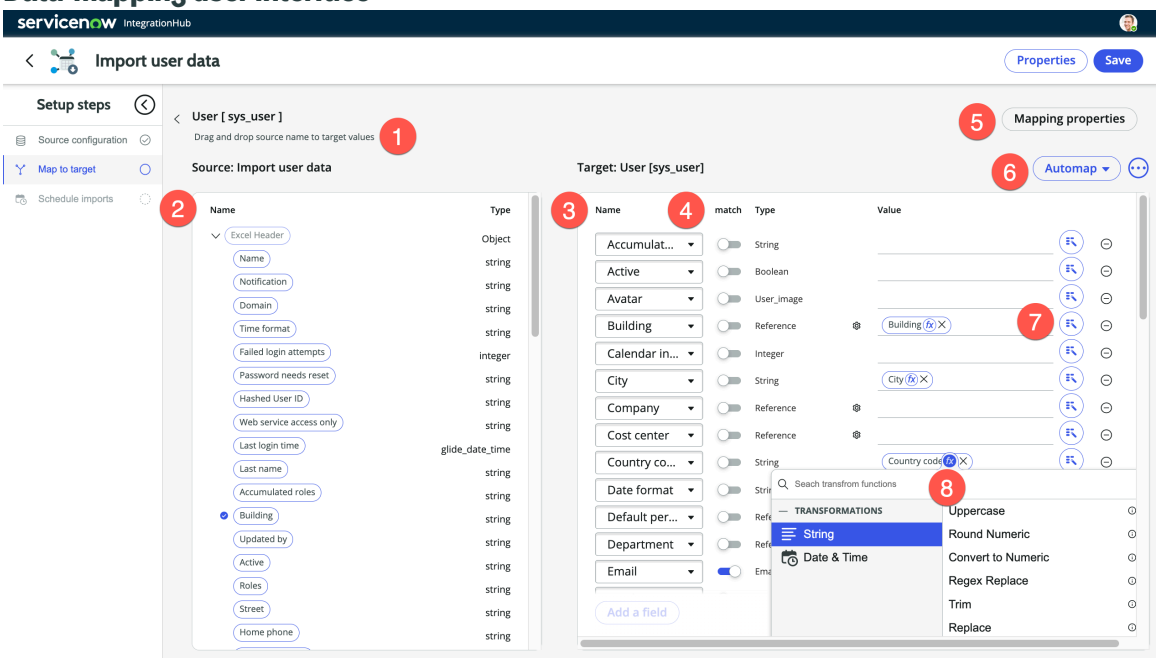
List of options for the target table. Includes the following.

- **Properties**: Opens the Mapping Properties window where you can view or edit the options to run the table's business rules when importing and to run the import synchronously.
- **Edit mapping**: Opens the data-mapping section where you can create or edit your data mapping.
- **Table Configuration**: Opens Table Builder where you can configure the target table. This option is only available if you have Table Builder installed. For more information, see Table Builder.
- **Revalidate**: Checks to see if there are any changes to the target entity schema. If changes are detected, the target table card displays a message saying the target schema has changed. Selecting the target table card opens a window where you can **Update** the target entity schema or **Cancel** to keep the schema the same. Revalidate your table whenever you edit the target table's configuration.
- **Delete**: Deletes the target table from the integration.

Data-mapping user interface



The data-mapping section has these components.

1. **Target table name**

   Name of the target table you're currently mapping to.

2. **Source data section**

   Section that displays the source data as data pills. To map the data, drag the data pills to the target table data section. You can also use the pill picker. After you map a source field to a target field, a small check mark icon ( ) appears next to the source field name. If you move your cursor to the check mark, the tooltip lists the target fields that source field has been mapped to, up to five fields.

3. **Target table data section**

   Section that displays how the source data maps to each field in the selected target table. You can display all the fields in the target table, or select individual fields with the **Add a field** button. For choice and reference fields, you can specify which column to map data to or you can use the default display column.

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4. Match toggle switch

Toggle switch to specify fields where the system should check for matching data and, if found, update existing records instead of creating new ones. In this image, the **Match** toggle switch is turned on for the **user id** field. If a record in the source data has a user id that matches the user id for a record in the target table, the system will update the existing record in the target table instead of creating a new one.

5. Mapping properties button

Button to view or edit the options to run the table's business rules when importing and to run the import synchronously.

6. Automap button

Button to automatically map source entities to similarly named target entities.

7. Data pill picker

Button to open the data pill picker. You can use the pill picker to map source data pills to field values in the target table.

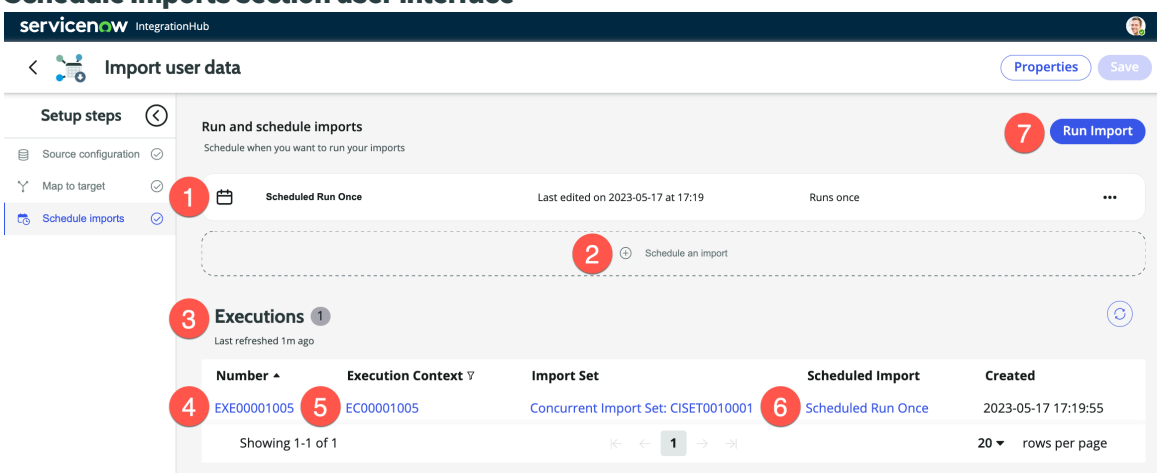
8. Transform function icon

Button to open the list of available transform functions. Use transform functions to change or modify your data. For example, the Trim transform function removes white space from the beginning and end of an input string.

Schedule imports

Run an import immediately, or schedule it to run at a specific time, at regular intervals, or after a parent import. Schedule large imports to run concurrently to reduce processing time.

Schedule imports section user interface



The schedule imports section has these components.

1. Scheduled imports

List of import schedules. Each import schedule appears in its own button.

2. Schedule an import button

Button to create an import schedule.

3. Executions section

Section with information about executed imports. Includes links to execution records, execution context records, and scheduled import records. This section only appears after an import is run.

4. Execution records

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List of execution records. Each execution record provides information about an execution, including the imported rows, errors, and log messages.

5. Execution context records

List of execution context records. Each execution context record specifies the next scheduled import to use when processing a hierarchical scheduled import.

6. Scheduled import records

List of scheduled import records. Each record provides the name, data source, schedule, and partition method for the scheduled import.

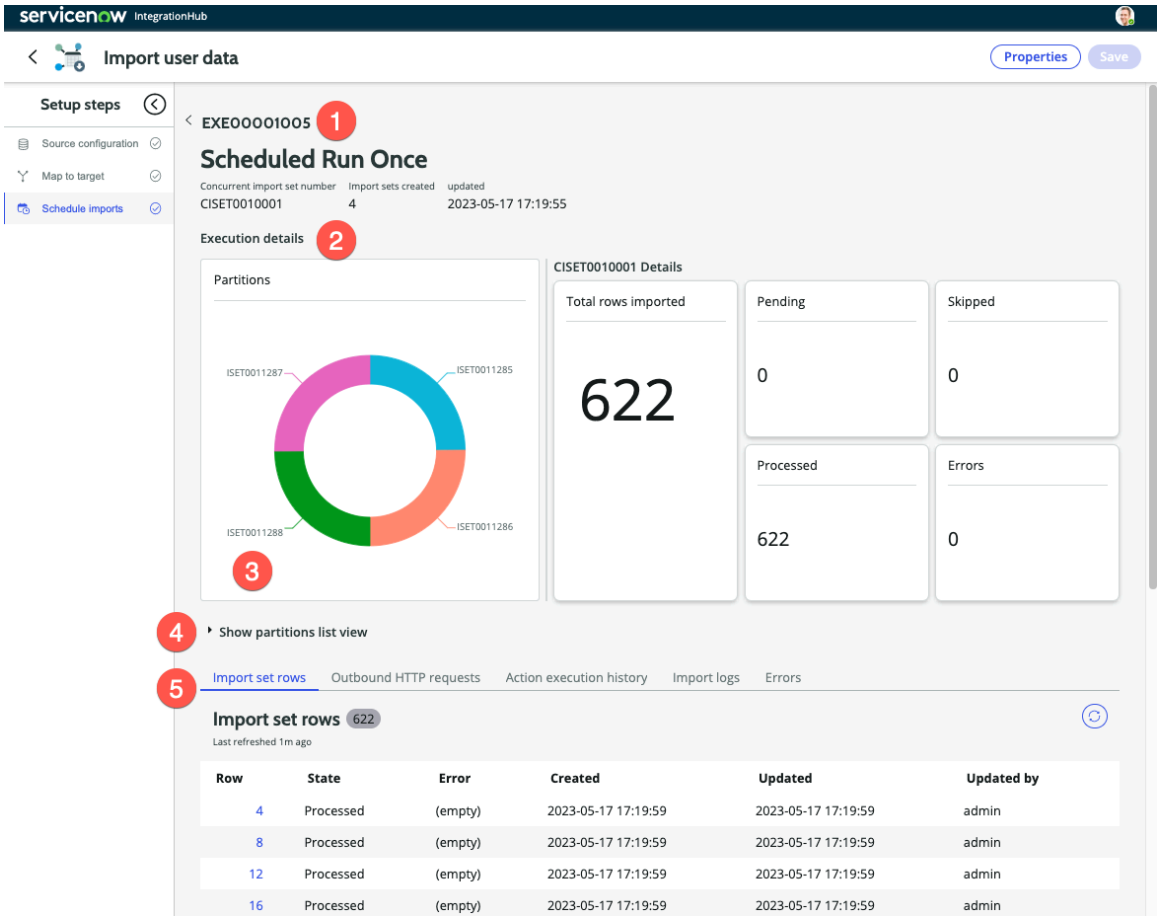
7. Run Import button

Button to run the import once.

Execution details

View details for each import, such as the execution time and date, and execution context. Open the import's execution records to view the import state and the imported rows, errors, and logs.

Execution details section user interface



The execution details section has these components.

1. Execution information

Section providing details about the execution, including the number of the execution record, the name of the scheduled import, the import set number, and the date it was updated.

2. Execution Details

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Section with cards showing the total number of rows imported, processed, pending, or skipped, and the number of errors that occurred. If the import is processed concurrently, this section also includes a Partitions card. For more information, see Concurrent imports.

You can click the cards to filter the results. Filtered results display in the Import Set Rows tab toward the bottom of the page. For example, clicking the **Pending** card displays the pending rows. Clicking **Total rows imported** or **Clear Selection** clears the filters.

Note: Card filtering is only available for import set rows. To see the filtered list, make sure you're on the Import Set Rows tab.

3. Partitions card

Graphical view of the import set partitions. The partitions card only appears for concurrent import sets. You can click a partition to view its details. You can also use the Execution Details cards for additional filtering. When you combine the partition filter with the card filters, the system uses an AND operation for filtering. For example, if you click a partition, then click the Errors card, the Import Set Rows tab displays only the errors for that partition.

4. Partitions list view

Option to view the details for each partition, including the import set number, and the type and state for each import set job. The partitions list view only appears for concurrent import sets. The partitions list view provides the same filtering capabilities as the Partitions card, so you can use either to filter a partition.

5. Import details

Section detailing the import set rows, outbound HTTP requests, action execution history, import logs, and errors for each execution record.

Integration Hub import terms

Imports in Integration Hub have these components.

Data source

A data source is a configuration record that defines the type of data to import and the endpoint where your instance can get it.

Data Stream action

A Data Stream action is an action that sends REST, SOAP, or JDBC requests from Workflow Studio to APIs and returns a stream of response data. Use Data Stream actions to retrieve data larger than 10 MB, or when working with APIs that return paginated results.

Target table

A target table is the table that you want your source data to be transformed to.

Transform function

A transform function is a function that changes or modifies your data. For example, a function that transforms an input string to all uppercase characters.

Execution

An execution is a run-time record that contains the execution details for a single import. Each execution provides import details for a specific target, including rows imported, log messages, and errors.

Execution context

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An execution context is a record that specifies the next scheduled import to use when processing a hierarchical scheduled import.

Import set

An import set is a set of run-time records that contain the raw data imported from a data source. The system stores imported records in an Import Set staging table.

Design considerations

Follow these guidelines to achieve the benefits offered by Integration Hub imports.

Create all Integration Hub imports from within Integration Hub

Only integrations created in the Integration Hub import environment are accessible there. For example, you can't configure a data source and mapping through platform forms, but then schedule the import from within Integration Hub. Only integrations created in Integration Hub appear on the landing page.

Don't alter configuration records outside of Integration Hub

Altering configuration records directly might change if and how data is imported and mapped. If you need to change the configuration of the data source, mapping, or import schedule, do so from within the Integration Hub import interface.

Avoid modifying Data Stream actions used in data sources

Modifying Data Stream actions used as data sources might change the mapping from source to target. When the output for a Data Stream action changes, the Map to target page displays a warning that the complex object schema has changed. You might need to reconfigure the mapping.

Configure a data source

Start importing data with Integration Hub by creating a data source. A data source specifies how and where to get the data you want to import.

Before you begin

- Imports in Integration Hub require the ServiceNow IntegrationHub Action Template - Data Stream [com.glide.hub.action_type.datastream] plugin. For more information, see Request IntegrationHub.
- A data source in Integration Hub uses an Excel file, a CSV file, or a Data Stream action. Data Stream actions have unique inputs, so if you plan to use one, make sure to familiarize yourself with it first. To learn more, see Data Stream actions and pagination. You can use Data Stream actions with dynamic outputs, but dynamic inputs aren't supported.
- Role required: admin or ih_import.

About this task

Configuring a data source is the first step to importing data in Integration Hub. After you set up the data source, you can select a target table, determine how data is transformed to the target table, and run and schedule the import.

Procedure

1. Navigate to **All** > **IntegrationHub** > **IntegrationHub - Import**.
2. Select **Create new integration**.
   The New Data Import Integration screen displays.
3. Configure your data source.

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a. Fill in the fields for the data integration.

Field	Description
Name	Name of your integration.
Short description	Description of your integration.
Application	Name of the application scope for your integration.

b. Select **Save & Continue**.

c. Use the **Source type** menu to select a data source type.

- To choose an Excel or CSV file, select **AD-HOC** > > **File**, then either **Excel** or **CSV**. In the File upload section, upload an XLSX, XLS, CSV, or ZIP file.
- To choose a Data Stream action, select **Spokes**. Active Data Streams are organized by spoke and listed alphabetically. In the Connection section, select the connection alias. For Data Stream actions that use a connection alias, you can override the default connection alias with any of its children's aliases. For more information, see Create a Connection and Credential alias.

d. Configure the data source.

- To configure an Excel spreadsheet, specify which sheet to use and which row number to use for the header. Only one sheet and one header can be specified.
- To configure a CSV file, select the delimiter.
- To configure a data stream action, enter any required inputs. This section only appears if the Data Stream action has inputs to enter. Data Stream actions with inputs have unique inputs, so the fields in this section depend on which Data Stream action is selected and its configuration. Any default values already configured by the spoke inputs are pre-filled. You can view the details of the Data Stream action by clicking the information icon (ⓘ) next to it. Clicking the icon opens the Data Stream action's configuration.

4. Select **Save**.

Result

The structure of the source data appears in the Source data structure preview pane. For an Excel or CSV file, the preview displays the column headers. For a Data Stream action, it displays the complex object output. If you edit the source configuration, click **Save** to reload the source data. The data must be previewed at least once before you can map it to a target table.

What to do next

Map your source data to target tables. See Map source data to a target table.

Map source data to a target table

Specify how source data is transformed to your target tables.

Before you begin

Configure a data source.

Role required: admin or ih_import.

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https://player.vimeo.com/video/1209918785?h=5f8842d24e&badge=0&autopause=0&player_id=0&app_id=58479

Procedure

1. Navigate to **All** > **IntegrationHub** > **IntegrationHub - Import**.
2. On the landing page, select your integration.
3. On the left navigation panel, select **Map to target**.
4. Add your target tables.

   a. On the Source to target table data mapping page, select **Add a table**.

   b. In the Mapping Properties window, fill in the fields.

Field	Description
Target table	Name of the table to transform your data to.
Run table's business rules when importing	Option to run the target table's business rules when you import the data.
Run the import synchronously	Option to run the import synchronously. When data is transformed in parallel, and there are multiple source records with a specific coalesce value, checking this option ensures that only one record with that coalesce value is inserted at a time. For more information, see the Synchronized inserts section on the Concurrent imports page.

   c. Select **Save**.

   You can add multiple target tables to your integration. Repeat steps 4a through 4c for each target table you want to add.

   Tables are listed in the order they're added. You can change the order by using the drag icon to the left of each table card to drag the card to a different position. The order of the table cards determines the order in which data is transformed into the target tables at runtime.

   Note: You can't select the same table more than once, and you can't select an extended table or parent table of a table already in the integration.

5. Map the fields from your source data to a target table.

   a. On the Source to target table data mapping page, select the button with the target table you want to map to.
   This opens the data-mapping section for the table. The left side of the page shows the source data. The right side is for the target table.

   b. Use the **Add a field**, **Add all fields**, or **Automap** button to configure the target side and begin mapping data.

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- To add all the fields in the target table, select **Add all fields**. Fields are added alphabetically.
- To add fields individually, select **Add a field** and choose the field name from the list. A field can only be added once.
- To add fields and map them automatically, select **Automap**. Automap maps source entities to similarly named target entities. The **Automap** button has two options.
  - **All matching fields in the target table** adds all the fields and maps the ones that match.
  - **All unmapped fields in the target selection** maps only the fields that you've already added but haven't mapped yet. If you haven't added any fields yet, this option is not available.

- For a target entity that has already been mapped, selecting **Automap** doesn't change its value. An automapped field has a wand icon on its data pill.

  By default, Automap maps a maximum of one source entity to a target entity. You can change this by setting the *glide.ih.automap.extractone* property to false.

  Automap matches source to target entities by looking for column names that are at least an 80% match. You can modify this with the *glide.ih.automap.minimum.score* property. For example, to make matches based on a 60% similarity, you can set *glide.ih.automap.minimum.score* to 60.

c. Map data by dragging data pills from the source to the **Value** column on the target table.

You can also map data by using the pill picker () on the right side of the target table. You can enter more than one value in the Value column, you can also enter text.

After you map a source field to a target field, a small check mark icon () appears next to the source field name. If you move your cursor to the check mark, the tooltip lists the target fields that source field has been mapped to, up to five fields.

d. Optional: Use the **Match** toggle switch to specify fields where the system should check for matching data and, if found, update existing records instead of creating new ones.

(Optional) For example, if a target table has an **Order number** field and a record with an order number of 743, there are two options for handling potential matches.

- If the **Match** toggle switch for the **Order number** field is on, the system checks for matching data. If the source data has a record with the same order number, the system updates the existing record in the target table.
- If the **Match** toggle switch for the **Order number** field is off, the system doesn't check for matching data. If the source data has a record with the same order number, the system creates a new record in the target table. In this case, the target table will have two records, both with an order number of 743.

e. Optional: For choice and reference fields, specify the column to map data to.

i. Select the gear icon (⚙).

ii. In **Field**, select the column to map to.

iii. In **If no matching record exists then do the following**, specify what to do if that column isn't available.

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- **Create a new choice/record**: Creates the choice or record in the target table.
- **Ignore this field**: Ignores only the field in the target table.
- **Skip this record**: Skips the entire record in the target table.

iv. Select **Done**.

f. **Optional:** Change or modify your data by applying transform functions.
For example, you can use the Uppercase transform function to change an input string to all uppercase characters. For more information, see Transform functions.

Note: Not all the transform functions available while creating flows and subflows are available in Integration Hub - Import.

i. Select the transform function icon ( ).

ii. Select a transform function from the menu, then select **OK**.

iii. To apply additional transform functions, select **Add a new transform**. Transform functions are applied in the order they're selected.

iv. After you've added all your transform functions, select **Done**.

6. When you're done with your mapping, select **Save**.
If you're mapping to more than one target table, repeat steps 5 and 6 for each table.

What to do next
Run or schedule a data import.

Run or schedule a data import

Specify when to run a data import by creating a schedule. Schedule an import to run at a specific time, at regular intervals, or after a parent import. You can also run your import immediately.

Before you begin
Configure a data source, then Map source data to a target table.

Role required: admin or ih_import.

Procedure
1. Navigate to **All** > **IntegrationHub** > **IntegrationHub - Import**.
2. On the landing page, select your integration.
3. On the left navigation panel, click **Schedule imports**.
4. On the Run and schedule imports page, click **Schedule an import**.
5. On the New schedule form, fill in the fields.

Field	Description
Scheduled Data Import	
Name	Name to uniquely identify the import schedule.
Data source	Data source for the import. This field is automatically set to the name of your integration.

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Field	Description
Run as	Name of the user or user role the import executes with. For example, the import may run as the System Administrator, or it may run with the roles of a specified user.
Application	Application scope for the import schedule.
Run	Option to specify when the import runs. Select one of the following. ○ **Daily**: Runs every day. ○ **Weekly**: Runs every week. ○ **Monthly**: Runs every month. ○ **Periodically**: Runs at regular intervals. ○ **After Parent Runs**: Runs after another import.
Day	Day of the week or month to run the import. Entered as a number. This field appears only when **Weekly** or **Monthly** is selected from **Run**.
Repeat interval	Amount of time to wait between imports. Entered in days, hours, minutes, and seconds. This field appears only when **Periodically** is selected from **Run**.
Parent	Name of the parent import. The parent import must finish before the current import begins. This field appears only when **After Parent Runs** is selected from **Run**.
Time	Time of day to run the import. Entered in hours, minutes, and seconds.
Active	Option to make the import schedule active.
Advanced	
Concurrent import	Option to divide the data into multiple import sets and process them concurrently.
Partition Method	Option to specify how to partition the data. Select one of the following. ○ **Custom size** ○ **Round Robin** This field appears only when **Concurrent import** is selected.
Partition Size	Number of records for the partition size. Must be greater than or equal to 1000. This field appears only when **Custom size** is selected from **Partition Method**.

6. Click **Save**.
7. **Optional:** To add a prescript or postscript, click the more options icon (•••) and select **Advanced setup**.
   This option opens the form for the scheduled data import, where you can add a script to run before or after your import.
8. **Optional:** Run your scheduled import right away by clicking the **Run Import** button, and refresh the Executions list to view the execution record.

What to do next

Your import will run at the scheduled time. After it runs, an Executions section appears on the Run and schedule imports page. The Execution section has execution records where you can view details about your import, including its runtime, the number of imported rows, and any errors or log messages.

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Transform settings

Configure the transform settings for your Integration Hub - Import integration. Specify batch size and empty-field handling, enable verbose mode, or run a script before or after the integration.

Configure transform settings

You can configure the transform settings for your integration by selecting the **Transform Settings** button at the top of the Map to target page in Integration Hub - Import.

Note: The **Transform Settings** button doesn't appear until you've added at least one target table to the Map to target page. For more information, see Map source data to a target table.

Field	Description
General	
Batch Size	Number of items to transform in each batch. Default value: 10
Verbose	Option to enable transform logs with details on transform operations, transformer rules, and transforms with multiple target tables. Default value: false
Copy Empty Fields	Option to copy any empty values in the source fields to the target fields. When this field is selected, empty source values are copied. When it's not selected, empty source values are not copied to the target fields. Default value: true
Scripts	
Execute OnBefore Script	Option to run a script before inserting or updating data. Send notifications, modify data, or perform other actions before the integration begins. The onBefore script has three parameters. • *source*: The source data from the import record. • *target*: The transformed data from the import record. In the onBefore script, this parameter accesses transformed data before it's inserted into the target table. • *importLog*: The log that records information about data import activity. The onBefore script has two variables. • *ignore*. Type: Boolean. When **true**, the specified import set row is ignored. • *ignore_reason*. Type: String. Message describing why the import set row was ignored.
Execute OnAfter Script	Option to run a script after inserting or updating data. Send notifications, calculate summaries, or perform other actions after the integration completes.

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Field	Description
	The onAfter script has three parameters. • *source*: The source data from the import record. • *target*: The transformed data from the import record. In the onAfter script, this parameter accesses transformed data after it's inserted into the target table. Once a record is inserted or updated, it has a sys_id. • *importLog*: The log that records information about data import activity.

Using Stream Connect for Apache Kafka

Connect your Apache Kafka environment to your ServiceNow instance with Stream Connect for Apache Kafka.

Apache Kafka is a distributed event-streaming platform that provides a unified way to exchange data across multiple systems. Stream Connect for Apache Kafka links your Kafka environment to your ServiceNow instance, enabling you to stream data between your instance and your external systems.

Note: Stream Connect requires an Workflow Data Fabric subscription and a Stream Connect subscription. For more information, see https://www.servicenow.com/now-platform/workflow-data-fabric.html.

Benefits

- Publish and process Kafka events at scale. Publish events to your Kafka environment from your ServiceNow instance and consume Kafka events from your external systems at a high volume with low latency.
- Build flows that produce and consume Kafka events. Stream Connect is integrated with Workflow Studio, providing a low-code way to publish and process Kafka messages.
- Import data from your Kafka environment and process that data using your existing Robust Transform Engine (RTE) or transform map configurations.
- Configure a consumer that uses your own scripts to process data from a Kafka topic.
- Monitor your consumers' performance with detailed reporting of statistics and performance metrics.
- Integrate your ServiceNow instance directly with your local Kafka environment with Direct Kafka.

Terminology

Stream Connect uses the following terms.

Producers

A producer publishes events to a Kafka environment. Stream Connect has two producers.

- Kafka Producer step in Workflow Studio
- ProducerV2 API

Consumers

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A consumer reads and processes events from a Kafka environment. Stream Connect has several consumers.

- Kafka Message trigger in Workflow Studio
- Extract Transform Load (ETL) Consumer
- Transform Map Consumer
- Script Consumer

Topics and topic namespaces

Events are organized and stored in topics. A topic stores events of the same type. Topics are partitioned. Events have a key. Events with the same key are stored in the same partition.

Topics link to a topic namespace. You can use namespaces to organize topics in logical ways. For example, you can group topics together based on which Kafka cluster they come from. You can also use namespaces to configure which domains can access which topics on a domain-separated instance. For more information, see Managing namespaces and topics in Hermes.

Topic aliases

A topic alias is a unique topic name that can be connected to any underlying Hermes or Direct Kafka topic. A topic alias can be moved to different instances and connected to a different underlying topic on each instance.

Subscriptions

A subscription is a record associated with a consumer. It stores configuration information about the consumer, such as the name of the Kafka topic to consume messages from and the number of partitions the topic has. The subscription record is created when a Kafka stream is activated.

Each subscription record has several metrics that enable you to view the performance of the consumer reading from the topic. For more information, see Viewing Kafka subscriptions and statistics.

Partition groups

A partition group is a set of topic partitions. For example, if a topic has six partitions, they can be divided into three partition groups, with two partitions in each group.

Kafka consumer job

A job that regularly checks Hermes for any new events in a topic. The job picks a free partition group and retrieves its subscription. The subscription gives the topic name, and the job checks the partitions for messages for that topic.

Kafka streams

A Kafka stream is a record that defines the data stream for a consumer. If you're using the Kafka Message trigger in Workflow Studio, the Kafka stream is automatically created for you. If you're using a different consumer, you'll need to create one manually.

To link your Kafka environment to your ServiceNow instance, Stream Connect uses the Hermes Messaging Service. The Hermes Messaging Service enables your instance to produce and consume large volumes of Kafka events. It manages the flow of data between your Kafka environment and your instance. For more information, see Hermes Messaging Service.

The following diagram shows some of the key components of Stream Connect.

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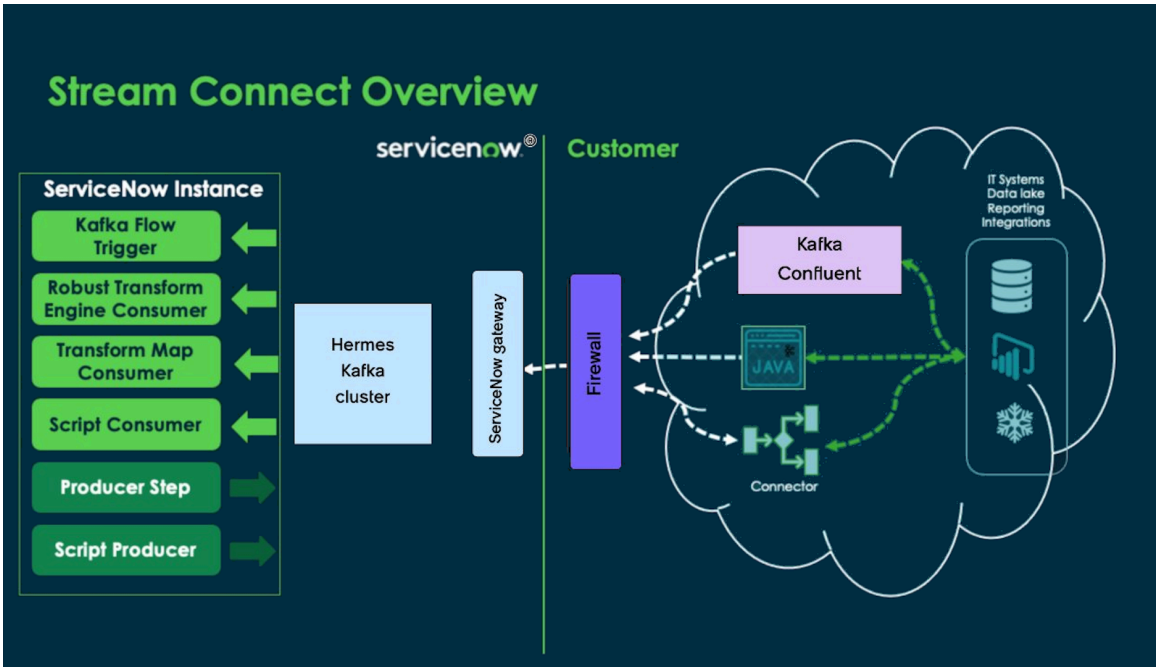
Stream Connect overview



Using Guided Setup for Stream Connect

Guided Setup provides a sequence of tasks that can help you configure Stream Connect. To open Guided Setup, navigate to **All** > **IntegrationHub** > **Stream Connect** > **Guided Setup**.

For more information about using the guided setup interface, see Using guided setup.

Stream Connect and Workflow Studio

Build flows that produce and consume Kafka events with Stream Connect and Workflow Studio. Stream Connect has a flow trigger for consuming Kafka events and an action step for producing them.

Use the Kafka Message trigger to create flows that process Kafka events. You can build a flow that consumes data from Kafka and inserts it into a table, or uses spokes to communicate the data to third-party environments.

The trigger is enabled when the flow is activated. After it's activated, the trigger starts the flow whenever there's a message in the specified Kafka topic. When you use the Kafka Message trigger, you don't need to create a Kafka stream or subscription record. The system automatically creates both when the flow is activated. Messages are read from the topic as long as the flow is active.

Use the Kafka Producer step to create actions that publish events to a topic in your Kafka environment. For example, you can use the step to create a message about an update on an incident in ServiceNow, then push the message to a topic in your Kafka environment.

Direct Kafka

Integrate your ServiceNow instance with your local Kafka environment with Direct Kafka. Build efficient integrations between your enterprise systems, enabling high-volume and robust integrations to exchange data between applications, and reduce data loss with the queuing mechanism if one environment is temporarily offline.

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With Direct Kafka, you can configure a custom Kafka connection to integrate Stream Connect on your instance with your local Kafka environment. This connection enables you to use Stream Connect and its features directly, without requiring the Hermes Messaging Service or a separate message replicator.

Stream Producer

Automatically stream changes from ServiceNow tables to Kafka topics with Stream Producer.

Stream Producer provides a configuration-based alternative to writing scripts or business rules for exporting data. It uses change data capture (CDC) technology to capture inserts, updates, and deletes on the tables you select. The captured changes are formatted as messages and sent to a Kafka topic, enabling real-time data synchronization with external applications.

Stream Producer has the following benefits.

- Eliminate dependency on business rules and custom scripts for data export.
- Reduce performance impact on the ServiceNow instance.
- Set it up once and automatically keep external data in sync.
- Streamline complex data integration workflows.

For details see Stream Producer.

Stream Connect alerting

Receive alerts and alert notifications for Stream Connect integrations. Stream Connect uses both active and scheduled monitoring to detect events across multiple components. If an issue is detected, the system creates an alert, logs a message to the Stream Connect Log, and sends out an alert notification. For details, see Stream Connect alerting.

Support for messages in an Avro format

Import and create schemas to send and receive messages in an Apache Avro format. Using an Avro format can reduce the size of the payload and simplify your integration to your local Kafka instance.

You can import Avro schemas directly from the Confluent Registry, or you can create your own schemas using a JSON file or a JSON-formatted string. The schemas are stored in ServiceNow and enable your producers and consumers to convert plain-text messages to an Avro format and back. For details, see Schema management in Stream Connect.

ETL, Transform Map, and Script Consumers

Import data from your Kafka environment using your existing RTE or transform map configurations. The Extract Transform Load (ETL) and Transform Map consumers simplify your data imports by providing an efficient way to take a payload from a Kafka message, transform the data, and insert or update a record in a table. You can switch from a scheduled data import to one using Stream Connect and process the data with the same configurations.

You can also use the Script Consumer to process data from your Kafka environment. The Script consumer is for more advanced use cases, such as when the data in the message isn't structured, or it requires data lookups using code.

When you Configure an Extract Transform Load (ETL) consumer, Configure a Transform Map consumer, or Configure a script consumer, you also need to Create a Kafka stream.

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ProducerV2 API

Publish events to a Kafka topic with the ProducerV2 API.

Stream Connect Message Replication

You can replicate data between your Kafka environment and ServiceNow with Stream Connect Message Replication.

Stream Connect Message Replication enables you to configure and manage message replications directly from your ServiceNow instance. It uses a MID Server or MID Server cluster to run the data replications, so you don't need to configure or host additional replication services. It also simplifies the message replication setup by automatically generating the required certificates.

For more information, see Stream Connect Message Replication.

Stream Connect logs

Log messages for producers and consumers are stored in the Stream Connect Logs [sys_consumer_log] table. Each log entry shows when the log was created; its level, message, and source; and links to any related Alert or Subscription records.

You can enable more detailed logging by adding the system property *glide.ih.kafka.stream_connect.debug* and setting it to **true**. To avoid filling up the logs, this property is automatically disabled after 24 hours. If you need detailed logging for longer than 24 hours, you can re-enable the property manually.

Unprocessed and undelivered messages

If a message can't be delivered, it's stored in the Kafka Undelivered Messages [sys_kafka_undelivered_messages] table. A scheduled job, Kafka Producer Retry, regularly reads this table and tries to redeliver any messages.

If a batch of messages can't be processed because it has timed out, it's stored in the Kafka Unprocessed Messages [sys_kafka_unprocessed_messages] table. The time-out for a message batch can be set with the *com.glide.kafka_consumer.timeout* property. The default value is 60 seconds. This table is a rotated table, so it cleans records automatically.

Producer compression formats

Specify a compression format for Stream Connect producers with the *com.glide.kafka_producer.compression_type* system property. It supports the following values:

- NONE
- GZIP
- LZ4

This property is not in the System Properties [sys_properties] table by default, so it must be added manually. This property sets the compression format for all Stream Connect producers.

Note: To consume a compressed message, it must have been compressed using GZIP or LZ4.

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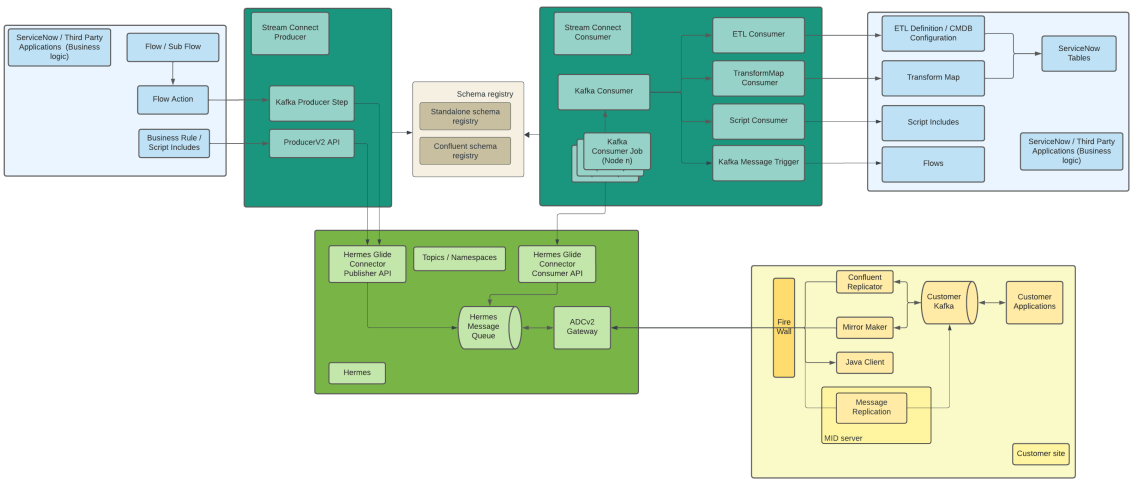
Domain separation

Use Stream Connect topic namespaces to configure which domains can access a Kafka topic on a domain-separated instance. Group topics into ServiceNow namespaces, then link the namespaces to specific domains. For more information, see Domain separation and Stream Connect.

Architecture diagram

The following diagram shows key components of Stream Connect, how they relate to ServiceNow and third-party applications, and how they connect to your Kafka environment through Hermes.

Stream Connect architecture diagram



Plugin

Stream Connect requires the ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin. This plugin enables the licensed components for working with message-based streaming data in Stream Connect.

Example use case

A telecommunications company monitors millions of networks, devices, and facilities-operations systems and equipment. The monitoring systems generate millions of alerts that need to be processed and responded to in order to maintain fully operational networks.

The messages are internally pushed from the monitoring sources to their Kafka environment. From there, they are replicated to the ServiceNow Hermes Kafka cluster. This triggers script consumers that read in the messages and parse the data in the headers, keys, and payloads to efficiently enter new records into the Event table.

The related TSOM product capabilities process the event data, quickly and efficiently creating incidents and field work orders for resolution of the issue, resulting in reduced time to resolution of the issue.

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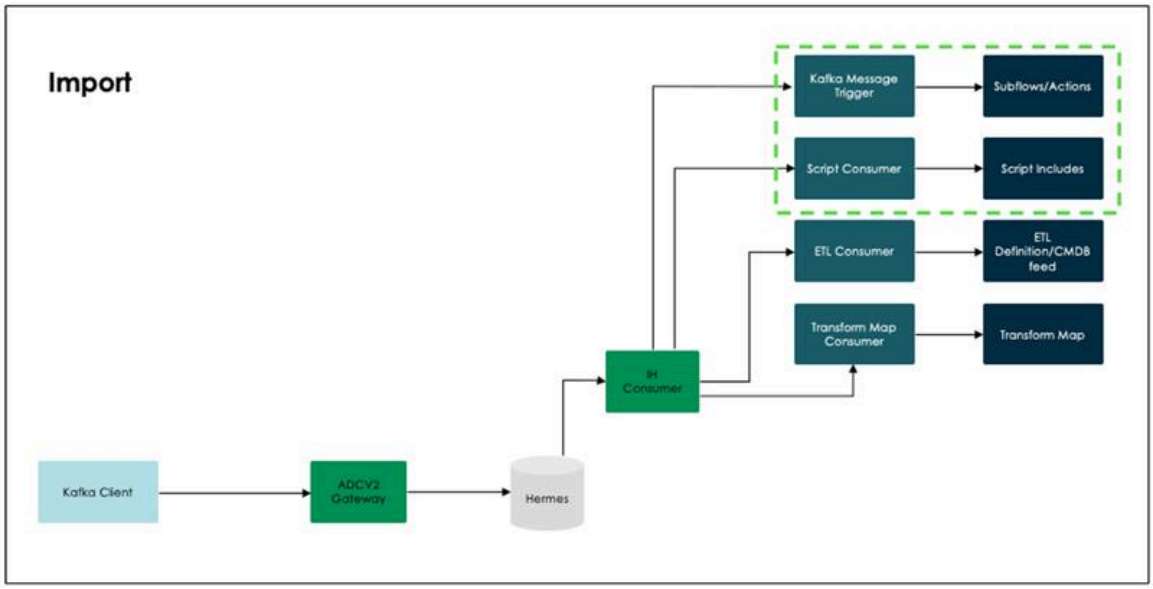
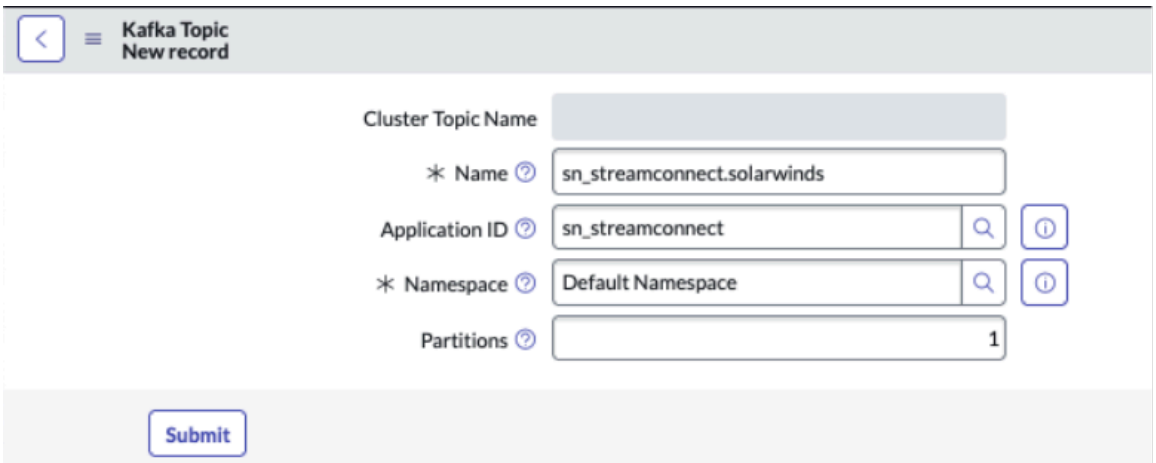


Key assumptions and decision criteria

- The data volume is incremental and frequent.
- The data includes messages about a variety of devices from a variety of tools.
- Clarify if the data only includes elements from the primary record, or if it also includes elements from related records.
- Confirm if the data import is associated with a process automation.

Guidance

- Define topics with a naming convention to clearly direct the processing of the messages. For example, if the data is coming from a Solarwinds monitoring tool source, the topic might be named sn_streamconnect.solarwinds. Topics can be found in the navigator under **Hermes Messaging Service** > **Topics**.



- When producing messages to Kafka (and replicating to Hermes), define and utilize keys to ensure the order of delivery and processing of messages. For example, to ensure messages are kept in order, use the device ID as the key value to keep them together for processing.
- Utilize headers, keys, and payload attributes to enable scaling and effective parsing of incoming messages from multiple sources.

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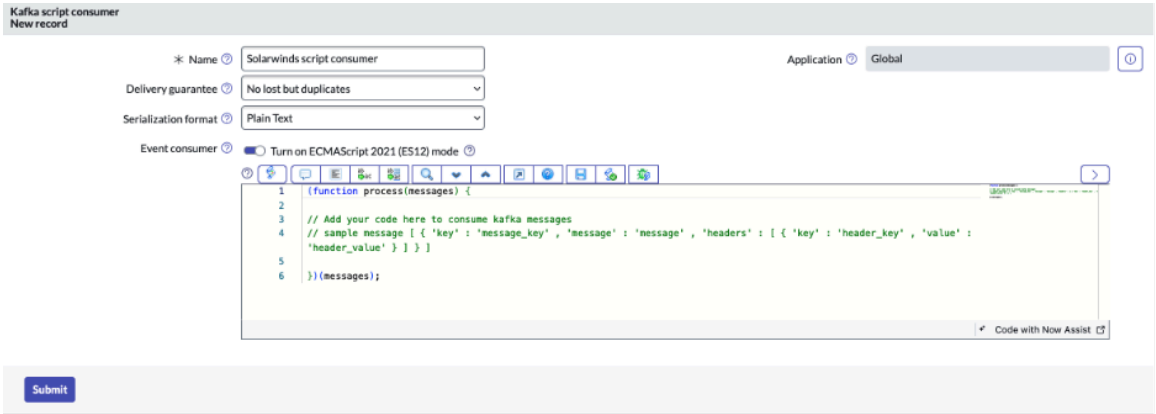
- Utilize a Script Consumer or Flow Trigger Consumer for the ingest of transactional data. Following the example, the script consumer could be named similarly, such as “Solarwinds script consumer”. Script consumers can be found in the navigator under **IntegrationHub** > **Consumers** > **Script Consumers**.



- The script consumer script parses the message content to identify what device the message was related to and processes it accordingly.

```
var message = JSON.parse(input);
var deviceName = message.device_name;
var ipAddress = message.ip_address;
var alertName = message.alert_name;
var alertDescription = message.alert_description;
var severity = message.severity;
var timestamp = message.timestamp;

// Create a new ServiceNow Event table record
var eventGR = new GlideRecord('em_event');
eventGR.initialize();
eventGR.setValue('source', 'Solarwinds');
eventGR.setValue('node', deviceName);
eventGR.setValue('type', 'Alert');
eventGR.setValue('severity', severity);
eventGR.setValue('message_key', alertName);
eventGR.setValue('description', alertDescription);
eventGR.setValue('additional_info', 'IP Address: ' + ipAddress + ', Timestamp: ' +
timestamp);
eventGR.insert();
```

Note: The above code is a partial, representative example focused on ingesting and parsing the message data to populate table records. It's intended to be helpful in guiding an implementation.

Stream Connect quick start guide

This quick start guide gives you an overview of how to set up and use each of the six Stream Connect producers and consumers to exchange data between your ServiceNow instance and a Kafka environment.

Stream Connect has two producers that send data from ServiceNow to a Kafka environment.

- Kafka Producer step in Workflow Studio
- ProducerV2 API

Stream Connect also has four consumers that retrieve data from a Kafka environment.

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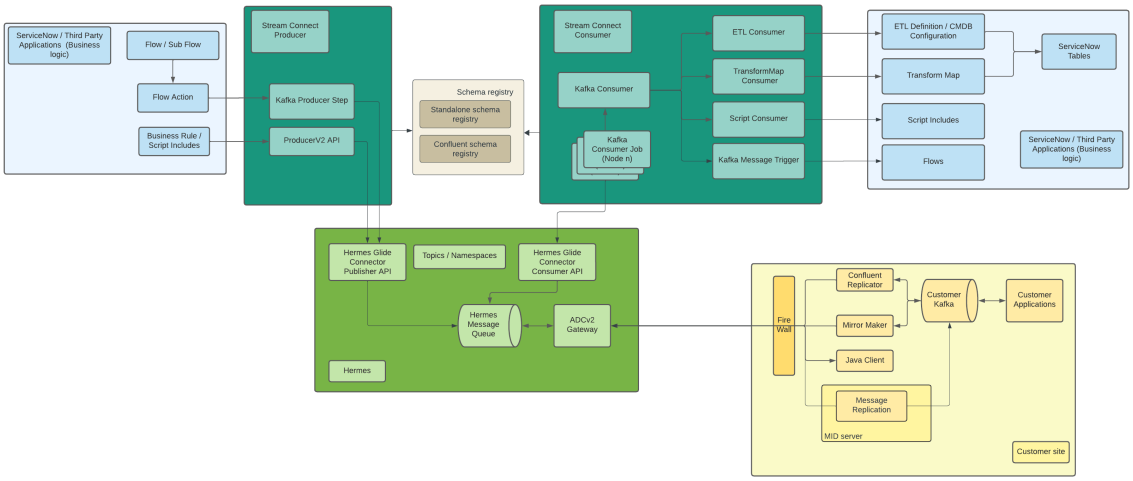
- Kafka Message trigger in Workflow Studio
- Extract Transform Load (ETL) consumer
- Transform Map consumer
- Script consumer

To link your ServiceNow instance to a Kafka environment, Stream Connect uses the Hermes Messaging Service. The following diagram shows each of the producers and consumers and how they connect to your Kafka environment, shown here as the customer site, through Hermes.

Stream Connect producers and consumers



For more information, see Using Stream Connect for Apache Kafka and the Hermes Messaging Service.

Getting started

To represent the customer site, this guide uses Apache Kafka command-line tools run in your computer. The configuration parameters used with this tool can be used to configure any client connection to the Application Delivery Controller, version 2 (ADCv2) gateway using the Kafka protocol.

All the given commands are tested with OpenSSL version (LibreSSL 2.8.3) and Apache Kafka binary distribution version kafka_2.13-3.4.0.tgz. However, all the commands should work with any version you have in your local environment.

Quick start steps

This quick start guide has five steps. Steps 1 and 2 cover how to set up and test a connection to Hermes. Steps 3 through 5 show you how to configure and use each of the Stream Connect producers and consumers to send and receive data.

1. The ADCv2 gateway uses mutual authentication to authenticate requests, so the first step is to create a keystore and truststore to use with your favorite Kafka client. The following page shows you how to create the required certificates: Set up a secure connection to the Hermes Messaging Service.
2. After you set up a secure connection to Hermes, verify the keystore and truststore have been correctly generated by Testing the connection to Hermes through the ADCv2 gateway.
3. Now you can Use the Kafka Message trigger and Script consumer to consume messages. The first part of this page shows you how to use the Kafka Message trigger in Workflow Studio to

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retrieve messages from Kafka. The second part shows you how to use the Script consumer to retrieve messages.

4. And Use the ETL and Transform Map consumers to import data. ETL definitions and transform maps specify the transformation logic to use when pulling data through scheduled imports. You can use the same ETL definitions and transform maps to transform the events received through Kafka.

   Note: To use the ETL consumer, you need a robust import set transformer. Likewise, to use the Transform Map consumer, you need a transform map.

5. Finally, you can Use the Kafka Producer step and the ProducerV2 API to publish messages. This page shows you how to use both the Kafka Producer step in Workflow Studio and the ProducerV2 API to push messages to Kafka.

Set up a secure connection to the Hermes Messaging Service

Secure your Kafka topics by generating a ServiceNow® instance-signed certificate.

Before you begin

Setting up the Hermes Messaging Service requires coordination with your network administrator and with your Kafka administrator. Work with your network administrator to obtain required security certificates and open the required ports. Work with your Kafka administrator to ensure that your Kafka environment is configured correctly and that your applications can connect to the Hermes Messaging Service using the standard Kafka protocol.

Make sure the following setup is in place:

- The Hermes Messaging Service is activated. See Activating the Hermes Messaging Service.
- The Key Management Framework plugin (com.glide.kmf.global) is activated.
- The Certificates [sys_kmf_certificate] table contains a ServiceNow instance root CA certificate.
- The instance isn't configured with a Custom URL. Custom URLs are not supported with the Instance PKI Certificate Generator.

Role required: hermes_admin, sn_kmf.cryptographic_manager, or admin

For details on assigning KMF roles, see Roles installed with Key Management Framework.

Procedure

1. Navigate to **All** > **Certificate Generator** > **Instance PKI Certificate Generator**.
2. **Optional:** Control access to topics by configuring Access Control Lists (ACLs) at the namespace or topic-level.

Option	Description
Apply ACLs to namespaces	**a.** Select **Configure ACLs**. **b.** In the Topic ACLs dialog box, select **Name spaces**. **c.** Enter a namespace that you want to config ure. **d.** Set the permission level by selecting either **Read Only** or **Read/Write**. **e.** Select **Add**.

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Option	Description
Apply ACLs to defined topics	**a.** Select **Configure ACLs**. **b.** In the Topic ACLs dialog box, select **De fined topics**. **c.** Enter an existing topic that you want to con figure. **d.** Set the permission level by selecting either **Read Only** or **Read/Write**. **e.** Select **Add**.

The bearer of the certificate is granted read or read/write access to the topics in the namespace or the existing topic that you selected.

3. Set up security for the Hermes Messaging Service.
   a. Navigate back to the Instance PKI Certificate Generator page.
   b. Enter a keystore password in the **Certificate Password** field.
   c. Select **Generate**.
   The system generates an instance-signed certificate in the Certificates [sys_kmf_certificate] table, creates a keystore, and creates a truststore.

   If Restricted Caller Access isn't allowed for the IPKI Certificate Generator, a cross scope access error appears. Contact Customer Service and Support for assistance with allowing Restricted Caller Access. To resolve this issue, Customer Service and Support can reference source_scope=76f9d51369115083f4ea77aab1677cc0 in the Restricted Caller Access Privileges [sys_restricted_caller_access] table.
4. Save a copy of the keystore by selecting **Download Keystore**.
5. Save a copy of the truststore by selecting **Download Truststore**.
6. Copy the keystore and truststore files to each producer and consumer client that will connect to the Hermes Messaging Service.

Result

You can now create a secure connection to the Hermes Messaging Service.

Note: You must use the keystore that you generated using the Instance PKI Certificate Generator to connect to Hermes. Custom-generated keystores that aren't created according to the ServiceNow documentation aren't supported.

Test the connection to Hermes through the ADCv2 gateway

Verify the keystore and truststore have been correctly generated by testing the connection to Hermes through the ADCv2 gateway.

Before you begin

- Role required: integration_hub_admin

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Procedure

1. Download and install Apache Kafka.

   a. Download the Apache Kafka binaries.

   b. Unzip the Kafka package by running the following command:

   ```
   tar -zxvf kafka_2.13-3.1.2.tgz
   ```

2. Navigate to the Kafka directory by running the following command:

   ```
   cd kafka_2.13-3.1.2
   ```

3. Configure a producer.

   a. Open the `config/producer.properties` file.

   b. Configure the following SSL properties:

   ```
   security.protocol=SSL

   ssl.truststore.password=<truststore password>

   ssl.truststore.location=<path to truststore.p12>

   ssl.truststore.type=PKCS12

   ssl.keystore.password=<keystore password>

   ssl.keystore.location=<path to keystore.p12>

   ssl.keystore.type=PKCS12

   ssl.key.password=<keystore password>
   ```

   Replace the following placeholder variables:

   - `<truststore password>` with your truststore password.
   - `<path to truststore.p12>` with the path to your truststore file.
   - `<keystore password>` with your keystore password.
   - `<path to keystore.p12>` with the path to your keystore file.

   After following steps 1 through 3, you should have downloaded Apache Kafka and configured the producer.properties correctly. All the commands given in next steps should run within the Apache Kafka home directory.

4. Copy the config/producer.properties file to config/bootcamp.properties.
   This example uses `bootcamp` as a generic name.

   ```
   cp config/producer.properties config/bootcamp.properties
   ```

5. Use the following command to list the topics.

   ```
   bin/kafka-topics.sh --list --command-config
    config/bootcamp.properties  --bootstrap-server
    <instance name>.service-now.com:4000,<instance
    name>.service-now.com:4001,<instance
   ```

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```
name>.service-now.com:4002,<instance
name>.service-now.com:4003
```

Be sure to replace `<instance name>` with the name of your instance.
If there are topics in the instance, they should be listed here.

Use the Kafka Message trigger and Script consumer to consume messages

Retrieve messages from Hermes with the Kafka Message trigger in Workflow Studio and the Script consumer.

Before you begin

- Role required: integration_hub_admin
- The first part of this section shows you how to use the Kafka Message trigger in Workflow Studio to consume messages. For more information about the trigger, see Create a flow with a Kafka Message trigger.
- The second part of this section shows you how to use the Script consumer to consume messages. For more information, see Configure a script consumer.

Procedure

1. Create a topic to consume messages.

   a. Use the following command to create a topic in Hermes.

   ```
   bin/kafka-topics.sh --create --command-config
    config/bootcamp.properties  --bootstrap-server
    <instance name>.service-now.com:4000,<instance
    name>.service-now.com:4001,<instance
    name>.service-now.com:4002, <instance
    name>.service-now.com:4003 --topic snc.<instance
    name>.topic1
   ```

   Be sure to replace `<instance name>` with the name of your instance.

   b. To view the topic, log in to the instance and navigate to **All** > **IntegrationHub** > **Stream Connect** > **Topics**.

   Note: It takes approximately 10 minutes to create a topic.

2. Create a flow trigger to consume messages from the topic.

   a. Navigate to **All** > **Process Automation** > **Flow Designer**.

   b. Select **Create new** > **Flow**.

   c. On the Flow properties form, enter a name for your flow, then enter **Submit**.
   This example uses the name `Topic1 Consumer`.

   d. In the trigger section, select **Add a trigger**, then select **Kafka Message** as the trigger type.

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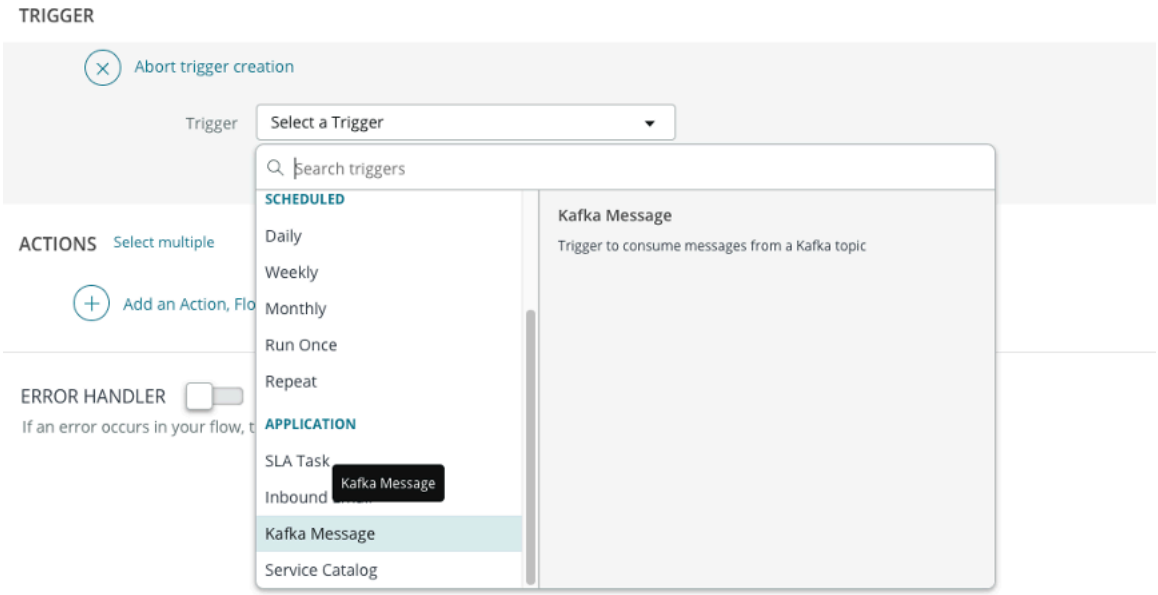
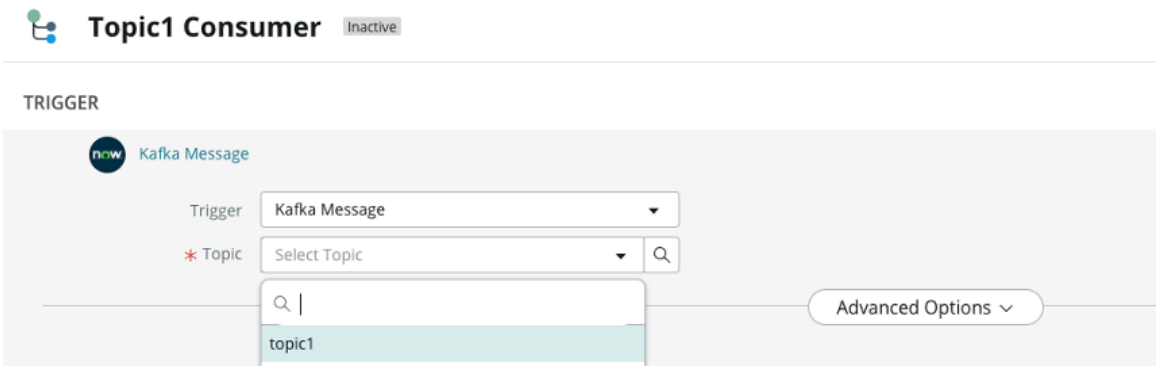


e. Select the Topic1 topic.



You can use the magnifying glass icon to see the list of available topics.

f. In the Actions section of the flow, navigate to **Add an Action, Flow Logic, or Subflow** > **Flow Logic** > **For Each**.

g. Drag the **Messages** data pill to the **Items** field, then select **Done**.

h. In the Actions section of the flow, navigate to **Add an Action, Flow Logic, or Subflow** > **Action** > **ServiceNow Core** > **Log**.

i. Drag the **Payload** data pill to the **Message** field, then select **Done**.

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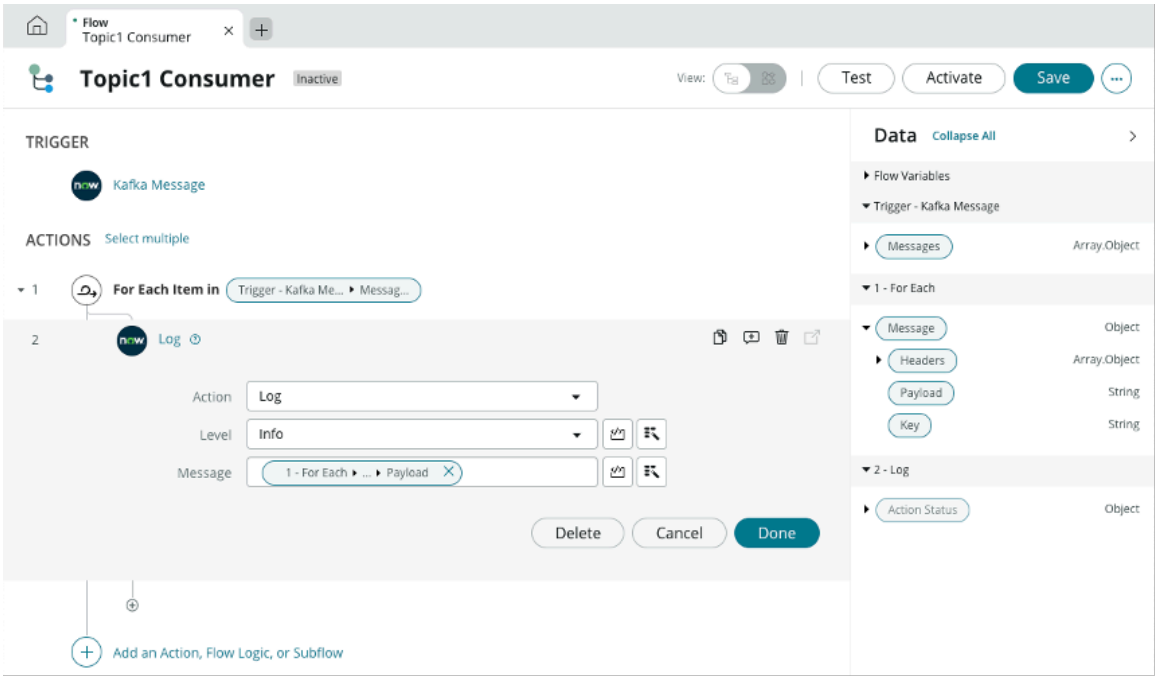
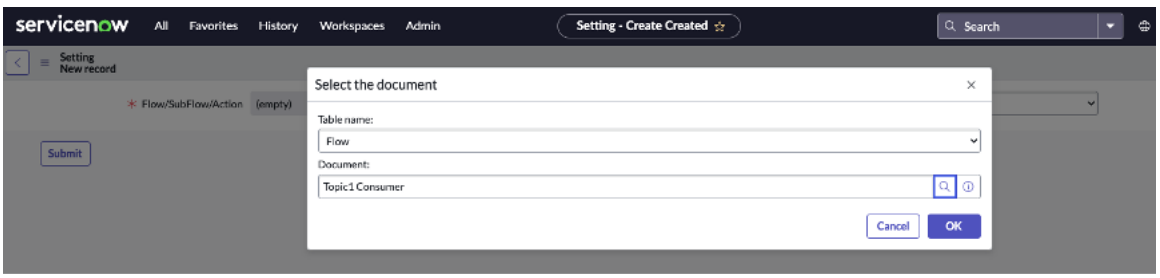


j. **Save** the flow trigger.

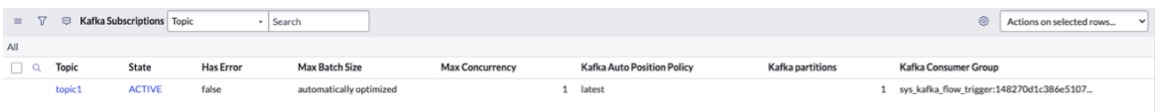
k. Go to the Settings [sys_flow_execution_setting] table to enable reporting for this flow.

l. Create a new entry and enable reporting to the flow created above.



m. Navigate back to your flow and select **Activate**.

n. To view your topic subscription, navigate to **All** > **Integration Hub** > **Stream Connect** > **Subscriptions**.



3. Publish messages to the topic using the Kafka command-line tool.

a. Run the following command to publish messages to the topic.

```
bin/kafka-console-producer.sh --topic
 snc.<instance name>.topic1  --producer.config
 config/bootcamp.properties  --bootstrap-server
 <instance name>.service-now.com:4000,<instance
 name>.service-now.com:4001,<instance
```

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```
name>.service-now.com:4002,<instance
name>.service-now.com:4003
```

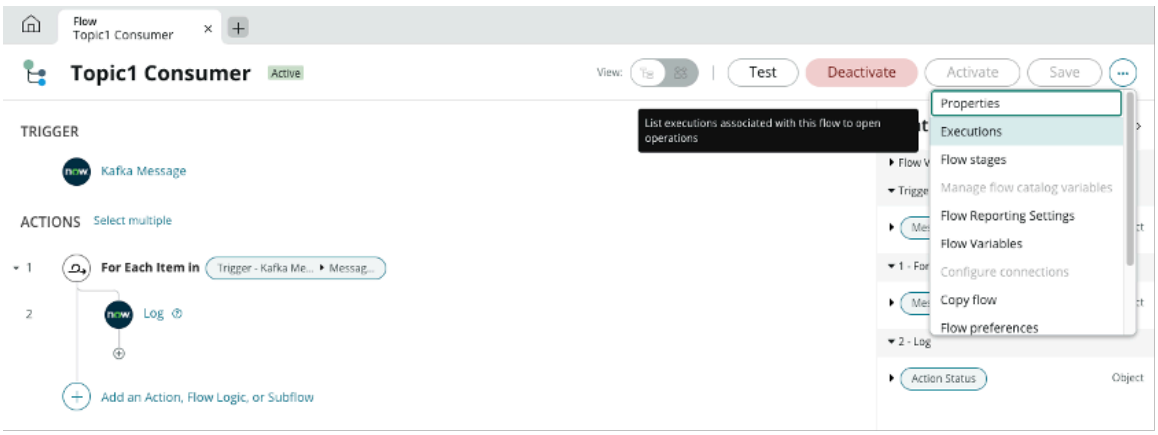
Be sure to replace `<instance name>` with the name of your instance.

This command prompts you for messages. Add a few sample messages. This example uses the following messages.

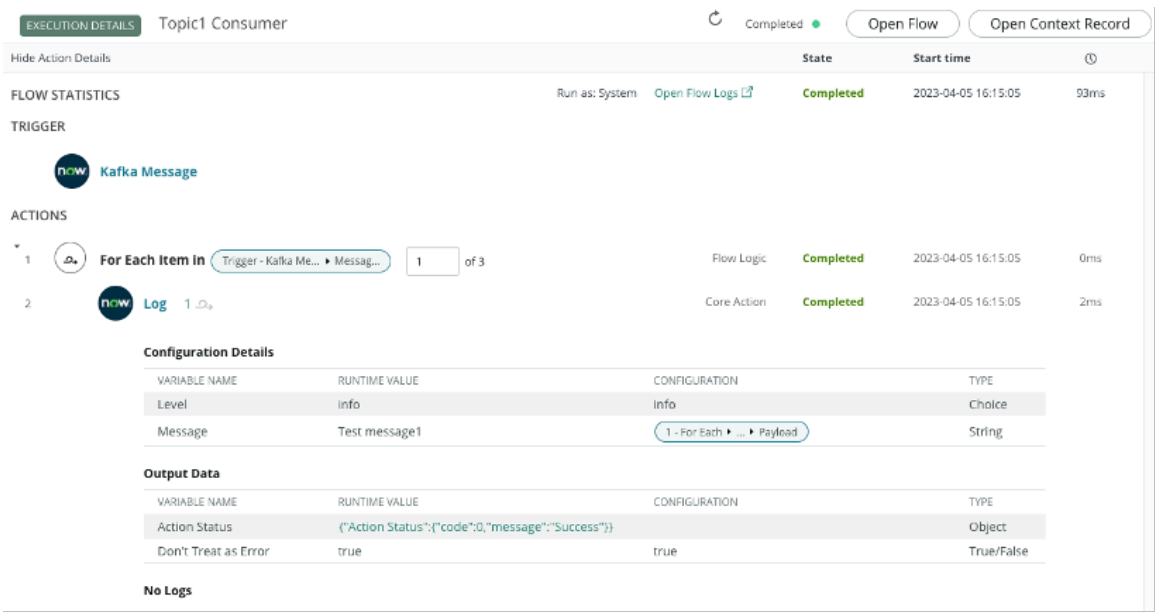
- Test message1
- Test message2
- Test message3

You should receive the messages in about a minute.

b. Navigate back to the flow and select **Executions**.



c. Open the flow execution.



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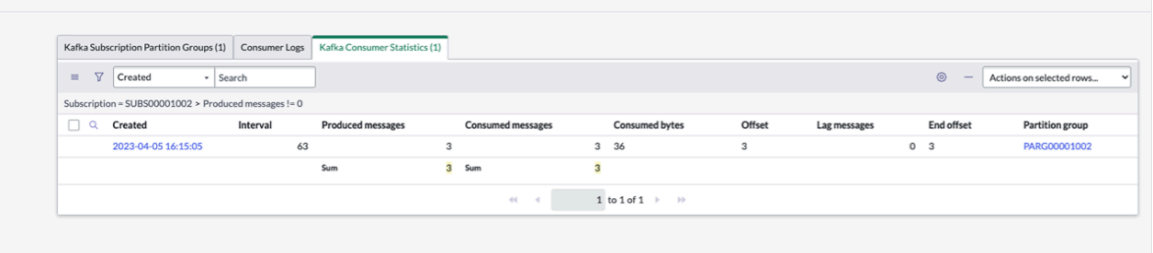
d. To view the statistics for this subscription, navigate to **All** > **Integration Hub** > **Stream Connect** > **Subscriptions**, open the subscription, and go to the statistics view.



4. Create a Script consumer to consume messages from the topic.

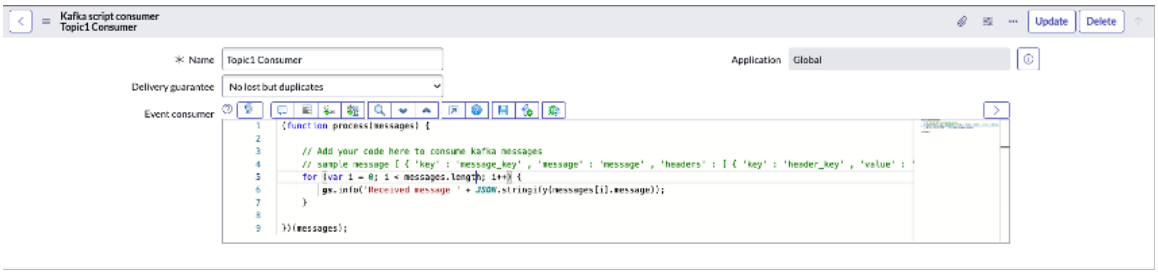
a. Navigate to **IntegrationHub** > **Consumers** > **Script Consumers**.

b. Select **New**.

c. In the **Name** field, enter a name for your script consumer.
This example uses `Topic1 Consumer`.

d. Set the script to log the message by adding the following logic in the script box.

```
for (var i = 0; i < messages.length; i++) {
      gs.info('Received message ' +
 JSON.stringify(messages[i].message));
 }
```



e. Save the form.

f. In the Related Links section, select **New** to add a Kafka stream to consume the messages.

g. On the Kafka Stream form, set the following field values.

- **Name** to `Topic1 Stream`.
- **Topic** to the topic created earlier, topic1.
- **Max concurrency** to `1`.
- **Start Consuming** to **All the messages stored in the topic**. This option enables you to read the messages already published to this topic.
- **Message handling** to **Automatically optimize**.

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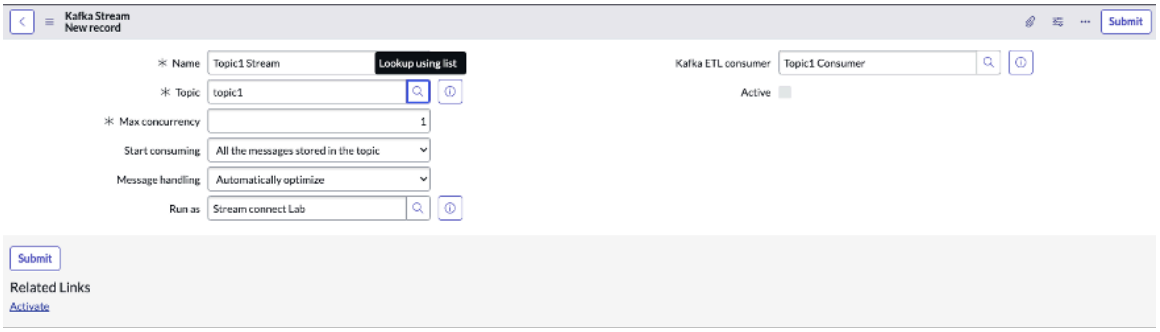
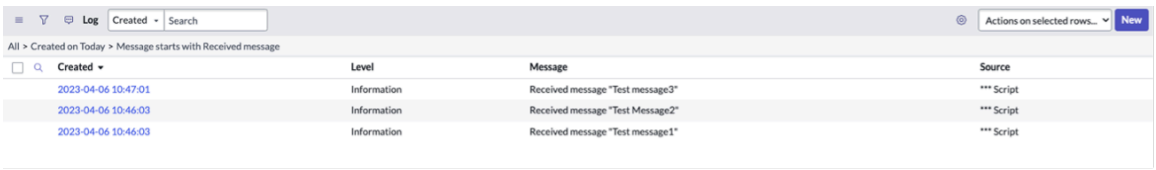


h. Select the **Activate** link under Related Links.
You should be able to see the activated subscription.

i. To view the messages, navigate to **All** > **System logs** > **System log** and filter messages that start with Received message.



j. You should see all the messages after 1 minute.

Use the ETL and Transform Map consumers to import data

Use ETL definitions and transform maps to process Kafka events. ETL definitions and transform maps specify the transformation logic to use when pulling data through scheduled imports. You can use the same ETL definitions and transform maps to transform the events received through Kafka.

Before you begin

- Role required: integration_hub_admin
- The first part of this section shows you how to use the ETL Consumer to consume messages. To use the ETL consumer, you need a robust import set transformer.
- The second part of this section shows you how to use a Transform Map consumer to consume messages. To use the Transform Map Consumer, you need a transform map.

Procedure

1. Create a topic to consume ETL and transform map consumer messages.

a. Use the following command to create a topic in Hermes.
In this example, the topic name is topic2.

```
bin/kafka-topics.sh --create --command-config
 config/bootcamp.properties  --bootstrap-server
 <instance name>.service-now.com:4000,<instance
 name>.service-now.com:4001,<instance
 name>.service-now.com:4002, <instance
 name>.service-now.com:4003 --topic snc.<instance
 name>.topic2
```

Be sure to replace `<instance name>` with the name of your instance.

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b. To view the topic, log in to the instance and navigate to **All** > **IntegrationHub** > **Stream Connect** > **Topics**.

Note: It takes approximately 10 minutes to create a topic.

2. Create an ETL Consumer to consume data from the topic.

a. Navigate to **All** > **IntegrationHub** > **Consumers** > **ETL Consumer**.

b. Select **New**.

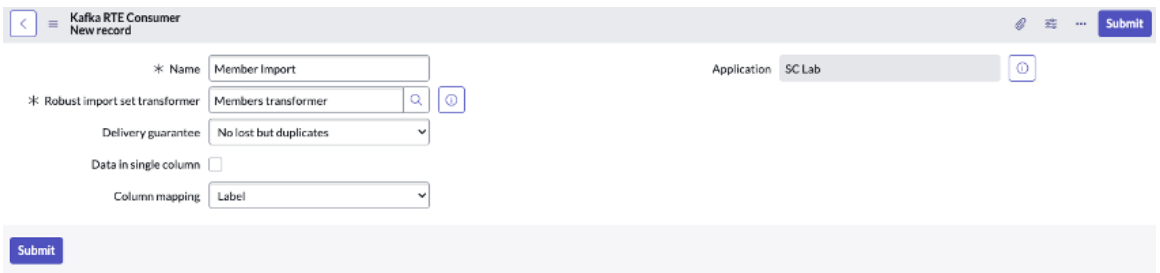
c. On the Kafka Consumer form, enter a name in the **Name** field.
This example uses the name Member Import.

d. For the **Robust import set transformer** filed, select an existing Robust import set transformer.
For the robust import set transformer, select one that is not using the option to store data in a single column. To be able to see the messages, make sure the robust import set transformer has the **Verbose** option enabled.

e. Deselect the **Data in single column** option.
This option should only be selected for import set tables with data in a single column.

f. Set the **Column mapping** to **Label**.

This means the input message's JSON keys are mapped to the column labels of the Import Set table.



g. Save the form.

h. Create a Kafka stream for the consumer.

i. On the Kafka Stream form, set the following field values.

- **Name** to `Topic2 Stream`.
- **Topic** to the topic created earlier, topic2.
- **Max concurrency** to `1`.
- **Start Consuming** to **Messages received after the first activation**.
- **Message handling** to **Automatically optimize**.

j. Select the **Activate** link under Related Links.

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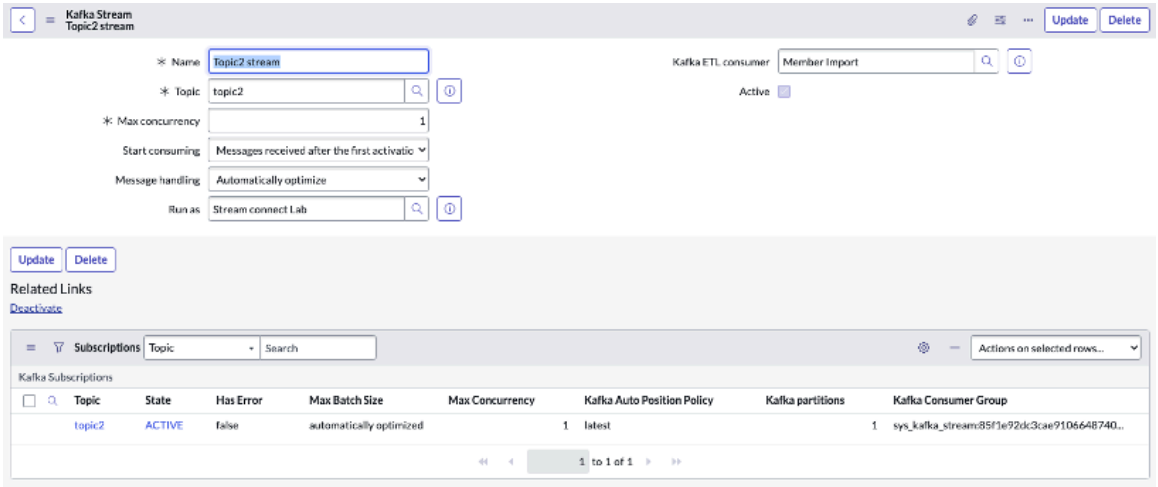
You should be able to see the activated subscription.



3. Publish messages to topic2.

   a. Run the following command to publish messages to topic2.

```
bin/kafka-console-producer.sh --topic
 snc.<instance name>.topic2  --producer.config
 config/bootcamp.properties  --bootstrap-server
 <instance name>.service-now.com:4000,<instance
 name>.service-now.com:4001,<instance
 name>.service-now.com:4002,<instance
 name>.service-now.com:4003
```

   Be sure to replace `<instance name>` with the name of your instance.

   This command prompts you for messages.

   b. Send the following JSON message.

```
{"city":"San
 Diego","name":"Jhon","id":"SN001","state":"California"}
```

   You can send this message with any values, but the JSON message key should match the Import Set table labels.

   c. Navigate back to the ETL Consumer you created.

   After about one minute, the data should have been imported through the import set.

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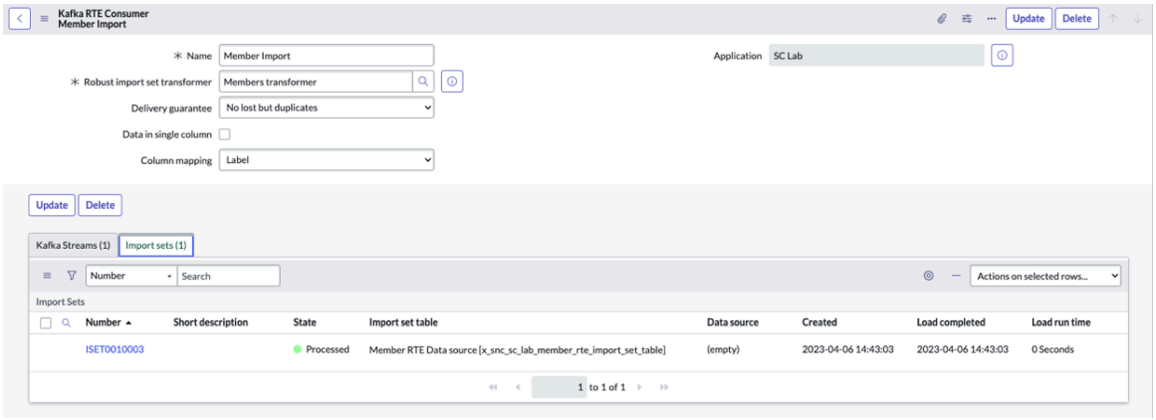
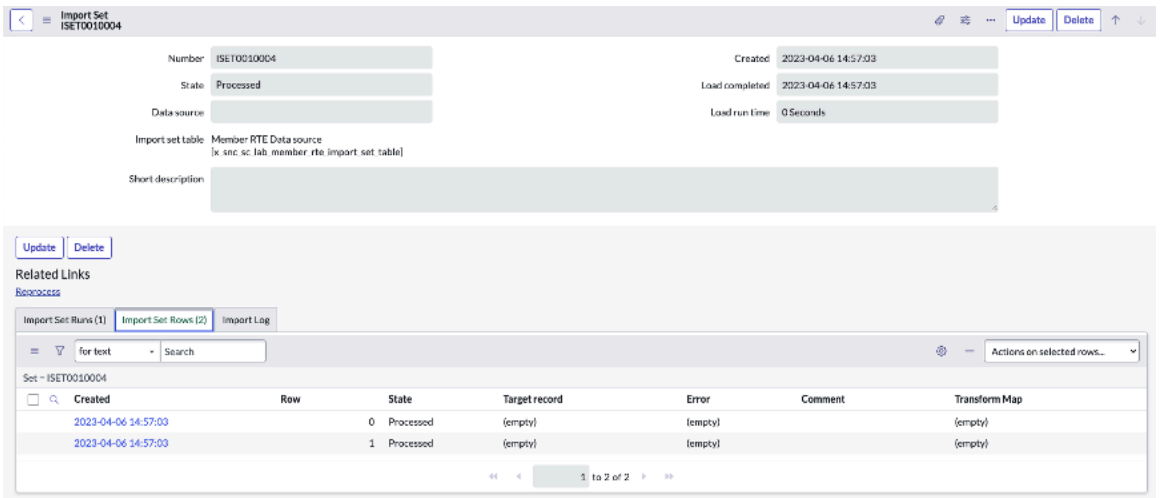
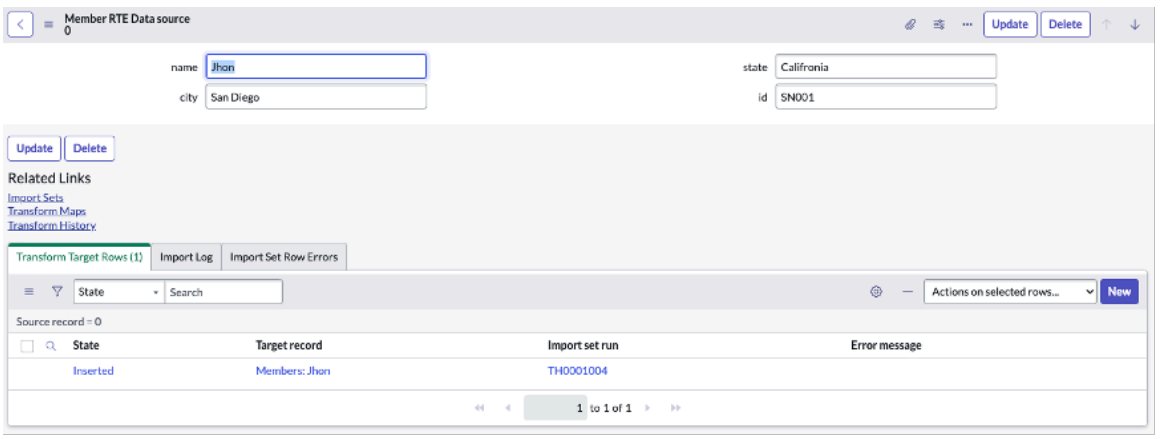


d. To view detailed information about the import set, select the import set number.



e. To view detailed information about an import set row, select the import set row number.



4. Create a Transform Map Consumer to consume data.

a. Navigate to **All** > **IntegrationHub** > **Consumers** > **Transform Map Consumer**.

b. Select **New**.

c. On the Transform Map Consumer form, enter a name in the **Name** field.

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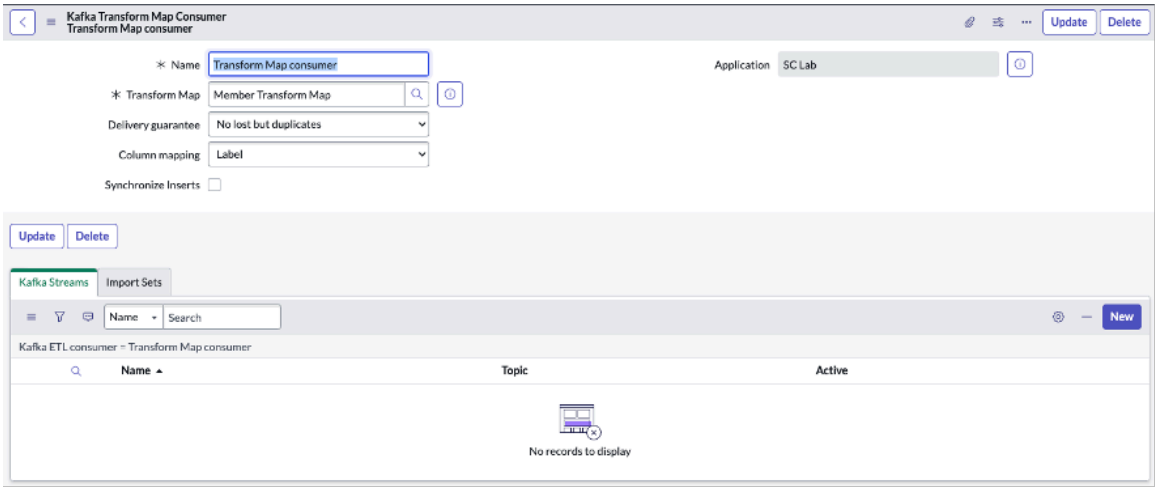
d. For the **Transform Map** field, select an existing transform map.



e. Save the form.

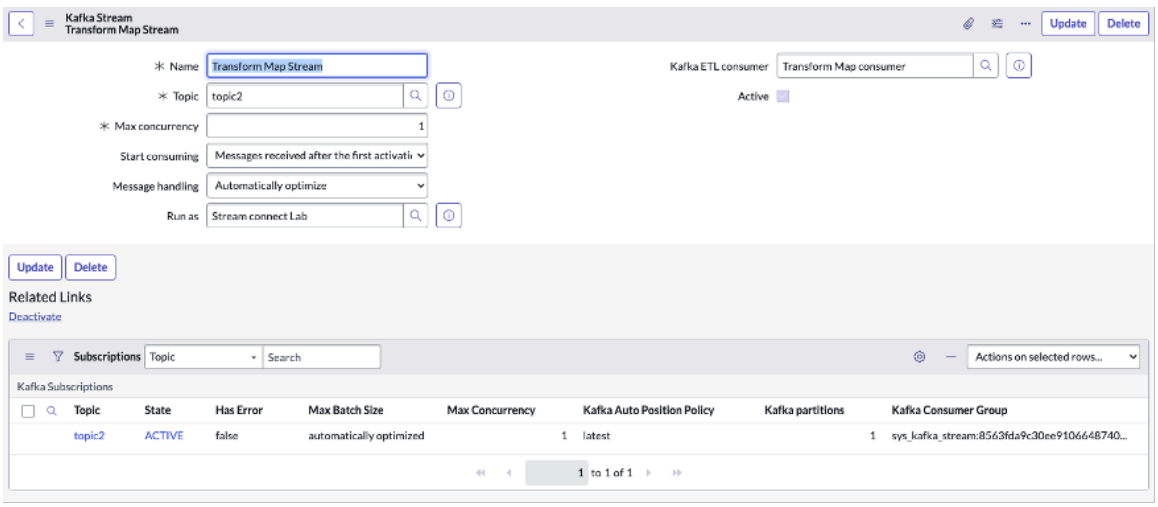
f. Create a Kafka stream for the consumer.

g. On the Kafka Stream form, set the following field values.

- **Name** to `Transform Map Stream`.
- **Topic** to the topic created earlier, topic2.
- **Max concurrency** to `1`.
- **Start Consuming** to **Messages received after the first activation**.
- **Message handling** to **Automatically optimize**.

h. Select the **Activate** link under Related Links.

You should be able to see the activated subscription.



5. Publish messages to topic2.

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a. Run the following command to publish messages to topic2.

```
bin/kafka-console-producer.sh --topic
 snc.<instance name>.topic2  --producer.config
 config/bootcamp.properties  --bootstrap-server
 <instance name>.service-now.com:4000,<instance
 name>.service-now.com:4001,<instance
 name>.service-now.com:4002,<instance
 name>.service-now.com:4003
```

Be sure to replace `<instance name>` with the name of your instance.

This command prompts you for messages.

b. Send the following JSON message.

```
{"city":"San
 Diego","name":"Jhon","id":"SN001","state":"California"}
```

You can send this message with any values, but the JSON message key should match the Import Set table labels.

c. Go to the Transform Map Consumer you created.
After about one minute, the data should have been imported through the import set.

d. To view detailed information about the import set, select the import set number as in step 3d above.

Use the Kafka Producer step and the ProducerV2 API to publish messages

Push data from ServiceNow to Hermes so that the Kafka consumers can read them.

Before you begin

- Role required: integration_hub_admin
- The first part of this section shows you how to use the Kafka Producer step in Workflow Studio to publish messages to Hermes. For more information about the step, see Kafka Producer step.
- The second part of this section shows you how to use the ProducerV2 API to publish messages. For more information, see ProducerV2 API.
- To receive all the messages, you need to run two consumers for different datacenters. See Consume test messages from a Hermes topic using the Kafka client for details.

Procedure

1. Start two consumers to receive messages.

a. Run the following commands from the command line to receive the messages.

```
bin/kafka-console-consumer.sh --consumer.config
 config/bootcamp.properties --topic snc.<instance
 name>.topic1 --group snc.<instance name>.consumer_group1
 --from-beginning --bootstrap-server <instance
 name>.service-now.com:4100,<instance
 name>.service-now.com:4101,<instance
```

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```
 name>.service-now.com:4102,<instance
 name>.service-now.com:4103
```

```
bin/kafka-console-consumer.sh --consumer.config
 config/bootcamp.properties --topic snc.<instance
 name>.topic1 --group snc.<instance name>.consumer_group1
 --from-beginning --bootstrap-server <instance
 name>.service-now.com:4200, <instance
 name>.service-now.com:4201, <instance
 name>.service-now.com:4202, <instance
 name>.service-now.com:4203
```

Be sure to replace `<instance name>` with the name of your instance.

2. Publish messages from the instance using a flow step.

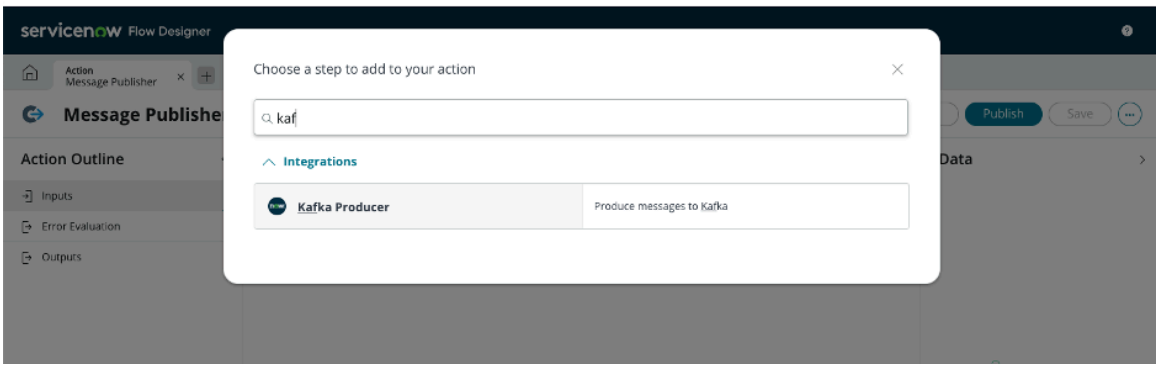
   a. Navigate to **All** > **Process Automation** > **Flow Designer**.

   b. Create a new action by selecting **Create new** > **Action**.

   c. In the Action properties form, give your action a name, then select **Submit**.
   This example uses the name Message Publisher.

   d. Add a **Kafka Producer** step to the action.

   To add an action step, select the plus sign between the **Inputs** and **Error Evaluation** in the Action Outline.



   e. In the step, set the **Topic** field to `topic1`.

   f. In the **Message** field, enter a message.

   You don't need to change any other fields.

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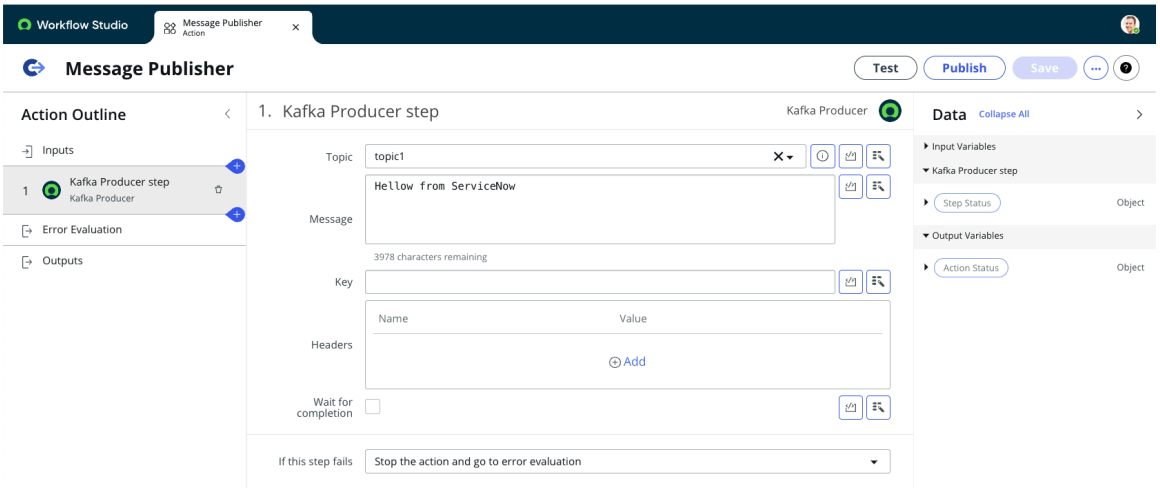

g. Select **Save** to save the action.

h. Select the **Test** button to test the action.
Testing the action publishes the message to the topic.

i. To view the message, go to the command-line consoles created in step 1.
The message should be present in one of the terminals.

3. Publish messages from the instance using a script.

a. Run the following script using the scripts background to publish messages to this topic from the instance.

```
var producer = new sn_ih_kafka.ProducerV2();
producer.send('<sys id of the topic record>',
 gs.generateGUID(), 'Test message from ServiceNow', false,
 null);
```

Be sure to replace `<sys id of the topic record>` with the sys_id of the topic record.

b. To view the message, go to the command-line consoles created in step 1.
The message should be present in one of the terminals.

Topic aliases

Use topic aliases to simplify topic management in Stream Connect. A topic alias is a unique topic name that can be connected to any underlying Hermes or Direct Kafka topic. A topic alias can be moved to different instances and connected to a different underlying topic on each instance.

Topic alias example

This example shows the form for a topic alias that is connected to a Direct Kafka topic.

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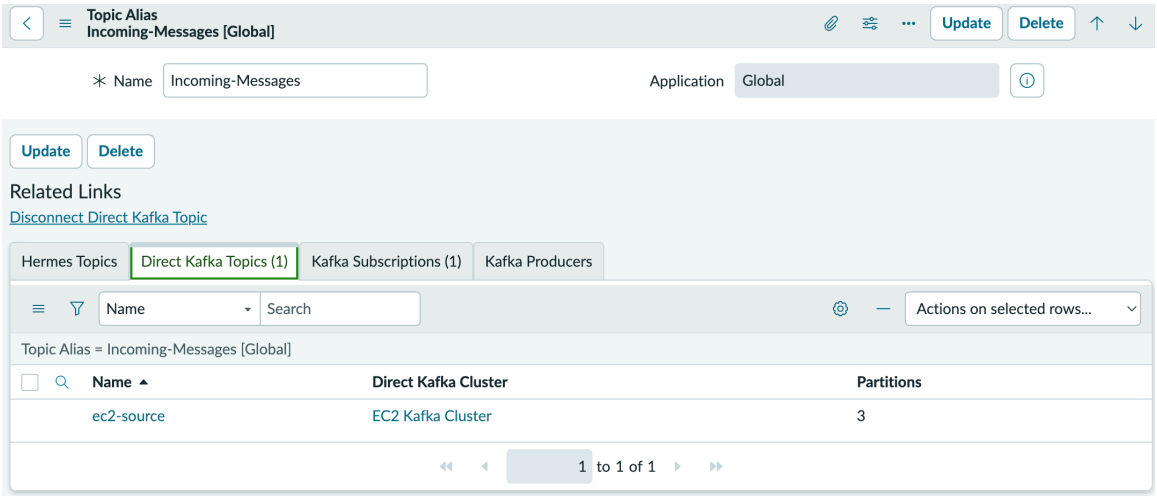

The full name of the topic alias is Incoming-Messages [Global]. A topic alias has a qualified name: It's a combination of the name that it's given (in this case, Incoming-Messages) followed by its application scope. It's possible for there to be multiple topic aliases with the same given name if the aliases are in different application scopes.

In the Related Links section, there are links to connect or disconnect topics. If a topic alias is already connected to a topic, there will be a link to disconnect it. In this example, the topic alias is already connected to a topic, so the link is **Disconnect Direct Kafka Topic**. If the topic alias wasn't already connected to a topic, the link would say **Connect Direct Kafka Topic**.

The links you see here are also determined by which plugins are installed.

- If the ServiceNow Stream Connect Installer (Direct Kafka) (com.glide.hub.stream_connect.onprem_installer) plugin is installed, links to connect or disconnect Direct Kafka topics appear.
- If the ServiceNow Stream Connect Hermes (com.glide.hub.stream_connect.hermes) plugin is installed, links to connect or disconnect Hermes topics appear.
- If both plugins are installed, links for both Hermes topics and Direct Kafka topics appear.

For a list of Stream Connect plugins, see Integration Hub plugins.

Below the Related Links are tabs for Topics, Kafka Subscriptions, and Kafka Producers.

- The Hermes Topics tab displays any connected Hermes topics. This tab only appears on hosted instances that have access to the ServiceNow hosted Hermes service.
- The Direct Kafka Topics tab displays any connected Direct Kafka topics. This tab generally appears only for instances where the ServiceNow Stream Connect Direct Kafka (com.glide.hub.stream_connect.direct_kafka) plugin is installed.
- The Kafka Subscriptions tab displays any associated subscriptions and related statistics. For more on subscription statistics, see Viewing Kafka subscriptions and statistics.
- The Kafka Producers tab displays any associated producers and their related statistics. For descriptions of producer statistics, see Viewing producer statistics.

Topic and topic alias tables

You can see topic aliases in the Topic Aliases [sys_sc_topic_alias] table. Certain ServiceNow product offerings may create internal topic aliases that can't be deleted or modified.

Direct Kafka topics are on the Direct Kafka Topics [sys_kafka_direct_topic] table. Hermes topics are on the Kafka Topics [sys_kafka_topic] table.

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Create and connect a topic alias

Create a topic alias and connect it to an underlying Hermes or Direct Kafka topic.

Before you begin

Role required: stream_connect_admin

Procedure

1. Navigate to **All** > **IntegrationHub** > **Stream Connect** > **Topic Alias** and select **New**.
2. Enter a name and select **Submit**.
3. From the Topic Aliases list, select the topic alias you just created.
4. Under Related Links, select either **Connect Direct Kafka Topic** or **Connect Hermes Topic**.

   The links in the Related Links section are determined by which plugins are installed. If the ServiceNow Stream Connect Installer (Direct Kafka) (com.glide.hub.stream_connect.onprem_installer) plugin is installed, the **Connect Direct Kafka Topic** link appears. If the ServiceNow Stream Connect Hermes (com.glide.hub.stream_connect.hermes) plugin is installed, the **Connect Hermes Topic** link appears. If both plugins are installed, both links appear.

   After selecting the link, a dialog box saying either Connect Direct Kafka Topic or Connect Hermes Topic appears.

5. Use the magnifying glass icon to open the list of topics and select the one you want to connect to the topic alias, then select **OK**.

   Note: Only topics that aren't already connected to a topic alias show up in the list of topics.

Result

After the topic alias is connected to a topic, the topic name appears in the appropriate tab: A Hermes topic appears in the Hermes Topics tab, and a Direct Kafka topic appears in the Direct Kafka Topics tab.

Under Related Links, the associated link changes from connect to disconnect. For example, a **Connect Hermes Topic** changes to a **Disconnect Hermes Topic**. You can use the disconnect link to disconnect the topic alias from the underlying topic.

Note: Disconnecting a topic alias may affect any active consumers or producers.

Stream Producer

Stream Producer enables you to automatically stream changes from ServiceNow tables to Kafka topics using change data capture (CDC), eliminating the need for custom scripts or business rules.

Stream Producer provides a configuration-based alternative to writing scripts or business rules for exporting data. Instead of relying on error-prone manual solutions, you can define producers once and automatically stream table changes to external systems.

Stream Producer uses change data capture (CDC) technology to capture inserts, updates, and deletes on the tables you select. The captured changes are formatted as messages and sent to a Kafka topic, enabling real-time data synchronization with external applications.

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Key benefits

- Eliminate dependency on business rules and custom scripts for data export.
- Reduce performance impact on the ServiceNow instance.
- Set it up once and automatically keep external data in sync.
- Streamline complex data integration workflows.

How it works

The following steps show the workflow for using Stream Producer.

1. Create a Stream Producer configuration and specify a table to monitor.
2. Define which change events to capture: insert, update, or delete.
3. Select which fields to include in the payload (or include all fields).
4. Configure an optional key and headers to accompany each message.
5. Specify the target Kafka topic.
6. Activate the producer.

Once activated, the Stream Producer automatically captures matching table changes and sends them to your Kafka topic without requiring any additional configuration or manual intervention.

Supported features

- Apply filters to capture only specific records.
- Serialize payloads as plain text or in an Avro format.
- Select individual fields or include all table fields.
- Configure custom Kafka message keys with optional prefixes.
- Add headers to messages with field values and metadata (including action type and collection timestamp).
- Track producer statistics and activity metrics.
- Manage multiple Stream Producers from a single console.

Limitations

The following features aren't supported.

- Large messages. If the message is larger than the max message size for the target Kafka environment, the message will fail to send and will be logged as `RecordTooLargeException`. The change record is skipped, and processing continues with the next change.
- Message chunking for payloads over a size limit.
- Interval-based change capture (trigger only on scheduled intervals).
- File attachments.

Change data capture operation

Stream Producer is built on a change data capture (CDC) framework, which provides a scalable, event-driven approach to detecting and exporting table changes. Rather than polling tables or

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relying on business rules, CDC captures changes at the database level and routes them through a message queue (CDC queue) for consumption by Stream Producer.

Stream Producer configurations define what data to capture, how to filter it, and where to send it. Once activated, the Stream Producer job runs continuously, processing change events and sending them to Kafka topics in your configured serialization format (JSON or Avro).

The following list provides an overview of how the CDC framework operates.

1. Change detection: When a record is inserted, updated, or deleted in a monitored table, the CDC framework captures the change at the database level.
2. CDC queue: The change is written to the Stream Connect CDC Change Queues [`cdc_queue_stream_connect`] table, with metadata including the table name, operation type (insert/update/delete), record sys_id, and timestamp.
3. Label assignment: Each Stream Producer configuration is assigned a label. Changes matching the producer's filter criteria are tagged with that label in the CDC queue.
4. Producer polling: The Stream Producer job polls the CDC queue periodically, retrieving changes for its label.
5. Payload construction: Stream Producer builds a message payload containing the specified fields and formats it according to your serialization choice.
6. Kafka dispatch: The formatted message is sent to the configured Kafka topic.

Key components

Stream Producer consists of the following components:

Stream Producer configuration (UI form)

The user-facing interface where admins define producers. Contains sections for table information, filtering, and Kafka topic configuration. Managed by the Stream Producers [`sys_sc_stream_producer`] table. The **Active** field is read-only and automatically managed by the activation process.

CDC Listener (background service)

Started when a Stream Producer is activated. Monitors the configured table for changes matching the filter criteria. Respects domain separation rules (if applicable).

Stream Connect CDC Change Queues [`cdc_queue_stream_connect`]

Stores change events with labels identifying which Stream Producers should consume them. Index on labels field is not available; labeled lookups use full-table scans.

Stream Producer Job

Scheduled batch job that polls the CDC queue, retrieves labeled changes, constructs payloads, and sends the payloads to Kafka. Runs every minute for a maximum of 2 minutes per execution. You can specify the maximum number of bytes written in a single Kafka transaction with the *`glide.ih.kafka.stream_producer.max_kafka_transaction_bytes`* property. The default value is 10MB.

Stream Producer CDC Statistics [`sys_sc_cdc_statistics`]

Tracks metrics for each Stream Producer: messages and bytes produced, processing time, CDC depth (queue depth). Statistics are aggregated per job execution and updated periodically.

Stream Producer [`sys_sc_stream_producer`]

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Internal representation of an active producer. Created automatically when a Stream Producer is activated. Links the Stream Producer configuration to its runtime state and Kafka topic routing.

Payload formats

Stream Producer supports two serialization formats for message payloads.

- JSON (human-readable, widely compatible) and
- Avro (schema-versioned, compressed).

You can select the serialization format when you Create a Stream Producer. For more information about schema management for Avro, see Schema management in Stream Connect.

ISO format in JSON payloads

Date and time fields in JSON payloads are serialized to ISO 8601 formats.

- Date fields are serialized to JSON as 2026-04-15.
- All fields containing a date and time are serialized to JSON as 2026-04-15T00:29:38.000Z when stored in UTC, or as 2026-04-15T00:29:38.000 when stored in wall-clock time.
- All fields containing only a time are serialized to JSON as 00:29:38Z when stored in UTC, or as 00:29:38 when stored in wall-clock time.
- All Boolean, integer, and float fields are serialized as Boolean, integer, and float in JSON.
- Payload fields that aren't dates, times, Booleans, or numbers aren't changed and continue to use `toString()`.

Headers and metadata

Each message sent to Kafka includes optional headers that carry metadata about the change event. Headers enhance message routing and processing in downstream systems.

Default headers: When enabled, Stream Producer automatically adds the following headers to every message.

- `action`: The type of change that triggered the message. Values are `insert`, `update`, or `delete`.
- `collection_timestamp_ms`: The millisecond timestamp when the change was captured in the CDC queue.
- `table_name`: The name of the source table being monitored.

Custom headers: You can configure additional headers using any fields from the source table. For reference or choice fields, headers include both the value and its display name, separated by a colon. For example, a reference field header might appear as `assigned_to:c39e3639876aba141444337e0ebb354f:Bob Person`.

Domain separation support

Stream Producer follows domain separation rules. When domain separation is enabled:

- Stream Producer configurations are scoped to a domain and can only see records visible to that domain.
- The CDC Advisor (change detection layer) filters changes by domain, ensuring domain isolation.

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- Domain inheritance follows the ServiceNow domain hierarchy (TOP → TOP/ACME, etc.).
- A Stream Producer in a parent domain can stream changes from child domains; a Stream Producer in a child domain can't access parent domain data.

Security and permissions

Stream Producer implements multi-layer security controls to protect table access and sensitive data, including:

- Role-based access control (RBAC) at the configuration and runtime layers.
- Table deny-listing to restrict which tables can be monitored.
- Automatic sensitive field filtering from payloads and schemas.

Role-based access control: Stream Producer configurations require specific roles to access and manage producers.

- `kafka_producer`: Required to create, activate, and deactivate Stream Producer configurations.
- `stream_connect_admin`: Administrative role with full access to Stream Producer management and Stream Producer [`sys_sc_stream_producer`] table operations.
- `stream_connect_viewer`: View-only role. Users with this role can't access the Stream Producer configuration UI.

Table deny-listing: Only tables explicitly allowed by the platform or administrator configuration are selectable when defining Stream Producer configurations. This prevents users from inadvertently configuring producers on restricted or unsupported tables. Some table categories are typically allowed by default:

- Incident, Problem, Change Request, and other ITSM tables.
- Custom application tables (with administrator approval).
- Integration-related tables that support external data synchronization.

Note: Accessing the deny-list requires the `maint` role (only ServiceNow Support).

Sensitive field filtering: Stream Producer automatically excludes sensitive field types from message payloads, Avro schemas, and UI displays to protect sensitive information, including:

- `password`: User password fields.
- `password2`: Secondary password fields or confirmation password fields.
- `glide_encrypted`: Fields encrypted with the ServiceNow platform encryption mechanism.

Plugin

Stream Producer requires the ServiceNow Stream Producer [`com.glide.hub.stream_connect.stream_producer`] plugin. This plugin is activated when you activate the ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin.

Create a Stream Producer

Create a Stream Producer configuration to automatically stream table changes to a Kafka topic. You can specify which table to monitor, which change events to capture, which fields to include, and configure keys and headers for routing and tracking.

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Before you begin

Before you begin:

- Verify that you have access to the Stream Connect application.
- Identify the table you want to monitor.
- Verify that a Kafka topic exists to receive the stream data.

Role required: `kafka_producer`

About this task

Create a Stream Producer configuration to define how ServiceNow captures and streams changes from a specific table. After you create and activate the configuration, the Stream Producer automatically sends matching table changes to your Kafka topic with optional keys and headers for enhanced message routing.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Stream Connect** > **Stream Producers**.
2. Select **New**.
3. On the *Stream Producer* form, fill in the fields.

Stream Producer form

Name	Descriptive name for this producer configuration. The name identifies the producer in the Stream Producer list and must be unique within the Stream Producer [sys_sc_stream_producer] table.
Application	Application scope for the producer. This field is automatically set.
Active	Indicates whether the Stream Producer is currently active. When a Stream Producer is first configured, it is inactive by default. You can activate the producer after it's configured.
Table Name	Name of the ServiceNow table you want to monitor for changes. Stream Producer captures inserts, updates, and deletes on this table.
Filter	Option to apply filters to restrict which records trigger the producer. Select **Add filter Condition** to create filters. You can add multiple conditions using AND/OR logic. Filter examples: ○ `Location = London` ○ `State = Active AND Location = London`
Capture all fields	Option to include every field from the table in the message payload. Selected by default. You can unselect to choose specific fields.
Fields	Fields to include in the payload. Use the slush bucket to add or remove fields. At least one field must be selected. The Sys ID is mandatory and is included in the record, even if the field selection is empty.

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	This field only appears if **Capture all Fields** is not selected (is not checked). **Note:** Sensitive field types (password, password2, glide_encrypted) are automatically excluded from all message payloads and schemas, regardless of whether they are selected. These fields aren't sent to Kafka to protect sensitive information.
On Insert	Option to configure which change events trigger the producer. When checked, **On Insert** captures new record insertions in the selected table.
On Update	Option to configure which change events trigger the producer. When checked, **On Update** captures updates to existing records in the selected table.
On Delete	Option to configure which change events trigger the producer. When checked, **On Delete** captures record deletions in the selected table.
Only trigger update if any selected field has changed	If enabled, update events only trigger when at least one of the selected fields has changed. This field can only be selected if **On Update** is also selected.
Topic Alias	The alias for the target Kafka topic. This is the topic that receives the stream data. Select from existing topics in your Kafka environment.
Key Selection	Select a key for the payload. The key is a single field value (or combination with a prefix) that determines which partition a message goes to in Kafka. Topics can be partitioned. Messages with the same key go to the same partition. This assists with the ordering of related messages. Common choices: Sys ID, incident number, request number, or any unique identifier in your table. Reference fields are supported; the ID value (not the display name) is used as the key.
Key Prefix	Option to select the type of key prefix. Choose one of the following. ○ **No prefix**: The default value. No prefix is added to the key. Example: `0a666274c3f1ba10d14320bdc00131dc` ○ **Instance Name**: The key is prefixed with the name of the instance. Example: `streamconnectdemo:0a666274c3f1ba10d14320bdc00131dc` ○ **Custom**: The key is prefixed to the value of your choosing. Example: `abc123-0a666274c3f1ba10d14320bdc00131dc`
Prefix	Prefix for the Key. This field only appears if **Key Prefix** is set to **Instance Name** or **Custom**. ○ If you selected **Instance Name**, it's automatically set to the name of the instance. ○ If you selected **Custom**, enter the prefix of your choice, up to 100 characters.

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Header Selection	Select one or more fields to include as Kafka message headers. Headers are key-value pairs that carry metadata about the change event and are useful for routing and filtering in downstream systems. By default, Stream Producer automatically adds the following system headers to every message. ○ `action`: The type of change (insert, update, or delete). ○ `collection_timestamp_ms`: The timestamp when the change was captured. ○ `table_name`: The name of the source table. You can select any number of fields from your source table. For each custom header field you select: ○ Simple fields (text, numbers, dates) are sent as-is. Example: `number:INC0000001` ○ Reference fields (links to other tables) include both the ID and display name. Example: `assigned_to:c39e3639876aba141444337e0ebb354f:Bob Person` ○ Choice fields (dropdown values) include both the value and display name. Example header: `"state": "1:New"`
Serialization Format	Option to specify how the message payload is formatted. Select **JSON** for plain text messages or **Encoded - Avro** to send messages in Apache Avro binary format with an embedded schema.

4. Select **Submit**.

Result
The Stream Producer configuration is created and ready to activate. The configuration appears in the Stream Producer list.

In the Related Links section of the form, there is a **Show Payload** option where you can select a record to view a sample JSON payload with a key, headers, and size.

If the **Serialization Format** is **Encoded - Avro** the Related Links section has a **View Schema** option where you can see the Table Message Schema Evolution form associated with the producer.

What to do next
To begin capturing and streaming table changes, activate the Stream Producer. See Activate or deactivate a Stream Producer for instructions.

Activate or deactivate a Stream Producer

Activate a Stream Producer configuration to begin capturing and streaming table changes to your Kafka topic. You can deactivate it at any time to stop streaming changes. When you deactivate a producer, any unprocessed messages in the CDC queue are discarded.

Before you begin
Before you begin:

- A Stream Producer configuration must exist.
- All required form fields must be completed.

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Role required: `kafka_producer`

About this task

When you activate a Stream Producer, the change data capture (CDC) listener starts monitoring the specified table for changes. Any matching table changes are immediately captured and sent to the target Kafka topic. When you deactivate the producer, monitoring stops and no new messages are sent.

> **Important:** When you deactivate a Stream Producer, any unprocessed messages that are currently staged in the CDC queue won't be sent to Kafka. This is the expected behavior to prevent sending stale or outdated events when the producer is reactivated later. When it's reactivated, only new changes (from the moment of reactivation onward) will be captured and sent.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Stream Connect** > **Stream Producers**.
2. In the Stream Producer list, locate and select the producer you want to activate or deactivate.
3. To activate the producer:
   a. In the Related Links section, select **Activate** (available only if the producer is currently inactive).
   The Stream Producer starts monitoring the table. The **Active** field is automatically set to `true`. A corresponding Kafka Producer record is created and appears in the **Kafka Producer** related list.
4. To deactivate the producer:
   a. In the Related Links section, select **Deactivate** (available only if the producer is currently active).
   A confirmation dialog appears warning you that deactivating the producer will stop all events from being published to the Kafka topic and listing the number of events currently staged in the CDC queue that will be discarded.
   b. Select **OK** to confirm deactivation, or **Cancel** to cancel.
   If you select **OK**: The Stream Producer stops monitoring the table. The **Active** field is automatically set to `false`. All staged messages in the CDC queue are discarded and will not be sent to the Kafka topic. No new messages are sent to Kafka.

Result

The Stream Producer is activated or deactivated as requested. If you activated the producer, it begins streaming table changes immediately. If you deactivated it, streaming stops.

What to do next

After activating a Stream Producer, you can monitor activity and metrics in the **Stream Producer CDC Statistics** related list on the Stream Producer form. Statistics are updated periodically and show the number of messages sent and other activity metrics.

Monitor and optimize Stream Producer performance

Monitor Stream Producer performance metrics and change data capture (CDC) queue health to identify bottlenecks and optimize for your deployment scale and throughput requirements.

Before you begin

Role required: admin

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About this task

Stream Producer performance is primarily constrained by CDC queue polling. The queue uses a non-indexed `labels` field for producer identification, which means each polling cycle performs a full-table scan. Monitoring queue depth (lag) and job execution time helps identify when you need to optimize.

The Stream Producer Scheduled Job runs automatically every minute (on each active node) to process CDC queue changes and send messages to Kafka. Each job execution processes all staged records with their configured keys and headers, formats them according to the selected serialization format (JSON or Avro), and publishes them to the target topic. The job has a maximum execution window of 2 minutes per run.

Procedure

1. Navigate to **All** > **Integration Hub** > **Stream Connect** > **Stream Producers** and open an active Stream Producer.
2. Scroll to the Stream Producer CDC Statistics related list at the bottom of the form.
   The related list displays recent statistics records showing aggregated metrics per job execution.
3. Review the following key metrics.
   - **Total Processing Time**: Total time (in seconds) spent processing this producer's labels in this job execution.
   - **Produced Bytes**: Number of message bytes processed in this job execution.
   - **Produced Messages**: Count of messages processed in this job execution.
   - **CDC Depth**: Number of unprocessed changes still in the CDC queue for this producer's labels. High lag indicates the job can't keep up with incoming changes.
4. Monitor trends over time.
   - If **CDC Depth** is consistently growing (each execution shows higher lag than the previous), the producer is falling behind. Lag increasing over hours/days indicates a bottleneck.
   - If **Total Processing Time** is approaching 2 minutes (the job's max execution window), the job is spending most of its time on this producer and may not have time to process other producers.
   - If **Produced Messages** is zero but lag is high, the queue may have unprocessable records or filter conditions are too restrictive.
5. To optimize performance, consider the following approaches.
   - Reduce scope: On the Table Information section of the Stream Producer form, apply tighter filters to capture fewer changes. Fewer records may mean faster processing.
   - Select specific fields: On the Stream Producer form, unselect **Capture all fields** to choose specific fields instead of capturing all fields. Smaller payloads may process faster.
   - Simplify headers: Reduce the number of custom header fields selected. Fewer headers may mean smaller message sizes and faster serialization.
   - Configure transaction batching: Adjust the Stream Connect property *`glide.ih.kafka.stream_producer.max_kafka_transaction_bytes`* to optimize transaction sizes. This property specifies the maximum number of bytes written in a single Kafka transaction. Higher values may improve throughput by batching more messages per transaction but increase memory usage; lower values may reduce latency but increase transaction overhead. Coordinate this setting with your Kafka broker configuration and network capacity.

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- Monitor multiple producers together: If many producers are active, the job may be busy processing queued changes. Consider spreading them across multiple scheduled times or prioritizing critical producers.
- Alert on lag threshold: Create a business rule or alert to notify admins when CDC lag exceeds a threshold (e.g., > 1000 unprocessed records).

Result
You're now monitoring Stream Producer performance and can identify optimization opportunities based on queue lag and processing time trends.

Stream Connect Message Replication

Replicate data between your Apache Kafka environment and ServiceNow.

With Stream Connect Message Replication, you can configure and manage message replications directly from your ServiceNow instance.

Stream Connect Message Replication uses a MID Server or MID Server cluster to run the data replications, so you don't need to configure or host additional replication services. It also simplifies the message replication setup by automatically generating the required certificates.

Enabling a MID Server to replicate data

Stream Connect Message Replication uses a MID Server with a replicator extension to replicate data to and from your local Kafka. For instructions on how to configure the MID Server, see Configuring MID Servers.

The MID Server must be able to access Hermes endpoints through the firewall. Work with your network administrator to make sure that the following port ranges are open.

- Producer: 4000–4050
- Consumer1: 4100–4150
- Consumer2: 4200–4250

Note: Proxy settings on the MID Server don't apply to Hermes connectivity. The MID Server proxy configuration applies only to HTTP-based communication. Hermes uses Kafka-native TCP connections, so traffic to the Hermes cluster bypasses proxy settings regardless of how the MID Server is configured.

Using a MID Server cluster

You can use a MID Server cluster, instead of a single MID Server, for message replication. With a MID Server cluster, if one of the MID Servers in the cluster fails, the other MID Servers can share the load of the failed MID Server.

In a MID Server cluster, the topic partitions are distributed across all the available MID Servers in the cluster. If a MID Server becomes unavailable, the partitions are redistributed on the remaining MID Servers. If an additional MID Server becomes available in the cluster, then the partitions are distributed across the MID Servers again.

For details on setting up a MID Server cluster, see Configure a MID Server cluster.

Note: The MID Server cluster must have the **Load Balance** cluster type. The **Failover** cluster type is not supported.

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Configuring connections and credentials for Kafka

Stream Connect Message Replication uses a Connection & Credential alias to connect to your local Kafka. To configure a Connection & Credential alias:

1. Create Kafka credentials with the authentication data required for the connection.
2. Configure a Kafka connection to connect to your Kafka environment.
3. Create a Connection & Credential alias, to associate the connection information and credential data. The Connection & Credential alias should have a **Connection type** of **Kafka** and must be accessible from the MID Server.

These steps are for configuring a Connection & Credential alias for connecting to Kafka. You don't need to set up connections or credentials for connecting to Hermes, because the MID Server automatically handles the creation of the required keystore, truststore, and certificates.

Creating message and topic replications

Message replication requires Message Replication records and Kafka Topic Replication records.

A Message Replication record represents a single Kafka cluster. For example, if you have two Kafka clusters, you would create two different Message Replication records, one for each cluster. A Message Replication record is the parent record for all the topics being replicated to or from that cluster. Message Replication records are stored in the Message Replications [sys_sc_message_replication] table.

A Kafka Topic Replication record specifies the replication from a single source topic to a single destination topic. You can't replicate a single source topic to multiple destinations. You can only replicate to each destination once. Kafka Topic Replication records are stored in the Kafka Topic Replications [sys_kafka_topic_replication] table.

For a step-by-step guide to creating message and topic replication records, see Create message and Kafka topic replications in Stream Connect.

Viewing message replication statistics

Once replications are running, the system creates a metrics record for each active topic replication every 60 seconds. Metrics records provide information about topic replications, including the **Message count**, which shows the number of messages replicated in each collection interval.

You can view metrics records on the Message Replication Statistics [sys_sc_channel_replication_metric] table. You can also view metrics records for a particular topic by checking the Message Replication Statistics on its Kafka Topic Replication record.

For a list of message replication metrics and their descriptions, see Viewing Stream Connect Message Replication statistics.

Required plugin

Stream Connect Message Replication requires the ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin.

Roles

The message_replication_admin role can create, modify, and delete records in all the message replication tables, including the connection and credential tables, and the message and topic replication tables.

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The message_replication_user role can view records in the message replication tables.

Logging

Most issues are logged in the MID Server log. Additional debug logging can be enabled by setting the *glide.stream_connect.message_replication.debug* MID Server property to **true**.

Create message and Kafka topic replications in Stream Connect

Set up message and topic replications to replicate data between your Apache Kafka environment and ServiceNow.

Before you begin

- Role required: message_replication_admin
- This feature requires a subscription. For more information, see Using Stream Connect for Apache Kafka.
- Verify the Hermes Messaging Service and Instance PKI Certificate Generator are working.
  - Check the status of and connection to the Hermes Kafka cluster.
  - Check the Key Management Framework Health to verify that all three items in the Instance PKI section are operational.
- Configure and start a MID Server or MID Server cluster. For more information, see Configuring MID Servers and Configure a MID Server cluster.

  The MID Server must be able to access Hermes endpoints through the firewall. Work with your network administrator to make sure that the following port ranges are open.
  - Producer: 4000–4050
  - Consumer1: 4100–4150
  - Consumer2: 4200–4250

  Note: Proxy settings on the MID Server don't apply to Hermes connectivity. The MID Server proxy configuration applies only to HTTP-based communication. Hermes uses Kafka-native TCP connections, so traffic to the Hermes cluster bypasses proxy settings regardless of how the MID Server is configured.

  If you're using a MID Server cluster, it must have a cluster type of **Load Balance**. The **Failover** cluster type is not supported.
- Stream Connect Message Replication uses a Connection & Credential alias to connect to your local Kafka. Create a Connection & Credential alias with a **Connection type** of **Kafka**. A Connection & Credential alias requires a Kafka Connection and a Kafka Credential.
- Stream Connect Message Replication requires the ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin.

About this task

This page shows you how to create a Message Replication record and an associated Kafka Topic Replication record.

A Message Replication record represents a single Kafka cluster. For example, if you have two Kafka clusters, you would create two different message replication records, one for each cluster. A Message Replication record is the parent record for all the topics being replicated to or from that cluster. Message Replication records are stored in the Message Replications [sys_sc_message_replication] table.

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A Kafka Topic Replication record specifies the replication from a single source topic to a single destination topic. You can't replicate a single source topic to multiple destinations. You can only replicate to each destination once. Kafka Topic Replication records are stored in the Kafka Topic Replications [sys_kafka_topic_replication] table.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Stream Connect** > **Message Replications** and select **New**.
2. On the Message Replication form, fill in the fields.

Message Replication form

Field	Description
Name	Name of the message replication.
Messaging service connection	Connection & Credential alias specifying which messaging service to connect to.
Application	Application scope for the message replication. This field is automatically set.
Active	Option to activate the message replication.

3. Select **Save**.
   After you save the form, the Message Replication Statuses and Kafka Topic Replications tabs appear at the bottom of the page.
4. On the Kafka Topic Replications tab, select **New**.
5. On the Kafka Topic Replication form, fill in the fields.

Kafka Topic Replication form

Field	Description
Name	Name of the topic replication. The name is generated automatically based on the values in other fields. To generate the **Name**, enter the values for the **Direction**, **ServiceNow topic**, and **Topic name** fields, then select **Save**. When the **Direction** is **To ServiceNow**, the **Name** has the following format: `topic name [replication name] -> ServiceNow topic name [SN]`. When the **Direction** is **From ServiceNow**, the **Name** has the following format: `ServiceNow topic name [SN] -> topic name [replication name]`.
Direction	Direction of the topic replication. ○ **To ServiceNow** replicates a topic from your local Kafka environment to ServiceNow. ○ **From ServiceNow** replicates a topic from ServiceNow to your local Kafka environment.
ServiceNow topic	Reference to the Kafka Topics [sys_kafka_topic] table.

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Field	Description
Replication	Message replication that manages this topic replication.
Topic name	Name of the topic in your local Kafka environment.
Active	Option to activate the topic replication.
Track in current update set	When selected, the topic replication is added to the current update set, so it's simpler to promote it from sub-production to production instances. You may need to configure the form to add this field.

6. Select **Submit**.
7. Follow steps 1–6 to create message and topic replications for all your Kafka clusters and topics.

Result
After you've created all your message and topic replication records, messages should be replicating. You can check the Message Replication Statuses [sys_sc_message_replication_status] tab on the Message Replication form to view the status, MID Server, and error messages for each message replication.

You can also check the Channel Replication Statuses [sys_sc_channel_replication_status] tab on the Kafka Topic Replication record to view status details for each topic replication, including the **MID Server**, **Error message**, and **Error Since** values.

Each Kafka Topic Replication record also has a related list named Message Replication Statistics. Once replications are running, this list displays metrics records, which are created every 60 seconds for each topic replication. Each metrics record has information about the topic replication, including the **Message count**, which shows the number of messages replicated in each collection interval.

What to do next
If you're replicating messages from your local Kafka into ServiceNow, you can configure a Script, ETL, or Transform Map consumer to process the messages or set up a Kafka Message trigger to start a flow.

If you're replicating messages from ServiceNow to your local Kafka, you can use a Kafka Producer step in Workflow Studio or use the ProducerV2 API to publish messages to the Hermes topic and your local Kafka.

Create Kafka credentials

Configure credentials for your Apache Kafka connection.

Before you begin
Role required: connection_admin or message_replication_admin

About this task
Configure connection and credential records for connecting to your local Apache Kafka environment.

- The connection record contains the information required for making the connection to your local Kafka. Connection records are stored in the Kafka Connections [kafka_connection] table.
- The credential record stores the authentication data required for the connection. Credential records are stored in the Kafka credentials [kafka_credentials] table.

After you've created both the connection record and the credential record, you can Create a Connection & Credential alias, which links your connection information and the credential data under a single name.

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Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Credentials**.
2. Select **New**.
3. On the form asking what type of credentials you would like to create, select **Kafka credentials**.
4. On the Kafka credentials form, fill in the fields.
   For a description of the fields, see Kafka credentials fields.
5. Select **Submit**.

What to do next

Configure a Kafka connection.

Configure a Kafka connection

Configure a connection to your Apache Kafka environment.

Before you begin

- Role required: connection_admin or message_replication_admin
- Create Kafka credentials.

About this task

Configure connection and credential records for connecting to your local Apache Kafka environment.

- The connection record contains the information required for making the connection to your local Kafka. Connection records are stored in the Kafka Connections [kafka_connection] table.
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After you've created both the connection record and the credential record, you can Create a Connection & Credential alias, which links your connection information and the credential data under a single name.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Connections & Credentials** > **Connections**.
2. Select **New**.
3. On the form asking what type of connection you would like to create, select **Kafka Connection**.
4. On the Kafka Connection form, fill in the fields.

Kafka Connection form

Name	Name for the connection.
Credential	Name of the credential used to authorize this connection.
Application	Application scope for the message replication. This field is automatically set.
Active	Option to activate the connection.
Connection alias	Name of the connection alias to associate with this connection.
Bootstrap servers	Comma-separated list in the format HOST:PORT,HOST:PORT. The list doesn't need to include all of the Apache Kafka cluster servers.

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Consumer group id	Kafka consumer group.id. If not provided, the value is created with the format `{instance_name}-consumer-{kafka_connection.sys_id}`
Additional client properties	Any additional client properties that should be specified when connecting to Kafka. For a full list and description of the available properties, see the Kafka documentation at https://kafka.apache.org/documentation/ .
Use MID Server	Option to use a MID Server. This field is automatically selected.
Advanced MID Server Configuration	
MID Selection	Option to select a specific MID Server or MID Cluster. Options are: ○ **Specific MID Server** ○ **Specific MID Cluster**
MID Server or MID Cluster	Name of the MID Server or MID Cluster to use.

5. Select **Submit**.

What to do next

Create a Connection & Credential alias with a **Connection type** of **Kafka**.

Viewing Stream Connect Message Replication statistics

When message replications are running, the system creates a metrics record for each active topic replication every 60 seconds. Metrics records provide information about topic replications. You can view metrics records on the Message Replication Statistics [sys_sc_channel_replication_metric] table. You can also view metrics records for a topic by checking the Message Replication Statistics on its Kafka Topic Replication record.

Message Replication Statistics

Metric	Description
Collection time	Time the metric collection ended. Formatted as yyyy-MM-dd and HH:mm:ss.
Collection interval	Duration of the collection interval, given in seconds.
Channel replication	Reference to the Kafka topic replication record.
Message count	Number of messages replicated during the collection interval.
Byte count	Number of bytes replicated during the collection interval.
Lag messages	At the end of the collection interval, the number of messages remaining to be processed at the source.
Source	Name of the topic used as the source.
Destination	Name of the topic used as the destination.
Direction	Direction of the replication, either **To ServiceNow** or **From ServiceNow**.
MID Server	Reference to the MID Server responsible for replication.

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Direct Kafka

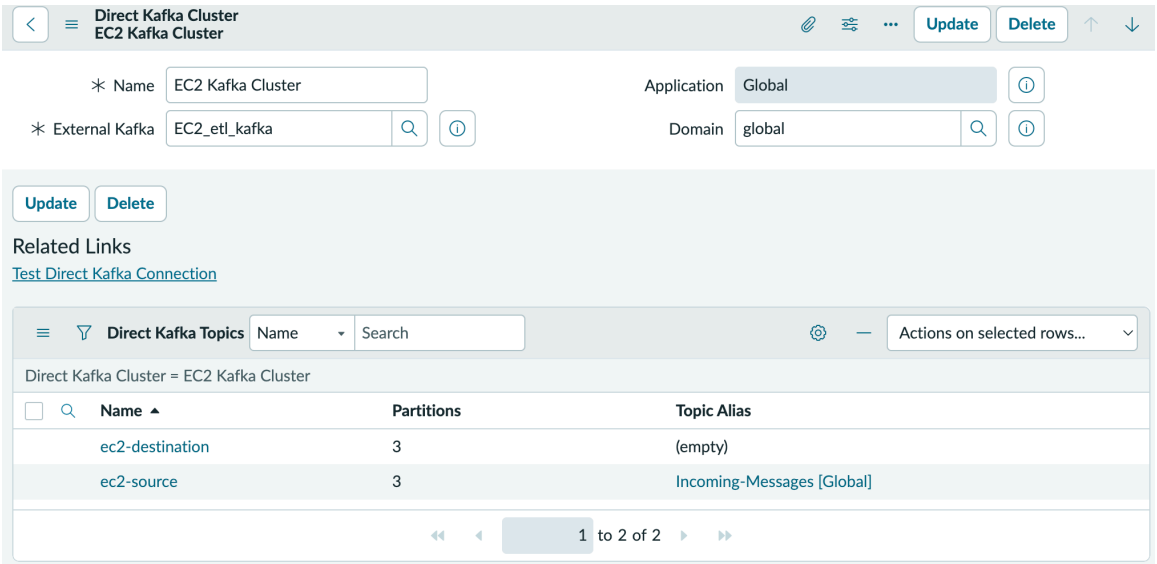
Integrate your ServiceNow instance with your local Kafka environment with Direct Kafka. Build efficient integrations between your enterprise systems, enabling high-volume and robust integrations to exchange data between applications, and reduce data loss with the queuing mechanism if one environment is temporarily offline.

With Direct Kafka, you can configure a custom Kafka connection to integrate Stream Connect on your instance with your local Kafka environment. This connection enables you to use Stream Connect and its features directly, without requiring the Hermes Messaging Service or a separate message replicator.

Direct Kafka Clusters

You can define a Direct Kafka Cluster for your local Kafka environment. A Direct Kafka Cluster uses a Connection and Credential alias to connect to your local Kafka. Once connected, the list of topics in your local Kafka is synchronized with your ServiceNow instance every five minutes. The Direct Kafka Cluster form displays the topics from your local Kafka, along with their partitions and topic aliases. You can also test the connection to the local Kafka from the Direct Kafka cluster form.

The following image shows an example of a Direct Kafka Cluster. The Connection and Credential alias is entered in the **External Kafka** field. Under Related Links, there's a link to **Test Direct Kafka Connection**. In the Direct Kafka Topics section, there's a list of the local Kafka topics and their partitions and topic aliases.



Connection and Credential aliases

Direct Kafka requires a Connection and Credential alias. For details on how to set one up, see Create a Connection & Credential alias.

Direct Kafka also requires a Kafka connection to connect to your local Kafka environment. For details, see Configure a Kafka connection. When configuring the Kafka connection, there are a couple things to keep in mind.

- The **Bootstrap servers** are required. Enter a comma-separated list in the format HOST:PORT,HOST:PORT. The list doesn't need to include all the Apache Kafka cluster servers.
- Direct Kafka doesn't use a MID Server. When you create the Kafka connection, make sure the **Use MID Server** check box isn't checked. If you want to use an existing connection that uses a MID Server, you can change the check box if the connection isn't already being used.

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Topic synchronization

After a Direct Kafka Cluster is created, local Kafka topics are added to the External Kafka Topics [sys_kafka_external_topic] table. A scheduled job runs every five minutes to synchronize the local Kafka topics with the topics in the External Kafka Topics table.

Create a Direct Kafka Cluster

Configure a Direct Kafka Cluster for your local Kafka topics.

Before you begin

- Role required: admin
- A Direct Kafka cluster requires a Connection and Credential alias and a Kafka connection. For step-by-step instructions, see Create a Connection & Credential alias and Configure a Kafka connection.

> **Note:** Direct Kafka doesn't use a MID Server. When you create the Kafka connection, make sure the **Use MID Server** check box isn't checked.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Stream Connect** > **Direct Kafka Cluster** and select **New**.
2. Enter a name in the **Name** field and the Connection and Credential alias in the **External Kafka** field, then select **Submit**.
   You can also add the domain in the **Domain** field.
3. From the Direct Kafka Clusters list, select the cluster you just created.
4. **Optional:** Test the connection by selecting **Test Direct Kafka Connection** under Related Links.
   The Test Connection window will open, run the test, and report the results.

Result

The topics from your local Kafka will be imported to ServiceNow and visible on the External Kafka Topics [sys_kafka_external_topic] table. A scheduled job runs every five minutes to synchronize local Kafka topics with the topics in the External Kafka Topics table.

What to do next

Create topic aliases to connect to your Direct Kafka topics.

Stream Connect alerting

Receive alerts and alert notifications for Stream Connect integrations.

Stream Connect uses both active and scheduled monitoring to detect events across multiple Stream Connect components. If an issue is detected, the system creates an alert, logs a message to the Stream Connect Log, and sends out an alert notification.

Alerts

Stream Connect uses both event-type alerts and threshold alerts. Each type of alert has a set of alerting properties that specify how to handle the alert.

- Event-type alerts (or real-time alerts) are created when there's an error in a Stream Connect component. For example, when a producer is unable to write to a topic, or a consumer is unable to read from a topic. These alerts are built into to the code and use the alerting properties to determine the severity level and when to send a notification. Event-type alerts are detected through active monitoring which uses various mechanisms to detect events across

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multiple Stream Connect components. The system caches the configuration and detects the events when they occur.

- Threshold alerts are created when a value transitions from below the threshold to at or above the threshold. For example, when the lag on a topic goes beyond a certain number of messages, or the processing time of the messages in a topic is above a specified value. When a threshold alert decreases from at or above a threshold to below it, the active flag on the alert is set to false. Threshold alerts are detected through scheduled monitoring, where a scheduled job runs scripted checks on Stream Connect integrations. An alert is generated for thresholds that meet the alert configuration specified by the alerting properties.

For a list and description of the alerts, or to configure alerting properties, see Stream Connect Alerting properties. You must have the Kafka Admin role to view or modify alerting properties.

Alert table

When an alert is triggered for the first time, an Alert [sys_sc_alert] record is added to the Stream Connect Alerts [sys_sc_alerts] table. If the same alert is triggered again, and the original alert record is still active, the record's **Last Detections [last_detection]** field is updated. If the original alert record is not active, a new record is added to the alerts table. An alert record is deactivated when the alert has not been triggered for a specified amount of time. This time interval varies depending on the type of alert and can be modified in the Stream Connect Alerting properties UI.

The Stream Connect alerts table shows if an alert is active and the alert's severity level, type, and updated date. It also displays:

- An alert's **Number**, which references the alert record. Each alert record contains detailed information about the alert, including the name of the affected component, the severity level, and the timestamp.
- An alert's **Affected Entity**, which references the target for an alert, for example, a Kafka Stream or a Kafka Flow Trigger.

You can view the Stream Connect Alerts table by navigating to **Integration Hub** > **Stream Connect** > **Alerts**.

Alerts are available for 30 days. A table cleaner job handles the retention period for the Stream Connect alerts table. Active alerts are deactivated if they don't reoccur within a specified duration. The duration is configured per alert type in the Stream Connect Alerting properties.

Alert logs

Log messages for Stream Connect alerts are written to the Stream Connect Log [sys_consumer_log]. This log has an Alert [sc_alert] field that references the associated Stream Connect Alert record.

Logs are available for 30 days. The log retention period is determined by the table rotation schedule for the Stream Connect Log.

Notifications

Receive alert notifications via email, SMS, or the ServiceNow® mobile app. Notifications contain detailed alert information, including the alert number, level, and a description.

When an alert is triggered, a notification is also triggered, unless a notification for that same alert was recently triggered. Each alert has a time interval property that specifies the amount of time, in seconds, required between alert detections to have the detections count as two separate alerts. A notification is only triggered if the time since the last notification is greater than that time

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interval or, in the case of threshold-based alerts, if the severity for the alert has increased since the last detection. This helps ensure that you don't receive multiple rapid notifications for the same alert. The time interval property for each alert can be modified from the Stream Connect Alerting properties UI.

Administrators can configure notification settings based on alert types, user preferences, and alert severity levels. There are three alert severity levels in the Notifications [sysevent_email_action] table.

- Stream Connect Alert - INFO
- Stream Connect Alert - WARNING
- Stream Connect Alert - CRITICAL

You can opt in to different levels using the standard system notification capabilities on the platform. Administrators can also configure notification debounce settings, including the time interval and criteria for consolidating alerts. For notification details, see Notifications.

Notifications are sent to users who are members of the Stream Connect Alert Notifications group. The Stream Connect Alert Notifications group members inherit the Stream Connect Alert Viewer role so that everyone who receives notifications can use the link in the notification to see the alert record.

Roles

To view Stream Connect Alerts, you must have the Kafka Admin role or the Stream Connect Alert Viewer role.

- The Kafka Admin [kafka_admin] role can view Stream Connect alert records and logs, configure Stream Connect Alerting properties, and configure alert notification settings.
- The Stream Connect Alert Viewer [stream_connect_alert_viewer] role has read-only access to Stream Connect alert records and logs.

ACLs and domain separation

ACLs on the Stream Connect Alerts table enable a user with the Stream Connect Alert Viewer role to view the alerts table and the reports on that table. Users without that role can't read or report on that table. Only users with the Kafka Admin role can insert and update records on that table. ACLs make the Stream Connect Alerting properties page available only to Kafka Admins.

On a domain-separated instance, the properties that govern alerts can be overridden on a per-domain basis. See Domain separation application properties for details.

The domain used to look up properties is the domain of the topic or consumer. The Stream Connect Alerting properties UI for setting properties sets the global properties, not domain-specific overrides. There's no UI for setting domain-specific overrides. The sys_domain of the Stream Connect Alerts table should be the same as the domain of the consumer that triggered it, for consumer alerts, or the domain for the sys_kafka_topic record for producer alerts. For alerts where a consumer or topic isn't known, the sys_sc_alert domain is set to global.

Plugin

Stream Connect alerting requires the ServiceNow Stream Connect Alerting [com.glide.hub.stream_connect.alerting] plugin. This plugin is automatically activated when the ServiceNow Stream Connect Installer[com.glide.hub.stream_connect.installer] plugin is activated.

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Stream Connect Alerting properties

Specify alert properties and how alerts are managed in Stream Connect.

Alerts

To view Stream Connect Alerting properties, navigate to **Integration Hub** > **Stream Connect** > **Alert Properties**. You must have the stream_connect_viewer role to view alerting properties and stream_commect_admin role to modify alerting properties.

The Stream Connect Alerting UI has the following alerts.

- Producer Failed Alert. Triggered when a producer fails to produce messages to a topic.
- Queue Depth Processing Time Alert. Triggered when the estimated message processing time exceeds the specified value.
- Consumer Poll Failed Alert. Triggered when a consumer is unable to connect to a topic or read the messages in a topic. For example, if a topic is deleted from Hermes while the associated subscription is still active.
- Consumer Processing Alert. Triggered when a consumer fails to process messages from a topic.
- Topic Replication Failed Age Alert. Triggered when the topic replication status remains FAILED for longer than the specified value.
- Topic Replication Inactivity Alert. Triggered when topic replication is inactive for longer than the specified value.
- Undelivered Messages Age Alert. Triggered when no messages are delivered to a topic for longer than the specified value. For example, if a producer is running but unable to send data due to network issues or misconfiguration, and the delivery gap exceeds the threshold.
- Unprocessed Messages Age Alert. Triggered when messages remain unprocessed in a topic for longer than the specified value. For example, if a consumer is assigned to a topic but fails to process messages due to a crash, lag, or misconfiguration, and the message backlog exceeds the threshold.

Producer Failed Alert

Alert level	Severity level for the alert. The options are: • IGNORED • INFO • WARNING • CRITICAL Default: CRITICAL
Time interval, in seconds, required between two detections to have them count as separate events.	The minimum number of seconds to wait before sending another notification for the same alert. Detections within this time interval count as a single alert and are linked to the same alert record.

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Producer Failed Alert (continued)

	Default: 3600 seconds
Specifies the number of separate notifications to send when there's a Producer Failed Alert for multiple topics. Select **Global** to receive a single notification, or **Per Topic** to receive a notification for each topic.	Select **Per Topic** to create an alert for each topic, or **Global** to create one alert for all topics. Default: Global

Queue Depth Processing Time Alert

Threshold, in seconds, for the queue depth processing time estimate to be considered info.	If the estimated queue processing time is greater than this value, generate an alert with a severity of INFO. Default: 0 seconds A value of 0 disables the alert at the specified severity level. To completely disable the alert, set the value to 0 for all three severity levels (INFO, WARNING, and CRITICAL).
Threshold, in seconds, for the queue depth processing time estimate to be considered a warning.	If the estimated queue processing time is greater than this value, generate an alert with a severity of WARNING. Default: 14400 seconds
Threshold, in seconds, for the queue depth processing time estimate to be considered critical.	If the estimated queue processing time is greater than this value, generate an alert with a severity of CRITICAL. Default: 86400 seconds
Time interval, in seconds, required between two detections to have them count as separate events.	The minimum number of seconds to wait before sending another notification for the same alert. Detections within this time interval count as a single alert and are linked to the same alert record. Default: 3600 seconds
Specifies the number of separate notifications to send when there's a Queue Depth Alert for multiple consumers. Select **Global** to receive a single notification, or **Per Consumer** to receive a notification for each consumer.	Select **Per Consumer** to create an alert for each consumer, or **Global** to create one alert for all consumers. Default: Global

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Consumer Poll Failed Alert

Alert level	Severity level for the alert. The options are: • IGNORED • INFO • WARNING • CRITICAL Default: CRITICAL
Time interval, in seconds, required between two detections to have them count as separate events.	The minimum number of seconds to wait before sending another notification for the same alert. Detections within this time interval count as a single alert and are linked to the same alert record. Default: 3600 seconds
Specifies the number of separate notifications to send when there's a Consumer Poll Failed Alert for multiple consumers. Select **Global** to receive a single notification, or **Per Consumer** to receive a notification for each consumer.	Select **Per Consumer** to create an alert for each consumer, or **Global** to create one alert for all consumers. Default: Global

Consumer Processing Alert

Alert level	Severity level for the alert. The options are: • IGNORED • INFO • WARNING • CRITICAL Default: WARNING
Time interval, in seconds, required between two detections to have them count as separate events.	The minimum number of seconds to wait before sending another notification for the same alert. Detections within this time interval count as a single alert and are linked to the same alert record. Default: 3600 seconds

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Consumer Processing Alert (continued)

Specifies the number of separate notifications to send when there's a Consumer Processing Alert for multiple consumers. Select **Global** to receive a single notification, or **Per Consumer** to receive a notification for each consumer.	Select **Per Consumer** to create an alert for each consumer, or **Global** to create one alert for all consumers. Default: Per Consumer

Topic Replication Failed Age Alert

Threshold, in seconds, for the topic replication failed age estimate to be considered info.	Triggered when the topic replication status remains FAILED for longer than the specified value. With a MID Server cluster, this alert is triggered if any of the MID Servers in the cluster has a topic replication status that remains FAILED for longer than the specified value. Default: 0 seconds A value of 0 disables the alert at the specified severity level. To completely disable the alert, set the value to 0 for all three severity levels (INFO, WARNING, and CRITICAL).
Threshold, in seconds, for the topic replication failed age estimate to be considered a warning.	If the topic replication status remains FAILED for longer than this value, generate an alert with a severity of WARNING. Default: 1800 seconds
Threshold, in seconds, for the topic replication failed age estimate to be considered critical.	If the topic replication status remains FAILED for longer than this value, generate an alert with a severity of CRITICAL. Default: 3600 seconds
Time interval, in seconds, required between two detections to have them count as separate events.	The minimum number of seconds to wait before sending another notification for the same alert. Detections within this time interval count as a single alert and are linked to the same alert record. Default: 3600 seconds
Specifies the number of separate notifications to send when there's a Topic Replication Failed Alert for multiple topic replications. Select **Global** to receive a single notification, or **Per Topic Replication** to receive a notification for each topic replication.	Select **Per Topic Replication** to create an alert for each topic replication, or **Global** to create one alert for all topic replications. Default: Global

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Topic Replication Inactivity Alert

Threshold, in seconds, for the topic replication inactivity estimate to be considered info.	If there are no messages replicated between the source and destination topic by any server for longer than this value, generate an alert with a severity of INFO. Default: 14400 seconds
Threshold, in seconds, for the topic replication inactivity estimate to be considered a warning.	If topic replication is inactive for longer than this value, generate an alert with a severity of WARNING.
Threshold, in seconds, for the topic replication inactivity estimate to be considered critical.	If topic replication is inactive for longer than this value, generate an alert with a severity of CRITICAL.
Time interval, in seconds, required between two detections to have them count as separate events.	The minimum number of seconds to wait before sending another notification for the same alert. Detections within this time interval count as a single alert and are linked to the same alert record. Default: 3600 seconds
Specifies the number of separate notifications to send when there's a Topic Replication Inactivity Alert for multiple replications. Select **Global** to receive a single notification, or **Per Topic Replication** to receive a notification for each topic replication.	Select **Per Topic Replication** to create an alert for each topic replication, or **Global** to create one alert for all topic replications. Default: Per Topic Replication

Undelivered Messages Age Alert

Threshold in seconds for undelivered messages age to be considered as an info	If no messages are delivered for longer than this value, generate an alert with a severity of INFO. A value of 0 disables the alert at the INFO level. To completely disable the alert, set the value to 0 for all three severity levels. Default: 3600
Threshold in seconds for undelivered messages age to be considered a warning	If no messages are delivered for longer than this value, generate an alert with a severity of WARNING. A value of 0 disables the alert at the WARNING level. Default: 14400

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Undelivered Messages Age Alert (continued)

Threshold in seconds for undelivered messages age to be considered critical	If no messages are delivered for longer than this value, generate an alert with a severity of CRITICAL. A value of 0 disables the alert at the CRITICAL level. Default: 28800
Time interval, in seconds, required between two detections to have them count as separate alerts. The Undelivered Messages Age Alert is configured to run hourly by default. To modify this interval, please consult the documentation for guidance.	The minimum number of seconds to wait before sending another notification for the same alert. Detections within this time interval count as a single alert and are linked to the same alert record. The Undelivered Messages Age Alert is configured to run hourly by default. Default: 3600
Specifies the number of separate notifications to send when there's an Undelivered Messages Age Alert.	This setting is always set to **Global**. Only one alert notification is generated, even if multiple topics are affected. Default: Global

Unprocessed Messages Age Alert

Threshold in seconds for unprocessed messages age to be considered info	If no messages are processed for longer than this value, generate an alert with a severity of INFO. A value of 0 disables the alert at the INFO level. To completely disable the alert, set the value to 0 for all three severity levels. Default: 3600
Threshold in seconds for unprocessed messages age to be considered a warning	If no messages are processed for longer than this value, generate an alert with a severity of WARNING. A value of 0 disables the alert at the WARNING level. Default: 14400
Threshold in seconds for unprocessed messages age to be considered critical	If no messages are processed for longer than this value, generate an alert with a severity of CRITICAL. A value of 0 disables the alert at the CRITICAL level. Default: 28800

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Unprocessed Messages Age Alert (continued)

Time interval, in seconds, required between two detections to have them count as separate alerts	The minimum number of seconds to wait before sending another notification for the same alert. Detections within this time interval count as a single alert and are linked to the same alert record. Default: 3600
Specifies the number of separate notifications to send when there's an Unprocessed Messages Age Alert.	Determines how many alert notifications are generated. This is always set to **Global**, meaning only one alert notification is created regardless of how many topics are affected. Default: Global

Using the Stream Connect Dashboard

View detailed statistics for your Stream Connect integrations. Manage producers and consumers, view data usage, and create or edit topics and replicators with the ServiceNow® Stream Connect dashboard.

The Stream Connect Dashboard combines several capabilities into a single environment, so you can:

- Manage multiple Stream Connect integrations through a single application.
- Gain insights into how your integrations use and process data with detailed charts, lists, and statistics.
- View total data usage, data usage per month, and data usage per topic, for the last 13 months.
- Edit topics, producers, consumers, and replicators through a simplified interface.
- View data for Hermes and Direct Kafka environments.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Workflow Data Fabric subscription

This application requires a Workflow Data Fabric subscription and a Stream Connect subscription. For more information, see https://www.servicenow.com/now-platform/workflow-data-fabric.html.

Stream Connect Dashboard organization

To view the dashboard, navigate to **All** > **Integration Hub** > **Stream Connect** > **Stream Connect Home**.

The dashboard has the following components.

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- Overview section, with data usage tab.
- Topics
- Consumers
- Producers
- Message Replications
- Topic Replications
- Alerts

The following sections explain each component in greater detail.

Overview section

View detailed information about your Stream Connect integrations.

The Overview section has two tabs: Stream activity and Data usage.

- The Stream activity tab shows the activity on topics, consumers, producers, replicators, and alerts.
- The Data usage tab shows Stream Connect usage over time.

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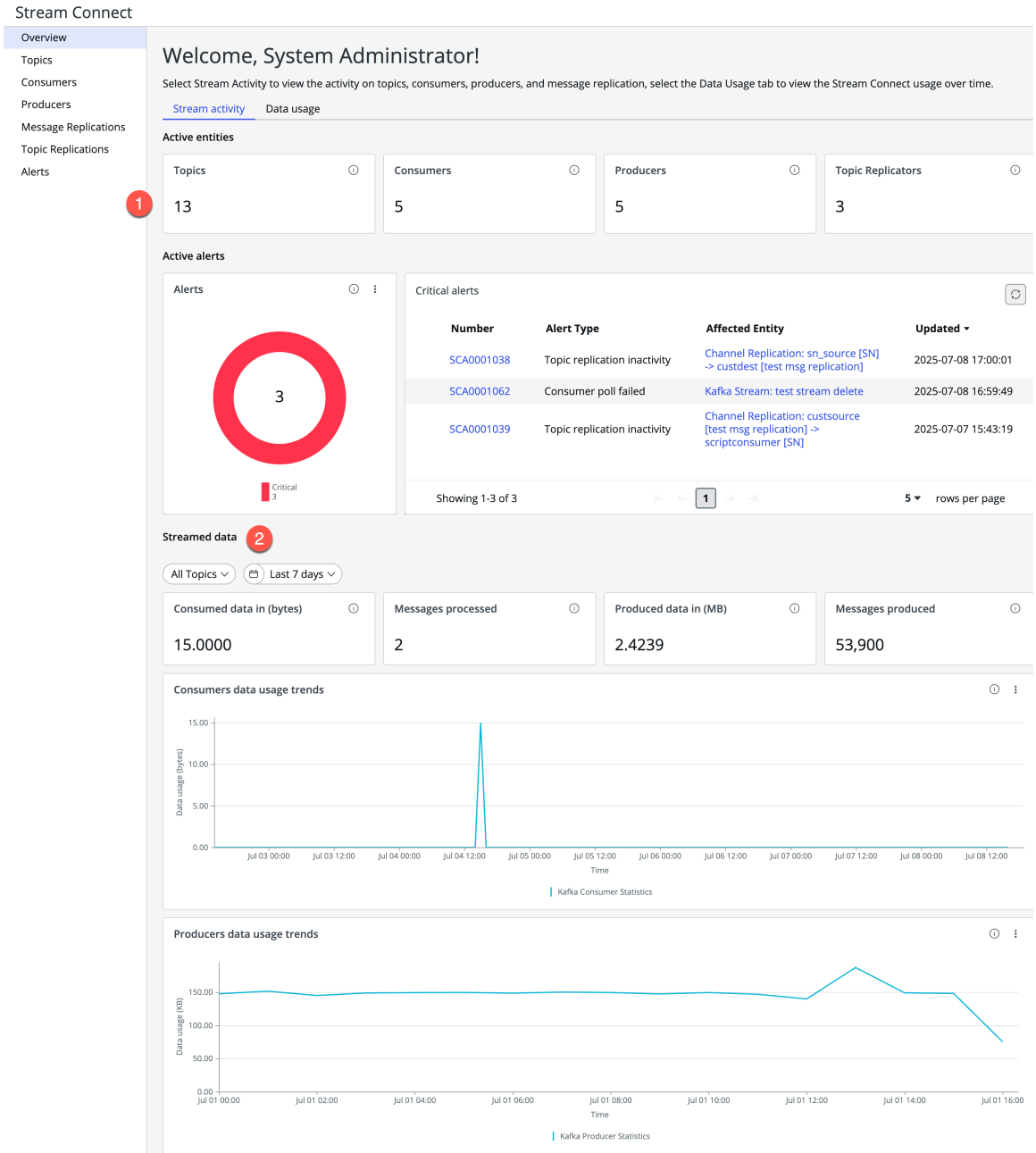
Stream Connect Dashboard Overview, Stream activity



The Stream activity tab has these components.

1. **Active entities and alerts**

   The Active entities section displays the number of topics, consumers, producers, and topic replicators created. The Active alerts section shows the total number of active alerts with each alert's number, type, affected entity, and date updated.

2. **Streamed data overview**

   This section has several charts detailing the amount of data and messages consumed and produced. By default, the charts display data for all topics. You can view data for a single topic by selecting one from the **All Topics** list. Each topic is listed by its topic alias. For a Direct Kafka topic, the alias name is followed by the system name, in brackets. For example, a topic with an alias of my_topic and a system name of c_platform appears as **my_topic [c_platform]**. If plugins for both Hermes and Direct Kafka are installed, alias names for Hermes topics are followed

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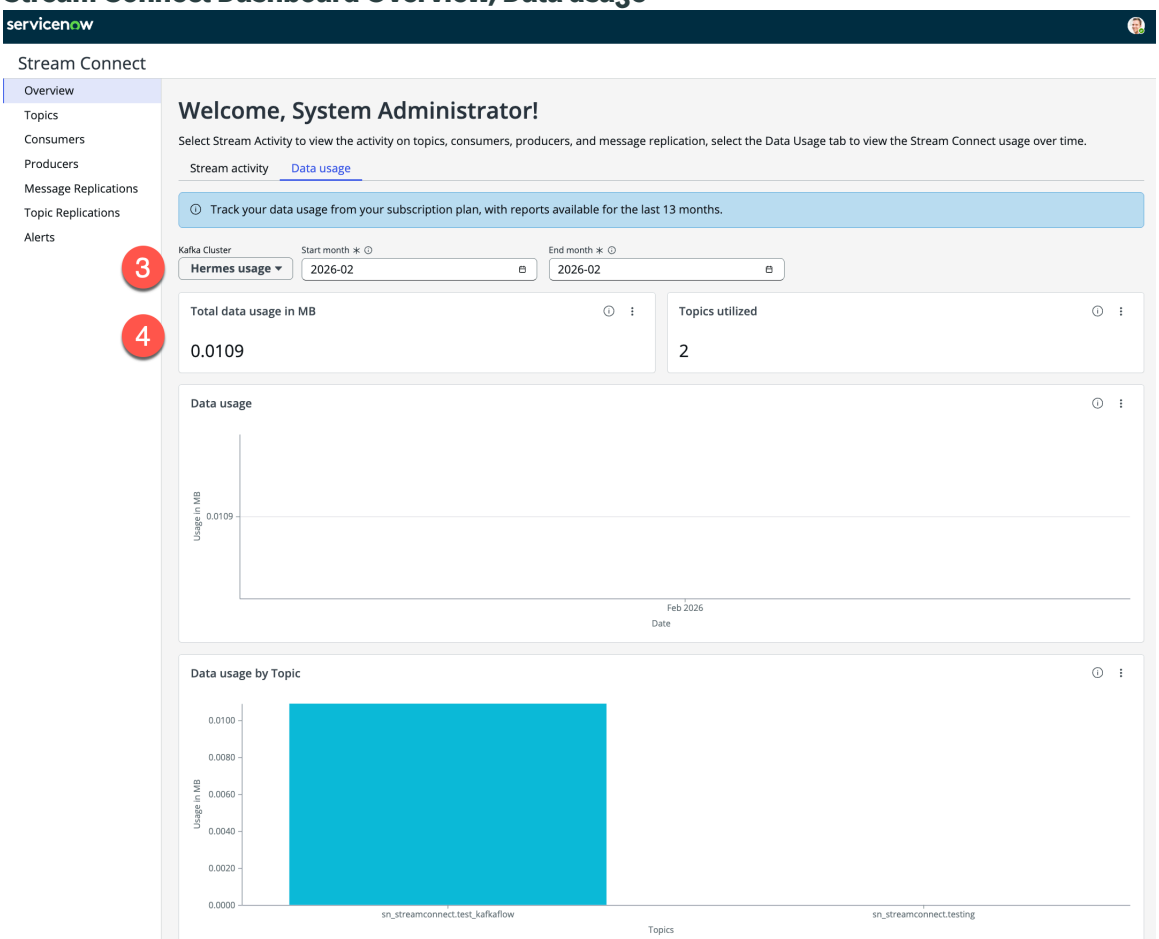
by **[Hermes]**. If only the Hermes plugin is installed, topic aliases appear without the system name.

You can also organize the displayed data by time, viewing data for the **Last 24 hours**, **Last 2 days**, **Last 7 days**, or by setting a **Custom range**.

This section has the following charts.

- Consumed data: The total amount of data consumed.
- Messages processed: The total number of processed messages.
- Produced data: The total number of data produced.
- Messages produced: The total number of messages produced.
- Consumers data usage trends: The amount of data consumers used over the last seven days.
- Producers data usage trends: The amount of data producers used over the last seven days.

Stream Connect Dashboard Overview, Data usage



The Data usage tab has these components.

3. Kafka Cluster and Month selectors

Use the **Kafka Cluster** list to select data for either **Hermes usage** or **Direct Kafka usage**.

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Note: The **Kafka Cluster** list only appears if the plugins for both Hermes and Direct Kafka are installed. If only one plugin is installed, the **Kafka Cluster** list is hidden and the dashboard displays data for either Hermes or Direct Kafka, depending on the plugin. For more information about plugins, see Integration Hub plugins.

Select a start month and end month to view data usage over time. Data usage history is available for the last 12 complete months plus the current month.

4. Data usage details

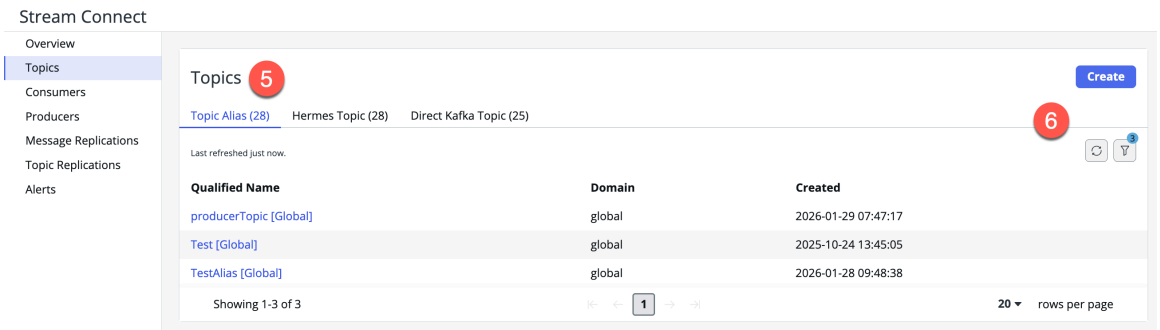
Displays the following charts.

- Total data usage in MB: The total data usage for the selected months.
- Topics utilized: The total number of topics with data usage for the selected months.
- Data usage: The data usage per month for the selected months.
- Data usage by topic: The data usage per topic for the selected months.

Topics

View topics and add, edit, or export a topic.

Stream Connect Dashboard Topics page



The Topics page has the following components.

5. Topics list

Displays all topics organized into tabs.

- The **Topic Alias** tab lists each topic alias and its domain and creation date.
- The **Hermes Topic** tab lists each Hermes topic with its name, topic alias, namespace, application ID, domain, and creation date. This tab only appears if you have the ServiceNow Stream Connect Hermes (com.glide.hub.stream_connect.hermes) plugin installed.
- The **Direct Kafka Topic** tab lists each Direct Kafka topic with its name, topic alias, Direct Kafka cluster, and creation date. This tab only appears if you have the ServiceNow Stream Connect Installer (Direct Kafka) (com.glide.hub.stream_connect.onprem_installer) plugin installed.

6. Action buttons

Contains several buttons that you can use to perform different tasks. **Create** a new topic, refresh the list of topics, or view and edit the list filters.

You can select a topic or topic alias from the list to view more detailed information. The following image shows an example of a topic page for a Hermes topic. The pages for topic aliases and

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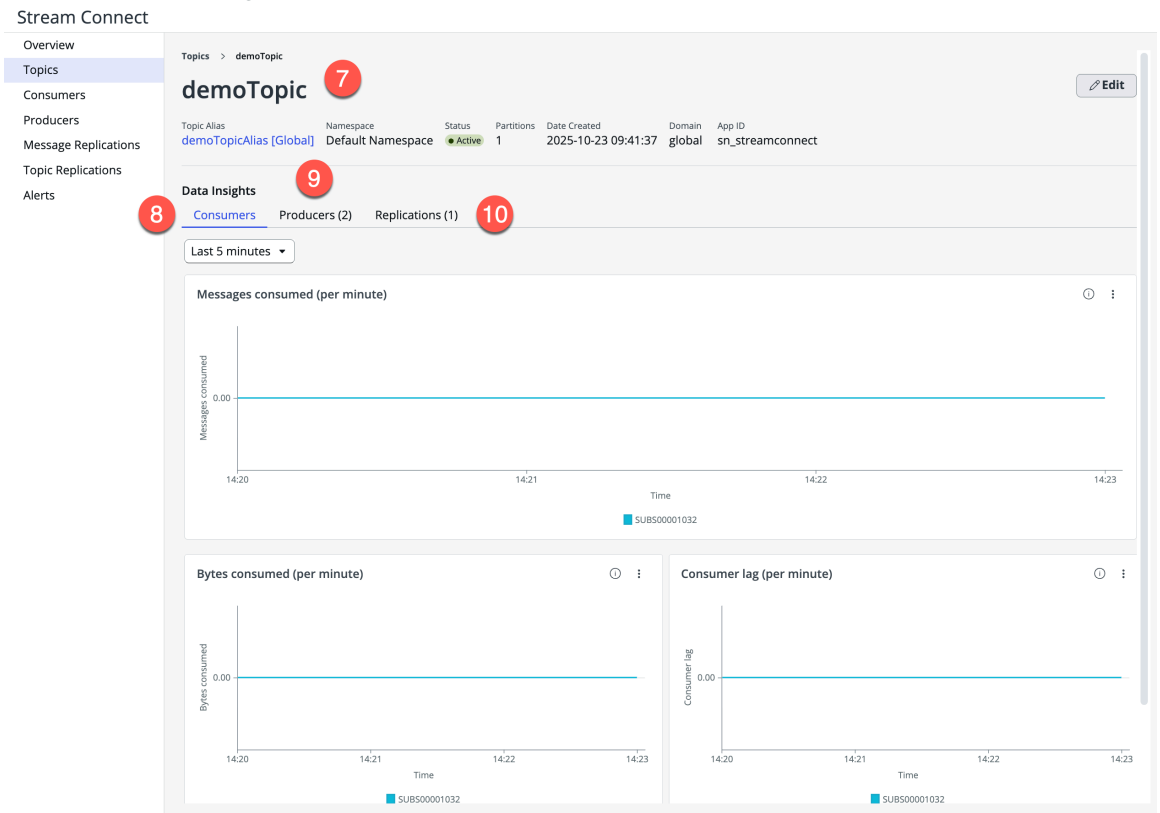
Direct Kafka topics are similar but have a few differences. For example, a topic page for a Direct Kafka topic doesn't have a **Replications** tab because Direct Kafka topics don't use them.

Individual topic page for a Hermes topic



The Hermes topic page has the following components.

7. Topic information section

Displays details about the topic, including the topic alias, namespace, status, number of partitions, date created, domain, and app ID. There's also an **Edit** button so you can edit the topic directly from this page.

8. Consumers tab

Displays the following charts.

- Messages consumed (per minute): The total number of messages consumed by consumers in the selected topic.
- Bytes consumed (per minute): The total number of bytes consumed.
- Consumer lag (per minute): The consumer lag in this topic group, by consumer.

All three charts can be filtered to display data for the **Last 5 minutes**, **Last hour**, or **Last 24 hours**. When the **Last 24 hours** is selected, the data is displayed in five minutes increments instead of every minute.

The **Consumers** tab may also have a Consumer list, which lists the consumers associated with the topic. Each consumer is listed with its number, state, error status, max concurrency, and consumer table. You can select the consumer number to view additional details for that consumer.

9. Producers tab

The **Producers** tab displays the following charts.

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- Messages Produced: The total number of messages produced. Updated hourly.
- Bytes Produced in (bytes): The total number of bytes produced. Updated hourly.

Both charts can be filtered to display data for the **Last 2 days**, **Last 7 days**, **Today**, **Yesterday**, or a **Custom range**.

The **Producers** tab also has a Producer list, which lists the producers associated with the topic, and each producer's name, type, Id, table, and domain. You can select a producer to view additional details.

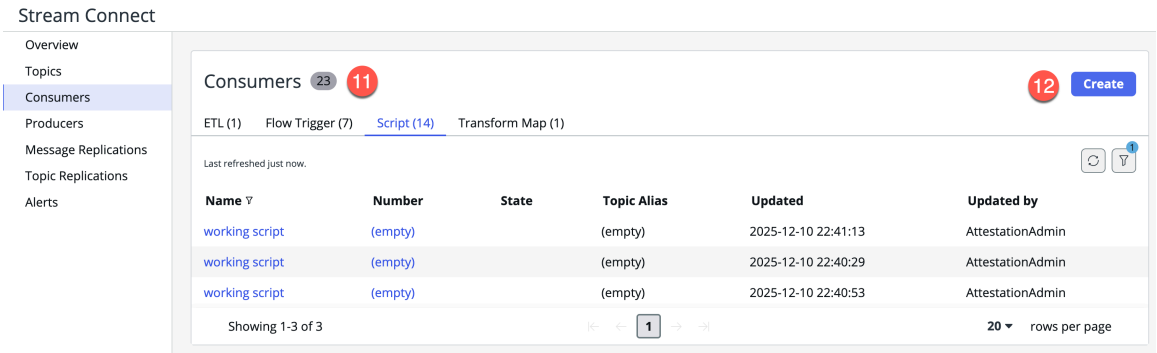
10. Replications tab (only on Hermes topic pages)

Displays the topic replications associated with the topic, and each replication's name, topic name, direction, status, whether it's active, and error message. You can select the replication name to view additional details for that topic replication.

Consumers

View and manage consumers.

Stream Connect Dashboard Consumers page



The Consumers page has the following components.

11. Consumer list

Displays all consumers, organized by type. The possible types are:

- ETL
- Flow Trigger
- Script
- Transform Map

Each consumer is listed with its name, number, state, topic alias, date updated, and who updated it.

12. Create button

To **Create** a new consumer, select this button, then select the type of consumer you want to create, then fill in the fields on the consumer's form. For form field descriptions, see the ETL consumer, Transform Map consumer, or Script consumer page.

Note: If you're creating a Flow Trigger consumer, there isn't a form to fill out. Instead, the dashboard opens Workflow Studio so you can build your flow trigger there. For a detailed guide, see Create a flow with a Kafka Message trigger.

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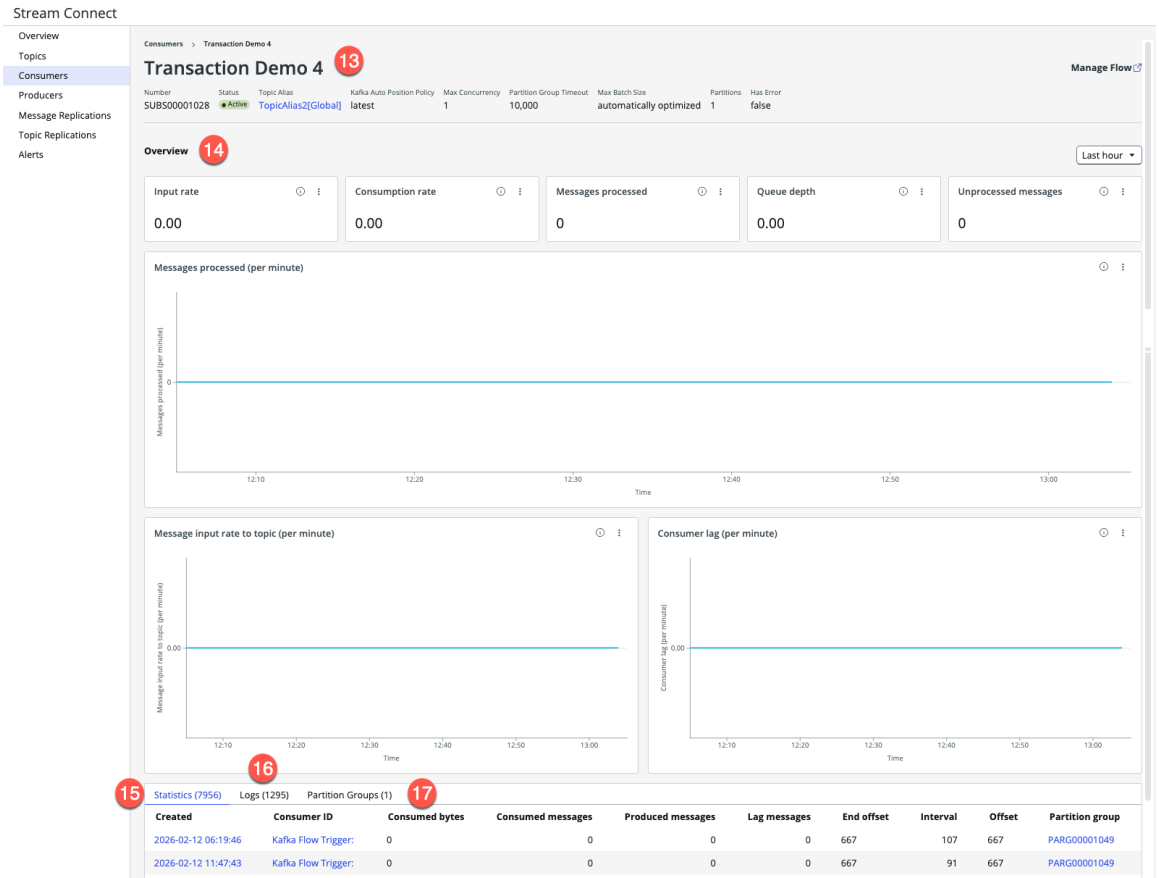
You can select a consumer from the list to view detailed information for that consumer.

Individual Consumer page



Each individual consumer page has the following components.

13. Consumer information section

Displays details about the consumer, including its number, status, topic alias, Kafka auto position policy, max concurrency, partition group timeout, max batch size, partitions, and an error flag.

14. Overview

Displays the consumer's input and consumption rate, messages processed, queue depth, and any unprocessed messages. It also displays the following charts.

- Messages processed (per minute): The total number of processed messages.
- Message input to topic (per minute): The total number of messages input to the topic.
- Consumer lag (per minute): The lag for the selected consumer.

All three charts can be filtered to display data for the **Last 5 minutes**, **Last hour**, or **Last 24 hours**. When the **Last 24 hours** is selected, the data is displayed for every five minutes instead of every minute.

15. Statistics tab

Displays consumer statistics, including the date it was created, the consumer ID, consumed bytes, consumed messages, produced messages, lag messages, end offset, interval, offset, and partition group.

16. Logs tab

Displays the created logs and each log's level, message, alert, and source.

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17. Partition Groups tab

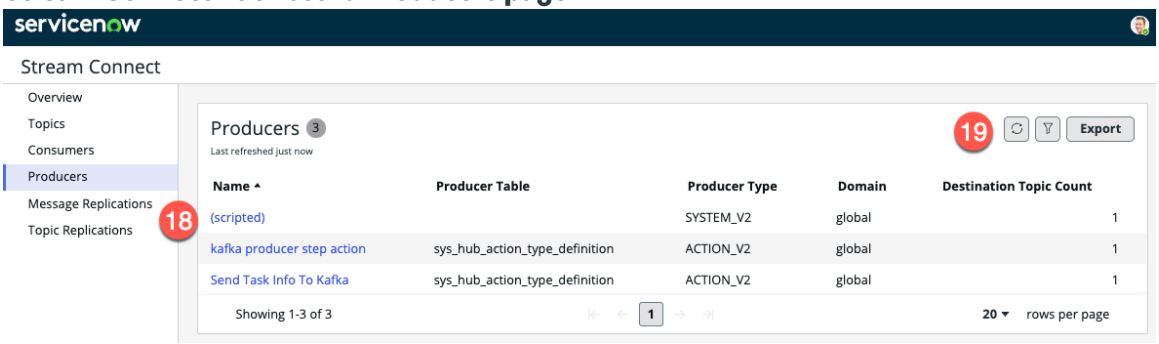
Displays partition groups with each one's number, first and last partition, and poll time.

For a detailed explanation of consumer data and statistics, including log, and partition group information, see Viewing Kafka subscriptions and statistics.

Producers

View, filter, and export producers.

Stream Connect Dashboard Producers page



The Producers page has the following components.

18. Producer list

Displays all producers and each producer's name, table, type, domain, and destination topic count.

19. Action buttons

Contains several buttons that you can use to refresh the list of producers, view or edit list filters, and **Export** a producer.

You can select a producer from the list to view detailed information for that producer.

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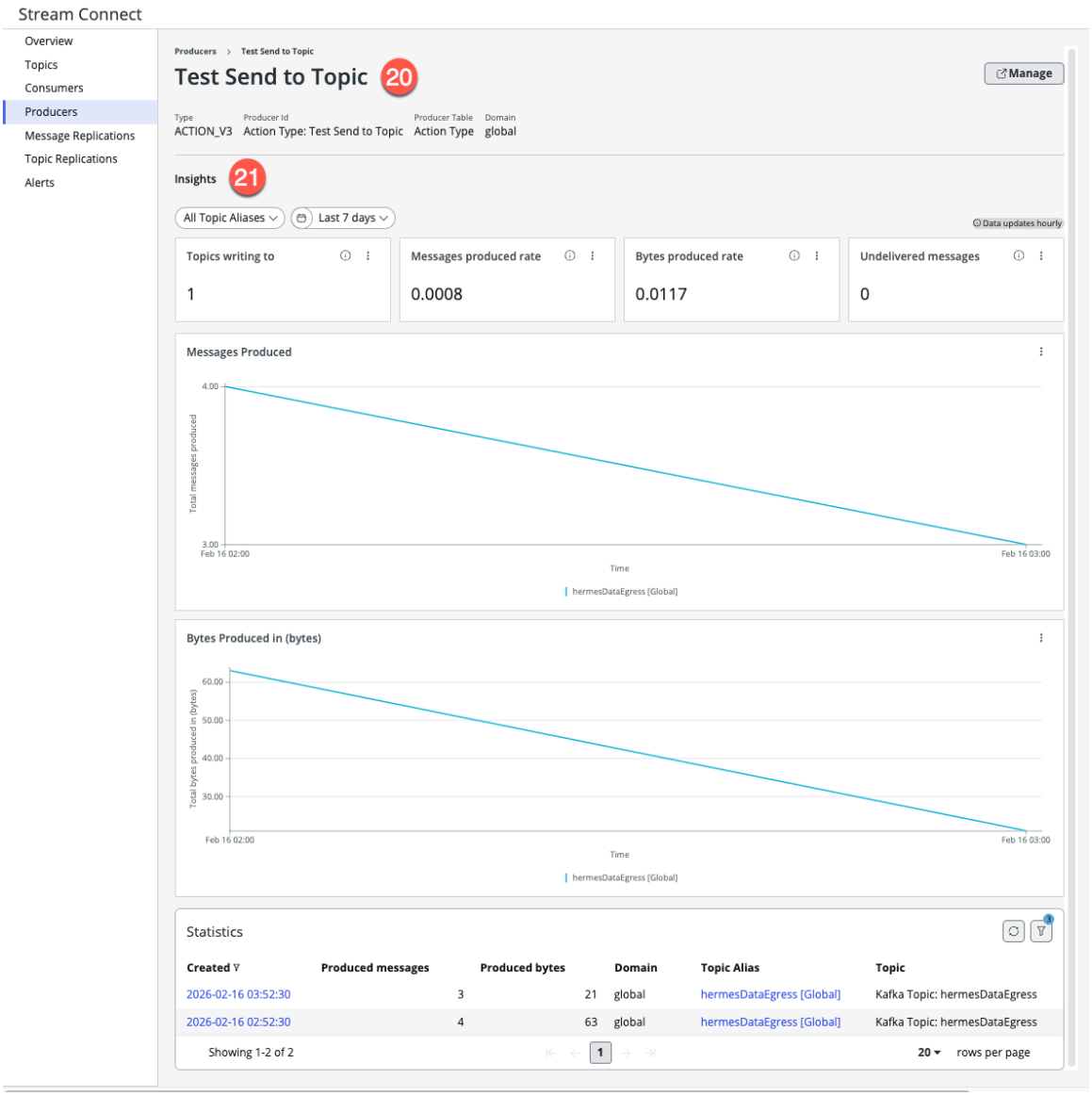
Individual Producer page



Each individual consumer page has the following components.

20. Producer information section

Displays details about the producer, including its type, ID, table, and domain. There's also a **Manage** button. The **Manage** button redirects to the corresponding entity that produced the messages. For example, entering **Manage** on a business rule producer opens the sys_script record. Entering **Manage** on a flow action opens that action in Workflow Studio. For background scripts, the **Manage** button is inactive because the script that was executed isn't saved on the system anywhere.

21. Insights

Displays the following data.

- Topics writing to: The total number of topics the producer is writing to.
- Messages produced rate: The average number of messages produced per second.
- Bytes produced rate: The average number of bytes produced per second.
- Undelivered messages: The total number of undelivered messages for the producer. If you're viewing data for a Stream Producer, this shows Pending

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messages instead of Undelivered messages. Pending messages refers to the messages in the staging table for this producer that are waiting to be produced.

- Messages produced: Shows the number of messages produced over the last seven days.
- Bytes Produced: Shows the number of bytes produced over the last seven days.

This data is updated every hour. The Messages produced and Bytes produced charts can be filtered to display data for the **Last 2 days**, **Last 24 hours**, **Last 7 days**, or a **Custom range**.

22. Statistics

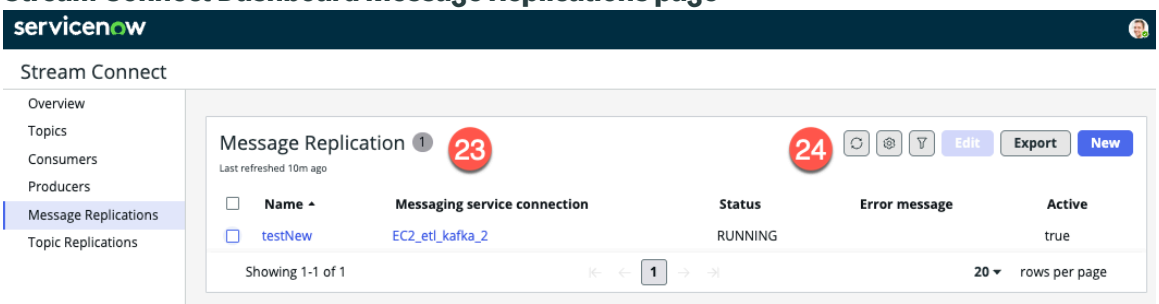
Displays producer statistics, including the date, number of produced messages and bytes, topic alias, and domain. If you're viewing data for a Stream Producer, this section also shows the Stream Producer CDC Statistics.

For a detailed description of Producer data and statistics, see Viewing producer statistics.

Message Replications

View message replications, and add, edit, or export a message replication.

Stream Connect Dashboard Message Replications page



The Message Replications page has the following components.

23. Message Replications list

Displays all message replications and each replication's name, messaging service connection, status, error message (if any), and whether it's active.

24. Action buttons

Contains several buttons that you can use to perform different tasks. Refresh the list of message replications, edit the list columns or reset the column widths, and view or edit the list filters. There are also buttons to **Edit** a message replication, **Export** a message replication, and create a **New** message replication.

- To edit a message replication, select the replication from the list, select the **Edit** button, then fill in the fields on the Edit Message Replication form.
- To create a new message replication, select **New**, then fill in the fields on the Create New Message Replication form.

You can select a message replication to view the replication's name, messaging service connection, status, error message (if any), and if it's active. You can also see any associated Kafka Topic Replications.

Topic Replications

View topic replications, and add, edit, or export a topic replication.

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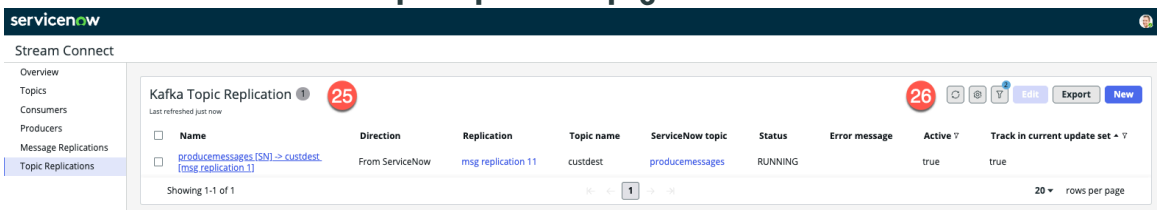
Stream Connect Dashboard Topic Replications page



The Topic Replications page has the following components.

25. Topic Replications list

Displays all topic replications, and each replication's name, direction, replication, topic name, ServiceNow topic, status, error message (if any), whether it's active, and whether it's being tracked in the current update set.

26. Action buttons

Contains several buttons that you can use to refresh the list of topic replications, edit the list columns or reset the column widths, and view or edit the list filters. There are also buttons to **Edit** a topic replication, **Export** a topic replication, and create a **New** topic replication.

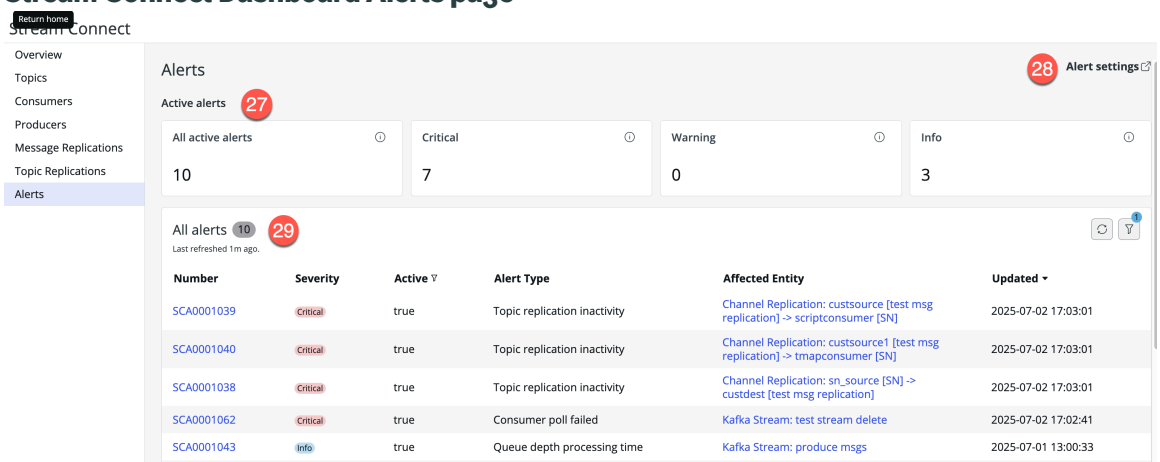
- To edit a topic replication, select the replication from the list, select the **Edit** button, then fill in the fields on the Edit Topic Replication form.
- To create a new topic replication, select **New**, then fill in the fields on the Create New Topic Replication form.

You can select a topic replication to view its name, direction, replication, topic name, ServiceNow topic, status, error message (if any), if it's active, and if it's being tracked in the current update set. You can also see any associated Message Replication statistics.

Alerts

View active alerts and each alert's severity level, state, type, and affected entity.

Stream Connect Dashboard Alerts page



The Alerts page has the following components.

27. Active alerts section

Displays the total number of active alerts and the active alerts in each severity level.

28. Alert settings

Opens the Alerting Properties page where you can specify alert properties and how alerts are managed.

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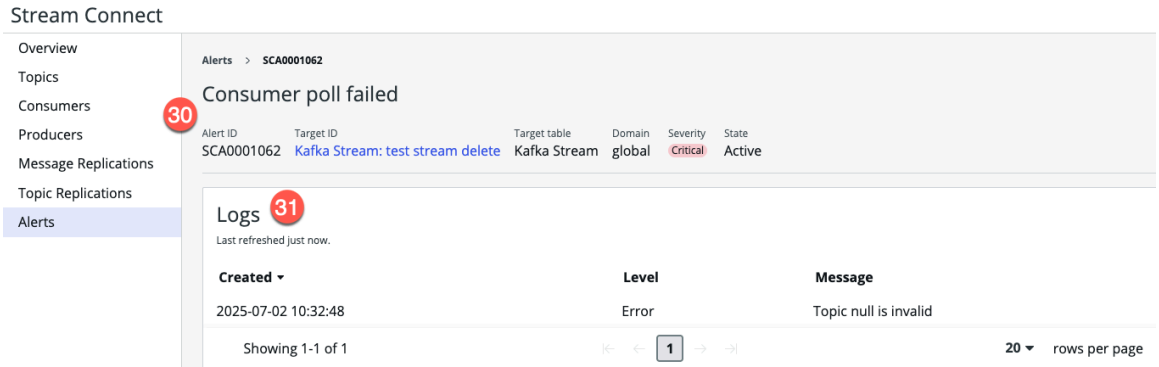
29. Alerts list

Lists all alerts. By default, the **Active** filter is set to **true**. You can modify the **Active** filter to view inactive alerts. Each listing shows the alert's number, severity, active status, alert type, affected entity, and date updated.

You can select an alert from the list to view detailed information for that alert.

Individual Alert page



Each individual alert page has the following components.

30. Alert information

Shows alert details, including the alert ID, target ID, target table, domain, severity, and state.

31. Alert logs

Displays the alert's log information. Each entry shows when the log was created, its level, and the log message.

Schema management in Stream Connect

Import and create schemas to send and receive messages in an Apache Avro format. Using an Avro format can reduce the size of the payload and simplify your integration to your local Kafka instance.

Avro is an open-source data-serialization system that uses schemas to structure encoded data. With an Avro schema, data can be converted from plain-text JSON to an Avro binary format and back. You can store schemas in ServiceNow, so your Stream Connect producers and consumers can use the schemas to serialize Avro messages.

The following image shows an overview of schema management in Stream Connect. Schemas, stored in schema registries, enable messages in producers and consumers to be converted from plain text to an Avro format and back.

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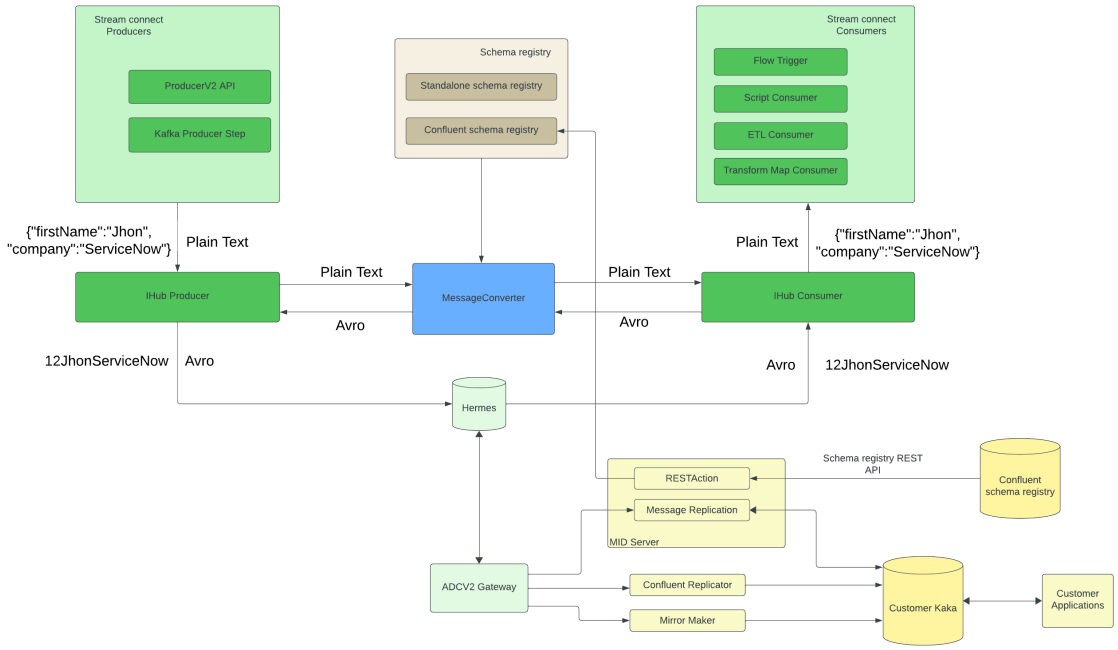

Schemas

You can import a schema from the Confluent registry or create your own standalone schema by uploading a JSON file or entering a schema directly as a JSON-formatted string.

After your schema is imported or created, you can see it on the Stream Connect Schemas [stream_connect_schema] table, which stores both Confluent and standalone schemas. Additionally, Confluent schemas are visible on the Confluent Stream Connect Schema [confluent_stream_connect_schema] table. Standalone schemas are on the Standalone Stream Connect Schema [standalone_stream_connect_schema] table.

All schemas have a schema ID, a globally unique identifier of the schema. For Confluent schemas, the schema ID is imported from the Confluent registry. For standalone schemas, the schema ID is generated locally and is unique on the instance. By default, the generated schema ID value is the next highest available schema ID on the instance. For example, if your schemas have ID numbers one through five, the next schema you create will have a schema ID of six. You can change the default value.

Schema IDs are unique per registry. For example, two schemas can both have an ID of one as long as they're in different registries.

Schema registries

Every schema belongs to a registry. There are two types of schema registries in ServiceNow: the Confluent Schema Registry and the Standalone Schema Registry.

Both schema registries have an option to **Track in the update set**. When this option is enabled, the schemas in that registry are saved to the update set. Saving the schemas to the update set makes it possible to move them from one environment to another. By default, this option is turned off for the Confluent Schema Registry because schema IDs may change from one environment to another. This option is enabled for the Standalone Schema Registry, because if you're creating schemas manually, the schema ID is less likely to change from one environment to another. To change the default setting for either registry, navigate to **All** > **IntegrationHub** > **Schema Registries**, select the registry, and change the **Track in the update set** option.

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Stream Producer schemas

When you create or update a Stream Producer record with the serialization format set to Avro, ServiceNow automatically generates and maintains an Avro schema for the associated table.

If a schema already exists for the table when the Stream Producer record is saved, that schema is reused. If no schema exists, a new one is generated based on the table's field layout. Table metadata is used to detect whether a schema needs to be regenerated. A new schema is only generated when the table structure has changed.

Schemas used by Stream Producer are cached in memory. If a message payload contains a field that the cached schema doesn't recognize, a new schema is generated and stored in the schema tables. The updated schema is then used to convert the change data capture (CDC) payload to Avro format before the message is sent to Kafka.

Schema tables and roles

Stream Producer schemas are stored across two tables in the ServiceNow IntegrationHub Stream Connect Schema [`com.glide.hub.stream_connect.schema`] plugin. These tables are read-only for all users. No one has create, update, or delete access.

Schema tables

Table	Description
Table Message Schemas [`sys_table_message_schema`]	Stores the Avro schema content for a table. Extends `stream_connect_schema`. Inherits all fields from the parent table, including the schema content field.
Table Message Schema Evolutions [`sys_table_message_schema_evolution`]	Tracks schema versions for a table. Each record has the following. • A subject in the format `sn_`*`table_name`* (for example, `sn_incident`). • The Table Message Schema, which is a reference to the corresponding `sys_table_message_schema` record. • The name of the ServiceNow table this schema is associated with. • The version number of the schema. The version increments each time a new schema is generated for the table.

For reference fields in the Avro payload, both the sys_id and display value are included.

Schema management roles

Role	Description
`message_schema_viewer`	Grants read, range, and report_view access to the schema tables (`sys_table_message_schema` and `sys_table_message_schema_evolution`). No user has create, update, or delete access

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Schema management roles (continued)

Role	Description
	to these tables. If the Stream Connect Core [com.glide.hub.stream_connect.common.core] plugin is active, this role is automatically included in the `stream_connect_viewer` role.

Wire-level message format

For interoperability, ServiceNow uses a wire-level message format similar to the ones used by other systems. The first byte is set to 0. The next 4 bytes are used for the schema ID. The remaining bytes are used for the data, serialized in an Avro format.

Byte 0	Magic byte.
Byte 1–4	Schema ID.
Remaining bytes	Data, serialized in an Avro format.

Producers and consumers

Stream Connect producers and consumers can be configured to use an Avro format.

When configuring a producer, simply specify which schema you want to use. Then when you run the producer, the message payload is generated in JSON and automatically converted to an Avro format using the specified schema. For more information on producers, see the Kafka Producer step or the ProducerV2 API.

You can also configure a Stream Producer to send messages in an Avro format. When the serialization format is set to Avro, the Stream Producer uses the auto-generated schema for the selected table to convert CDC payloads to Avro before sending them to Kafka.

Configuring a consumer is similar. Specify the serialization format as **Encoded** and select a schema registry. When the consumer receives a message in an Avro format, it's automatically converted to JSON according to the schema for the schema ID received in the message. For more information, see the Kafka Message trigger or the ETL, Transform Map, or Script consumers.

Schema Registry REST API

The Schema Registry REST API exposes your Stream Producer Avro schemas to external systems and consumers. External applications can use the API to retrieve schemas and decode Avro-encoded messages received from Kafka topics.

The API is available at the base URI `/api/now/schemaregistry`. It uses standard ServiceNow authentication. ACLs control access to the scripted REST API endpoints.

Plugin

Schema management features require the ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin.

Stream Producer schema evolution features requires either the:

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- ServiceNow Integration Hub Stream Connect Schema [com.glide.hub.stream_connect.schema] plugin, or the
- ServiceNow Stream Connect Installer (Direct Kafka) [com.glide.hub.stream_connect.onprem_installer] plugin.

If the Stream Connect Core [com.glide.hub.stream_connect.common.core] plugin is installed, the `message_schema_viewer` role is automatically added to the `stream_connect_viewer` role.

Import a schema from the Confluent Registry

Import a Schema from the Confluent Registry to enable your Stream Connect producers and consumers to send and receive Kafka messages in an Apache Avro format.

Before you begin

- Role required: kafka_admin
- This feature is part of schema management in Stream Connect. For more information, see Schema management in Stream Connect.
- The ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin is required.
- To import a schema, you need to have a Connection and Credential alias to connect to your Confluent registry. Navigate to **All** > **IntegrationHub** > **Schema Management** > **Configure Connection** to configure your alias. For instructions, see Create a Connection & Credential alias.

About this task

Stream Connect uses schemas to convert messages from plain text to an Avro format and back. Using an Avro format can reduce the size of the payload and simplify your integration to your local Kafka instance.

This document shows you how to import a schema from the Confluent registry. You can also Create a standalone schema in Stream Connect.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Schema Management** > **Import Schema from Confluent Registry**.
2. Select the **Subject** of the schema you want to import from the Confluent Registry.
3. Select the **Version** of the schema to import.
   The most recent version is the default.
4. Select **Submit**.
   On the Confluent Stream Connect Schema form, the **Schema** field has the JSON-formatted schema that you imported from the registry, and the **Schema ID** field has the schema's ID.

Result

Your schema is visible on the Stream Connect Schemas [stream_connect_schema] table and the Confluent Stream Connect Schema [confluent_stream_connect_schema] table.

What to do next

Use Stream Connect producers and consumers to send and receive messages in an Avro format.

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Create a standalone schema in Stream Connect

Create a schema to enable your Stream Connect producers and consumers to send and receive Kafka messages in an Apache Avro format.

Before you begin

- Role required: kafka_admin
- This feature is part of schema management in Stream Connect. For more information, see Schema management in Stream Connect.
- The ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin is required.

About this task

Stream Connect uses schemas to convert messages from plain text to an Avro format and back. Using an Avro format can reduce the size of the payload and simplify your integration to your local Kafka instance.

This document shows you how to create your own standalone schema by uploading a JSON file or by entering a schema directly as a JSON-formatted string. You can also Import a schema from the Confluent Registry.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Schema Management** > **Create Standalone Schema**.

   On the form to create an Avro schema, the value of the **Schema ID** is automatically filled in. You can keep the suggested value or change it.

   All schemas have a schema ID, a globally unique identifier of the schema. For standalone schemas, the schema ID is generated locally and is unique on the instance. By default, the generated schema ID value is the next highest available schema ID on the instance. For example, if your schemas have ID numbers one through five, the next schema you create will have a schema ID of six. Schema IDs are unique per registry. For example, two schemas can both have an ID of one as long as they're in different registries.

2. In the **Source** field, select one of the following.

Option	Description
File	Select a JSON file to import the schema. Once imported, the contents of the file are visible in the **JSON schema** field.
Avro formatted String (JSON)	Enter a schema in a JSON-string format.

3. Select **Submit**.
   On the Standalone Stream Connect Schema form, the **Schema** field has the JSON-formatted schema that you uploaded or entered.

Result

Your schema is visible on the Standalone Stream Connect Schema [standalone_stream_connect_schema] table and the Stream Connect Schemas [stream_connect_schema] table.

What to do next

Use Stream Connect producers and consumers to send and receive messages in an Avro format.

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Configure an Extract Transform Load (ETL) consumer

Import and process data from your Kafka environment using your existing Robust Transform Engine (RTE) configurations.

Before you begin

- Role required: integration_hub_admin
- This consumer requires a Stream Connect subscription. For more information, see https://www.servicenow.com/now-platform/workflow-data-fabric.html.
- The ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin is required.
- This consumer requires a robust import set transformer.

About this task

To configure a consumer, you need to create two records.

1. The consumer record, which specifies how to import and process data.
2. A record for the Kafka stream, which defines the stream of data to your consumer.

This task covers the consumer creation. For instructions on creating a Kafka stream, see Create a Kafka stream.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Consumers** > **ETL Consumer**.
2. Select **New**.
3. In the form, fill in the fields.

Kafka ETL Consumer

Field	Description
Name	Name of the ETL consumer.
Robust import set transformer	Name of the robust import set transformer to use to process data.
Delivery guarantee	If there's a node failure, option to specify the delivery guarantee for incoming messages. Select one of the following. ○ **No lost but duplicates**: All messages are delivered at least once. Some messages might be delivered more than once. ○ **Once or not at all**: A message isn't delivered more than once. Some messages might not be delivered at all.
Serialization format	The serialization format for the message. Select one of the following. ○ **Plain Text**: Select this option for any plain-text messages. This is the default format. ○ **Encoded**: Select this option for messages in an Apache Avro format. Converting plain-text messages to an Avro format requires a schema. Select the schema registry in the **Schema registry** field. For more information on schemas, see Schema management in Stream Connect.

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Field	Description
Data in single column	Option to have the import set table store data in single column.
Column mapping	Option to specify whether the message's JSON key maps the data to the column's name or label in the import set table. Select one of the following. ○ **Label** ○ **Column name** This field appears only when the **Data in a single column** check box is cleared.
Application	Application scope for the ETL Consumer.
Schema registry	Registry for the selected schema. Select one of the following. ○ **Standalone Schema Registry** ○ **Confluent Schema Registry** This field appears only when the **Serialization format** is set to **Encoded**. For the Confluent Schema Registry, if the received message's schema ID isn't in the schema table, the system imports the schema dynamically, using the configured REST connection.

4. Select **Save**.

What to do next

Create a Kafka stream for this consumer. After the stream is activated, you can start receiving messages from your Kafka environment.

Configure a Transform Map consumer

Import and process data from your Kafka environment using your existing transform map configurations.

Before you begin

- Role required: integration_hub_admin
- This consumer requires a Stream Connect subscription. For more information, see https://www.servicenow.com/now-platform/workflow-data-fabric.html.
- The ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin is required.
- This consumer requires a transform map.

Formatting Kafka message payloads

Use simple JSON payloads for Kafka messages. Each Kafka message should have just one, flat JSON object. Complex JSON payloads, such as those with lists and nested objects, are not supported.

Example of simple, valid JSON input, using a flat map of key-value pairs.

```
{"key1": "value1", "key2": "value2"}
```

Examples of complex, invalid JSON input. The first uses a list. The second uses nested objects.

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```
[{"key1": "value1", "key2": "value2"}, {"key1": "value3",
 "key2": "value4"}]
```

```
{"key1": "value1", "key2": {"key3": "value3", "key4": "value4"}}
```

About this task

To configure a consumer, you need to create two records.

1. The consumer record, which specifies how to import and process data.
2. A record for the Kafka stream, which defines the stream of data to your consumer.

This task covers the consumer creation. For instructions on creating a Kafka stream, see Create a Kafka stream.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Consumers** > **Transform Map Consumer**.
2. Select **New**.
3. In the form, fill in the fields.

Transform Map Consumer

Field	Description
Name	Name of the Transform Map consumer.
Transform Map	Name of the transform map to use to process data.
Delivery guarantee	If there's a node failure, option to specify the delivery guarantee for incoming messages. Select one of the following. ○ **No lost but duplicates**: All messages are delivered at least once. Some messages might be delivered more than once. ○ **Once or not at all**: A message isn't delivered more than once. Some messages might not be delivered at all.
Serialization format	The serialization format for the message. Select one of the following. ○ **Plain Text**: Select this option for any plain-text messages. This is the default format. ○ **Encoded**: Select this option for messages in an Apache Avro format. Converting plain-text messages to an Avro format requires a schema. Select the schema registry in the **Schema registry** field. For more information on schemas, see Schema management in Stream Connect.
Column mapping	Option to specify whether the message's JSON key maps the data to the column's name or label in the import set table. Select one of the following. ○ **Label** ○ **Column name**
Synchronize Inserts	Option to guarantee there's only one record with unique coalesce field values by synchronizing record inserts.
Application	Application scope for the Transform Map Consumer.
Schema registry	Registry for the selected schema. Select one of the following.

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Field	Description
	○ **Standalone Schema Registry** ○ **Confluent Schema Registry** This field appears only when the **Serialization format** is set to **Encoded**. For the Confluent Schema Registry, if the received message's schema ID isn't in the schema table, the system imports the schema dynamically, using the configured REST connection.

4. Select **Save**.

What to do next

Create a Kafka stream for this consumer. After the stream is activated, you can start receiving messages from your Kafka environment.

Configure a script consumer

Use a script to import and process data from your Kafka environment.

Before you begin

- Role required: integration_hub_admin
- This consumer requires a Stream Connect subscription. For more information, see https://www.servicenow.com/now-platform/workflow-data-fabric.html.
- The ServiceNow Stream Connect Installer [com.glide.hub.stream_connect.installer] plugin is required.

About this task

To configure a consumer, you need to create two records.

1. The consumer record, which specifies how to import and process data.
2. A record for the Kafka stream, which defines the stream of data to your consumer.

This task covers the consumer creation. For instructions on creating a Kafka stream, see Create a Kafka stream.

Procedure

1. Navigate to **All** > **IntegrationHub** > **Consumers** > **Script Consumer**.
2. Select **New**.
3. In the form, fill in the fields.

Script consumer

Field	Description
Name	Name of the Script consumer.
Delivery guarantee	If there's a node failure, option to specify the delivery guarantee for incoming messages. Select one of the following.

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Field	Description
	○ **No lost but duplicates**: All messages are delivered at least once. Some messages might be delivered more than once. ○ **Once or not at all**: A message isn't delivered more than once. Some messages might not be delivered at all.
Serialization format	The serialization format for the message. Select one of the following. ○ **Plain Text**: Select this option for any plain-text messages. This is the default format. ○ **Encoded**: Select this option for messages in an Apache Avro format. Converting plain-text messages to an Avro format requires a schema. Select the schema registry in the **Schema registry** field. For more information on schemas, see Schema management in Stream Connect.
Event consumer	Script to use to consume the messages received from the Kafka topic.
Application	Application scope for the Script Consumer.
Schema registry	Registry for the selected schema. Select one of the following. ○ **Standalone Schema Registry** ○ **Confluent Schema Registry** This field appears only when the **Serialization format** is set to **Encoded**. For the Confluent Schema Registry, if the received message's schema ID isn't in the schema table, the system imports the schema dynamically, using the configured REST connection.

4. Select **Save**.

Example:
This example shows a sample script for processing messages. It includes the **utc_timestamp** field, a string-type field in UTC timezone, and the **metadata** field, which includes the following:

- **timestampEpoch**, data type: long
- **partition**, data type: int
- **offset**, data type: long
- **dataCenter**, data type: string

```
(function process(messages) {
  for (var i = 0; i < messages.length; i++) {
    var m = messages[i];

    var headerParts = [];
    for (var j = 0; j < m.headers.length; j++) {
      headerParts.push('header[' + j + ']_key=' +
m.headers[j].key + ' | header[' + j + ']_value=' +
m.headers[j].value);
    }

    var line = [
      'message_key='     + m.key,
```

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```
      'message_body='    + m.message,
      'partition='       + m.metadata.partition,
      'offset='          + m.metadata.offset,
      'datacenter_id='   + m.metadata.datacenter_id,
      'utc_timestamp='   + m.utc_timestamp,
      'timestamp_epoch=' + m.metadata.timestamp_epoch
    ].concat(headerParts).join(' | ');

    gs.info('[Kafka Message] ' + line);
  }
})(messages);
```

To convert the **utc_timestamp** field to *GlideDateTime*, see the following examples.

```
// Example 1
var timestamp = new GlideDateTime("2025-08-19 23:31:45");
console.log(timestamp.getValue());

// Example 2
var timestamp2 = new GlideDateTime();
timestamp2.setNumericValue(1755646305218);
console.log(timestamp2.getValue());

// Example 3
var timestamp3 = new GlideDateTime("1970-01-01 00:00:00");
timestamp3.add(1755646305218);
console.log(timestamp3.getValue());
```

What to do next

Create a Kafka stream for this consumer. After the stream is activated, you can start receiving messages from your Kafka environment.

Create a Kafka stream

Define a data stream for an Extract Transform Load (ETL), Transform Map, or Script consumer. A Kafka stream defines the stream of data to your consumer.

Before you begin

- Role required: integration_hub_admin
- Kafka streams are part of Stream Connect which requires a Stream Connect subscription. For more information, see https://www.servicenow.com/now-platform/workflow-data-fabric.html.

About this task

You must create a Kafka stream to use an ETL, Transform Map, or Script consumer. After you configure a consumer, and create and activate a stream, you can start receiving messages from your Kafka environment.

Procedure

1. Open the record for your ETL, Transform Map, or Script consumer.
   To find a consumer record, navigate to **All** > **IntegrationHub** > **Consumers** and select **ETL Consumer**, **Transform Map Consumer**, or **Script Consumer**.
2. Locate the Kafka Streams section and select **New**.
3. In the form, fill in the fields.

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Kafka Stream

Fields	Description
Name	Name of the Kafka stream.
Topic Alias	Name of the topic alias for the topic to monitor for messages.
Max concurrency	Maximum number of parallel processors to use to consume messages, and the number of partition groups to create. Default value: 1
Relative weight	For each cycle, the maximum amount of time allocated to the consumer for processing messages, relative to other consumers. For example, a consumer with a relative weight that's twice as high as another consumer's gets twice as much time. Consumers that have the same relative weight get the same amount of time. The minimum value is 5. The maximum value is 2000. The default value is equal to the max concurrency multiplied by the value of the *glide.ih.kafka.consumer.max_seconds_per_partition_group* property. The *glide.ih.kafka.consumer.max_seconds_per_partition_group* property specifies the maximum time, in seconds, allocated to each partition group. Its default value is 10. The system uses the relative weight to calculate the partition group timeout for the subscription. The partition group timeout specifies the maximum time, in milliseconds, allocated to each partition group in a specific subscription. This field appears only when **Advanced** is selected.
Start consuming	Option to specify where to begin consuming messages from the topic. Select one of the following. ○ **Messages received after the first activation**: Only consumes messages the topic received after the stream was activated. ○ **All the messages stored in the topic**: Consumes all the messages in the topic, even messages received before the stream was activated.
Message handling	Option to specify the number of messages processed per run or let the system decide the number of messages. Select one of the following. ○ **Automatically optimize**: The system determines the number of messages to process per run. ○ **Manually override**: You specify the number of messages to process per run. This field appears only when **Advanced** is selected.
Maximum messages	Maximum number of messages to process per run. This field appears only when **Manually override** is selected from **Message handling**.
Run as	Option to run the consumer with the credentials of a specified user.
Consumer	The name of the consumer to stream data to. This field is automatically set to the name of the consumer from which you started adding the stream.

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Fields	Description
Active	Option to make the stream active.
Advanced	Option to view the advanced fields **Relative weight** and **Message handling**.

4. Under Related Links, select **Activate**.
   After the stream is activated, the system automatically creates a Kafka subscription for the associated consumer.
5. Select **Submit**.

Result

When you activate the stream, the consumer begins looking for messages to process in the specified topic. You can view detailed information about the consumer and its performance by visiting its subscription page. For details, see Viewing Kafka subscriptions and statistics.

Viewing Kafka subscriptions and statistics

View detailed information about a Kafka consumer and its performance, including the number of records added to the topic, the number of records processed, and the number of records remaining to be processed.

A subscription is a record associated with a consumer. It stores configuration and performance details about the consumer. A subscription is created when a Kafka stream is activated.

Each subscription page includes the following sections.

- Kafka subscription
- Metrics
- Kafka subscription partition groups
- Stream Connect logs
- Kafka consumer statistics

To view a subscription record, navigate to **IntegrationHub** > **Stream Connect** > **Subscriptions**. Select the info icon (ⓘ) for the subscription you want to view, then select **Open Record**.

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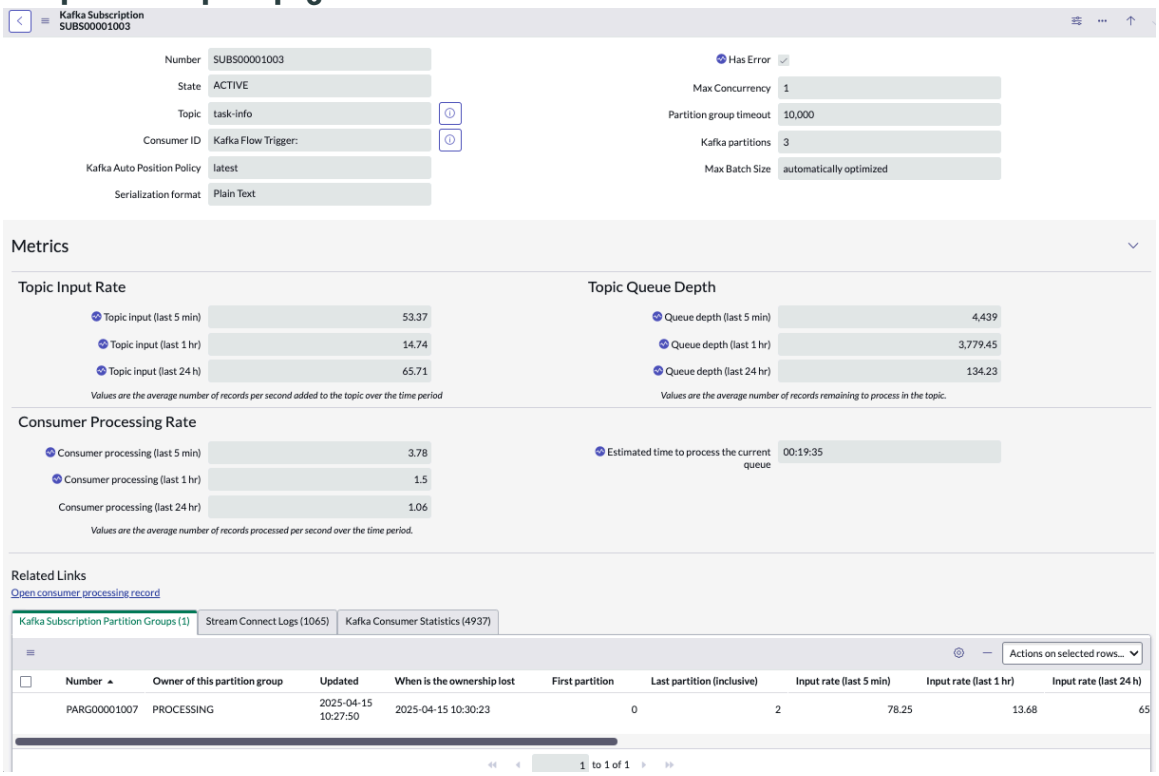
Sample subscription page for a Kafka consumer



Kafka subscription

The Kafka subscription section shows configuration details for the consumer and subscription.

Field	Description
Number	Number of the subscription record.
State	State of the consumer. Options are: • ACTIVE • REFRESHING • STOPPING
Topic alias	Topic alias for the topic the consumer is processing messages from.
Consumer ID	Unique identifier for the consumer.
Kafka Auto Position Policy	Specifies where the consumer starts reading messages from the topic. Options are: • earliest: The consumer starts reading from the earliest available message in the topic. • latest: The consumer reads only the messages delivered to the topic after the consumer started.
Serialization format	Serialization format for the message. Options are:

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Field	Description
	• Plain Text • Encoded
Has Error	Indicates if the subscription has any errors.
Max Concurrency	Maximum number of parallel processors used to consume messages and the number of partition groups.
Partition group timeout	Maximum time, in milliseconds, allocated to each partition group in the subscription.
Kafka partitions	Number of partitions in the topic.
Max Batch Size	Maximum number of messages processed per run. Options are: • automatically optimized: The system chooses the number of messages. • a number: The user manually selected a number.

Metrics

Each metric is measured over three time intervals: the previous five minutes, the previous hour, and the previous 24 hours.

- Topic Input Rate: The average number of records added to the topic per second.
- Topic Queue Depth: The average number of records remaining to be processed in the topic.
- Consumer Processing Rate: The average number of records processed per second. The **Estimated time to process the current queue** shows the time required to process the messages currently in the queue. It's calculated based on the queue depth and the consumer processing rate. The time estimate is formatted as HH:MM:SS.

Related Links

View the record for the consumer that is processing the messages by selecting **Open consumer processing record**.

Kafka subscription partition groups

The Kafka subscription partition groups tab shows the following details.

Field	Description
Number	Number for the partition group.
Owner of this partition group	Ownership state of the partition group. Options are: • NONE: The partition group isn't owned by any Kafka consumer jobs. It's available to pick up and process. • PROCESSING: The partition group is owned by a Kafka consumer job and is processing messages. • LOCKED: The partition group isn’t owned by a Kafka consumer job and isn’t available to pick up.

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Field	Description
	When a Kafka consumer job is activated, it checks for the earliest updated record with an owner of NONE and picks one. Then the consumer job changes the owner to PROCESSING and processes it for 10 seconds. When it's done processing, the state is changed back to NONE, so it can be picked up and processed again later. If the consumer job processes all the messages, it sets the owner to LOCKED for 10 seconds, after which it's set to NONE again.
Updated	Date and time the partition group was last updated.
When is the ownership lost	Date and time that ownership is lost.
First partition	Number of the first partition for the partition group.
Last partition (inclusive)	Number of the last partition for the partition group.
Input rate Given for the last five minutes, last hour, and last 24 hours.	Average number of records added to the partition group per second.
Consumer processing Given for the last five minutes, last hour, and last 24 hours.	Average number of messages consumed from the partition group per second.
Queue depth Given for the last five minutes, last hour, and last 24 hours.	Average number of records remaining to be processed in the partition group.

Stream Connect logs

The Stream Connect Logs tab displays the log entries for the associated consumer. Each log entry shows when it was created; its level, message, and source; and links to any related Alert or Subscription records. Stream Connect logs are stored in the Stream Connect Logs [sys_consumer_log] table. This table also includes logging for producers.

You can enable more detailed logging in the Stream Connect logs by adding the system property *glide.ih.kafka.stream_connect.debug* and setting it to **true**. To avoid filling up the logs, this property is automatically disabled after 24 hours. If you need detailed logging for longer than 24 hours, you can re-enable the property manually.

Use the *glide.ih.kafka.producer.message_bytes_to_log* property to specify how many bytes of a message to display in the logs. This property only impacts logging for producers. The default value is 0, meaning no message content is logged.

Kafka consumer statistics

The Kafka Consumer Statistics tab shows the following details.

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Field	Description
Created	Date and time the consumer statistics record was created.
Partition group	Record for the partition group.
Topic Alias	The topic alias for the topic associated with the consumer. A topic alias is a unique topic name that can be connected to any underlying Hermes or Direct Kafka topic.
Topic	The Hermes or Direct Kafka topic associated with the consumer.
Interval	Duration for the consumer statistics record, given in seconds. You can change the length of the interval with the *glide.ih.kafka.consumer.log_interval* property. The default value is 60 seconds. You can specify whether to log messages to the consumer log when there are no produced or consumed Kafka messages during the interval with the *glide.ih.kafka.consumer.log_empty_stats* property. The default value is true.
Offset	Sum of all the offsets for the partition group.
End offset	Sum of all the end offsets for the partition group.
Lag messages	Difference between the end offset and the current offset.
Consumed messages	Number of messages processed by the consumer during the interval time.
Produced messages	Number of messages produced to the topic during the interval time.
Consumed bytes	Number of bytes processed by the consumer during the interval time.
Consumer ID	Unique identifier for the consumer.
Consumer Table	Name of the underlying consumer table. One of the following: • Kafka Stream [sys_kafka_stream] • Kafka Flow Trigger [sys_kafka_flow_trigger]

Viewing producer statistics

View detailed information about a Stream Connect producer and its performance, including the producer type and ID, and the total number of bytes and messages produced to a topic.

Stream Connect producers, including the Kafka Producer step and the ProducerV2 API, publish messages from ServiceNow to a Kafka topic. You can view detailed information and statistics for each producer.

Each producer has a record that stores information about that producer, such as its type and ID. A producer might also have an associated statistics record with information about the producer's performance, including the number of bytes and messages it's produced to a topic.

Producer details and statistics are covered in two tables.

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- Kafka Producers [sys_kafka_producer] table
- Kafka Producer Statistics [sys_kafka_producer_statistics] table

Both tables require the Kafka Admin [kafka_admin] role to view. These tables are read only and the records in them can't be manually created, updated, or deleted.

Stream Connect logs

Producer logs are stored in the Consumer Logs [sys_consumer_log] table. Each log entry shows when it was created; its level, message, and source; and links to any related Alert.

You can enable more detailed logging by adding the system property *glide.ih.kafka.stream_connect.debug* and setting it to **true**. To avoid filling up the logs, this property is automatically disabled after 24 hours. If you need detailed logging for longer than 24 hours, you can re-enable the property manually.

Use the *glide.ih.kafka.producer.message_bytes_to_log* property to specify how many bytes of a message to display in the logs. This property only impacts logging for producers. The default value is 0, meaning no message content is logged.

Kafka Producers table

The Kafka Producers [sys_kafka_producer] table captures producer information per topic. You can view the Kafka Producers table by navigating to **All** > **Integration Hub** > **Stream Connect** > **Producers**.

Kafka Producers table fields

Field	Description
Number	Unique identifier for the producer. Links to the producer record.
Producer Type	Type and version number for the producer. Each producer type is followed by the version number of the producer. For example, if the producer is the ProducerV2 API, the type listed is SCRIPT_V2. Options are: • ACTION: Kafka Producer step. • SCRIPT_ACTION: A producer called from within a scripted step in Workflow Studio. • SCRIPT: Producer API or ProducerV2 API. • SYSTEM: Any server-side execution in the ServiceNow Platform where the system can't identify any record associated with the execution.
Producer Table	Name of the table producing the record. For example, if the record is produced by a business rule, the table is Business Rule [sys_script]. If it's produced by the Kafka Producer step, it's Action Type [sys_hub_action_type_definition].
Producer ID	Reference to the record that produces the messages.

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Kafka Producers table fields (continued)

Field	Description
Topic Alias	The topic alias for the topic associated with the producer. A topic alias is a unique topic name that can be connected to any underlying Hermes or Direct Kafka topic.
Topic	Reference to the Kafka topic record for the producer.
Domain	Name of the domain for the record producing the event.
Created	Date the producer was created. Formatted as YYYY-MM-DD hh:mm:ss.
Created by	Name of the person that created the producer.
Updated	Date the producer was update. Formatted as YYYY-MM-DD hh:mm:ss.

Kafka Producer Statistics

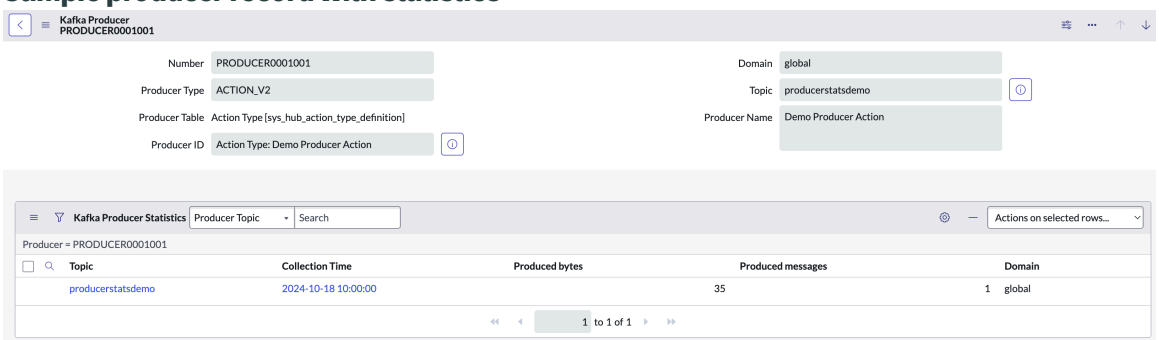
The Kafka Producer Statistics [sys_kafka_producer_statistics] table captures producer statistics for each producer. Statistics are collected once per hour.

Kafka Producer Statistics table

Field	Description
Collection Time	Time the producer statistics were collected. Statistics are collected and reported every hour.
Produced bytes	Total number of bytes produced during the collection period.
Produced messages	Total number of messages produced during the collection period.
Producer	Reference to the producer record.
Domain	Name of the domain for the producer.

You can also view the statistics for a specific producer by selecting the producer's record from the table.

Sample producer record with statistics



MID Hermes API extension

MID Hermes API is a MID Server extension that enables communication to Hermes via a MID Server.

Send message payloads to a Hermes topic with MID script includes and the MID Hermes Producer API. MID script includes push data to Hermes through a scriptable API

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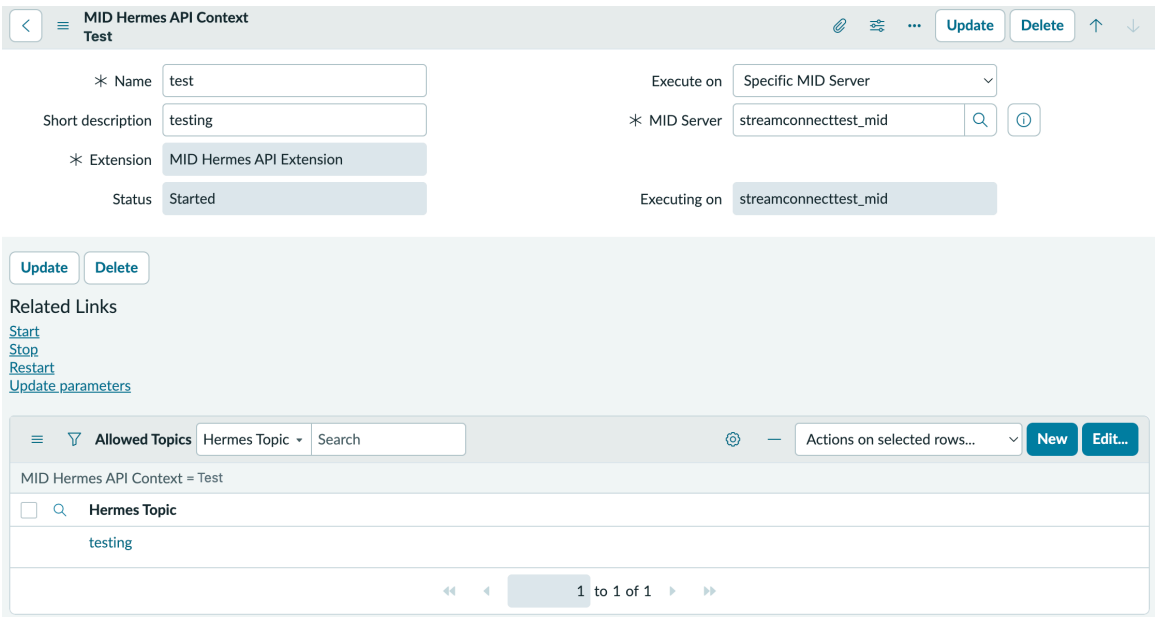
interface, so Stream Connect isn't required. Activate the ServiceNow MID Hermes API (com.glide.mid.hermes_api) plugin to use this extension.

Extension context records

Configuration details for the MID Hermes API extension are stored in context records. A context record specifies which MID Server the extension context executes on. After the context record is created, you can also use it to:

- View the status of the extension context.
- Start, stop, and restart the extension context.
- Update parameters.
- View the allowed Hermes topics and edit or create topics.

The following image shows an example of a completed MID Hermes API Context record.



Statistics

You can view statistics for the MID Hermes API extension by navigating to **All** > **MID Server** > **Extensions** > **MID Hermes API Statistics** or going directly to the MID Hermes API Statistics [sys_mid_hermes_api_metric] table.

This table includes the following statistics.

- Byte count: Number of bytes produced during the collection interval.
- Collection time: Time the collection interval ended.
- Collection interval (seconds): Duration of the collection interval. The default is 60 seconds.
- Message count: Number of messages produced during the collection interval.
- MID Hermes API Extension Context: Name of the extension context record used for producing messages.
- MID Server: Reference to the MID Server executing the extension context.
- Topic: Name of the Hermes topic the extension context is producing messages to.

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The metrics for this table are collected in-memory per (extension_context, topic) and aggregated continuously during each 60-second interval. Then they're transmitted as a single batch to ServiceNow, resulting in one database record per unique context-topic combination per interval rather than individual records for each message.

This table has a table cleaner that automatically purges old statistics records based on data retention policies, helping to prevent unbounded table growth.

Access certificates

The mTLS Hermes access certificates contain topic ACLs. When the MID Server generates the CSR, the value in the topics_acl field from the MID Extension Context table is set as the ACL on the CSR. The REST call to sign the CSR passes the MID Extension Context sys_id, so the server can verify that the ACL matches the context configuration.

If the ACL in the Hermes access certificate doesn't match the ACL in the MID Extension Context record, the MID Server automatically retries the verification up to three more times. Between each attempt, the MID Server refetches the latest ACL from the instance. If the ACL still doesn’t match after the final attempt, a REST error is returned and logged.

When the MID extension context starts, the topic ACL string it provides is compared to the one that's part of the mTLS Hermes access certificate. If it's different, a new mTLS certificate with the correct ACL is generated.

If the allowed topics change, business rules automatically restart the MID extension context. When an extension is restarting, producing still works with the old configuration until the new configuration is loaded.

Certificates are valid for seven days. When a certificate is created, a five-day timer starts to re-request the access certificate before it expires.

Configure the MID Hermes API Extension

Configure the MID Hermes API extension to enable the MID Hermes Producer API to produce messages to Hermes via a MID Server.

Before you begin

- Role required: kafka_admin
- Deploy and start a MID Server.

  Note: Proxy settings on the MID Server don't apply to Hermes connectivity. The MID Server proxy configuration applies only to HTTP-based communication. Hermes uses Kafka-native TCP connections, so traffic to the Hermes cluster bypasses proxy settings regardless of how the MID Server is configured.

- Activate the ServiceNow MID Hermes API (com.glide.mid.hermes_api) plugin.

Procedure

1. Navigate to **All** > **MID Server** > **Extensions** > **MID Hermes API**.
2. Select **New**.
3. On the form, fill in the fields.

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MID Hermes API Context form

Field	Description
Name	Name of the MID Server extension context.
Short description	Description of the MID Server extension context.
Extension	Name of the MID Server extension for this context. This field is automatically set to **MID Hermes API Extension**.
Status	Current status of the extension context. This field is automatically set.
Execute on	Identifies where this extension context is executed. This field is automatically set to **Specific MID Server**.
MID Server	Name of the MID Server to execute this context. **Note:** You can't use the same MID Server to create multiple context records (no duplicate records).
Executing on	Name of the MID Server that is executing this context. This field is automatically set.

4. Select **Submit**.
5. Select the newly created context record from the MID Hermes API Contexts [ecc_agent_ext_context_mid_hermes_api] table.
6. Under Related Links, select **Start**.
   The extension context starts. You should see **Started** in the **Status** field.

What to do next

Add Hermes topics by selecting **New** on the **Allowed Topics** tab. When you add a new topic, it's created and linked, so it shows up in the **Allowed Topics** tab.

Note: After changing the list of allowed topics, the MID Hermes API context record goes into the **Restarting** state. The new list of allowed topics is enforced after the record has returned to the **Started** state.

Managing connections in Integration Hub

Create several connections to a single integration provider. View and configure connections in a simplified interface with the Connections dashboard.

Connections and credentials in Integration Hub

Integration Hub uses aliases to manage connection information and credentials when integrating with external systems. Using an alias eliminates the need to configure multiple credentials and connection information profiles when using multiple environments. Integration Hub only requires an alias, which then resolves to use the correct credentials and connection information during runtime. Learn more about credentials, connections, and aliases.

Support for multiple connections

Integration Hub supports multiple connections to a single integration provider. For example, you can have connections to several different Jira environments.

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You can select which connection you want to use in a flow, and override preset connections for flows, subflows, and actions directly through Workflow Studio. When a flow is promoted to production, you can reestablish a connection to each account without needing to modify the flow.

You can also view, edit, and create connections for integration actions directly in Workflow Studio. Integration actions have one or more connection fields in the Action Properties section, simplifying connection management at the action-level.

Personal Authentication dashboard

Use your personal credentials to connect to third-party integrations with the Personal Authentication dashboard. View, authenticate, revoke, and renew your personal authentications through a simplified, consolidated interface.

The Personal Authentication dashboard provides a streamlined way to manage your personal authentication integrations. With personal authentication, multiple users can use Integration Hub without needing to share superuser credentials. It also enhances security by removing the need to manage ACLs for third-party systems.

Connections dashboard

You can view and configure your connection and credential aliases with the Connections dashboard. The Connections dashboard enables you to manage multiple connections through a single interface, and provides simplified processes for adding, editing, and configuring connections. With the Connections dashboard, you can view details about an alias and all associated child connections in a single location.

Use the mTLS protocol with a MID Server

Make outbound REST and SOAP calls through a MID Server using mTLS. Store mTLS credential and certificate information on the instance, in a configuration file, or in an external vault. The MID Server retrieves the credential and certificate information and makes outbound REST and SOAP calls using the mTLS protocol.

Supporting multiple connections

Support several connections to a single integration provider. Select connections for flows, subflows, and actions directly from a flow.

Benefits

Multiple connections support offers these benefits.

- Have more than one connection to the same integration provider. For example, you can establish connections to several different Jira environments.
- Select which connection you want to use in a flow. Override preset connections for flows, subflows, and actions directly through Workflow Studio.
- When a flow is promoted to production, reestablish a connection to each account without needing to modify the flow.

To learn more about connections, see Connections and Credentials.

Connection and credential aliases

Integration Hub uses aliases to manage connection information and credentials when integrating with external systems. Using an alias eliminates the need to configure multiple credentials and

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connection information profiles when using multiple environments. Integration Hub only requires an alias, which then resolves to use the correct credentials and connection information during runtime.

With connection and credential aliases, you can also create additional aliases or connections called child aliases. Child aliases enable you to create multiple connections within the same application integration. For more information, see Create a Connection and Credential alias.

Flow-level connection selection

You can choose a connection for a flow or subflow directly from the flow's main page. When you select a new connection, it overrides any preconfigured connection for that flow. To choose a connection, select the More Actions menu icon (), and select the **Configure connections** option. This option opens the Configure Connections window, where you can select the connections for your flow. The Configure Connections window displays:

- All the aliases used in the flow.
- The icon and name for each alias.
- A list of the configured connections for each alias. The default connection is listed first. Other connections are listed alphabetically.
- An information icon for each alias. Selecting the icon opens the Connection & Credential Aliases record for the default connection shown in the list.
- A **Manage Connections** option that opens the connections dashboard.
- Options to **Cancel** connection selection or **Update** your connection choice.

Each alias has one entry in the Configure Connections window, regardless of how many actions or subflows may use that alias. When you select a connection at the flow level, the new connection applies to all the actions and subflows using that alias. For example, if a flow has several actions that use a Slack service, changing the connection for the Slack service changes the connection for all the Slack service actions within the flow.

You can see which parts of a flow a connection change affects by matching the alias icons in the flow to the ones in the Configure Connections window. An action that impacts a Slack service has a Slack icon next to the action in the flow. The Slack icon also appears next to the alias name in the Configure Connections window.

The Configure Connections window is automatically updated whenever you add or delete a flow component that has connections. When you add an action or subflow to a flow, the Configure Connections window displays the connections for the action or subflow that you just added. If you remove an action or subflow, the connection information is removed from the Configure Connections window.

You can choose whether to display the **Configure connections** option with the *sn_flow_designer.connections_override_enabled* system property. Setting the property to **true** displays the **Configure connections** option, while setting it to **false** hides it. If you delete the system property or it doesn't exist, the **Configure connections** option is displayed by default.

View which connection your flow ran with by examining the Step Configuration section of the flow's execution details. The connection alias listed in the CONFIGURATION column is the alias that the flow was originally designed to run with. The alias listed in the RUNTIME VALUE column is the one that the flow actually ran with.

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Execution details page



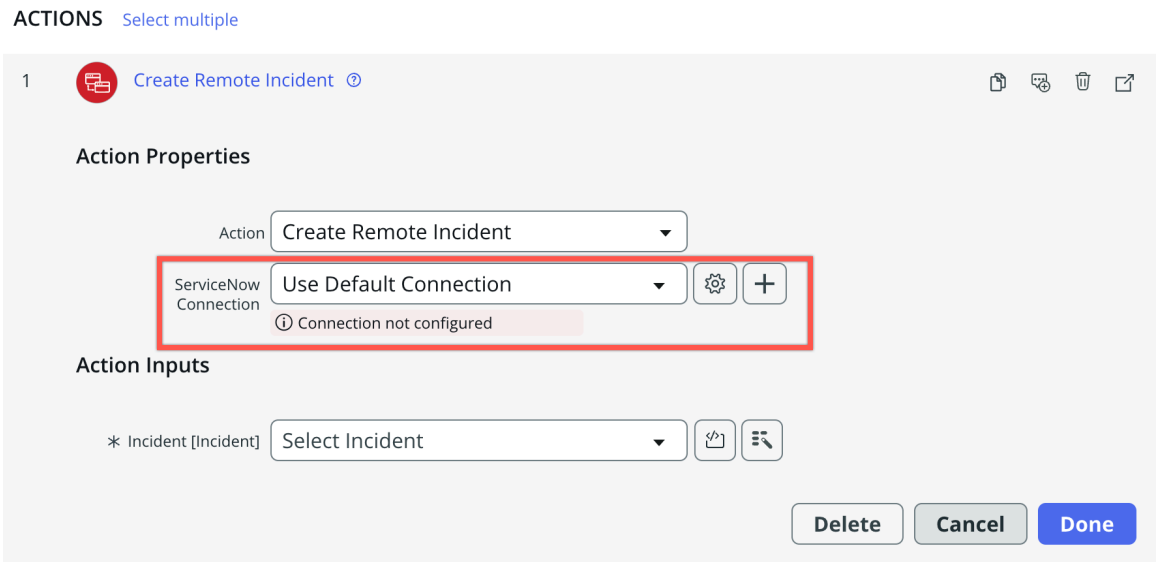
Action-level connection selection

You can select connections for individual integration actions within a flow. This functionality is useful if a flow must interact with multiple configurations of the same provider. For example, downloading a file from one configuration of a file storage provider then uploading the file to a different configuration of the same file storage provider.

Integration actions have one or more connection fields in the Action Properties section where you can edit or configure a connection. If the connection alias is using a configuration template with a test action, you can also test the connection from here. For details, see Create a test action to test a connection alias from a configuration template.

In the following example, the Create Remote Incident action has a connection field called **ServiceNow Connection**. The default connection hasn't been configured yet, so a `Connection not configured` message appears below the connection field. This message appears whenever the connection for the selected alias is not configured

Example of a connection field in an integration action



Use the gear icon (⚙) to create or configure an alias.

- For connections using a configuration template, the gear icon opens a window where you can create or configure a connection.
- For connections without a configuration template, the gear icon opens the platform form for creating a connection and credential alias.

Use the plus icon (+) to add a new child connection alias.

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The pencil icon (, not shown in the image) opens the Edit Connection window where you can edit the selected connection. If the connection is using a configuration template with a test action, you can test the connection by using the **Save and Test** button.

Dynamic inputs

You can select connections for flows and subflows containing actions with dynamic inputs. When a connection override is specified at the flow level, the dynamic action uses the flow-level override. For example, in a flow with a data-gathering action, the action uses the flow's override connection for the data-gathering step rather than the action's default connection. If an override is specified at the action level, the dynamic action uses the action-level override.

Multiple overrides within a flow

When there is more than one override in a flow, they're applied according to the following rules:

- Action-level overrides always apply.
- Subflow-level overrides always apply to the subflow. The override also applies to actions within the subflow that don't have their own overrides configured.
- Flow-level overrides apply to subflows and actions that don't have their own overrides configured.

Flow promotion

When you move a flow to a production instance, the alias information is transferred with it, but the underlying connection information is not. An alias functions as a type of container for connections. The container moves with the flow, but the specific connection information doesn't. Any connections associated with the alias become unconfigured and must be reconfigured before you can use them in the new environment.

You can configure connections without having to modify the flow because you already have the base alias set up. To configure a connection:

- If the alias has a configuration template, configure the connection through the Connections dashboard. See Configure a connection in the Connections dashboard for instructions.
- If an alias doesn't have a configuration template, configure it through the platform user interface. For more information about configuring a connection without a template, see Getting started with connections .

Override a connection in a flow

Override a connection for a flow, subflow, or action.

Before you begin

For details about flow overrides, including how they affect actions with dynamic inputs and how multiple overrides are applied, see Supporting multiple connections.

Role required: flow_designer or admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer**.
2. Select the flow or subflow that has the connection you want to modify.
3. Click the More actions icon ( ), and select **Configure connections**.

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4. In the Configure Connections window, identify the alias associated with the connection that you want to override and select a new connection from the list.
5. Click **Update**.

> **Note:** If the option is enabled, you can also override a connection at the action level. Click **Advanced Options** below the action. Choose the new connection from the list, then click **Done**. This option is only available if the action has an overridable connection.

What to do next
Test the flow.

Create a test action to test a connection alias from a configuration template

For connection aliases using a configuration template, you can create a test action that enables you to test the connection directly from the Action Properties section of actions contained in a flow in Workflow Studio.

Before you begin
Role required: admin

Plugin required: Integration Hub Starter

To test a connection alias with a test action, the connection alias must be associated with a configuration template. You can check if an alias already has a configuration template by navigating to **All** > **Integration Hub** > **Connection & Credential Aliases**, selecting the alias record from the list, and checking the **Configuration Template** field.

If you don't have a connection alias or an associated configuration template, you can create them. For step-by-step instructions on setting up a configuration template, see Create a configuration template. After you create a configuration template, you can Create a Connection & Credential alias and associate it with the template by adding the template name to the **Configuration Template** field.

About this task
This task is divided into two main steps. The first step describes how to create a test action in Workflow Studio that uses the alias you want to test. The second step describes how to add the name of the test action to the **Test Action** field in the configuration template.

Procedure
1. Create a test action in Workflow Studio.
   a. Navigate to **All** > **Process Automation** > **Workflow Studio**.
   b. In Workflow Studio, select **New**, then **Action**.
   c. On the New Action form, enter a name in the **Action name** field.
      This name is the name that you'll add to the **Test Action** field in the configuration template.
   d. Fill out the rest of the form, then select **Build action**.
   e. In the action, add a new step by selecting the plus icon, then select **REST**.
   f. On the form, enter the following field values, then select **Save**.

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REST step

Field	Value
Connection	**Use Connection Alias**
Connection Alias	<name of the connection alias to test>
Build Request	**Manually**
HTTP Method	**GET**
If this step fails	**Stop the action and go to error evaluation**

2. Add the name of the test action to the **Test Action** field in the configuration template.
   a. Navigate to **All** > **Integration Hub** > **Configuration Templates**.
   b. Select the template associated with the connection alias you're testing and enter the name of the action in the **Test Action** field, then select **Save**.

What to do next

Test your connection directly in the Action Properties section of an action contained in a flow in Workflow Studio. For details, see Action-level connection selection in Supporting multiple connections.

Using the Personal Authentication dashboard

Use your personal credentials to connect to third-party integrations. View, authenticate, revoke, and renew your personal authentications through a simplified, consolidated interface.

The Personal Authentication dashboard provides a streamlined way to manage your personal authentication integrations. With personal authentication, multiple users can use Integration Hub without needing to share superuser credentials. It also enhances security by removing the need to manage ACLs for third-party systems.

This feature requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Dashboard overview

The Personal Authentication dashboard has two main sections.

- The My Integrations section at the top of the page, which shows your authenticated integrations.
- The Integrations I can use section at the bottom of the page, which shows the integrations available to you.

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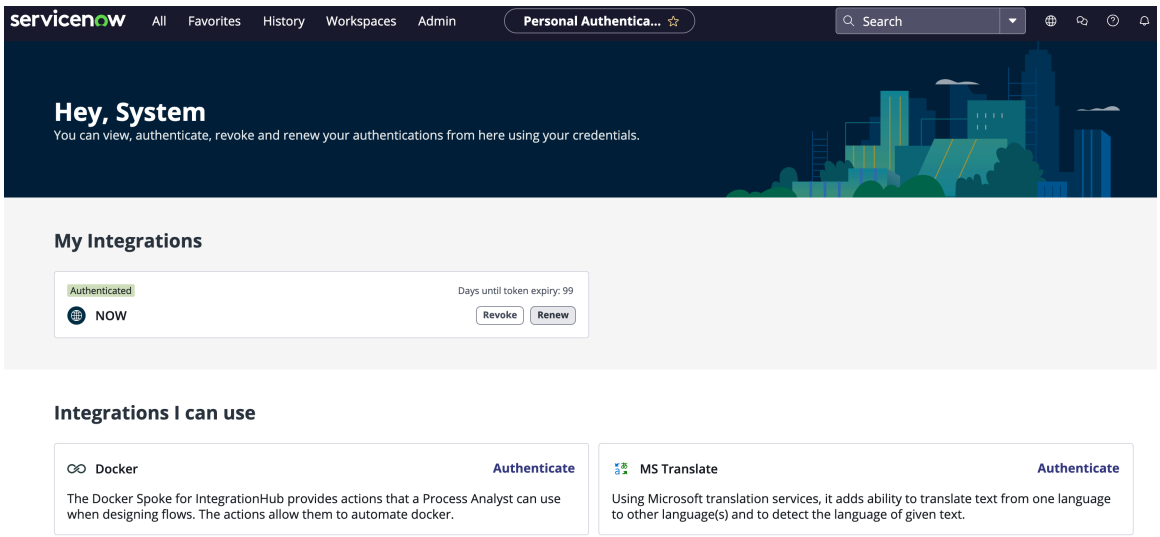
Personal Authentication dashboard



My Integrations section

Displays authenticated integrations. Each integration has its own card. From the card, you can **Revoke** or **Renew** the authentication.

When you revoke an authentication, you revoke any relevant access or refresh tokens for the personal authentication credential associated with the integration. Revoking invalidates the existing authentication. You can reauthenticate later to reestablish the connection. Once the authentication is revoked, the integration card moves to the Integrations I can use section of the dashboard.

Renewing an authentication renews the associated token and updates the expiration date. To renew, select the **Renew** button on the integrations card. This button opens a pop-up window where you can reauthenticate the credential. The contents of the pop-up window depend on the integration.

- For ServiceNow integrations, the pop-up window has fields where you can enter the **Username** and **Password** for the credential, then select **Get OAuth Token**.
- For all other integrations, the pop-up window displays your OAuth credential page for that application.

Integrations I can use section

Displays the integrations that are available but not authenticated. To authenticate, select the **Authenticate** button on the integration card. Authenticating opens the same pop-up window that opens when you **Renew** an integration: For ServiceNow integrations, the pop-up window has the **Username**, **Password**, and **Get OAuth Token** buttons. For all other integrations, the pop-up window displays your OAuth credential page for that application.

Once the credential is authenticated, the integration card moves to the My Integrations section at the top of the dashboard.

Required dashboard setup

If you're already using the personal authentication credential type, you can upgrade to the dashboard by installing the Personal Authentication [com.snc.sn_ihub_personal_auth] plugin. After installing the plugin, navigate to **All** > **IntegrationHub** > **Personal Authentication** > **Personal Integrations** to see the dashboard.

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The integrations on the dashboard all come from the Connection & Credential Aliases [sys_alias] table. Any alias where the credential has a personal integration type is displayed on the dashboard, according to the following guidelines.

- If the credential currently has a valid token, it's listed in the My Integrations section of the dashboard.
- If the credential doesn't currently have a valid token, it's listed in the Integrations I can use section of the dashboard.

If you're not already using the personal authentication credential type, you can configure one by creating a Connection & Credential Alias that uses an OAuth 2.0 credential with the **Integration Type** of **Personal**. For more details and instructions, see Create a Connection & Credential alias.

Token revocation URL

Revoking an authentication revokes all the related active tokens stored in the instance for the user that initiated the session. You can also enable token revocation on the OAuth Server by providing the server's token revocation endpoint in the **Token Revocation URL** field.

To enable authentication revocation at the OAuth Server, fill in the **Token Revocation URL** field in the Application Registries form for the integration's OAuth Provider. To fill in this field, follow these steps.

1. Navigate to **All** > **System OAuth** > **Application Registry**.
2. Select the form for the appropriate OAuth Provider from the Application Registries [oauth_entity] table.
3. In the **Token Revocation URL** field, enter the OAuth Server's token revocation endpoint.

Roles

The Personal Authentication dashboard requires the sn_personal_auth.personal_auth_user role.

Using the Connections dashboard

View and configure your connection and credential aliases through a simplified interface. Add new connections, edit existing connections, and view connection details.

Benefits

The Connections dashboard provides these benefits:

- Enables connection admins to manage multiple connections through a single interface.
- Provides simplified processes for adding, editing, and configuring connections.
- Displays details about an alias and all associated child connections in a single location.

Landing page

The dashboard landing page displays all the connection and credential aliases available on your instance. You can search for an alias by name, sort aliases by date created, or sort them alphabetically in ascending or descending order.

Each alias is displayed in a card format. Cards display the following:

- The application's icon.
- The name and scope of the parent alias.

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- A short description of the application associated with the alias. This option only appears when there are no connections.
- The total number of connections.
- A list of all the connections associated with the alias. The first connection is the default parent connection.
- A **View Details** option that displays specific information about the alias and any child connections.
- An **Advanced Setup** option. This option only appears when an alias doesn't have a configuration template.
- An **Add Connection** option. This option is only available when an alias has a configuration template.

Each page of the Connections dashboard displays a maximum of 12 aliases. Page through to see additional aliases.

Detailed view

View details about an alias and any child connections by clicking the **View Details** option on the alias card. The details page has two columns. The first column displays:

- The application's icon.
- The name and scope of the parent alias.
- An option to **View connection alias**, which opens the associated Connection & Credential Aliases record.

The second column of the detailed view displays:

- An **Add Connection** or **Advanced Setup** option, depending on whether the alias has a configuration template.
- The number of connections associated with the alias.
- A list of connections associated with the alias. The default connection is marked.

Connections that are not configured have a **Configure** option. Connections that are configured have an **Edit** option. Each configured connection displays the connection name, endpoint, credential name, and credential type.

If an alias uses an OAuth credential, the OAuth access or refresh token status is displayed with each connection. For connections that require a new token, you can request one by clicking **Get OAuth Token**.

Configuration templates

Configuration templates enable you to set up complex integrations using a single form. For example, an OAuth integration requires registering an OAuth provider, generating a token, and creating several connection and credential records. But if you use a configuration template to set up an OAuth integration, you only need to fill in one form. The system creates the associated records. To learn more about templates, see Connection and Credential configuration templates.

To add, edit, or configure connections directly through the dashboard, an alias must have a configuration template. Not all aliases have templates. Templates were first introduced in the Orlando release, so aliases from previous versions may not have them yet. An alias without a template displays an **Advanced Setup** option on both its dashboard and detailed view. Clicking

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Advanced Setup opens the alias's connection and credential record, where you can set up the alias. For more information about working with aliases that don't have templates, see Create a Connection and Credential alias.

Unconfigured connections

When you transfer an alias or promote it to production, its underlying connection information doesn't get transferred with it. In this situation, the connection is in an unconfigured state and must be reconfigured before you can use it. You can reestablish the underlying connections either through the dashboard or through the platform user interface.

- If the alias has a template, you can configure the connection through the dashboard.
- If it doesn't have a template, configure it through the platform user interface. For more information about configuring a connection without a template, see Getting started with connections.

Roles

To access the Connections dashboard, you must have the connection_admin or admin role.

Add a connection in the Connections dashboard

Add a connection through the Connections dashboard.

Before you begin

Role required: connection_admin or admin

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer** and click the **Connections** tab.
2. Locate the alias you want to add a connection to and select **Add Connection**.
   If there isn't an **Add Connection** option, the alias doesn't have a configuration template. To add a connection through the dashboard, the parent alias must have a template. Not all aliases have templates. Templates were first introduced in the Orlando release, so aliases from previous versions may not have them yet. If yours doesn't, you can set up your alias through the platform user interface instead. Select the **Advanced Setup** option to get started. For more information, see Create a Connection and Credential alias. To learn more about templates, see Connection and Credential configuration templates.
3. On the form, fill in the fields.
   The fields that appear on the form depend on which configuration template the parent alias has. For details on each specific template, visit Connection and Credential configuration templates.
4. To submit the form, click **Create Connection**.

Result

The alias card displays the new connection under the Connections list.

Configure a connection in the Connections dashboard

Configure a connection through the Connections dashboard.

Before you begin

Role required: connection_admin or admin

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About this task

When you transfer an alias or promote it to production, its underlying connection information doesn't get transferred with it. In this situation, the connection is in an unconfigured state and must be reconfigured before you can use it.

Procedure

1. Navigate to **All** > **Process Automation** > **Flow Designer** > and click the **Connections** tab.
2. Locate the alias that you want to add a connection to and click **View Details**.
3. In the detailed view, locate the connection that you want to configure and click **Configure**.
4. On the Configure Connection form, fill in the fields.
   The fields that appear on the form depend on which configuration template the parent alias has. For details on each specific template, see Connection and Credential configuration templates.

   Configuring a connection through the dashboard requires the parent alias to have a configuration template. If yours doesn't, clicking **Configure** opens the Connection and Credential Alias record for your alias instead of the Configure Connection form. For more information about configuring your connection in the Connection and Credential Alias record, see Create a Connection and Credential alias.
5. To submit the form, click **Configure**.

Result

The detailed view displays the new connection in the Connections list.

Using the mTLS protocol with a MID Server

Make outbound REST and SOAP calls through a MID Server using mTLS. Store mTLS credential and certificate information on the instance, in a configuration file, or in an external vault. The MID Server retrieves the credential and certificate information and makes outbound REST and SOAP calls using the mTLS protocol.

Mutual authentication using the Transport Layer Security protocol (mTLS) is a secure, certificate-based, authentication scheme where the server and the client authenticate each other. With mTLS, the client presents a certificate or certificate chain to the server, and the server authenticates the client in the same way that the client authenticates the server (mutual authentication).

You can use mTLS with a MID Server by defining a MID Protocol Profile for connections that use mutual authentication. The MID Protocol Profile specifies the mTLS credential and certificate information required for the connection. The MID Server uses the information in the MID Protocol profile to retrieve the keystore, register protocols with the HTTP Client, and make outbound calls with mTLS.

Note: This feature requires an Integration Hub subscription. For more information, see Legal schedules - IntegrationHub overview.

Create a MID Protocol Profile to use mTLS on a MID Server

A MID Protocol Profile enables you to use the mTLS protocol with a MID Server. With a MID Protocol Profile, you can save your mTLS password and certificate information directly on the instance, in a configuration file, or in an external vault. The MID Server uses this information to make outbound REST and SOAP calls using mTLS.

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Before you begin

- Role required: admin or action_designer.
- Configure and start a MID Server. For more information, see Configuring MID Servers.

About this task

This task is divided into four steps.

1. Create a Connection & Credential Alias. This task shows you how to create a basic Connection & Credential alias. For detailed information, see Create a Connection & Credential alias.
2. Create a connection. This task shows you how to create a basic HTTP(s) connection. For more details, see Create an HTTP(s) connection.
3. Create a MID Protocol Profile. The mTLS keystore and password may be stored on the instance (in the MID Protocol Profile), off the instance (in the MID Server's `config.xml` file), or in an external vault. ServiceNow supports CyberArk Password Vault for vault storage.
   - If you're storing them on the instance, the keystore and password must also be on the MID Server.
   - If you're storing them in the config.xml file, make sure you add the mTLS protocol parameters to the file before you configure the MID Protocol Profile. The `config.xml` is in the `/agent` directory, in the MID Server installation directory. See MID Server parameters.
   - If you're storing them in an external vault, make sure you set up your CyberArk integration configuration before creating a MID Protocol Profile.
4. Test your connection with a REST step. This step is optional.

Procedure

1. Create a Connection & Credential alias.
   a. Navigate to **All** > **IntegrationHub** > **Connection & Credential Alias** and select **New**.
   b. On the Connection & Credential Aliases form, enter a name in the **Name** field, and confirm that **Connection type** is set to **HTTP**.
   c. Select **Save**.
2. Create a connection.
   a. On the Connection & Credential Aliases form, in the Connections tab, select **New**.
   b. On the HTTP(s) Connection form, enter a **Name**.
   c. Select **URL builder**, **Mutual authentication**, and **Use MID server**.
   d. In the **MID protocol profile** field, use the magnifying glass icon to open the MID Protocol Profiles form and select **New**.
3. Create a MID Protocol Profile.
   a. On the form, fill in the fields.

MID Protocol Profile form

Field	Description
Protocol	Name for the protocol profile.
Keystore path	Path to the keystore on the MID host. The path can be absolute or relative.

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Field	Description
	If you're storing mTLS credential information on the instance, enter your keystore path in this field. The keystore must also be on the MID Server. If you're storing mTLS credential information in the `config.xml` file for the MID Server, leave this field empty. Make sure you have added the mTLS protocol parameters to the `config.xml` file.
Applies to	Determines whether this credential applies to all MID Servers or only select ones. Select one of the following. ▪ **All MID servers** ▪ **Specific MID servers**
MID servers	MID Servers this credential applies to. This field is only available when **Applies to** is **Specific MID servers**.
Default port	Default port for the protocol. Default value is 443.
External credential store	Option to use an external credential storage system. Select this option only if you're using CyberArk to store your credential information. You may need to configure the form layout to view this option.
Password	Password for the mTLS protocol. Stored in the database in encrypted form. If you're storing mTLS credential information on the instance, enter your password in this field. The password must also be on the MID Server. If you're storing mTLS credential information in the `config.xml` file for the MID Server, leave this field empty. Make sure you have added the mTLS protocol parameters to the `config.xml` file. If you're storing mTLS credential information in CyberArk, enter the CyberArk ID for the credential.

b. Select **Submit**.

c. On the HTTP(s) Connection form, enter the target host for the connection in the **Host** field and **Save** the Connection form.
On the HTTP(s) Connection form, the **Connection URL** field is filled in with the connection URL.

4. **Optional:** Test your connection with a REST step.

a. Navigate to **All** > **Process Automation** > **Workflow Studio**.

b. On the Workflow Studio landing page, select **New** > **Action**.

c. Give your action a name in the **Action name** field and select **Build action**.

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d. In the Action Outline section, select **REST**.

e. In the REST step, in the **Connection** field, select **Use Connection Alias** and in the **Connection Alias** field, select the connection alias you created.
The **Base URL** field should be filled in with the connection URL created in step 2.

f. **Save** the REST step and select **Test**.

g. In the pop-up window, select **Run Test**.
After the test runs, the EXECUTION DETAILS page displays. In the ACTION section, expand the steps section. Scroll down to the Step Output Data section to view the Status Code. It should be **200**, showing that you were able to make a successful call to the MID using mTLS.

Integration Hub reference

Reference topics provide additional information about Integration Hub and domain separation.

Domain separation and Integration Hub

Domain separation is supported for Integration Hub. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard*

The support level is Standard but has some exceptions or special conditions.

- Includes all aspects of **Basic** level support.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must be able to configure minimum viable product (MVP) business logic and data parameters. This configuration is done per tenant, as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Overview

In general, IntegrationHub inherits the domain separation features of Workflow Studio. As each spoke (application) can have its own domain separation relationship, there is no one specific support level to associate with IntegrationHub. To learn more, see Domain separation and Flow Designer.

Related topics

Domain separation for service providers

Domain separation and Stream Connect

Domain separation is supported for Stream Connect. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

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Support level: Standard

- Includes all aspects of **Basic** level support.
- Application properties are domain-aware as needed.
- Business logic: The service provider (SP) creates or modifies processes per customer. The use cases reflect proper use of the application by multiple SP customers in a single instance.
- The instance owner must configure the minimum viable product (MVP) business logic and data parameters per tenant as expected for the specific application.

Sample use case: An admin must be able to make comments required when a record closes for one tenant, but not for another.

For more information on support levels, see Application support for domain separation.

Message replication

Records in the following Stream Connect Message Replication tables are domain separated.

- Message Replications [sys_sc_message_replication]
- Channel Replications [sys_sc_channel_replication]
- Message Replication Statistics [sys_sc_channel_replication_metric]
- Kafka Topic Replications [sys_kafka_topic_replication]

The domain for a message replication record is specified in the record's **sys_domain** field.

For channel replication and replication metrics records, the domain is determined by the *domain_master* attribute. The *domain_master* attribute uses a reference field's domain to determine the domain for the current record. A channel replication record gets its domain from the referenced message replication record. A replication metrics record gets its domain from the referenced channel replication record.

A Kafka topic replication record has the same domain as its associated channel replication record because the Channel Replications table is a parent of the Kafka Topic Replications table.

Topic namespaces

You can use topic namespaces to configure which domains can access a Kafka topic on a domain-separated instance. In ServiceNow, Kafka topics are linked to a namespace. Namespaces can be linked to ServiceNow domains. When a namespace is assigned to a specific domain, all the topics created with that namespace are also assigned to the namespace's domain. Users can only see and interact with the topics they have access to, based on domain visibility and access control lists (ACLs).

For more information, see Managing namespaces and topics in Hermes.

Producers and consumers

Stream Connect producers and consumers are also domain separated. For producers, you can produce data only to topics that are visible to the domain.

For consumers, all the tables used to keep runtime data are domain separated. These tables include the following.

- Kafka Streams [sys_kafka_stream]
- Kafka Subscriptions [sys_kafka_subscription]

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- Kafka Subscription Partition Groups [sys_kafka_partition_group]
- Kafka Consumer Statistics [sys_kafka_consumer_statistics]
- Kafka Unprocessed Messages [sys_kafka_unprocessed_messages]

Domain users can create domain-specific Kafka streams with the topics that are visible to the domain. When activating a Kafka stream, the subscription and partition groups are created within the same domain. At runtime, the domain of the partition group is set by the consumer thread so that all the data is imported to the correct domain. For more information on producers, consumers, and Kafka streams, see Using Stream Connect for Apache Kafka.

Schema management

Tables for schemas and schema registries are domain separated. These include the following.

- Stream Connect Schemas [stream_connect_schema]
- Standalone Stream Connect Schema [standalone_stream_connect_schema]
- Confluent Stream Connect Schema [confluent_stream_connect_schema]
- Stream Connect Schema Registry [stream_connect_schema_registry]
- Confluent Stream Connect Schema [confluent_stream_connect_schema]
- Standalone Stream Connect Schema [standalone_stream_connect_schema]

Stream Connect roles

Assign roles to specify what different users can see and do.

Roles

For more information about managing and assigning roles, see Managing roles.

Stream Connect roles

Role	Description	Roles inherited
Kafka_admin	Manage integration with Kafka, including topics and settings related to kafka subscriptions.	• sn_help_setup_player • pd_author • hermes_viewer • pd_operator • stream_connect_alert_viewer • canvas_user • view_changer • fd_read_flows
kafka_namespace_admin	Manage Kafka namespace definitions. In an MSP instance with Kafka integrations in multiple domains, managing namespace definitions properly is important	kafka_admin

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Stream Connect roles (continued)

Role	Description	Roles inherited
	to maintain separation between domains, so it is recommended that this role not be granted to administrators within a single domain.	
stream_connect_admin	Management role for setting related to subscriptions, topics etc.	• message_replication_admin • stream_connect_api • kafka_admin • stream_connect_viewer • kafka_namespace_admin • connection_admin
stream_connect_alert_viewer	Read-only access to all stream connect alert records and logs.	None
stream_connect_api	Role with full access to invoke Stream Connect scriptable APIs	None
stream_connect_readonly_api	Role required to invoke read-only scriptable API calls related to Stream Connect	None
stream_connect_viewer	Role with read-only access to Stream Connect configuration and runtime statistics.	• message_replication_user • hermes_viewer • stream_connect_readonly_api • stream_connect_alert_viewer

Direct Kafka usage metrics

Direct Kafka Usage metrics table provides administrators with visibility into data usage between your instance and Direct Kafka systems. This read-only table tracks usage metrics on an hourly, daily, and monthly basis. Usage records are automatically retained for 13 months, with a scheduled cleaner job removing records older than this threshold on a monthly basis.

Direct Kafka usage metrics table

Column	Description
Kafka Cluster	The name of the Kafka cluster being monitored.
Megabytes Per Hour	The amount of data transferred, measured in megabytes per hour.

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Direct Kafka usage metrics table (continued)

Column	Description
Metric Name	The type of metric being tracked. Values: BytesProduced, BytesConsumed
Period Start	The timestamp indicating when the measurement period begins.
Roll Up Type	The aggregation level for the metric. Values: HOURLY, DAILY, MONTHLY
Topic	The specific Kafka topic associated with the usage metric.

Integration Hub Remote Process Sync

Integration Hub Remote Process Sync enables you to set up one-way or bidirectional integrations among multiple ServiceNow instances, so that your process flows stay in sync.

Note: Integration Hub Remote Process Sync requires an Integration Hub subscription. For more information, see Legal schedules - Integration Hub overview.

An Integration Hub Remote Process Sync integration lets you span automated workflows for your business process across multiple ServiceNow instances. As a service provider, keep multiple customer instances in sync automatically, using Workflow Studio subflows to automate your process's workflows for all of your customers.

Benefits

Integration Hub Process Sync provides you with these benefits:

- Automate cross-enterprise automated processes that span multiple instances, keeping various process stakeholders up-to-date
- Manage how to synchronize and correlate your record, attachment, and journal field data across multiple instances
- Ensure order delivery for data updates in remote instances, using a standalone correlation engine and queueing system
- Manage and troubleshoot errors and outages in your automated mutli-instance processes with the built-in execution engine in Workflow Studio.

Roles

By default, Remote Process Sync provides the following roles that you can assign to users:

Role	Users with this role can
ih_process_sync	Create, update, or delete process sync definitions and related records.
ih_process_sync_api	Access Remote Process Sync APIs only.
ih_process_sync_run_as	Run outbound and inbound flows associated with a process sync definition. This user

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Role	Users with this role can
	must have access to the tables for which any records are created or updated in the flow.

Domain separation

You can use Remote Process Sync to synchronize process flows among multiple domain-separated instances. In a domain-separated environment, the following conditions apply:

1. When building your integration
   - Configuration tables have a sys_domain, and data is domain separated.
   - Configuration tables are meant to be in the same domain as the parent configuration record.
   - Subflows may be chosen from the current or any parent domain.
   - No tables have sys_overrides , and thus cannot override business rules or UI actions from parent domains.
2. When your integration runs
   - Only records from the configuration domain and associated child domains are captured.
   - Queue tables have a sys_domain. The outbound record is stored in the same domain as the captured source record. The inbound record is stored in the same domain as the Inbound API user in the Remote System record.
   - The outbound subflow runs in the same domain as the queued record.
   - The inbound subflow runs in the same domain as the user specified in the Remote System record's Run Inbound Flows as field.

Getting started

Before deciding to move forward with Remote Process Sync as your integration framework, consider how this framework compares to other multi-instance ServiceNow AI Platform® integrations. While solutions such as Instance Data Replication and the Remote Instance spoke support simple multi-instance integrations, Remote Process Sync supports more complex multi-instance integration use cases, focusing on integrating instances by high-level business processes.

Note: Remote Process Sync replaces the eBonding spoke for integrating instances.

When you're ready to start building and managing a Remote Process Sync integration, learn the basics of Getting started with Remote Process Sync.

Getting started with Remote Process Sync

Learn the basics of setting up a Remote Process Sync integration in order to link the automated processes among two or more ServiceNow® instances together.

Note: Integration Hub Remote Process Sync requires a subscription to the Integration Hub Enterprise package. For more information, see Request Integration Hub.

Before getting started with your Remote Process Sync integration

Before deciding to move forward with Remote Process Sync as your integration framework, consider how this framework compares to other multi-instance ServiceNow AI Platform® integrations. While solutions such as Instance Data Replication and the Remote Instance spoke support simple multi-instance integrations, Remote Process Sync supports more complex

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multi-instance integration use cases, focusing on integrating instances by high-level business processes.

Note: Remote Process Sync replaces the eBonding spoke for integrating instances.

If you choose to use Remote Process Sync as your multi-instance integration framework, the next step is to learn about the difference between:

1. Building your integration, and
2. Managing your integration

Building your integration involves creating and configuring a process sync definition and its related records. For more information on how to get started with building your Remote Process Sync integration, either step through an example of how to Build your first Remote Process Sync integration, or learn about Process sync definitions.

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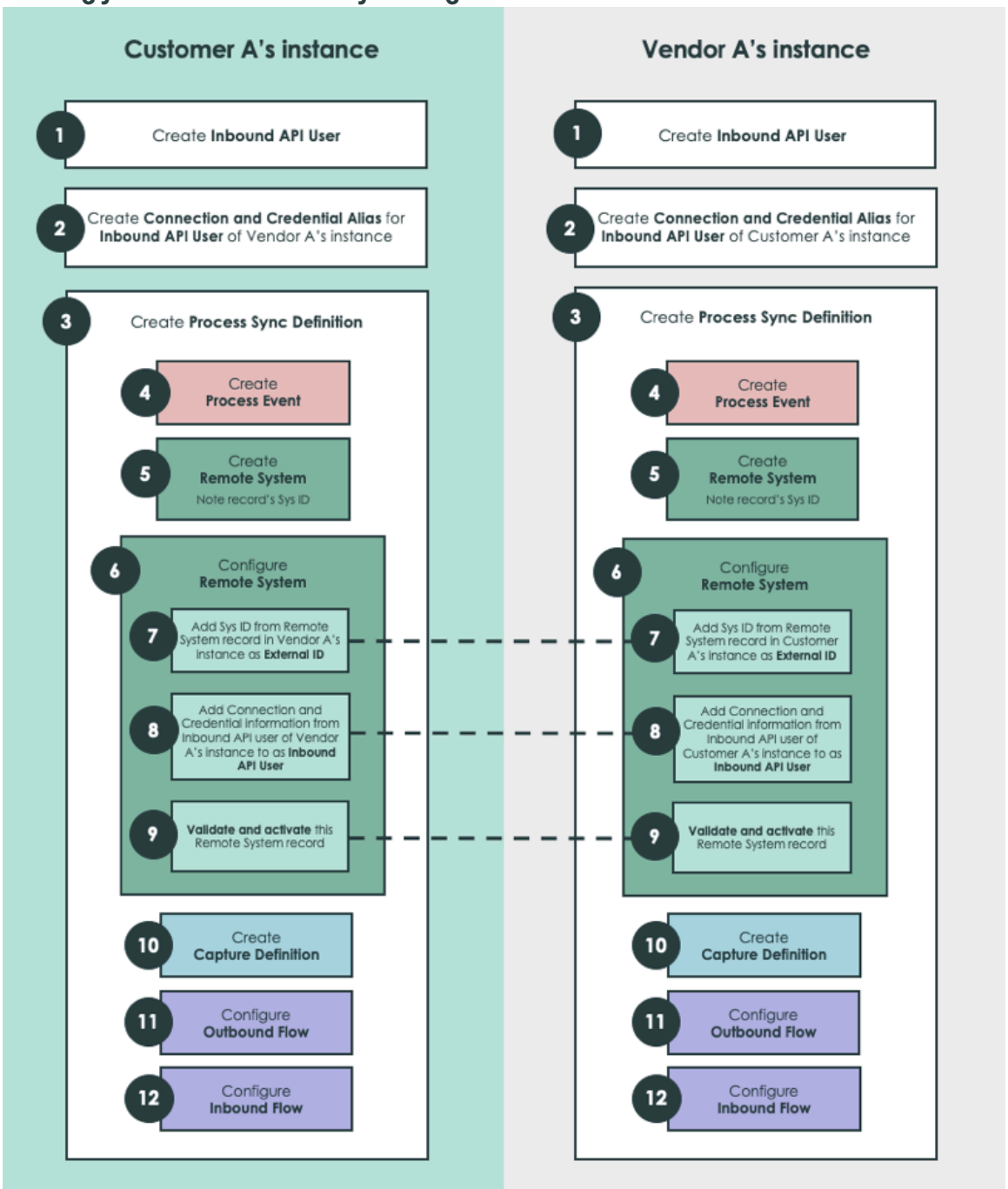
Building your Remote Process Sync integration



Managing your integration involves monitoring the outbound and inbound queues and checking for errors related to any triggered process sync definitions. For more information on how to monitor and check for errors with your Remote Process Sync integration, see Outbound queues and inbound queues and Monitoring and troubleshooting your integration. You may also want to periodically evaluate the outbound and inbound flows that run automatically for your integration and determine whether to make any changes to these flows in Workflow Studio.

Note: Both building and managing a Remote Process Sync integration on your instance also requires that you collaborate effectively with users of the remote instance, or remote instances. Be sure to meet with the stakeholders involved in your integration regularly to plan, manage, and continually improve the automated business processes that your multi-instance integration handles.

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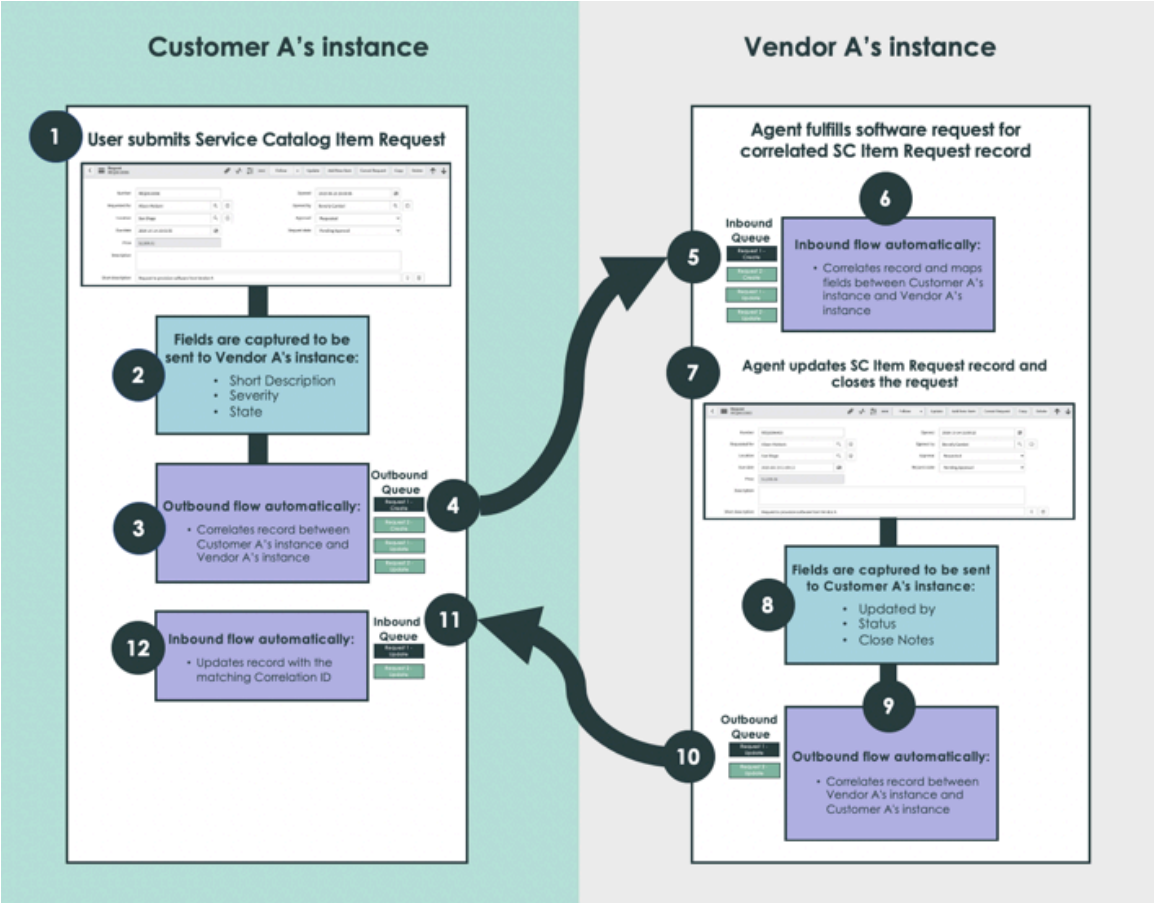
Managing your Remote Process Sync integration



Process sync definitions

A process sync definition contains all of the configurations for your Remote Process Sync integration. Start by creating a new Process Sync Definition record for your integration. Navigate to **IntegrationHub** > **Remote Process Sync** > **Process Sync Definitions**, and then click **New**. In the Process Sync Definition form, fill in the following fields:

Field	Description
Name	Enter a name that accurately describes which part of your business process your instance handles. For example, if users on your instance work to fulfill Service Catalog requests for your customers, enter a name such as Service Catalog Request Fulfillment.
Description	Optionally, describe which part of your business process that this process sync definition handles.
Application	Automatically set to your current application scope.
Domain	If your process relates to a specific domain, choose a domain other than `global`. For more information, see Domain separation for service providers.

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Click **Submit**, and then you can see your newly created Process Sync Definition record in the list. Next, select the Process Sync Definition record that you just created. You can see that your Process Sync Definition record has the following related lists:

- Capture Definitions
- Process Events
- Remote Systems
- Outbound Flows
- Inbound Flows

Refer to the following sections to learn how to set the configurations for each of these related items.

Capture definitions

A capture definition specifies when your instance should send data to a remote instance and what data your instance should send. A capture definition contains the configurations for your process sync definition's trigger and captured fields. The trigger specifies what record operation, such as creating, updating, or deleting a record, causes your instance to send data to a remote instance. When a Capture Definition is triggered, it creates an object from a source record, which contains captured fields. Then, the outbound flow starts running and correlates the captured fields from the source record to fields in a related record on the remote system.

A Capture Definition record has the following fields:

Field	Description
Process Event	In the Capture Definition form, use the lookup using list icon ( ) to choose the Process Event record that you want to associate with this capture definition. If no process event exists yet, enter a name for your process event, and the system automatically creates a Process Event record and associates the record with your capture definition. For more information, see Process Events.
State	Choose **Active** to activate this capture definition so that the parent process sync definition triggers when the conditions you set in this form's Trigger section are met.
Order	Enter a value for the order in which you want your capture definition to trigger relative to other capture definitions. Lower order values are honored before higher order values.
Application	Automatically set to your current application scope.
Domain	If your process relates to a specific domain, choose a domain other than `global`. For more information, see Domain separation for service providers.

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In the Trigger section, choose an authorized source table whose records you want to trigger your process sync definition. You can also add field conditions that, when met, cause your process sync definition to trigger. When the conditions are met for the trigger specified in your capture definition, any outbound flows associated with your process sync definition start running. For more information, see Outbound flows and inbound flows.

Field	Description
Source Table Name	Choose an authorized table whose records will trigger your process sync definition every time the records are created, updated, and deleted.
Filter	Use the condition builder to add conditions that, when met, will trigger your process sync definition. For example, selecting **[State]** > **[is]** > **[Work In Progress]** causes your process sync definition to trigger every time a record in your selected table's State is updated to Work In Progress.

Lastly, in the Capture section, add fields to the Selected list that you want to include in the payload for your outbound flow.

Field	Description
Include fields	Add fields to the Selected list which you want to sync with fields in the remote instance every time your process sync definition triggers. Use the add item icon ( ) to add fields from the Available list to the Selected list. **Note:** • When your integration runs, the outbound payload that is sent to remote instances always contains these captured fields, regardless of whether they were updated or not. • You can map these captured fields to fields in the remote instance by configuring mappings in the remote instance's inbound flow that is associated with the same process event. For more information, see Outbound flows and inbound flows.
Include Attachments	If selected, any attachments that are associated with triggering records on your local instance will sync with attachments in correlated records on the remote instance. For more information, see

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Note: RPS captures both interactive and non-interactive changes. You can configure RPS to ignore non-interactive changes, such as changes made via a scheduled job, by setting the *glide.hub.process.sync.capture.non_interactive.changes* property to **false**. For more information, see the How to configure Remote Process Synchronization (RPS) framework to ignore non-interactive changes to records [KB1565025] article in the Now Support Knowledge Base.

Process events

A process event specifies which part of your business process begins in your local instance and ends in the remote instance. The Process Event record in your local instance and in the remote instance should have the same name because the process event signifies the link between these instances that allows them to share parts of the same business process. A Process Event record has the following fields:

Field	Description
Name	Enter a name that describes the part of your business process that begins in your local instance and ends in the remote instance. For example, if users in your instance request software that will be provisioned in the remote instance, you can name the process event `User requests software`. **Note:** An administrator for the remote instance, or remote instances, must also create a process event with the same name that you use here. Creating these process events in separate instances creates the logical link that allows you to integrate data among multiple instances.
Application	Automatically set to your current application scope.
Domain	If your process relates to a specific domain, choose a domain other than `global`. For more information, see Domain separation for service providers.

Remote systems

A remote system contains the configurations for the outbound and inbound connections related to another ServiceNow instance. A Remote System record has the following fields:

Field	Description
Name	Enter a name that describes the remote instance. For example, if the instance is managed by one of your customers, Customer A, enter `Customer A's Instance` in the name field.

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Field	Description
Description	Optionally, enter more details that describe the remote instance's general purpose in your business process.
External ID	Enter the Sys ID for the Remote System record that shares the same process event with your instance. To get a record's Sys ID, select **Copy sys_id** from the context menu (☰) in the record's form view. For example, if your Remote Process Sync integration spans two instances, Instance A and Instance B, use the Sys ID from Instance A's Remote System record as the External ID in Instance B and vice-versa. Connecting the Sys IDs and External IDs in this way helps multiple instances know which instance to connect to when the automated outbound and inbound flows run.
Application	Automatically set to your current application scope.
Domain	If your process relates to a specific domain, choose a domain other than `global`. For more information, see Domain separation for service providers.
Error Subflow	The subflow to run if the Inbound or Outbound State becomes errored. Use the lookup using list icon (🔍) to select a subflow. A subflow appears on this list if: **1.** It is an active, published subflow, and **2.** An input to the subflow is of type Reference to the Process Sync Remote Systems [ih_sync_remote_system] table. Choose the subflow you want to run when the connection to the remote instance fails. The subflow you select runs whenever your local instance can't connect to the remote instance after your process sync definition triggers. There is an error subflow template you can copy and use to make your own Error Subflows. The RPS Error Subflow Template enables you to select notification methods for when the Inbound and Outbound States are errored. You can view the template by navigating to Workflow Studio and searching for it in the Subflows tab. You can view remote systems that your instance fails to connect to by navigating to **All**

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Field	Description
	> **IntegrationHub** > **Remote Process Sync** > **Remote Systems - With Errors**.
Connection Alias	Select the lookup using list icon () to find and choose a Connection & Credential Alias record that you want to use to authenticate with the remote instance. If you haven't set up a Connection & Credential Alias record for this purpose yet, create a new record with Connection and Credential in the Type field. For more information, see Create a Connection and Credential alias.
Outbound State	Set to `Disabled` by default. You can change this field's value to `Active` by selecting the **Validate and Activate Remote System** related link in this Remote System record's form view after you finish creating the record.
Inbound API User	User who can connect to the remote instance. This user must have credentials that match those of the user with the ih_process_sync_api role in the remote instance.
Run Inbound Flows as	Select the lookup using list icon () to find and choose a user that you want to run the inbound flow for the associated process event. Option to specify the user that runs the flow. You can select the system user or the user who initiates the session. Select the user who initiates the session option when updates should come from the user who triggered the flow. For example, use this option when you want the incident record comments to come from the user who started the flow. Settings for the Run as option in a flow don't apply to child subflows.
Inbound State	Set to `Disabled` by default. You can change this field's value to `Active` by selecting the **Validate and Activate Remote System** related link in this Remote System record's form view after you finish creating the record.

Note: After creating a Remote System record with the appropriate fields filled in, you must then click the **Validate and Activate Remote System** related link. Clicking this link checks that you can successfully connect to the remote instance and then activates the outbound and inbound connections.

After creating a Process Event record and a Remote System record, you can then associate Workflow Studio subflows with these records so that automated actions run whenever your process sync definition triggers.

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Outbound flows and inbound flows

An outbound flow specifies which Workflow Studio subflow your instance uses to:

1. Process local data, as fields captured in the capture definition, that will be sent to the remote instance
2. Correlate this data with data on the remote instance
3. Send this data to the remote instance

An Outbound Flow record has the following fields:

Field	Description
Process Event	Select the lookup using list icon ( ) to find and choose the Process Event record that you want to associate with this outbound flow. The process event that you select should logically relate to the automated actions that the outbound flow will run when your process sync definition triggers. For example, if your outbound flow maps fields from a Service Catalog Item Request record submitted by users in your local instance to related fields in the remote instance, then choose a process event related to users making Service Catalog item requests.
Outbound Subflow	Select the lookup using list icon ( ) to find and choose the Workflow Studio subflow that you want to run whenever your process sync definition triggers. Your instance provides you with a Remote Process Sync Outbound Flow Template - Basic subflow that you can use as a template in any Outbound Flow record. However, you can customize the Remote Process Sync Outbound Flow Template - Basic subflow so that it meets the needs of your business process. You can customize this subflow using the Remote Process Sync outbound actions. For more information, see Build your first Remote Process Sync integration.
Remote System	Select the lookup using list icon ( ) to find and choose the Remote System record that you want to connect to when your outbound flow runs automated actions that require authenticating with the remote instance. The Remote System record you choose should be the remote instance that handles the inbound part of your Remote Process Sync integration.
Application	Automatically set to your current application scope .

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Field	Description
Domain	If your process relates to a specific domain, choose a domain other than `global`. For more information, see Domain separation for service providers.

An inbound flow specifies which Workflow Studio subflow your instance uses to:

1. Correlate data on the local instance with the data sent from the remote instance
2. Map fields sent from the remote instance to fields on the local instance
3. Process data sent from the remote instance to the local instance

An Inbound Flow record has the following fields:

Field	Description
Process Event	Select the lookup using list icon ( ) to find and choose the Process Event record that you want to associate with this inbound flow. The process event that you select should logically relate to the automated actions that the inbound flow will run when your local instance is ready to handle the payload sent by the remote instance. For example, if your inbound flow maps fields from a Service Catalog Item Request record that users in the remote instance submitted to related fields in your local instance, then choose a process event related to users making Service Catalog item requests.
Inbound Subflow	Select the lookup using list icon ( ) to find and choose the Workflow Studio subflow that you want to run whenever your instance handles data sent by a remote instance. Your instance provides you with a Remote Process Sync Inbound Flow Template - Basic subflow that you can use as a template in any Inbound Flow record. However, you can customize the Remote Process Sync Inbound Flow Template - Basic subflow so that it meets the needs of your business process. You can customize this subflow using the Remote Process Sync inbound actions. For more information, see Build your first Remote Process Sync integration.
Remote System	Select the lookup using list icon ( ) to find and choose the Remote System record that you want to connect to when your inbound flow runs automated actions that require authenticating with the remote instance. The Remote System record you choose should be the remote instance that handles the

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Field	Description
	outbound part of your Remote Process Sync integration.
Application	Automatically set to your current application scope.
Domain	If your process relates to a specific domain, choose a domain other than `global`. For more information, see Domain separation for service providers.

Note: Each outbound flow and inbound flow must always be associated with one process event and one remote system only.

Before simply choosing the system-provided Remote Process Sync Outbound Flow Template - Basic or Remote Process Sync Inbound Flow Template - Basic subflows for your process sync definition, you may want to customize these subflows in Workflow Studio.

Syncing attachments

you can choose to send attachments associated with your local record by using the Include Attachments option in your capture definition. However, Remote Process Sync handles attachments differently from other data in your integration due to security and attachment file size issues:

- The first time that a record in your integration syncs, all attachments are sent in the outbound payload. Subsequent syncs can send either changes to attachments or all attachments.
- Attachment metadata is always sent with the outbound payload. This metadata includes an encrypted synthetic key, hash, file name, content type, and size.
- The remote instance decides which attachments to receive by comparing each hash and file name from the inbound payload to those on the instance. Then, the following process occurs:
  1. The originating system validates the key and pushes attachments to the correlation record.
  2. The originating system notifies the remote system that the attachments are complete.
  3. The remote system moves the attachments from the correlation record to the target record.

Syncing comments and work notes

In your integration, comments and work notes are synced among instances only when changes occur to those journal fields. Change metadata is included in payloads so that remote systems can identify which user created the comment or work note and when it was created.

Outbound queues and inbound queues

After building your Remote Process Sync integration by creating and configuring the records mentioned in the previous sections, you can then manage your integration by monitoring the outbound queue and inbound queue in your instance.

An outbound queue contains the status, error information, retry data, and flow context information for outbound subflows that ran for data that was sent out of your instance. To view the records in your outbound queue, navigate to **IntegrationHub** > **Remote Process Sync** > **Outbound Queue State**.

An Outbound Queue State record has the following fields:

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Field	Description
Created	Date that the automated action in your integration occurred
Error info	Status message for the outbound payload
Process Event	Process event
Remote System	Remote System
Retry metadata	Metadata for any retry policies configured for your outbound payload
Status	Processing status of the payload in the outbound queue. Options include: • Ready • Processed • Error • Skipped
Domain	Domain in which the automated action for your integration ran
Time In Queue	Time spent waiting for the processing of the record.
Processing Time	Time spent processing the record, in milliseconds.
Outbound Subflow Context	Sys ID of the execution record for the outbound flow that processed the payload

Note: You can get more detailed troubleshooting information for outbound payloads in associated Outbound Queue records. To access these records, navigate to **IntegrationHub** > **Remote Process Sync** > **Outbound Queue**.

An inbound queue contains the status, processing sequence, and correlation information for inbound subflows that ran for data that was sent from a remote instance to your local instance. To view the records in your inbound queue, navigate to **IntegrationHub** > **Remote Process Sync** > **Inbound Queue**.

An Inbound Queue record has the following fields:

Field	Description
Transform Context	Sys ID of the execution record for the inbound flow that processed the payload
Domain	Domain in which the automated action for your integration ran
Local Correlation ID	Correlation ID on the local instance
Operation	Type of record operation that the remote instance performed, which caused the remote instance to trigger and send data. Options include:

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Field	Description
	• Create • Update • Delete
Payload	String as JSON payload for inbound data
Process Event	Process event associated with the integration action
Remote Correlation ID	Correlation ID on the remote instance
Remote System	Remote System record associated with the instance that sent the data
Sequence	Order in the queue. A lower number is processed before a higher number.
Time In Queue	Time spent waiting for the processing of the record.
Processing Time	Time spent processing the record, in milliseconds.
Status	Processing status of the payload in the inbound queue. Options include: • Ready • Processed • Error • Skipped **Note:** If an Inbound Queue record has an Error status, change the status to Ready to retry processing the inbound payload.

Note: Both the Outbound Queue and Inbound Queue tables are maintained by table cleaners that remove records from these tables every 30 days.

Monitoring and troubleshooting your integration

You can use the following tables to monitor your Remote Process Sync integration, once it is built and running:

Table	Description
XML Stats	View the *process_sync_queue* section for information about the outbound and inbound queues for your integration, including the size of the queue as well as error and processing rates.
Outbound Queue	View the capture data for records that are staged to be sent out of your instance.

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Table	Description
Outbound Queue State	View the state of records in the Outbound Queue table.
Inbound Queue	View the combined inbound queue and record table.
Logs	Start by turning on debugging by setting the *glide.ih.process.sync.debug* system property to `true`. Then, scan the Logs for error messages beginning with `OutboundQueueDao` and `InboundQueueDao` to find log messages with more information about potential issues with your integration.

If an error occurs with your Remote Process Sync integration, begin by confirming whether the error is a connection error or a data processing error:

Connection errors

Outbound connection errors automatically retry several times before setting the Remote System record's Outbound State to Error. If errors keep occurring for an outbound connection, confirm that nothing has changed with the Remote System's Inbound API User, such as a change in the user's credentials. Then, validate and activate the Remote System record again.

Data processing errors

Data processing errors typically occur as a result of errors in an outbound flow or inbound flow. To troubleshoot these errors, you can add error handling actions to your flow, such as a Log action or Send Email action, when the flow's State changes to Error. You can also add actions that reprocess or skip processing of records in the Outbound Queue or Inbound Queue tables if an error with the flow occurs.

Build your first Remote Process Sync integration

Step through an example of how to build a Remote Process Sync integration in order to link the automated processes of two ServiceNow® instances together.

Before you begin

- Activate Remote Process Sync on each instance in your integration by purchasing the Integration Hub Enterprise package. For more information, see Request Integration Hub.
- Activate the explicit roles security feature on each instance in your integration. For more information, see Explicit Role plugin.
- Learn about how to build and manage an Integration Hub Remote Process Sync integration by checking out Getting started with Remote Process Sync.
- Confirm the instances that you will link together in the following example are not production instances. It is recommended to test this example on sub-production instances only in order to avoid overwriting any important data on either instance. You might also want to use a Personal Developer Instance for testing this example integration.
- Confirm that you do not have any existing business rules, workflows, or Workflow Studio flows whose logic will conflict with the flows we will create in the following example.
- Role required: admin

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About this task

In the following example, you will step through how to link two ServiceNow instances' automated processes together. The use case for this example is that a customer creates requests for hardware that are fulfilled by a vendor. We will refer to the customer's instance as Instance A, and the vendor's instance as Instance B. We will start by setting up credentials in each instance that can access the remote instance. We will also create a user in each instance that can run the outbound and inbound flows.

Procedure

1. In Instance A, ensure that your domain is set to `global`, and then navigate to **System Security** > **Users and Groups** > **Users**.
2. Select **New** to open a new User form view, and then fill in the following fields:

Field	Description
User ID	Enter `rps.api.instance.a`
First name	Enter `RPS API User for Instance A`

   Select **Save**.
3. While still on the User form, select **Set Password** to set a password.
   For details, see steps four and five in Configure password for a user.
4. Reset the password for RPS API User for Instance A.
5. Navigate back to **System Security** > **Users and Groups** > **Users** and select the User record that you just created.

   a. Navigate to and select the Roles related list.

   b. Select **Edit...** to configure the user's roles.

   c. In the search window above Collection, enter `ih_process_sync_api`.

   d. Select **ih_process_sync_api** and **snc_external** from the Collection list, and then select the add button ( ) to add these roles to the Roles List.

   > **Note:** The snc_external role restricts the access of external users to only the resources they have been explicitly granted access to.

   e. Select **Save**.
6. Select **New** to open a new User form view, and then fill in the following fields:

Field	Description
User ID	Enter `rps.run.as`
First name	Enter `RPS Run as User A`

   Select **Save**.
7. While still on the User form, select **Set Password** to set a password.
   For details, see steps four and five in Configure password for a user.

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8. Reset the password for RPS Run as User A.
9. Navigate back to **System Security** > **Users and Groups** > **Users** and select the User record that you just created.
   a. Navigate to and select the Roles related list.
   b. Select **Edit...** to configure the user's roles.
   c. In the search window above Collection, enter `ih_process_sync_run_as`.
   d. Select **ih_process_sync_run_as** from the Collection list, and then select the add button ( ) to add that role to the Roles List.
   e. In the search window above Collection, enter `incident_manager`.
   f. Select **incident_manager** from the Collection list, and then select the add button ( ) to add that role to the Roles List.
   g. Select **Save**.
10. In Instance B, ensure that your domain is set to `global`, and then navigate to **System Security** > **Users and Groups** > **Users**.
11. Select **New** to open a new User form view, and then fill in the following fields:

Field	Description
User ID	Enter `rps.api.instance.b`
First name	Enter `RPS API User for Instance B`

    Select **Save**.
12. While still on the User form, select **Set Password** to set a password.
    For details, see steps four and five in Configure password for a user.
13. Reset the password for RPS API User for Instance B.
14. Navigate back to **System Security** > **Users and Groups** > **Users** and select the User record that you just created.
    a. Navigate to and select the Roles related list.
    b. Select **Edit...** to configure the user's roles.
    c. In the search window above Collection, enter `ih_process_sync_api`.
    d. Select **ih_process_sync_api** and **snc_external** from the Collection list, and then select the add button ( ) to add these roles to the Roles List.

       Note: The snc_external role restricts the access of external users to only the resources they have been explicitly granted access to.

    e. Select **Save**.
15. Select **New** to open a new User form view, and then fill in the following fields:

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Field	Description
User ID	Enter `rps.run.as`
First name	Enter `RPS Run as User B`

Select **Save**.

16. While still on the User form, select **Set Password** to set a password.
For details, see steps four and five in Configure password for a user.

17. Reset the password for RPS Run as User B from Instance B.

18. Navigate back to **System Security** > **Users and Groups** > **Users** and select the User record that you just created.

    a. Navigate to and select the Roles related list.

    b. Select **Edit...** to configure the user's roles.

    c. In the search window above Collection, enter `ih_process_sync_run_as`.

    d. Select **ih_process_sync_run_as** from the Collection list, and then select the add button ( ) to add that role to the Roles List.

    e. In the search window above Collection, enter `incident_manager`.

    f. Select **incident_manager** from the Collection list, and then select the add button ( ) to add that role to the Roles List.

    g. Select **Save**.

19. In Instance A, navigate to **IntegrationHub** > **Connections & Credentials** > **Credentials**, and then select **New**.

    a. From the list of connection options, select **Basic Auth Credentials**.

    b. In the form, fill in the following fields:

Field	Description
Name	Enter `RPS Vendor Credentials`
User name	Enter `rps.api.instance.b`
Password	Enter the password for RPS API User for Instance B.

> **Note:** The credentials you enter must match the credentials for the RPS API User that you created in Instance B.

    c. Select **Submit**.

20. While still in Instance A, navigate to **IntegrationHub** > **Connections & Credentials** > **Connection & Credential Aliases**, and then select **New**.

    a. In the Name field, enter `RPS Vendor Demo`.
    Leave all other fields as they are, and then select **Submit**.

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b. From the list, select the RPS `Vendor` Demo record that you just created.

c. In the Connections related list, select **New**.

d. In the form, fill in the following fields:

Field	Description
Name	Enter RPS `Vendor`.
Credential	Select the lookup using list icon ( ), and then select the RPS `Vendor Credentials` record from the list.
Connection URL	Enter the base URL of Instance B. The URL should begin with `https://` and end with `.service-now.com/`

e. Leave all other fields as they are, and then select **Submit**.

21. In Instance B, navigate to **IntegrationHub** > **Connections & Credentials** > **Credentials**, and then select **New**.

a. From the list of connection options, select **Basic Auth Credentials**.

b. In the form, fill in the following fields:

Field	Description
Name	Enter RPS `Customer Credentials`
User name	Enter `rps.api.instance.a`
Password	Enter the password for RPS API User for Instance A.

Note: The credentials you enter must match the credentials for the RPS API User that you created in Instance A.

c. Select **Submit**.

22. While still in Instance B, navigate to **IntegrationHub** > **Connections & Credentials** > **Connection & Credential Aliases**, and then select **New**.

a. In the Name field, enter RPS `Customer Demo`.
Leave all other fields as they are, and then select **Submit**.

b. From the list, select the RPS `Customer` Demo record that you just created.

c. In the Connections related list, select **New**.

d. In the form, fill in the following fields:

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Field	Description
Name	Enter `RPS Customer`.
Credential	Select the lookup using list icon (), and then select the `RPS Customer Credentials` record from the list.
Connection URL	Enter the base URL of Instance A. The URL should begin with `https://` and end with `.service-now.com/`

e. Leave all other fields as they are, and then select **Submit**.

We've successfully created credentials that can be used to access each remote instance. Now, let's ensure that we can send and receive data between instances by configuring the Remote System record for a Process Sync Definition in each instance.

23. In Instance A, navigate to **IntegrationHub** > **Remote Process Sync** > **Process Sync Definitions**, and then select **New**.

a. In the form, fill in the following fields:

Field	Description
Name	Enter `Hardware Request Process`
Description	Enter `Process for requesting hardware and handling fulfilled hardware requests`

b. Leave all other fields as they are, and then select **Submit**.

c. From the list, select the `Hardware Request Process` record that you just created.

24. In the Remote Systems related list, select **New**.

a. In the form, fill in the following fields:

Field	Description
Name	Enter `Vendor Instance - Instance B`
Description	Enter `Vendor instance that fulfills hardware requests`
Connection Alias	Select the lookup using list icon (), and then select the `RPS_Vendor_Demo` record from the list.
Inbound API User	Select the lookup using list icon (), and then select the `RPS API User for Instance A` record from the list.

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Field	Description
Run as	Select the lookup using list icon ( ), and then select the RPS `Run as User` record from the list.

b. In the context header, select the additional actions icon ( ) and then select **Copy sys_id**. You will need this Sys ID as the value for the External ID field of the Remote System record in Instance B.

c. Leave all other fields as they are, and then select **Submit**.

25. In Instance B, navigate to **IntegrationHub** > **Remote Process Sync** > **Process Sync Definitions**, and then select **New**.

a. In the form, fill in the following fields:

Field	Description
Name	Enter `Hardware Fulfillment Process`
Description	Enter `Process for fulfilling hardware requests`

b. Leave all other fields as they are, and then select **Submit**.

c. From the list, select the `Hardware Fulfillment Process` record that you just created.

26. In the Remote Systems related list, select **New**.

a. In the form, fill in the following fields:

Field	Description
Name	Enter `Customer Instance - Instance A`
Description	Enter `Customer instance that requests hardware`
External ID	Paste the value of the Sys ID that you copied from the Remote System record in Instance A.
Connection Alias	Select the lookup using list icon ( ), and then select the `RPS_Customer_Demo` record from the list.
Inbound API User	Select the lookup using list icon ( ), and then select the RPS `API User for Instance B` record from the list.

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Field	Description
Run as	Select the lookup using list icon ( ), and then select the RPS `Run as User` record from the list.

b. Leave all other fields as they are, and then select **Submit**.

c. From the Remote Systems related list, select the `Customer Instance - Instance A` record.

d. In the context header, select the additional actions icon ( ) and then select **Copy sys_id**. You will need this Sys ID as the value for the External ID field of the Remote System record in Instance A.

27. In Instance B, navigate to **IntegrationHub** > **Remote Process Sync** > **Remote Systems - All**, and then select the `Customer Instance - Instance A` record from the list.

a. In the External ID field, paste the value of the Sys ID that you copied from the Remote System record in Instance A.

b. Select Update to save your changes to the record.

c. From the list, select the `Customer Instance - Instance A` record.

d. In the Related links section, select **Validate and Activate Remote System**.
You should see a message that displays `Remote system validated and activated successfully`. If you see an error message instead, go back and check the configuration for the Remote System record.

We have successfully connected Instance A and Instance B together so that they can share data across their process workflows. Now, we will define how our integration will trigger and run automatically, as well as which fields we want to capture and sync between instances.

28. In Instance A, navigate to **IntegrationHub** > **Remote Process Sync** > **Process Sync Definitions**, and then select the `Hardware Request Process` record from the list.

29. In the Process Events related list, select **New**.

a. In the Name field, enter `Request Hardware`.

Note: This field is case-sensitive. It functions similarly to an API endpoint method name.

b. Leave all other fields as they are, and then select **Submit**.

30. In the Process Events related list, select **New**.

a. In the Name field, enter `Hardware Request Fulfilled`.

b. Leave all other fields as they are, and then select **Submit**.

31. In the Capture Definitions related list, select **New**.

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a. In the form, fill in the following fields:

Field	Description
Process Event	select the lookup using list icon ( ), and then select the `Request Hardware` record from the list.
State	Select **Active**
Source Table Name	Select **Incident [incident]**
Filter	In the condition builder, select **Assignment Group** > **is** and then select the lookup using list icon ( ). Choose the `Hardware` record from the list.
Include fields	Select the following fields and then select the add item button ( ) to add them to the Selected list: ▪ Number ▪ Short description ▪ Assignment group ▪ Severity ▪ State **Note:** Sys ID is already included in the Selected list. Leave this field in the Selected list as well.

b. Leave all other fields as they are, and then select **Submit**.

32. In the Outbound Flows related list, select **New**.

a. In the form, fill in the following fields:

Field	Description
Process Event	From the list, select **Request Hardware**.
Outbound Subflow	Select `Copy of Remote Process Sync Outbound Flow Template - Basic` record. To make a copy, follow these steps. **i.** Use the **Configure Subflow** button next to the **Outbound Subflow** field to navigate to Workflow Studio. **ii.** In Workflow Studio, select the Subflows tab.

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Field	Description
	iii. Filter the **Name** column to locate the `Remote Process Sync Outbound Flow Template - Basic` record and select it. iv. In the subflow, select the More Actions menu, then select **Copy subflow**. v. **Publish** the subflow copy. This template subflow handles the correlation of local and remote records and sends the captured payload to the remote instance. **Note:** When building your own integration, you can add Remote Process Sync actions to personalize this template subflow to your needs. To edit this template subflow in Workflow Studio, select the Configure Subflow icon ( ).
Remote System	Select the lookup using list icon ( ), and then select the `Vendor Instance - Instance B` record from the list.

b. Leave all other fields as they are, and then select **Submit**.

33. In Instance B, navigate to **IntegrationHub** > **Remote Process Sync** > **Process Sync Definitions**, and then select the `Hardware Fulfillment Process` record from the list.

34. In the Process Events related list, select **New**.

a. In the Name field, enter `Request Hardware`.

b. Leave all other fields as they are, and then select **Submit**.

35. In the Process Events related list, select **New**.

a. In the Name field, enter `Hardware Request Fulfilled`.

b. Leave all other fields as they are, and then select **Submit**.

Note: Create Process Event records in both instances with names that match. This will help you keep track of the linked process workflows between instances.

36. In the Capture Definitions related list, select **New**.

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a. In the form, fill in the following fields:

Field	Description
Process Event	select the lookup using list icon ( ), and then select the `Hardware Request Fulfilled` record from the list.
State	Select **Active**
Source Table Name	Select **Incident [incident]**
Filter	In the condition builder, select **Assignment Group** > **is** and then select the lookup using list icon ( ). Choose the `Hardware` record from the list. Then, select **AND** to add another condition and select **Incident state** > **is** > **Resolved**.
Include fields	Select the following fields and then select the add item button ( ) to add them to the Selected list: ▪ Number ▪ State ▪ Resolved by ▪ Resolution notes ▪ Resolution code **Note:** Sys ID is already included in the Selected list. Leave this field in the Selected list as well.

b. Leave all other fields as they are, and then select **Submit**.

37. In the Outbound Flows related list, select **New**.

a. In the form, fill in the following fields:

Field	Description
Process Event	From the list, select **Hardware Request Fulfilled**.
Outbound Subflow	Select `Copy of Remote Process Sync Outbound Flow Template - Basic` record. To make a copy, follow these steps.

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Field	Description
	i. Use the **Configure Subflow** button next to the **Outbound Subflow** field to navigate to Workflow Studio. ii. In Workflow Studio, select the Subflows tab. iii. Filter the **Name** column to locate the `Remote Process Sync Outbound Flow Template - Basic` record and select it. iv. In the subflow, select the More Actions menu, then select **Copy subflow**. v. **Publish** the subflow copy. This template subflow handles the correlation of local and remote records and sends the captured payload to the remote instance. **Note:** When building your own integration, you can add Remote Process Sync actions to personalize this template subflow to your needs. To edit this template subflow in Workflow Studio, select the Configure Subflow icon ( ).
Remote System	Select the lookup using list icon ( ), and then select the `Customer Instance - Instance A` record from the list.

b. Leave all other fields as they are, and then select **Submit**.

We have successfully set up how our Remote Process Sync integration will trigger, and which fields will be captured and sent to either remote instance. In this final section, we will customize the inbound flows in Workflow Studio so that they properly transform inbound data.

38. In Instance B, navigate to **IntegrationHub** > **Remote Process Sync** > **Process Sync Definitions**, and then select the `Hardware Fulfillment Process` record from the list.

39. Make a copy of the `Remote Process Sync Inbound Flow Template - Basic` record.

a. Navigate to Workflow Studio and select the Subflows tab.

b. Filter the **Name** column to locate the `Remote Process Sync Inbound Flow Template - Basic` record and select it.

c. In the subflow, select the More Actions menu, then select **Copy subflow**.

40. In the subflow, update the Payload.

a. Expand the `Transform Payload from Inbound Sample` action.

b. In the Sample Payload field, enter the following sample payload:

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```
{"capture_metadata":{"changed_by":"admin","timestamp":"2020-0
9-24 19:26:59"},
"changed_fields":[

 {"display_value":"","value":"incident","key":"sys_class_name
"},

 {"display_value":"","value":"552c48888c033300964f4932b03eb09
2","key":"sys_id"},
  {"display_value":"","value":"INC0040015","key":"number"},
  {"display_value":"","value":"","key":"short_description"},

 {"display_value":"Hardware","value":"9f5b572d9cd82010f877a5c
fd1fdce30","key":"assignment_group"},
  {"display_value":"","value":"1","key":"severity"},
  {"display_value":"","value":"2","key":"state"}]}
```


Note: This payload is a complex object that represents the captured metadata and fields that are sent from Instance A to Instance B.

c. Select **Done**.

41. In the subflow, under the `Else` flow logic, select **Create Incident Record**.

a. Add the following fields and associated values:

Field	Value
Short description	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **short_description**.
Description	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **short_description**.
Assignment group	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **assignment_group**.
Urgency	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **severity**.
State	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **state**.

b. Select **Done**.

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42. Under the `If` flow logic next to `then`, select **Update Incident Record**.

a. In the Fields input, add the following fields and associated values:

Field	Value
Short description	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **short_description**.
Description	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **short_description**.
Assignment group	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **assignment_group**.
Urgency	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **severity**.
State	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **state**.

b. Select **Done**.

43. **Publish** the subflow.

44. Back in the Hardware Fulfillment Process record, in the Inbound Flows related list, select **New**.

a. In the form, fill in the following fields:

Field	Description
Process Event	From the list, select **Request Hardware**.
Inbound Subflow	Select `Copy of Remote Process Sync Inbound Flow Template - Basic`.
Remote System	Select the lookup using list icon ( ), and then select the `Customer Instance - Instance A` record from the list.

b. Leave all other fields as they are, and then select **Submit**.

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45. In Instance A, navigate to **IntegrationHub** > **Remote Process Sync** > **Process Sync Definitions**, and then select the `Hardware Request Process` record from the list.
46. Make a copy of the `Remote Process Sync Inbound Flow Template - Basic` record.
    a. Navigate to Workflow Studio and select the Subflows tab.
    b. Filter the **Name** column to locate the `Remote Process Sync Inbound Flow Template - Basic` record and select it.
    c. In the subflow, select the More Actions menu, then select **Copy subflow**.
47. In the subflow, update the Payload.
    a. Expand the `Transform Payload from Inbound Sample` action.
    b. In the Sample Payload field, enter the following sample payload:

```
{"capture_metadata":{"changed_by":"admin","timestamp":"2020-10-26 14:18:45"},
"changed_fields":[

 {"display_value":"","value":"incident","key":"sys_class_name"},

 {"display_value":"","value":"d4cdfce8db4c2410cfe4d9595e96197b","key":"sys_id"},
  {"display_value":"","value":"INC0040014","key":"number"},
  {"display_value":"","value":"101","key":"state"},
  {"display_value":"","value":"Resolved by caller","key":"close_code"},
  {"display_value":"System Administrator","value":"6816f79cc0a8016401c5a33be04be441","key":"resolved_by"},
  {"display_value":"","value":"","key":"close_notes"}]}
```

    Note: This payload is a complex object that represents the captured metadata and fields that are sent from Instance B to Instance A.

    c. Select **Done**.
48. Under the `If` flow logic next to `then`, select **Update Incident Record**.
    a. In the Fields input, add the following fields and associated values:

Field	Value
State	Select the data pill picker icon (). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **state**.
Resolved by	Select the data pill picker icon (). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **resolved_by**.

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Field	Value
Resolution notes	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **close_notes**.
Resolution code	Select the data pill picker icon ( ). Dot-walk to and then select **1 - Transform Payload from Inbound Sample** > **Changed Fields** > **close_code**.

b. Select **Done**.

49. In the subflow, delete the `Else` statement.

50. **Publish** the subflow.

51. Back in the Hardware Fulfillment Process record, in the Inbound Flows related list, select **New**.

a. In the form, fill in the following fields:

Field	Description
Process Event	From the list, select **Hardware Request Fulfilled**.
Inbound Subflow	Select `Copy of Remote Process Sync Inbound Flow Template - Basic`.
Remote System	Select the lookup using list icon ( ), and then select the `Vendor Instance - Instance B` record from the list.

b. Leave all other fields as they are, and then select **Submit**.

Result

We've finished building our Remote Process Sync integration. The integration will now trigger whenever a user creates an Incident record with the Hardware assignment group in Incident A. When this happens:

- The fields specified in Instance A's Capture Definition are captured and stored in a local record.
- The local record is correlated with a remote record in Instance B.
- The captured fields are mapped to the fields we specified in Instance B's Inbound Flow.

Then, when a user resolves the correlated Incident record in Instance B:

- The fields specified in Instance B's Capture Definition are captured and stored in a local record.
- The local record is correlated with the remote record in Instance A.
- The captured fields are mapped to the fields we specified in Instance A's Inbound Flow.

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What to do next

Test out your Remote Process Sync integration by creating an Incident record in Instance A with the Hardware assignment group. Then, resolve the correlated Incident record in Instance B. If your correlated records don't sync as expected, check your Inbound API User's credentials and Process Sync Definition configuration in each Instance. If you continue to experience issues with your example integration, refer to Monitoring and troubleshooting your integration.

Remote Process Sync Dashboard

View detailed statistics for your Remote Process Sync integrations. The Remote Process Sync Dashboard helps you monitor the health and performance of RPS by collecting and visualizing metrics such as records processed, queue sizes, processing times, and error states.

The Remote Process Sync Dashboard provides visibility into your Remote Process Sync integration performance. Use this dashboard to:

- Monitor remote systems and queue health
- Track record processing metrics
- Identify performance bottlenecks
- Troubleshoot integration issues

The dashboard consists of three tabs: **Overview**, **Inbound Queue**, and **Outbound Queue**

Before you begin

- You must install the plugin com.glide.hub.process.sync.dashboard to be able to view the Remote Process Sync Dashboard.
- The glide.hub.process.sync.record.successful.status property must be set to true for data to show on this dashboard.

To access the Remote Process Sync Dashboard, navigate to **All** > **Integration Hub** > **Dashboards** > **Remote Process Sync Dashboard**. You must have the integration_admin or admin role to view the dashboard.

Overview tab

The Overview tab shows high-level health metrics and processing trends.

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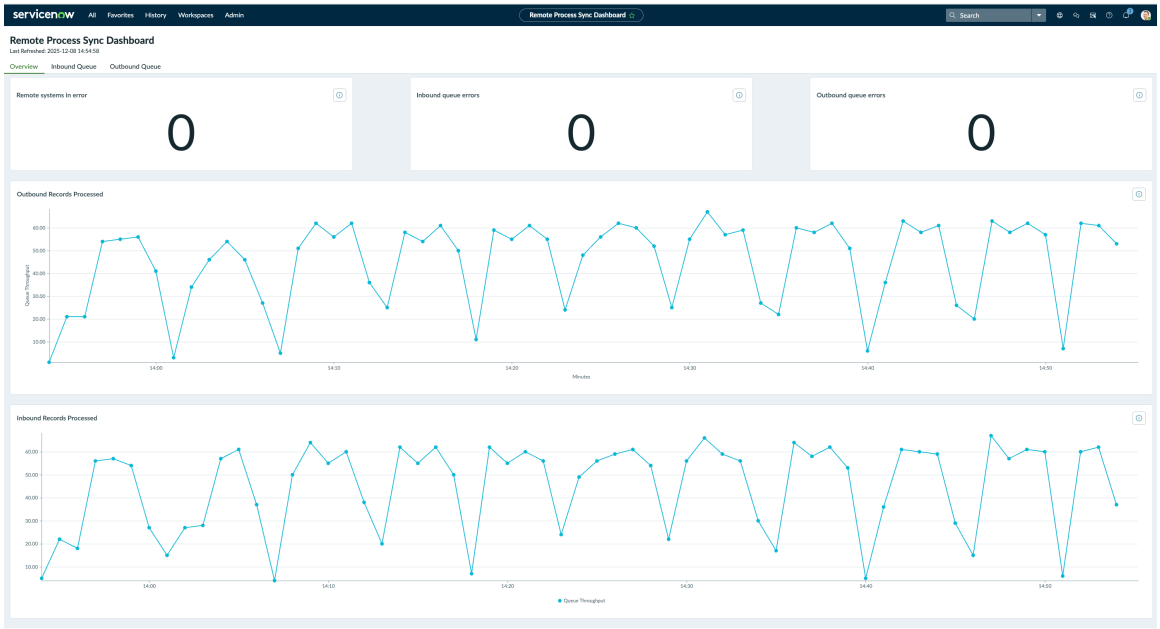

The Overview tab includes these components:

1. Remote systems in error: Count of remote systems where the inbound or outbound status is marked as Error.
2. Inbound queues in error: Count of inbound queue records with state = Error.
3. Outbound queues in error: Count of outbound queue records with state = Error.
4. Outbound Records Processed: Line graph showing the count of outbound queue records processed over the last 24 hours.
5. Inbound Records Processed: Line graph showing the count of inbound queue records processed over the last 24 hours.

Inbound Queue tab

The Inbound Queue tab shows detailed metrics for records being synchronized from remote systems into ServiceNow.

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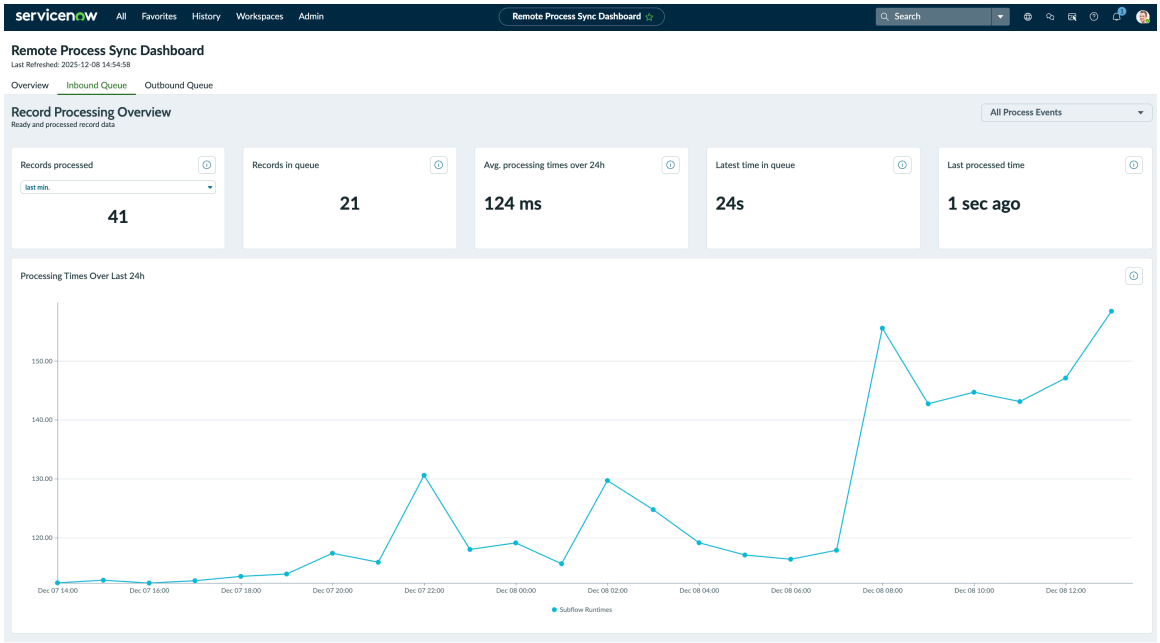

Use the **Record Processing Overview** dropdown to filter metrics by specific process events (for example, Issue Created, Incident Updated), or select **All Process Events** to view aggregate metrics.

The Inbound Queue tab includes these components:

1. Records processed: Count of inbound records processed within the selected time range. Select from last minute, last hour, or last day using the dropdown.
2. Records in queue: Current count of unprocessed records in the inbound queue.
3. Avg. processing times over 24h: Average time (in milliseconds) to process inbound records over the last 24 hours.
4. Latest time in queue: Time elapsed since the most recent record was added to the inbound queue.
5. Last processed time: Time elapsed since the last record in the inbound queue was processed.
6. Processing Times Over Last 24h: Line graph showing the processing time (Subflow Runtimes) for inbound records over the last 24 hours.

Outbound Queue tab

The Outbound Queue tab shows detailed metrics for records being synchronized from ServiceNow to remote systems.

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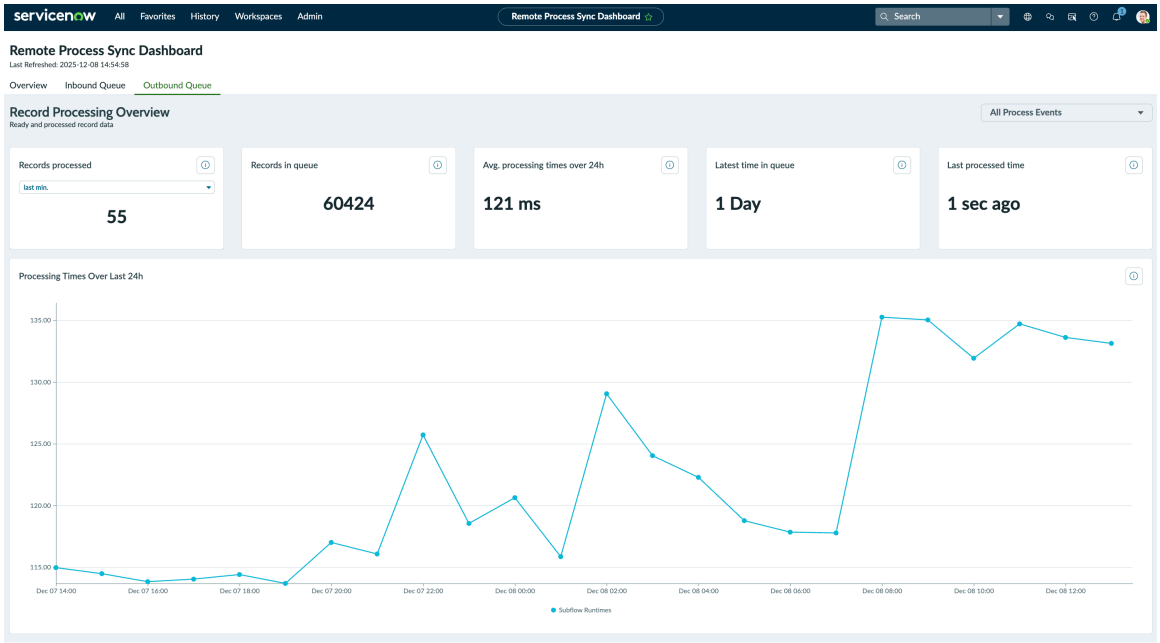

Use the **Record Processing Overview** dropdown to filter metrics by specific process events, or select **All Process Events** to view aggregate metrics.

The Outbound Queue tab includes these components:

1. Records processed: Count of outbound records processed within the selected time range. Select from last minute, last hour, or last day using the dropdown.
2. Records in queue: Current count of unprocessed records in the outbound queue.
3. Avg. processing times over 24h: Average time (in milliseconds) to process outbound records over the last 24 hours.
4. Latest time in queue: Time elapsed since the most recent record was added to the outbound queue.
5. Last processed time: Time elapsed since the last record in the outbound queue was processed.
6. Processing Times Over Last 24h: A line graph showing the processing time (Subflow Runtimes) for outbound records over the last 24 hours.

Remote Process Sync actions

Learn how to use actions in outbound and inbound flows for your Integration Hub Remote Process Sync integration.

Remote Process Sync provides you with a collection of Workflow Studio actions that you can use to customize the default outbound and inbound flow templates. These actions let you:

- Create correlations between records on local and remote instances
- Manage attachments between local and remote instances
- Send captured payloads to a remote instance
- Transform inbound payloads to complex objects

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Remote Process Sync action dependencies

Certain Remote Process Sync actions are dependent upon other actions, and thus are generally intended for you to use together. The following use cases describe situations in which you might consider using dependent Remote Process Sync actions in your outbound and inbound flows.

Correlate a record with a captured payload: Use these actions in the following order to automatically correlate a record with a captured payload to be sent to a remote system:

1. Look Up Correlation By Local Correlation ID - Use this action to determine if a correlated record exists between your staged local record and a record on the remote system.
2. Send Captured Payload to Remote System - Use the `Correlation Detail` output data pill from the **Look Up Correlation By Local Correlation ID** record as the value for the Correlation Detail input in this action. This enables you to correlate the local record containing the outbound payload to a record on the remote system.

Note: The *`Remote Process Sync Outbound Flow Template - Basic`* provides you with these two actions so that you don't need to set up this correlation yourself.

Identify and request missing attachments from a remote system: Use these actions in the following order to automatically look up and request attachments from a remote system that don't exist in your local system:

1. Identify New Attachments - Use this action to look up any attachments that exist on the remote system but don't exist on your local system for correlated records.
2. Request Attachments from Remote System - Use this action to request the transfer of identified attachments from the remote system to your local system.

Create Correlation action

Create a correlation between a record on the local instance and a record on a remote instance. A correlation identifies a remote system and a local record to synchronize. Each instance maintains a copy of the correlation, which contains a set of shared correlation identifiers. Remote Process Sync actions and flows use the correlation identifiers to synchronize records.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag and drop pills from the Data panel or select them from the pill picker.

Remote Correlation ID

Data type: *`String`*

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Globally unique ID of a correlation on a remote instance you are synchronizing processes with. This ID uniquely identifies the correlation for outbound transactions.

Local Correlation ID

Data type: *String*

Globally unique ID of a correlation on the local instance you are synchronizing processes with. This ID uniquely identifies the correlation for inbound transactions.

Remote System

Data type: *Record*

Reference to the Process Sync Remote System record for the remote instance you are synchronizing processes with. This record identifies the instance that receives outbound synchronization changes or that sent inbound synchronization changes.

Local Record

Data type: *Record*

Reference to a record on the local instance you are synchronizing with another instance. The data pill contains all the field values for the specified record. For example, a case record on the local instance.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Correlation Detail

Data type: *Object*

Object containing correlation information about a record. The object identifies the local and remote correlation IDs associated with a local record.

Status

Data type: *String*

Status code returned by the action.

Error

Data type: *String*

Error returned by the action.

Get Attachment Metadata for Local Record action

Get the list of attachments associated with a specified local record. Use the output of this action to synchronize the attachments of a local record with the attachments of a remote record.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

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Retry policy

The Get Attachment Metadata for Local Record action uses the RPS Push Attachment Policy to retry failed requests at regular intervals. To view or edit this policy, navigate to the Retry Policies [sys_retry_policy] table at **All** > **IntegrationHub** > **Connections & Credentials** > **Retry Policies**.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Local Record

Data type: *Record*

Reference to a record on the local instance you are synchronizing with another instance. The data pill contains all the field values for the specified record. For example, a case record on the local instance.

Strategy

Data type: *Choice*

Level of attachment detail to gather. The available options are All or Deltas. Use the All option to gather all synchronized attachments. Use the Deltas option to gather only attachments that have changed since the last synchronization.

Remote System

Data type: *Record*

Reference to the Process Sync Remote System record for the remote instance you are synchronizing processes with. This record identifies the instance that receives outbound synchronization changes or that sent inbound synchronization changes.

Correlation Detail

Data type: *Object*

Object containing correlation information about a synchronized record. The object identifies the local and remote correlation IDs associated with a local record.

Attachments

Data type: *Array of Objects*

Array containing a list of attachment objects to evaluate.

Max Attachment Size (MB)

Data type: *Integer*

Integer specifying the maximum uncompressed attachment size that can be included in the list of attachments, in megabytes.

You can use this field to limit attachment sizes and avoid errors that may result from syncing very large attachments.

Leave this field blank to use the platform limit for attachment sizes.

Allowed Extensions

Data type: *List*

List containing the attachment extensions that can be included in the list of attachments. Leave this field blank to use the platform restrictions.

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Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Attachments: Data type: *Array of Objects*

Array containing information about the attachments to synchronize.

Identify New Attachments action

Identify the attachments already associated with a local record to determine which remote attachments require synchronization. Use the output of this action to request missing attachments from the remote system.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Retry policy

The Identify New Attachments action uses the RPS Push Attachment Policy to retry failed requests at regular intervals. To view or edit this policy, navigate to the Retry Policies [sys_retry_policy] table at **All** > **IntegrationHub** > **Connections & Credentials** > **Retry Policies**.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag and drop pills from the Data panel or select them from the pill picker.

Attachments

Data type: *Array of Objects*

Array containing a list of attachment objects to evaluate.

Local Record

Data type: *Record*

Reference to a record on the local instance you are synchronizing with another instance. The data pill contains all the field values for the specified record. For example, a case record on the local instance.

Max Attachment Size (MB)

Data type: *Integer*

Integer specifying the maximum uncompressed attachment size that can be included in the list of attachments, in megabytes.

You can use this field to limit attachment sizes and avoid errors that may result from syncing very large attachments.

Leave this field blank to use the platform limit for attachment sizes.

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Allowed Extensions

Data type: *List*

List containing the attachment extensions that can be included in the list of attachments. Leave this field blank to use the platform restrictions.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Attachments

Data type: *Array of Objects*

Array containing information about the attachments to synchronize.

Count

Data type: *Integer*

Number of attachments identified.

Look Up Correlation by Local Correlation ID action

Look up an active correlation by a specified local correlation ID. The local correlation ID identifies the correlation on the local instance. Remote Process Sync actions and flows use the returned correlation to synchronize a local record with a record on a remote system.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Remote System

Data type: *Record*

Reference to the Process Sync Remote System record for the remote instance you are synchronizing processes with. This record identifies the instance that receives outbound synchronization changes or that sent inbound synchronization changes.

Local Correlation ID

Data type: *String*

Globally unique ID of a correlation on the local instance you are synchronizing processes with. This ID uniquely identifies the correlation for inbound transactions.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

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Correlation Detail

Data type: *Object*

Object containing correlation information about a record. The object identifies the local and remote correlation IDs associated with a local record.

Status

Data type: *String*

Status code returned by the action.

Look Up Correlation by Local Record action

Look up an active correlation by a specified local record sys_id. The local record is the record the correlation synchronizes on the local instance. Remote Process Sync actions and flows use the returned correlation to synchronize a local record with a record on a remote system.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Remote System

Data type: *Record*

Reference to the Process Sync Remote System record for the remote instance you are synchronizing processes with. This record identifies the instance that receives outbound synchronization changes or that sent inbound synchronization changes.

Local Record

Data type: *Record*

Reference to a record on the local instance you are synchronizing with another instance. The data pill contains all the field values for the specified record. For example, a case record on the local instance.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Correlation Detail

Data type: *Object*

Object containing correlation information about a record. The object identifies the local and remote correlation IDs associated with a local record.

Status

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Data type: *String*

Status code returned by the action.

Move Attachments action

Move attachments from a correlation record to the local record it synchronizes. This action looks up the correlation record by its sys_id.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Correlation ID: Data type: *String*

Globally unique ID of a correlation record on the local instance.

Outputs

This action has no outputs.

Request Attachments from Remote System action

Request the transfer of the identified attachments using the specified correlation. The system moves attachments associated with the record on the remote system to the local system.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Attachments

Data type: *Array of Objects*

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Array containing a list of attachment objects to evaluate.

Remote System

Data type: *Record*

Reference to the Process Sync Remote System record for the remote instance you are synchronizing processes with. This record identifies the instance that receives outbound synchronization changes or that sent inbound synchronization changes.

Correlation Detail

Data type: *Object*

Object containing correlation information about a synchronized record. The object identifies the local and remote correlation IDs associated with a local record.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Status: Data type: *String*

Status code returned by the action.

Send Captured Payload to Remote System

Generate a captured payload, and send it to a remote system. This action should follow a Look Up Correlation action. Remote Process Sync flows use the returned correlation to check if a new correlation should be created.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Remote System

Data type: *Record*

Reference to the Process Sync Remote System record for the remote instance you are synchronizing processes with. This record identifies the instance that receives outbound synchronization changes or that sent inbound synchronization changes.

CRUD Operation

Data type: *Choice*

Database operation that triggered the process event. The available options are Create, Update, or Delete.

Process Event

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Data type: *String*

Name of the process event to run. The name is the same on each instance that participates in process synchronization. For example, case-to-incident.

Payload

Data type: *Object*

Object containing changes generated by a capture definition. For example, a list of field changes for a case record on the local instance. The system transforms this object to a JSON string to send it to a remote instance.

Correlation Detail

Data type: *Object*

Object containing correlation information about a synchronized record. The object identifies the local and remote correlation IDs associated with a local record.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Status

Data type: *String*

Status code returned by the action.

Error Message

Data type: *String*

Error returned by the action.

Local Correlation ID

Data type: *String*

Globally unique ID of a correlation on the local instance you are synchronizing processes with. This ID uniquely identifies the correlation for inbound transactions.

Remote Correlation ID

Data type: *String*

Globally unique ID of a correlation on a remote instance you are synchronizing processes with. This ID uniquely identifies the correlation for outbound transactions.

Transform Payload from Inbound Sample action

Transform a Remote Process Sync payload from a JSON string to a complex object. Generate the object structure from a sample of the inbound payload.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

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This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Payload

Data type: *String*

JSON string containing changes generated on a remote instance. For example, a list of field changes for a case record from a remote instance. The system transforms this JSON string to an object on the local instance.

Sample Payload

Data type: *String*

Portion of a JSON payload you want to use to generate an object structure. Select the elements of the JSON structure you want to map to elements of an object structure.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Capture Metadata

Data type: *Object*

Object containing information about the capture definition that created the payload.

Changed Fields

Data type: *Dynamic Object*

Object containing information about the field value changes. The system uses these changes to synchronize correlation and local records.

Attachment Metadata

Data type: *Array of Object*

Array containing information about the attachments to synchronize.

Error Message

Data type: *String*

Error returned by the action.

Update Correlation State action

Enable or disable synchronization of records by the specified correlation. Set an active correlation to inactive to disable synchronization of records. Set an inactive correlation to active to resume synchronization of records.

Roles and availability

Available as a ServiceNow Core Remote Process Sync action.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

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Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Correlation Detail

Data type: *Object*

Object containing correlation information about a synchronized record. The object identifies the local and remote correlation IDs associated with a local record.

State

Data type: *Choice*

Synchronization state of records. The available options are Active or Inactive. Active records are being synchronized. Inactive records are not synchronized.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Correlation Detail

Data type: *Object*

Object containing correlation information about a record. The object identifies the local and remote correlation IDs associated with a local record.

Status

Data type: *Choice*

Synchronization state of records. The available options are Active or Inactive. Active records are being synchronized. Inactive records are not synchronized.

Error

Data type: *String*

Error returned by the action.

Remote Process Sync sample subflows

Copy and configure the sample subflows to synchronize processes between multiple instances. Use an inbound subflow to parse incoming record data. Use an outbound subflow to send record data to a remote instance.

Remote Process Sync provides you with sample inbound and outbound subflows for you to use as templates. These subflows let you:

- Receive record data from a remote instance and process it as incidents
- Send incident record data to a remote instance for processing

Remote Process Sync Inbound Flow Template - Basic

A sample Remote Process Sync subflow to process incoming payloads received from a remote instance. This subflow creates a correlation between a remote record and a local incident record. Copy this subflow and edit the actions that refer to the Incident table.

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Roles and availability

Available as a Global Remote Process Sync subflow.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Wait for Completion

Data type: *True/False*

Option to require the parent flow to wait for the subflow to complete. If enabled, the parent flow cannot proceed to the next action until the subflow completes.

Remote System

Data type: *Record*

Reference to the Process Sync Remote System record for the remote instance you are synchronizing processes with. This record identifies the instance that receives outbound synchronization changes or that sent inbound synchronization changes.

Remote Correlation ID

Data type: *String*

Globally unique ID of a correlation on a remote instance you are synchronizing processes with. This ID uniquely identifies the correlation for outbound transactions.

Local Correlation ID

Data type: *String*

Globally unique ID of a correlation on the local instance you are synchronizing processes with. This ID uniquely identifies the correlation for inbound transactions.

Process Event

Data type: *String*

Name of the process event to run. The name is the same on each instance that participates in process synchronization. For example, case-to-incident.

Payload

Data type: *String*

JSON string containing changes generated on a remote instance. For example, a list of field changes for a case record from a remote instance. The system transforms this JSON string to an object on the local instance.

CRUD Operation

Data type: *Choice*

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Database operation that triggered the process event. The available options are Create, Update, or Delete.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Error Message

Data type: *String*

Error returned by the action.

Status

Data type: *Choice*

Synchronization state of records. The available options are Active or Inactive. Active records are being synchronized. Inactive records are not synchronized.

Remote Process Sync Outbound Flow Template - Basic

A sample Remote Process Sync subflow to send outgoing payloads to a remote instance. This subflow creates a correlation between a remote record and a local incident record. Copy this subflow and edit the input for the local record to the table of your choice.

Roles and availability

Available as a Global Remote Process Sync subflow.

Subscription requirements

This action requires an Integration Hub subscription. For more information, see Request Integration Hub and Legal schedules - IntegrationHub overview.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action needs. To add dynamic values, you can also drag pills from the Data panel or select them from the pill picker.

Wait for Completion

Data type: *True/False*

Option to require the parent flow to wait for the subflow to complete. If enabled, the parent flow cannot proceed to the next action until the subflow completes.

Local Record

Data type: *Record*

Reference to a record on the local instance you are synchronizing with another instance. The data pill contains all the field values for the specified record. For example, a case record on the local instance.

Remote System

Data type: *Record*

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Reference to the Process Sync Remote System record for the remote instance you are synchronizing processes with. This record identifies the instance that receives outbound synchronization changes or that sent inbound synchronization changes.

CRUD Operation

Data type: *Choice*

Database operation that triggered the process event. The available options are Create, Update, or Delete.

Trigger/Capture Definition

Data type: *Record*

Reference to the Capture Definition record that the system uses to create an outbound payload. The data pill contains all the field values for the specified record. For example, a capture definition for case records.

Process Event

Data type: *String*

Name of the process event to run. The name is the same on each instance that participates in process synchronization. For example, case-to-incident.

Payload

Data type: *Object*

Object containing changes generated by a capture definition. For example, a list of field changes for a case record on the local instance. The system transforms this object to a JSON string to send it to a remote instance.

Outputs

These outputs appear in the Data panel. You can use them as inputs elsewhere in your flow.

Status

Data type: *Choice*

Synchronization state of records. The available options are Active or Inactive. Active records are being synchronized. Inactive records are not synchronized.

Error Message

Data type: *String*

Error returned by the action.

Correlation

Establish a synchronization relationship between records that reside on separate instances.

A correlation identifies record data from a remote instance you want to use on a local instance. An integration can use data from a correlated remote record to update a local record. Typically, integrations correlate records to synchronize them and ensure that record changes propagate across instances.

There are two types of correlation available.

- Classic correlation field
- Integration Hub Correlation records

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Classic correlation field

Prior to Integration Hub Remote Process Sync, you could only create correlations with a limited set of record types that had a Correlation ID field. By default, the Correlation ID field is only available to Configuration Item, Service, and Task records. The Correlation ID field stores the globally unique ID of a matching remote record. The Correlation ID identifies the remote record whose data values should be used to update the local record. For example, suppose incident record INC100001 correlates to problem record PRB123456 on a remote instance. Whenever changes are made to fields in remote problem PRB123456, the system uses the Correlation ID to identify that local incident INC100001 receives the same field updates.

A classic correlation creates a one-to-one relationship between a record on the local system and a record on a remote system. One local record can only ever correlate to one remote record. The correlation provides no information about the remote system nor the current state of the correlation. Administrators manually manage classic correlations from the records being updated.

Sample classic correlation field

Local Instance

Number	Short Description	State	Correlation ID
INC100001	Cannot connect to network	Work In Progress	sys_id of PRB123456

Remote Instance

Number	Short Description	State	Correlation ID
PRB123456	Cannot connect to network	Complete	sys_id of INC100001

Integration Hub Correlation records

Integration Hub Remote Process Sync extends the functionality of classic correlation with the introduction of dedicated Correlation [ih_sync_correlation] records.

A Correlation record contains these fields.

Local Correlation ID

The globally unique ID that identifies the correlation on the local system. By default, Integration Hub Remote Process Sync generates a unique sys_id value for this field. The distinct sys_id acts as an alias which prevents the correlation from breaking due to changes in the local record. When Integration Hub Remote Process Sync sends this ID value to a remote system, the receiving instance uses it as the Remote Correlation ID.

Remote Correlation ID

The globally unique ID that identifies the correlation on the remote system. By default, Integration Hub Remote Process Sync generates a unique sys_id value for this field. The distinct sys_id acts as an alias which prevents the correlation from breaking due to changes in the remote record. When Integration Hub Remote Process Sync sends this ID value to a remote system, the receiving instance uses it as the Local Correlation ID.

Local Table

The table where the correlation creates or updates records. An Integration Hub Remote Process Sync capture definition monitors this table for record changes.

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Integration Hub Remote Process Sync uses this field to find correlations by table name.

Local Record

The record created or updated by a correlation. This field stores the same value as the Correlation ID field from a classic correlation. When other business logic makes changes to this record, the changes do not overwrite the correlation.

Remote System

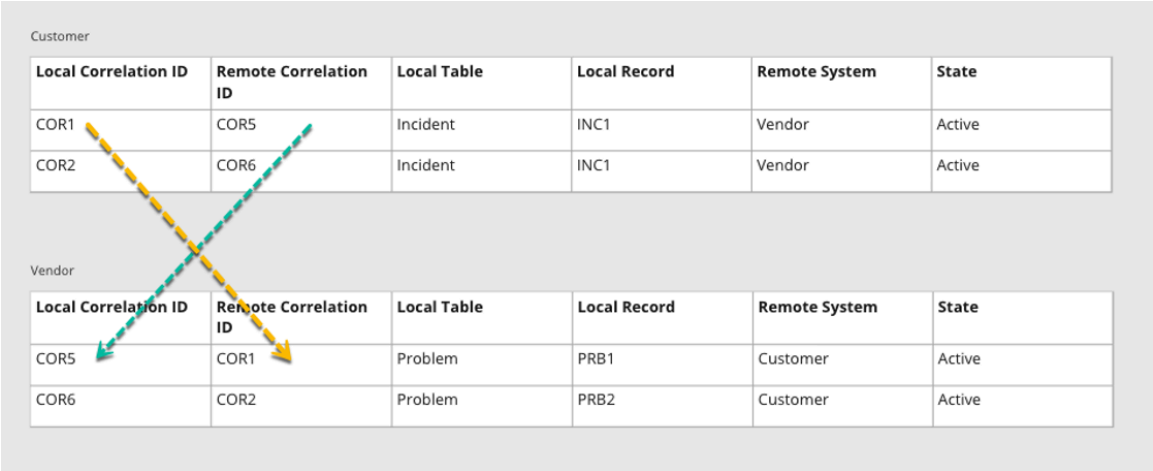
The remote instance where Integration Hub Remote Process Sync sends and receives record changes. Each correlation record can only refer to one remote instance. To correlate the same local record to multiple remote systems simultaneously, you can create multiple correlation records.

State

The synchronization state of the correlation. Active correlations receive additions and updates. Inactive correlations do not produce additions or updates, but can be queried for auditing purposes and reactivated as needed.

Danger: Integration Hub Remote Process Sync manages correlation records for you. Directly editing correlation records may prevent synchronization of records, and may result in data loss.

Sample Integration Hub Correlation record



Correlation records offer several advantages over a single correlation field.

- Allow management of correlations by Remote Process Sync
- Identify the remote system associated with a correlation
- Provide separate Correlation ID values for the local and remote systems
- Allow correlation of a single local record with multiple remote systems
- Allow correlations to be deactivated and reactivated as needed
- Allow Correlation ID values to be distinct from the sys_id of a remote record

Remote Process Sync system properties

Refer to the list of system properties for Remote Process Sync to learn how to manage your process-oriented, multi-instance integration.

To set Remote Process Sync system properties, navigate to **IntegrationHub** > **Remote Process Sync** > **Properties** or set them on the System Properties [sys_properties] table.

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System Property	Description
glide.hub.process.sync.jobs.outbound.context_reporting	If set to `true`, outbound scheduled jobs: • Use the standard *FlowAPI* instead of the quick API (default) • Write flow contexts to the outbound queue • Write outbound records to the Outbound Queue States [ih_sync_outbound_record] table • Default value: `false` • Minimum value: Not applicable • Maximum value: Not applicable
glide.hub.process.sync.jobs.inbound.context_reporting	If set to `true`, inbound scheduled jobs: • Use the standard *FlowAPI* instead of the quick API (default) • Write flow contexts to the inbound queue • Write inbound records to the Inbound Records [ih_sync_inbound_record] table • Default value: `false` • Minimum value: Not applicable • Maximum value: Not applicable
glide.hub.process.sync.jobs.outbound.process_maxtime	Maximum time, in seconds, that an outbound scheduled job runs before timing out. • Default value: 300 • Minimum value: 60 • Maximum value: 1800

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System Property	Description
glide.hub.process.sync.jobs.inbound.process_maxtime	Maximum time, in seconds, that an inbound scheduled job runs before timing out. • Default value: 300 • Minimum value: 60 • Maximum value: 1800
glide.hub.process.sync.jobs.outbound.subflow.execution_timeout	Time, in milliseconds, that an outbound subflow runs before timing out. • Default value: 30000 • Minimum value: None • Maximum value: None
glide.hub.process.sync.jobs.inbound.subflow.execution_timeout	Time, in milliseconds, that an inbound subflow runs before timing out. • Default value: 30000 • Minimum value: None • Maximum value: None
glide.hub.process.sync.retry.times	Number of times to retry processing of an outbound queue before setting the queue's state to Error. • Default value: 3 • Minimum value: 0 • Maximum value: 10
glide.hub.process.sync.retry.interval.seconds	Time interval, in seconds, between each retry attempt to process an outbound or inbound queue. • Default value: 60 • Minimum value: 0 • Maximum value: 300
glide.hub.process.sync.debug	If set to `true`, log entries will be created in **System Logs** > **System Log** > **All** for Remote Process Sync tables.

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System Property	Description
	• Default value: `false` • Minimum value: Not applicable • Maximum value: Not applicable
glide.hub.process.sync.record.successful.status	If set to `true`, the Status field for outbound queues will be updated to Success when there are no errors processing the record in the queue. • Default value: `true` • Minimum value: Not applicable • Maximum value: Not applicable
glide.hub.process_sync.inbound_queue.error.ttl.seconds	Number of seconds that records in the error state can exist in the inbound queue before they expire. The system purges expired records from the queue once a day. **Important:** Records in the error state have not been processed. Review and fix the process definition and its related records. To reprocess records in the inbound queue, set the state to Ready. To ignore these records, set the state to skipped. • Default value: 2592000 (30 days) • Minimum value: 0 • Maximum value: 5184000 (60 days)
glide.hub.process_sync.inbound_queue.processed.ttl.seconds	Number of seconds that records in the processed state can exist in the inbound queue before they expire. The system purges expired

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System Property	Description
	records from the queue once a day. • Default value: 604800 (7 days) • Minimum value: 0 • Maximum value: 5184000 (60 days)
glide.hub.process_sync.inbound_queue.ready.ttl.seconds	Number of seconds that records in the ready state can exist in the inbound queue before they expire. The system purges expired records from the queue once a day. **Important:** Records in the ready state have not been processed. Review the system batch size settings to ensure that it can process all incoming records before they expire. • Default value: 2592000 (30 days) • Minimum value: 0 • Maximum value: 5184000 (60 days)
glide.hub.process_sync.inbound_queue.skipped.ttl.seconds	Number of seconds that records in the skipped state can exist in the inbound queue before they expire. The system purges expired records from the queue once a day.

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System Property	Description
	Important: Records in the skipped state will not be processed. Review and fix the process definition and its related records. To reprocess records in the inbound queue, set the state to Ready. To ignore these records, leave the state as skipped. • Default value: 604800 (7 days) • Minimum value: 0 • Maximum value: 5184000 (60 days)
glide.hub.process_sync.inbound_queue.table_cleaner_batch_size	Number of inbound queue records to process per batch when purging expired records. • Default value: 10000 • Minimum value: 1000 • Maximum value: 500000
glide.hub.process_sync.outbound_queue.error.ttl.seconds	Number of seconds that records in the error state can exist in the outbound queue before they expire. The system purges expired records from the queue once a day. **Important:** Records in the error state have not been processed. Review and fix the process definition and its related records. To reprocess records in the outbound queue, set the state to Ready. To ignore these records, set the state to skipped.

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System Property	Description
	• Default value: 2592000 (30 days) • Minimum value: 0 • Maximum value: 5184000 (60 days)
glide.hub.process_sync.outbound_queue.processed.ttl.seconds	Number of seconds that records in the processed state can exist in the outbound queue before they expire. The system purges expired records from the queue once a day. • Default value: 604800 (7 days) • Minimum value: 0 • Maximum value: 5184000 (60 days)
glide.hub.process_sync.outbound_queue.ready.ttl.seconds	Number of seconds that records in the ready state can exist in the outbound queue before they expire. The system purges expired records from the queue once a day. **Important:** Records in the ready state have not been processed. Review the system batch size settings to ensure that it can process all outgoing records before they expire. • Default value: 2592000 (30 days) • Minimum value: 0 • Maximum value: 5184000 (60 days)
glide.hub.process_sync.outbound_queue.skipped.ttl.seconds	Number of seconds that records in the skipped state can exist in the outbound queue before they expire. The system purges expired

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System Property	Description
	records from the queue once a day. **Important:** Records in the skipped state will not be processed. Review and fix the process definition and its related records. To reprocess records in the outbound queue, set the state to Ready. To ignore these records, leave the state as skipped. • Default value: 604800 (7 days) • Minimum value: 0 • Maximum value: 5184000 (60 days)
glide.hub.process_sync.outbound_queue.table_cleaner_batch_size	Number of outbound queue records to process per batch when purging expired records. • Default value: 10000 • Minimum value: 1000 • Maximum value: 500000

Robotic Process Automation (RPA) Hub

Use the ServiceNow® Robotic Process Automation (RPA) Hub to enable end-to-end automation for your organization. With a combination of UI interactions and element-based automations that interact between the various business applications, you can emulate user actions and eliminate mundane and repetitive human activities.

Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

What you can do with AI

Use ServiceNow Otto for RPA Hub to accelerate automation development with AI. Instead of writing code or configuring workflows manually, you can describe what you need in natural language and Now Assist generates automations, activities, and logic rules. You can preview generated code before deploying, ensuring it meets your requirements. For more information, see ServiceNow Otto for RPA Hub.

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The following generative AI capabilities are available:

- Build simple, brand-new automations quickly and efficiently.
- Easily add new activities to existing automations, ensuring modularity and scalability.
- Enhance the automation logic with text instructions, either in an empty activity or by selecting a component in an existing one.

Helpful resources

- Troubleshooting issues for the Robotic Process Automation (RPA) Hub application
- Ask or answer questions in the community forum
- Developer documentation
- Contact Customer Service and Support
- Robotic Process Automation (RPA) Hub glossary
- RPA General Guidelines

AI in RPA Hub

Use ServiceNow Otto for RPA Hub to accelerate automation development with AI. Instead of writing code or configuring workflows manually, you can describe what you need in natural language and AI generates automations, activities, and logic rules. You can preview generated code before deploying, ensuring it meets your requirements.

ServiceNow Otto for RPA Hub overview

The ServiceNow Otto for RPA Hub application offers generative AI capabilities to accelerate your automation development process. The following generative AI capabilities are available in the RPA Desktop Design Studio application:

- Build simple, brand-new automations quickly and efficiently.
- Easily add new activities to existing automations, ensuring modularity and scalability.
- Enhance the automation logic with text instructions, either in an empty activity or by selecting a component in an existing one.

Both new and experienced users can develop and build faster automation by using the ServiceNow Otto for RPA Hub application.

Generative AI skills

The RPA bot generation skill helps users to build an automation that is based on text input. Access the RPA bot generation skill from the RPA Desktop Design Studio user interface.

For more information, see Robotic Process Automation (RPA) bot generation skill.

How to use the RPA bot generation skill

By using the RPA bot generation skill, your users can perform the following tasks:

Create an automation with AI

Create an automation from text instructions and preview the options from the RPA Desktop Design Studio user interface. First, your user selects the **Create automation** option and then selects the **Build with AI** option to get started. For more information, see Create an automation with AI.

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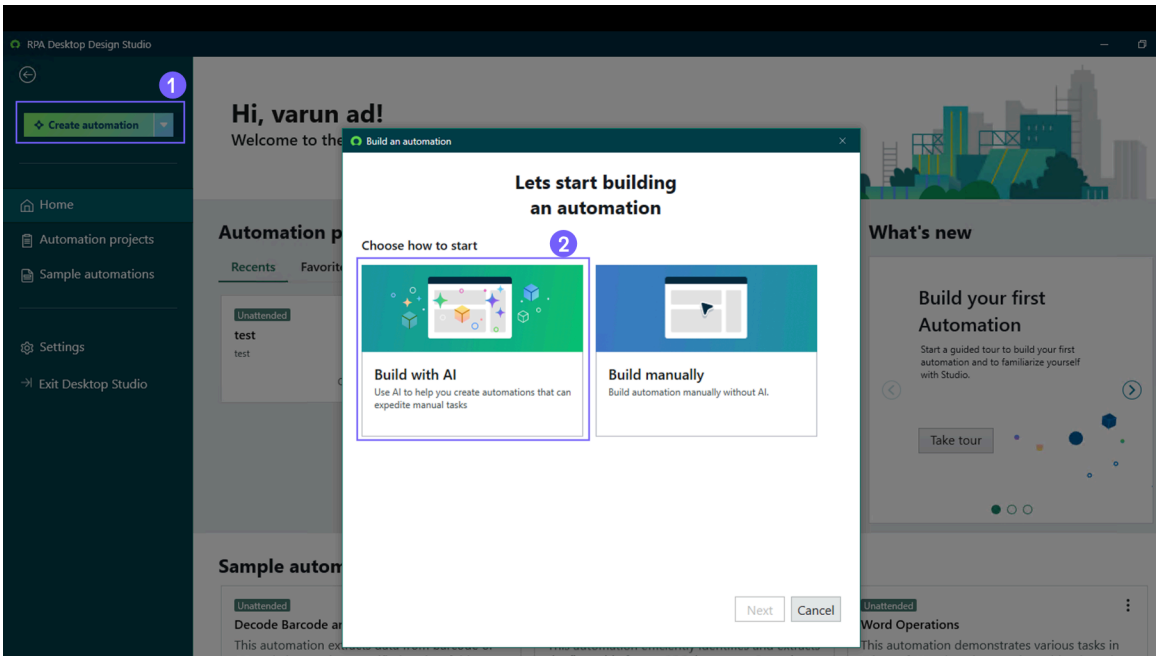
The following example shows how an automation is created with AI in the RPA Desktop Design Studio user interface.

Create an automation with AI from the RPA Desktop Design Studio user interface

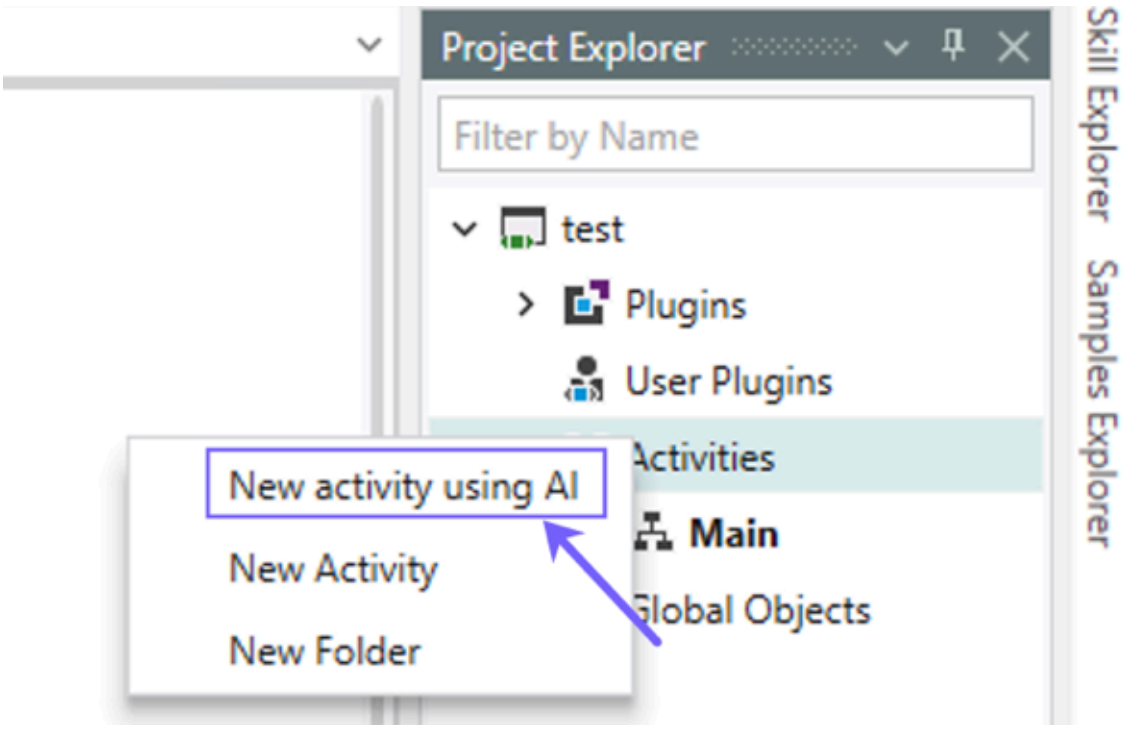


Create an activity with AI

Create an activity from the text instructions and preview options. For more information, see Create an activity with AI.

The following example shows how an activity is created with AI in the RPA Desktop Design Studio user interface.

Create an activity with AI from RPA Desktop Design Studio user interface



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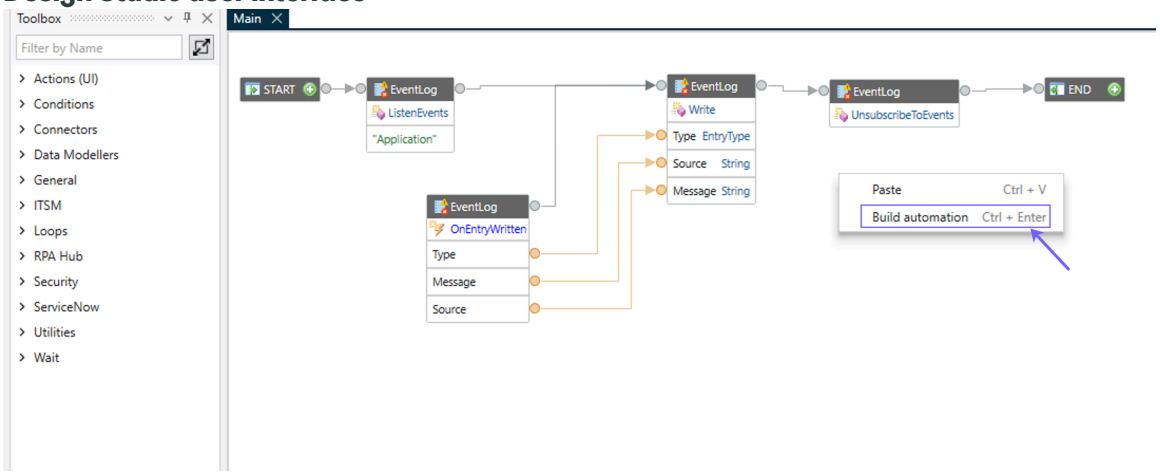
Extend automation logic with AI

Enhance an automation logic by using text instructions with the **Build automation** option, either from an empty activity or by selecting a component in an existing activity. For more information, see Build an automation with AI.

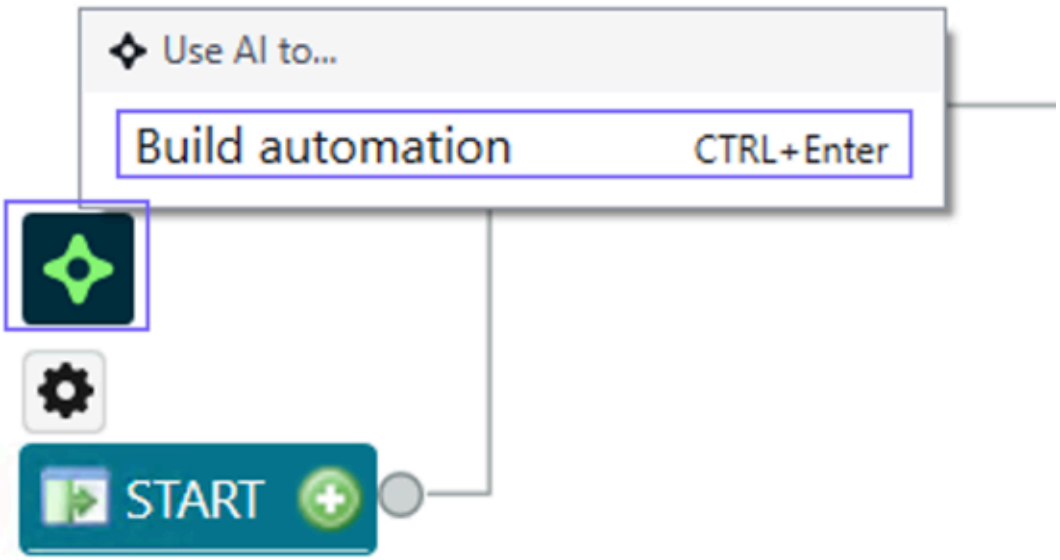
The following example shows an automation logic that is built with AI from an empty activity on the design surface in the RPA Desktop Design Studio user interface.

Build an automation logic from an empty activity in the RPA Desktop Design Studio user interface



The following example shows an automation logic that is built with AI by selecting a component in the RPA Desktop Design Studio user interface.

Build an automation logic by selecting a component in the RPA Desktop Design Studio user interface



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Licensing requirements

The ServiceNow Otto for RPA Hub application requires a Workflow Data Fabric (previously known as Automation Engine) license and a ServiceNow Otto for Creator license.

Application information

Activate the ServiceNow Otto for RPA Hub store app (com.sn_rpa_na) to use the RPA bot generation skill.

This store app has the following dependencies:

- RPA Hub (com.sn_rpa_fdn)
- ServiceNow Otto for Creator (com.sn_now_creator)

Important:

- Not all model providers are available for customers with in-country SKUs, and some AI products/features are currently unavailable for in-country customers. For more information, see the KB1584492 article in the Now Support Knowledge Base. Be sure to check for model provider availability updates in future releases.
- Some AI products/features are currently unavailable for customers in the FedRAMP, NSC DOD IL5, or Australia IRAP-Protected data centers, self-hosted customers, or in other restricted environments. For more information, see the KB0743854 article in the Now Support Knowledge Base. Be sure to check for availability updates in future releases.
- Some AI products/features are currently available only for customers in some regions. Be sure to check for availability updates in future releases.
- Some AI products and skills are not available in Regulated Markets. For more information, see KB2593939: Regulated Markets AI Products/Skills Not Available. Be sure to check for availability updates in future releases.

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Furthermore, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. Customers can opt out of future data collection at any time, as described in the AI Opt-Out page.

Note: We have controls in place to enable/disable the data collection and data processing.

Related topics

Robotic Process Automation (RPA) bot generation skill

Install ServiceNow Otto for RPA Hub

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Create an automation with AI

Build an automation with AI

Create an activity with AI

Limitations of ServiceNow Otto for RPA Hub

Example instructions for ServiceNow Otto for RPA Hub

Robotic Process Automation (RPA) bot generation skill

Use the RPA bot generation skill to create automations, activities, and automation logic additions from text instructions and preview options from the RPA Desktop Design Studio user interface.

The skill enables citizen developers to participate in the automation development process. Citizen developers can contribute their domain expertise and knowledge of business processes to create automation flows. A citizen developer can quickly and easily create automation flows by describing the task or process in natural language via text. No in-depth technical knowledge of Robotic Process Automation (RPA tools) or programming languages is needed, which makes automation accessible to a wider audience.

The RPA bot generation skill streamlines the process of creating workflows, reducing the time and effort required to implement RPA solutions. An automation flow can be generated in minutes rather than hours or days, accelerating the time-to-value.

By generating automation flows through text-based descriptions, RPA becomes more approachable for individuals and businesses who may not have prior experience with automation or coding.

Access the RPA bot generation skill from the RPA Desktop Design Studio user interface.

Enable RPA bot generation to gain the following benefits:

- Build simple, brand-new automations quickly and efficiently.
- Easily add new activities to existing automations, ensuring modularity and scalability.
- Use in-line prompting to refine automation logic, whether starting from components or a empty design surface.

Roles

RPA developer (sn_rpa_fdn.rpa_developer) or RPA admin (sn_rpa_fdn.rpa_admin) roles are required to use this skill. These roles contain the AI Admin Hub user role (sn_nowassist_admin.user).

Activation

Install the ServiceNow Otto for RPA Hub application from the ServiceNow Store website. For more information, see Install ServiceNow Otto for RPA Hub.

Then, turn on the RPA bot generation skill to use generative AI for creating automations and activities, and extending automation logic. For more information, see Turn on the RPA bot generation skill.

You must have a subscription for ServiceNow Otto for Creator and RPA Hub applications.

Limitations of the RPA bot generation skill

For more information about the limitations of the Robotic Process Automation (RPA) bot generation skill, see Limitations of ServiceNow Otto for RPA Hub.

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Accessing the generative AI capability in RPA Desktop Design Studio

If you log in to the RPA Desktop Design Studio with either RPA Developer or RPA Admin after enabling the RPA bot generation skill, the generative AI capability is available. In this scenario, you can create and edit automations, activities, and extend automation logic flow through text instructions and preview options.

If you log in to the RPA Desktop Design Studio with a role other than RPA Developer or RPA Admin after enabling the RPA bot generation skill, the generative AI capability will not be available. In this scenario, you will not be able to create and edit automations, activities, or extend automation logic flow through text instructions and preview options.

If you log in to the RPA Desktop Design Studio with a role other than RPA Developer or RPA Admin and then switch to one of these roles, you won't be able to access the generative AI capability. Restart the RPA Desktop Design Studio and log in with RPA Admin or Developer.

If you log in to the RPA Desktop Design Studio with either RPA Developer or RPA Admin, and then switch to any other user roles apart from these, you will encounter an error message when attempting to access the generative AI capability.

Related topics

- Turn on the RPA bot generation skill
- Create an automation with AI
- Create an activity with AI
- Build an automation with AI
- Example instructions for ServiceNow Otto for RPA Hub
- Limitations of ServiceNow Otto for RPA Hub

RPA Hub

ServiceNow® Robotic Process Automation Hub (RPA Hub) is a powerful platform for orchestrating and managing your robotic workforce to execute various business processes efficiently.

Get started

Explore	Configure	Use
		
Learn about RPA Hub concepts and features.	Install and set up RPA Hub.	Configure bot processes, robots, packages, queues, alert rules, and parameters.

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Monitor	Reference	
		
Execute bot processes and view logs and details.	Get details about RPA Hub components like fields, tables, and properties.	

Helpful resources

- Troubleshooting issues for the Robotic Process Automation (RPA) Hub application
- Ask or answer questions in the community forum
- Developer documentation
- Contact Customer Service and Support
- Robotic Process Automation (RPA) Hub glossary
- RPA General Guidelines

Exploring RPA Hub

Learn about the RPA Hub features that enable you to govern, manage, and supervise your digital workforce.

RPA Hub overview

Use RPA Hub to streamline automation processes, improve efficiency, monitor, and optimize your automation initiatives effectively.

By using multi-tenancy, you can create logical partitions to effectively manage your robots (unattended and attended) for different customers (internal or external) from a single instance. Each logical instance has its own access control list (ACL), robots, licenses, and execution logs.

RPA Hub users

Users

User	Description
Release manager	Creates bot processes and robots in RPA Hub. Add developers to the Managed by group of the bot process so that they can customize the bot process. Configures and publishes the bot process.
Developer	Configures bot processes to assign business applications, robots, credentials, process parameters, schedules, and so on. Creates and deploys automations in a low-code environment. Manages data, schedules, work items, and other configuration parameters.

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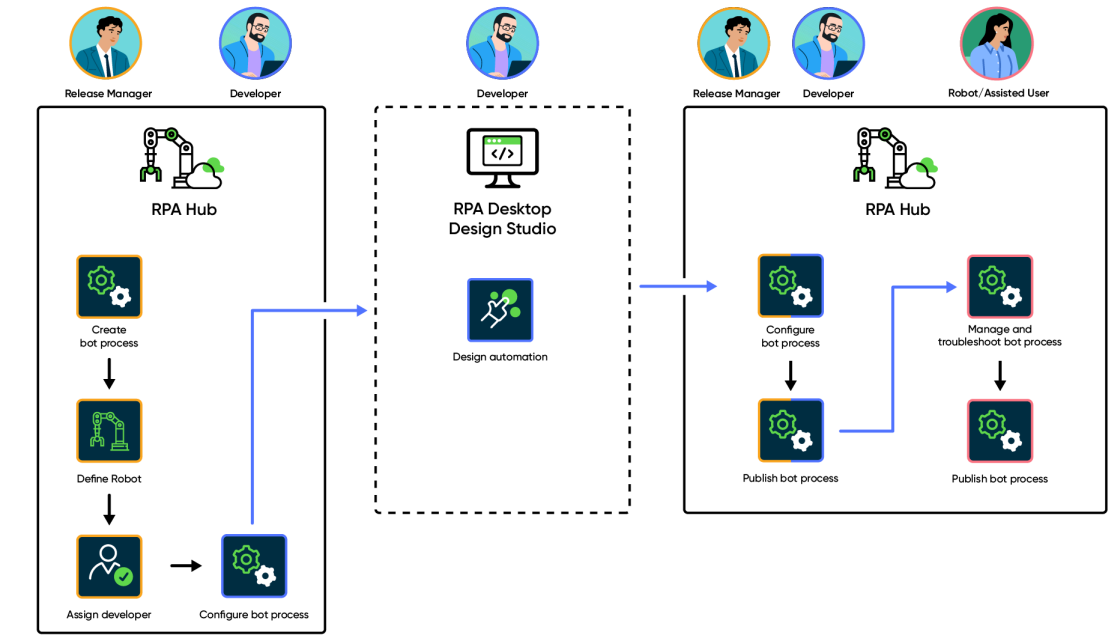
Users (continued)

User	Description
Support user	Identifies, diagnoses, and resolves the issues that are related to bot processes. Performs first-level troubleshooting. Publishes and manages a bot process.

RPA Hub workflow

The following illustration describes the basic tasks involved in creating an attended or unattended automation using RPA Hub. For detailed instructions, see Configuring RPA Hub.

Creating automations using RPA Hub



1. As a release manager, create a bot process and define robots. Add developers to the Managed by group of the bot process so that the developer can continue to configure the bot process.
2. As a developer, configure the bot process to associate a package, business applications, robots, parameters, and credentials so that robots can use them to run automations.
3. As a developer, build automation packages, tests the automation projects, and handles exceptions in RPA Desktop Design Studio.
4. As a developer, publish the configured bot process to execute, manage, and monitor automations.
5. As a support user, diagnose, troubleshoot, and resolve issues with bot process and then publish the bot process.

RPA Hub benefits

- Enables you to deploy, monitor, manage, and verify the compliance of all robots at an enterprise level from a centralized location.
- Manages the metadata that includes robots, packages, bot processes, queues, schedules, shared parameters, and alerts. For more information about these terms, see Robotic Process Automation (RPA) Hub glossary.

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- Triggers unattended robots with the execution details.
- Provides insights into the complete Robotic Process Automation (RPA) practice via a dashboard. From this dashboard, you can see the current execution status (jobs and queues) and event correlation between the various configuration items.

What to explore next

To learn more about configuring and managing RPA Hub, see:

- Configuring RPA Hub
- Using RPA Hub
- RPA Hub reference

Related topics

Internationalization support for RPA Hub

Restructuring RPA Hub tables

Migrating your data from a lower environment to a higher environment in RPA Hub

Obtaining client authentication and code signing certificates for RPA Hub

Applying the CSDM guidelines to RPA Hub

Domain separation and Robotic Process Automation (RPA) Hub

Migrating the bot process configuration in RPA Hub

Learn about RPA suite of applications

Learn about the Robotic Process Automation (RPA) Hub applications, types of automations, benefits, high-level architecture, and workflow.

Robotic Process Automation (RPA) Hub overview

The following Robotic Process Automation (RPA) applications operate and interact with each other in an enterprise environment to automate tasks efficiently.

RPA Hub

The ServiceNow® RPA Hub application provides a centralized orchestration to deploy, monitor, manage, measure, and verify compliance of all robots at an enterprise level.

Unattended Robot

The ServiceNow® Unattended Robot is a software agent that you install on a Windows machine. Unattended Robot can execute unattended automations without requiring any human intervention.

The ServiceNow® Unattended Robot Login Agent is a software agent that you install on a Windows machine with Unattended Robot. You can use this application to unlock or to perform a self-login to the robot machine when an unattended bot process is triggered.

Attended Robot

The ServiceNow® Attended Robot is a software agent that you install on a Windows machine. Attended Robot can execute attended automations that require human intervention.

RPA Desktop Design Studio

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The ServiceNow® RPA Desktop Design Studio is a Windows native application that is used by RPA developers to design or configure automation workflows.

Types of automations

You can create two types of automations with RPA Desktop Design Studio and run them with Unattended Robot or Attended Robot:

Unattended automation

In this automation, tasks, processes, or workflows are carried out by the robots without the need for direct human intervention or supervision. You can use this type of automation to automate highly repetitive tasks.

For example, Report generation. In this use case, the reports are automatically generated and distributed to relevant stakeholders.

Unattended automation offer significant efficiency gains, reduced operational costs, and improved accuracy in organizations.

Attended automation

Also known as human-assisted automation. In this automation, the robots work alongside human users to augment their tasks and activities. You can use this type of automation with human supervision.

For example, Customer service. In this use case, robots can assist customer service representatives by providing relevant information, suggesting responses, and automating data entry. The robots are installed on operator's workstations and are triggered by human operators on demand.

Attended automation is often suited for scenarios where a combination of automation and human judgment is required to handle complex, dynamic, or non-standard tasks.

Robotic Process Automation (RPA) Hub users

Robotic Process Automation (RPA) Hub users

User	Description
Release manager	Creates bot processes and robots in RPA Hub. Add developers to the Managed by group of the bot process so that they can customize the bot process. Configures and publishes the bot process.
Developer	Configures bot processes to assign business applications, robots, credentials, process parameters, schedules, and so on. Builds automation packages, tests the automation projects, and handles exceptions in RPA Desktop Design Studio. Publishes packages to RPA Hub. Creates and deploys automations in a low-code environment.
Robot user/Assisted user	Executes automations in the specified robot machine.

Robotic Process Automation (RPA) Hub workflow

The three main parts of a process workflow are RPA Hub, RPA Desktop Design Studio, and robot machines (virtual machine or user desktop).

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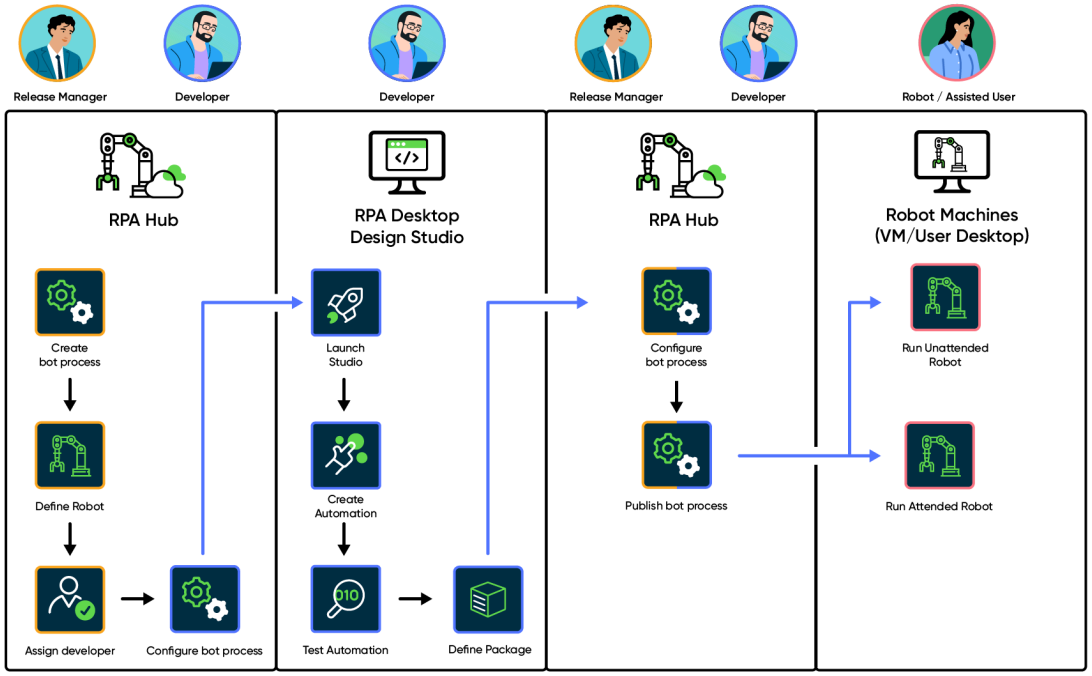
The following diagram shows the process workflow of the Robotic Process Automation (RPA) Hub applications.

Workflow of creating and executing automations using Robotic Process Automation (RPA) Hub applications



1. As a release manager, create a bot process, define robots, and assign a developer who would continue to configure the bot process.
2. As a developer, configure the bot process to associate a package, business applications, robots, parameters, and credentials so that robots can use them to run automations.
3. As a developer, build automation packages, tests the automation projects, and handles exceptions in RPA Desktop Design Studio.
4. As a developer, publish the configured bot process to execute, manage, and monitor automations.
5. As a robot user or assisted user, execute automations in the specified Windows machine where Attended Robot or Unattended Robot is installed.

RPA Hub Benefits

- Increases productivity and delivers higher operational efficiencies.
- Enhances accuracy by eliminating processing errors.
- Enhances customer service and meets highly varied customer demands.

Integration with Workflow Studio

Robotic Process Automation (RPA) Hub provides an integration with the Workflow Studio application. This integration enables you to integrate ServiceNow workflows with Robotic Process Automation by using ServiceNow components for Workflow Studio. For more information about RPA Hub actions and subflow, see Workflow Studio actions and subflow in RPA Hub.

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Key Management Framework

RPA Hub uses the ServiceNow® Key Management Framework for all the sensitive data that is stored on the application. For more information, see Understanding the Key Management Framework.

Important information for upgrading RPA Hub to Brazil

Ensure that you upgrade the current installed Microsoft Software Installers (MSIs) (RPA Desktop Design Studio, Attended Robot, Unattended Robot, and Unattended Robot Login Agent), by downloading the RPA applications. For more information, see Download the RPA applications from RPA Hub.

Important: The following upgrade steps are applicable only when you're upgrading from San Diego or Tokyo to Brazil.

Based on the number of records in the application file table, you could experience a potential delay while upgrading the RPA Hub applications from Tokyo or before to Brazil.

Before upgrading RPA Hub to Brazil, you must set the value of the *glide.rollback.blacklist.TableParentChange.change* system property to **false**. If this property doesn't exist in the System Property [sys_properties] table, add the property and set its value to false.

After you upgrade to the Brazil, the bot process definitions change to the new structure, that is, the bot process configuration. Although the bot process configuration doesn't replace the bot process completely. Most fields are moved from bot process to bot process configuration.

If you upgrade to the Utah version without updating the system property value, the tables don't extend the Application File table. Manually to update the table changes, see the Restructuring RPA Hub tables to sys_metadata in Utah article in the Now Support Knowledge Base.

What to explore next

To learn more about configuring Robotic Process Automation, see:

- RPA Hub
- Unattended Robot
- Unattended Login Agent
- Attended Robot
- ServiceNow Otto for RPA Hub
- RPA Desktop Design Studio

RPA Hub architecture

Learn about the Robotic Process Automation (RPA) Hub architecture.

The following diagram shows how the ServiceNow instance communicates with the customer environment.

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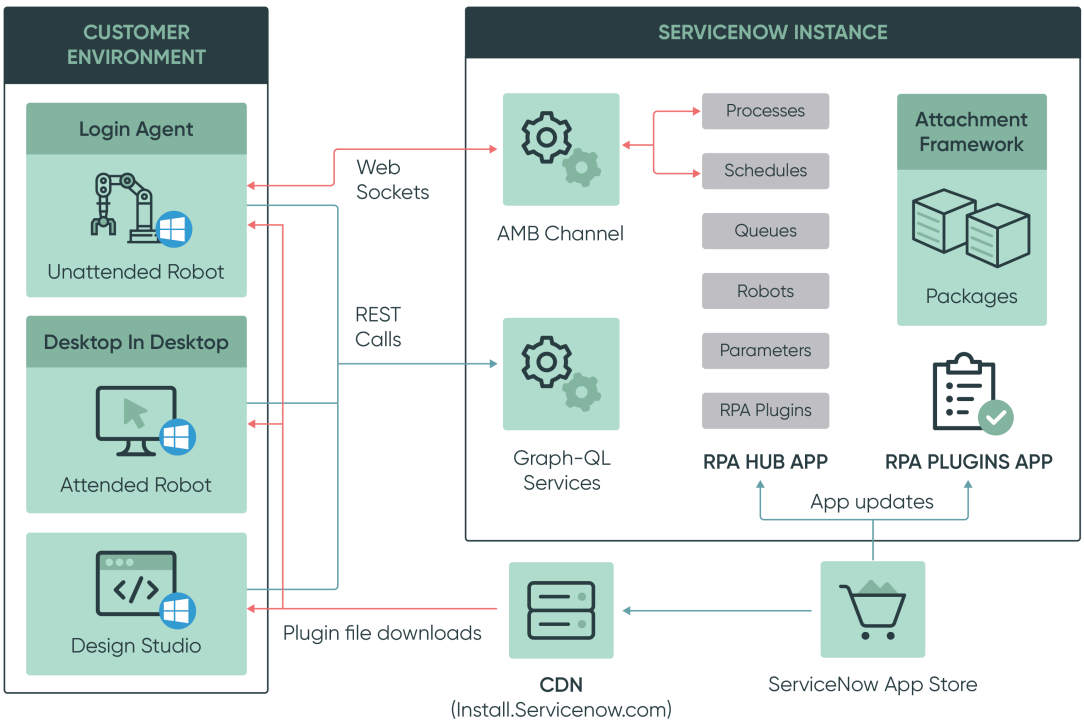
High-level architecture of the Robotic Process Automation (RPA) Hub application



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Various components make up the architecture of the Robotic Process Automation (RPA) Hub application:

- RPA Desktop Design Studio, Unattended Robot, and Attended Robot are the three applications that you install to form the customer environment.
- The Unattended Robot Login Agent is a software agent that you install on a Windows machine with Unattended Robot. You can use this application to unlock or to perform a self-login to the robot machine when an unattended bot process is triggered.
- Unattended robots work independently without any human intervention. They are installed on Windows machines or Virtual Desktop Infrastructures (VDIs). For example, to create an unattended robot, you need to mention the machine name on which the robot is installed on. The automation is executed from here.
- Attended robots work along with humans to improve the efficiency of a bot process. They are installed on user desktops.
- After the automation is built in the RPA Desktop Design Studio, a developer tests it locally and then publishes it to the ServiceNow® RPA Hub instance for further orchestration.
- RPA Hub is a scoped application in the ServiceNow instance. It is the command and control center for managing the robots, packages, and bot processes. For more information about these terms, see Robotic Process Automation (RPA) Hub glossary.
- The automation that is uploaded from the RPA Desktop Design Studio resides under the packages section, which also acts as a build repository.
- You can install the RPA Hub application and the plugins from the ServiceNow Store. The ServiceNow Store checks the Content Delivery Network (CDN) for updates. RPA plugins form the building blocks that are used to create an automation. The plugin files are delivered via the CDN application to RPA Desktop Design Studio, Unattended Robot, and Attended Robot. The plugin inventory is maintained inside the RPA plugin.

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- In a bot process record, you define the sequence of actions that a robot follows to accomplish a specific task, along with the schedule. This information is passed to the robots. When the automation is triggered, the automation executes.
- In the RPA Hub application, additional capabilities, like the queue. A queue is a structured data storage mechanism, used for managing and controlling the distribution of tasks, work items, or cases to different robots for processing.
- The entire scoped application is safeguarded with access control lists (ACLs).

RPA Hub features

Learn about the various RPA Hub features and capabilities.

Bot process

Bot process

A bot process is a predefined sequence of actions that a robot follows to accomplish a specific task or achieve a particular goal.

Bot process configuration

A bot process configuration is a record that contains the bot process settings. The bot process configuration record is mapped to a bot process record. It is a one to one mapping.

For more information, see Bot process.

Robots

A robot runs a bot process (automation). Robots are designed to interact with software applications, data sources, and user interfaces like a human operator would, but in a more efficient, accurate, and consistent manner.

There are two types of robots:

- Unattended robots: robots that run unattended automations that don't require any human intervention.
- Attended robots: robots that run attended automations that require human intervention.

For more information, see Robots.

Package and package version

A package is a container that groups together one or more automation logic and their related files, configurations, and dependencies.

A package version is a specific release of a package. After a package is created, the RPA developer publishes an automation from RPA Desktop Design Studio. This process results in a new package version.

For more information, see Package and package version.

Credential management

Streamline the credentials that robots use to perform the automation that you define in the bot process. Instead of creating the same set of credentials for each bot process, you can create a credential group that includes a robot credential, application credentials, and external credentials. You can then associate the credential group to multiple bot processes.

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For more information, see Credential management.

Smart card

Smart card login for a Windows machine is a secure method of logging into the system using a physical smart card instead of a username and password. It's commonly used in organizations to enhance security, particularly in environments with high security requirements.

For more information, see Smart card.

Embedded Task Automation (ETA)

With the embedded task automation feature, trigger attended bot processes (attended automations) from the ServiceNow forms, apart from initiating them from the Attended Robot application.

For more information, see Embedded Task Automation.

Robot pool

Create a robot pool in RPA Hub to distribute and manage the workload among multiple unattended robots for unattended bot processes.

For more information, see Robot pool.

Robot calendar

You can use the robot calendar in RPA Hub to view and create the schedule for the unattended robots. It's a simple, efficient, and interactive way to work with robots and schedules. By using the calendar, you can manage and plan a robot's schedule in a single view.

For more information, see Robot calendar.

Scheduled maintenance days

Track the scheduled maintenance (SM) days on the robot calendar so that the bot processes can function optimally. If an issue occurs, you can take preventive measures. For example, you can know in advance about the days when the robot or the bot process is unavailable so that you can avoid the number of skipped process jobs.

For more information, see Scheduled maintenance days.

Graceful stop

Graceful Stop functionality provides a capability for robots to exit the automation smoothly. You can define a secure termination point within an automation process. It also enables you to perform clean-up tasks such as closing in-use applications. It is applicable for assigned robots as well as robots in a robot pool.

For more information, see Graceful stop functionality.

Queues

The queues are implemented to distribute the workload among various robots. Work Items (WI) within a queue are processed simultaneously by two or more robots. A queue is a repository that can hold a number of work items. Work items can store multiple types of data, such as transaction information, customer details, or information from a document.

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For more information, see Queues implementation.

Work items

A work item is a record in a work queue that stores the data a robot needs to perform a specific task. Each item in the queue is processed separately, allowing robots to handle large workloads in smaller, manageable parts.

For more information, see Work items.

Shared parameters

Shared parameters enable you to store the global variables or configurable items in one place. These variables are used across bot processes.

For more information, see Shared parameters.

Process parameters

Process parameters store the variables that are used within a bot process. The process parameter can only be used by the bot process they are created in.

For more information, see Process parameters within a bot process.

Code quality checks

A code quality check refers to the process of evaluating the automation file or script to assess its adherence to coding standards, best practices, maintainability, and overall quality. Code quality checks are essential in RPA development life cycle, to ensure that the automation file is robust, efficient, and free from common issues that could lead to errors or difficulties in the future.

For more information, see Code quality checks.

Alert rule and variable

Alert rules are configurations that define conditions in which an alert or a notification must be triggered. These rules help in managing and responding to issues identified in automations.

Alert variable refers to a variable or parameter associated with alerts in RPA Hub.

For more information, see Alert rule and variable.

Process jobs

A process job represents the execution of a bot process on a robot.

For more information, see View process jobs.

Automation logs

Automation logs are series of succession stages or a series of checkpoints that occur during the execution of a bot process. It enables monitoring and auditing the automation process. These logs are generated from the robot for unattended and attended bot processes.

For more information, see View automation logs.

RPA Hub Workspace

Learn about the digital workforce that you can manage all from the RPA Hub Workspace.

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RPA Hub Workspace overview

ServiceNow® RPA Hub Workspace is a web-based platform that helps you orchestrate ServiceNow robots to execute ongoing business processes. Use attended and unattended robots in your environment to create, monitor, manage, and deploy a digital workforce.

RPA Hub is the default landing page of the RPA Hub Workspace. You can access this page in two ways:

- By navigating to **All** > **Robotic Process Automation** > **RPA Hub Workspace** and then selecting the home icon ( ).
- By navigating to **Workspaces** > **RPA Hub Workspace**.

This page contains descriptions about the following basic score card, lists, and reports that you can use to manage your digital workforce:

Bot process summary

Vertical bar charts of the incident records that involve bot processes or a robot. In the Insights section, view a donut report of robots states. You can also see an overview of the change records associated with the robots, bot processes, and business applications that are related to the bot processes



Robot utilization section

Chart legends of the highest and lowest utilized unattended and attended robots, over a period.



Process jobs summary

Donut report of the process jobs by status in the last 24 hours. For example, abandoned, canceled, failed, running, skipped, and success.

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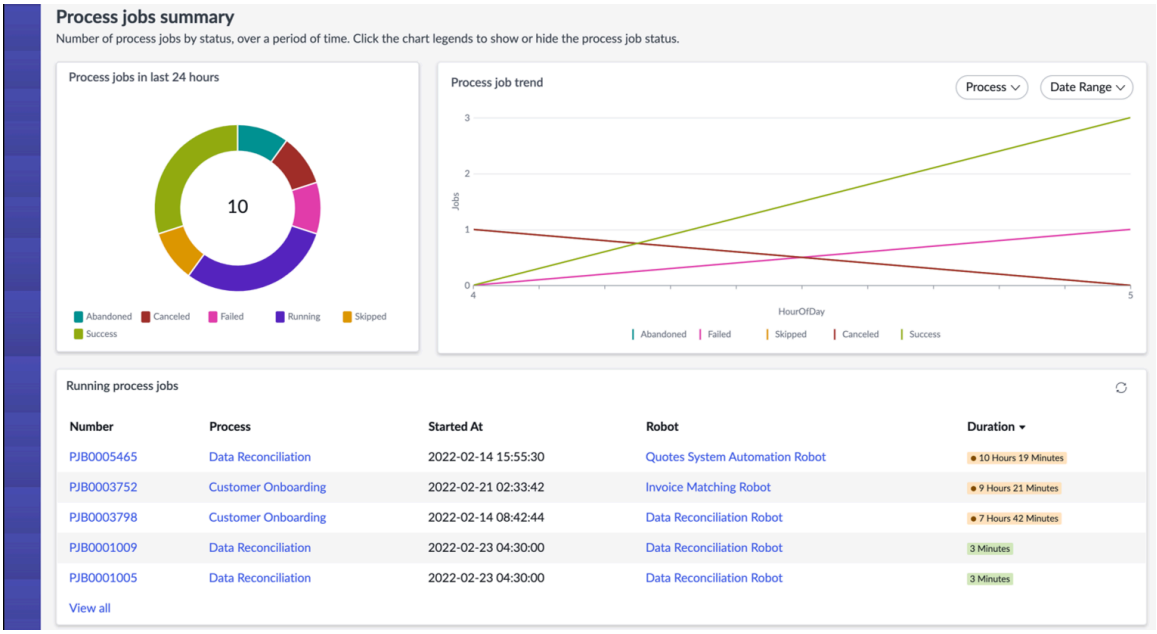
Spline report of the process job trend by status, over a period. Spline reports show how one or more values change over time by connecting a series of known data points with a curve that emphasizes the trend over individual data points.

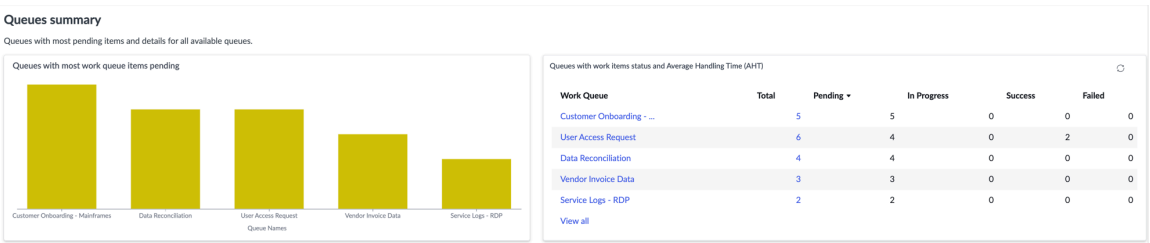
List of the current running process jobs.



Queues summary

Vertical bar report of queues with most work items pending, work items status, and Average Handling Time (AHT).

List of the queues with the work item status.



Top 5 business applications in the last 7 days

Vertical bar reports of the top 5 business applications used by the Robotic Process Automation (RPA) bot processes in the last 7 days.

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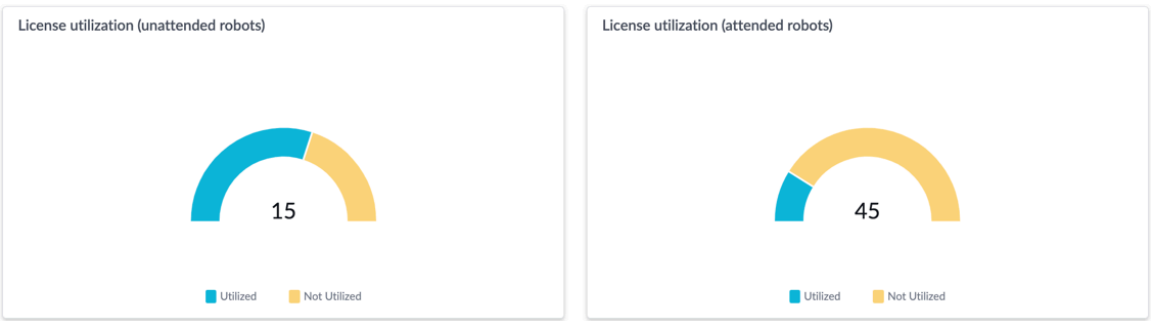
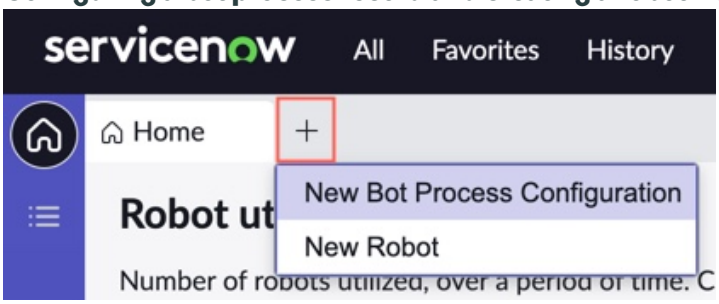
License utilization

Semi-donut reports of the license utilization of unattended and attended robots.



You can configure a bot process record and create a robot by selecting the plus icon (+). For more information, see Configuring a bot process record in RPA Hub and Robots in RPA Hub.

Configuring a bot process record and creating a robot from the landing page



Lists view

From the list icon ( ), you can configure a bot process record and create a package, shared parameter, queue, and robot. You can also view the installed RPA plugins, alerts, and process jobs.

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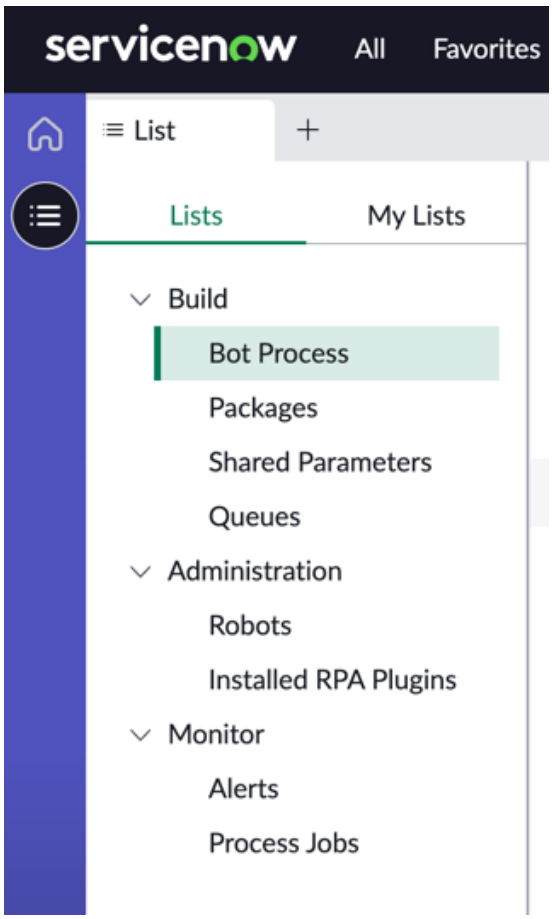
Lists view



You can create your own filtered lists to monitor your digital workforce by configuring **My Lists**. These lists are only visible to you.

Help center

Help Center provides users with the information they need, and tells users what they can accomplish while they're using a configurable workspace. Help Center content appears in the right sidebar when the user clicks the help icon. If Help Center content exists for the current UI page, then the help icon has an indicator (). Multiple help topics for the same page are available in Help Center.

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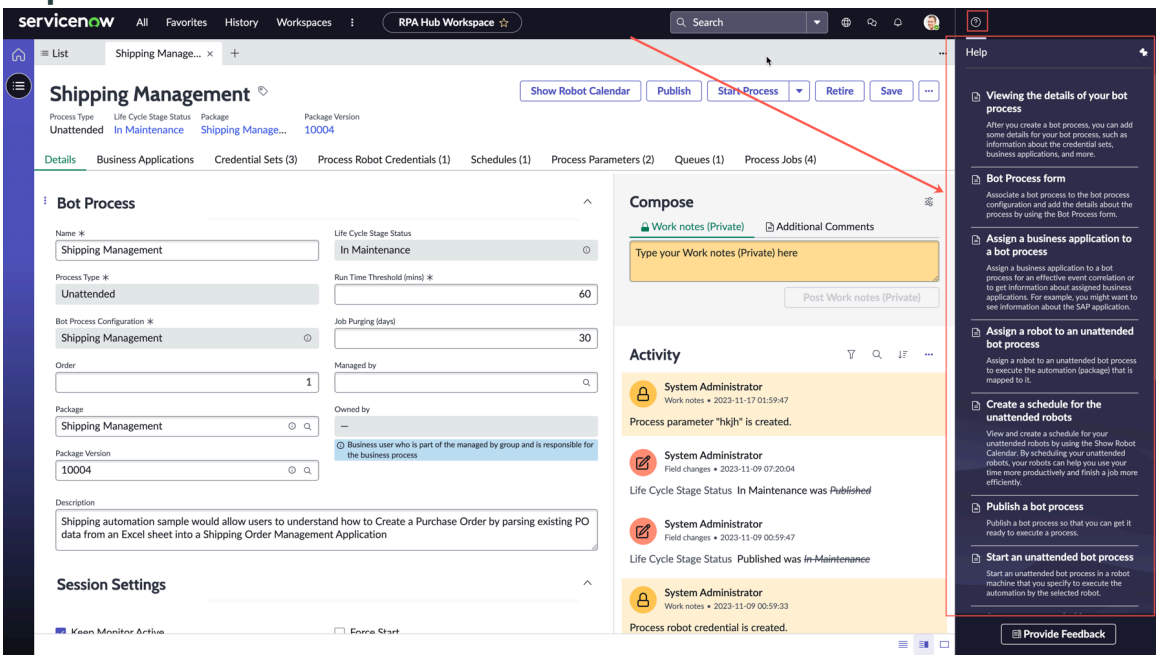
Help Center Icon View



Dark theme

Help alleviate eye strain by switching to a dark theme or mode available in the RPA Hub Workspace for RPA Hub landing page, Robot Calendar, Overview page, and RPA Hub system properties. For more information about the dark theme, see Exploring themes in Next Experience.

Internationalization support for RPA Hub

You can customize the RPA Hub application for your international users by using a language plugin with the ServiceNow AI Platform. Internationalization is enabled for only for the RPA Hub instance on ServiceNow AI Platform, but not for thick client applications such as RPA Desktop Design Studio, Unattended Robot, and Attended Robot.

Internationalization support is automatically enabled and isn't configurable.

To view the full list of languages that are offered as ServiceNow AI Platform plugins and are supported in RPA Hub, see Activate a language.

Getting started

Install Robotic Process Automation (RPA) Hub

You can install the Robotic Process Automation (RPA) Hub application (sn_rpa_fdn) if you have the admin role. The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

Before you begin

- Ensure that the application and all of its associated ServiceNow Store applications have valid ServiceNow entitlements. For more information, see Get entitlement for a ServiceNow product or application.
- Review the RPA Hub application listing in the ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.

Role required: admin

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About this task

The following items are installed with Robotic Process Automation (RPA) Hub:

- Roles
- Scheduled jobs
- Tables
- Actions and subflow

For more information, see Components installed with RPA Hub and Workflow Studio actions and subflow in RPA Hub.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Robotic Process Automation (RPA) Hub application (sn_rpa_fdn) using the filter criteria and search bar.

   You can search for the application by its name or ID. If you cannot find the application, you might have to request it from the ServiceNow Store.

   Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.
3. In the Application installation dialog box, review the application dependencies.

   Dependent plugins and applications are listed if they will be installed, are currently installed, or need to be installed. If any plugins or applications need to be installed, you must install them before you can install Robotic Process Automation (RPA) Hub.
4. **Optional:** If demo data is available and you want to install it, select the **Load demo data** check box.
   Demo data are the sample records that describe application features for common use cases. Load the demo data when you first install the application on a development or test instance.
5. Select **Install**.

What to do next

Use the Robotic Process Automation (RPA) Guided Setup to configure the application on your instance.

To access Robotic Process Automation (RPA) Guided Setup, navigate to **All** > **Robotic Process Automation** > **Administration** > **Guided Setup**. For more information about using the guided setup interface, see Using guided setup.

Use Guided Tours in RPA Hub

Use Guided Tours in RPA Hub to get instructions on how to perform a task. Guided Tours use a series of steps that may span multiple pages. The tour includes links to detailed documentation.

Before you begin

You must do this task in the classic environment.

Role required: Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

Guided Tours help train and onboard users within the RPA Hub user interface (UI). Each tour contains a series of interactive steps that help you complete a specific task or a process within

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the same browser window. If needed, administrators can create more tours. For more information, see Guided Tours.

When you visit a page that has a guided tour for the first time, a welcome screen appears. You can choose to either begin the tour or skip the tour.

The guided tour isn't yet available when Next Experience is enabled.

In RPA Hub, guided tours are currently available for creating queues and configuring a bot process and associated assets.

Procedure

1. Navigate to **All** > **Robotic Process Automation**.
2. Select the feature that you want to configure.

   Example
   For example, select **Build** > **Queues** to use the guided tour for creating queues.
3. Select the **Show help** icon ().
4. **Optional:** Select **Pin Help Center menu** icon  to pin the Help Center side panel on the page.
5. Select **Take a Tour**.
6. Take the necessary action and select **Next** to progress through the tour.
   For ending the tour at any point, you can select **End Tour** in the side panel or select the Close icon in the pop-up window and confirm to end the tour.
7. Select **Complete** after the tour is ended.

Configuring RPA Hub

You can plan and configure an RPA Hub implementation in your organization.

Configuration overview

Perform the following tasks for configuring RPA Hub:

1. Install Robotic Process Automation (RPA) Hub.

   Install the Robotic Process Automation (RPA) Hub application (sn_rpa_fdn) if you have the admin role. The application includes demo data and installs related ServiceNow® Store applications and plugins if they are not already installed.

2. (Optional) Restructure RPA Hub tables.

   Restructure the Robotic Process Automation (RPA) tables to an application file, so that changes that you make to these tables are captured in the update sets and can be moved seamlessly across environments. With this process, you don't have to re-create the data records in the targeted environment.

3. (Optional) Migrating your data from a lower environment to a higher environment in RPA Hub.

   Use the update set capability to migrate your data from a lower (non-production) environment to a higher (production) environment for real-time use.

4. Set up client authentication and code signing certificates.

   You can generate a client authentication and a code signing certificate in two ways. You can either generate and install user certificates or export active directory certificates.

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- Generate and install user certificate from KeyStore Explorer.

  Generate a client authentication certificate for authentication purposes in the Unattended Robot application. Generate a code signing certificate for publishing an automation project from RPA Desktop Design Studio.

- Export Active Directory certificates.

  You can export Microsoft Active Directory certificates, such as root, intermediate, and a client authentication certificate, for authentication purposes. You can then register the exported root and intermediate certificate in the ServiceNow instance and map the exported client authentication certificate to the user.

5. Applying the CSDM guidelines to RPA Hub.

   Apply Common Service Data Model (CSDM) guidelines to define configuration items (CIs) and relationships between CIs in the CMDB. This process ensures that your data resides in the appropriate CMDB tables for maximum value from your ServiceNow AI Platform applications.

6. Create a robot license distribution record in RPA Hub.

   In the classic environment, define the consumption and distribution of licenses for parent and child domains, or global domain by creating a robot license distribution record in RPA Hub.

7. Configure RPA Hub properties.

   In the classic environment, configure RPA Hub properties, such as auto assignment of robots or defining the authentication mechanism to customize the experience.

Using Guided Setup to implement RPA Hub

Guided Setup provides a sequence of tasks that help you configure RPA Hub on your ServiceNow® instance. With Guided Setup, keep track of what you have completed, so you can stop and start again where you left off. To open Guided Setup for RPA Hub, navigate to **All** > **Robotic Process Automation** > **Administration** > **Guided Setup**.

For more information about using the guided setup interface, see Using guided setup.

Using Guided Tours to get help related to a configuration task

Guided Tours provide step-by-step instructions on your ServiceNow® instance to help you complete a task. For more information about using guided tours, see Use Guided Tours in RPA Hub.

Related topics

Configuring Unattended Robot

Configuring Attended Robot

Install ServiceNow Otto for RPA Hub

Configuring RPA Desktop Design Studio

Download the RPA applications from RPA Hub

Download the Robotic Process Automation (RPA) applications in your Windows machine from RPA Hub as a prerequisite for installing the applications or upgrading them.

Before you begin
You must do this task in the classic environment.

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You need to have access to the RPA Hub instance for downloading the RPA applications.

Role required: admin, sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

About this task

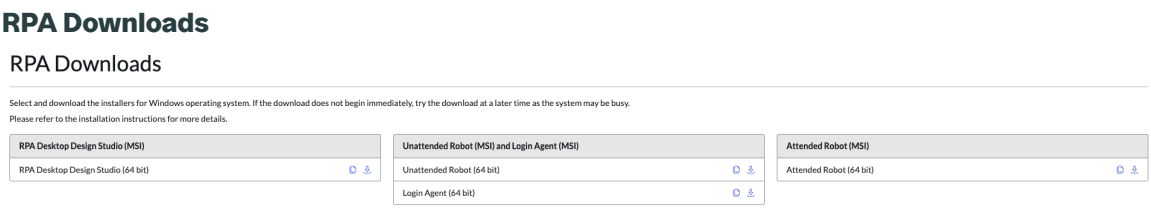
Do this task to download the following RPA applications:

- RPA Desktop Design Studio
- Unattended Robot
- Unattended Robot Login Agent
- Attended Robot

Important: Ensure to upgrade the current installed MSIs (RPA Desktop Design Studio, Attended Robot, and Unattended Robot), if any by downloading the RPA applications.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Administration** > **Downloads**.
2. In the RPA Downloads page, do any of the following actions to download the required application:
   - Select the download icon ( ).
   - Select the copy link ( ). In a browser, right-click and select **paste and go** option.



A dialog box might prompt you to save or open the zip file.

Note: Depending on your browser setting, the browser might automatically save the file to your Downloads folder.

3. From the downloaded zip file, extract the application installation file (.msi file).

What to do next

Install RPA Desktop Design Studio. For more information, see Install RPA Desktop Design Studio.

To run an unattended bot process, install Unattended Robot and install Unattended Robot Login Agent. For more information, see Install Unattended Robot and Install Unattended Robot Login Agent.

To run an attended bot process, install Attended Robot. For more information, see Install Attended Robot.

Add the ServiceNow RPA Chrome extension to your Chrome browser to launch the Robotic Process Automation (RPA) applications in this browser and to establish a browser interaction. For more information, see Add the ServiceNow RPA Chrome extension.

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Install ServiceNow Otto for RPA Hub

If you have the admin role, you can install the ServiceNow Otto for RPA Hub application so that your human agents or users can get started with developing automations faster.

Before you begin

- Review the ServiceNow Otto for RPA Hub application listing in ServiceNow Store for information on dependencies, licensing or subscription requirements, and release compatibility.
- Perform these steps in your ServiceNow instance.
- Ensure that the AI Search application is enabled on your instance by navigating to **All** > **AI Search** > **AI Search Status**. If AI search is not enabled, select **Request AI Search**.
- Role required: admin

About this task

Important: The ServiceNow Otto for RPA Hub requires a separate subscription to ServiceNow Otto for Creator.

Procedure

Perform any of the following tasks to install the ServiceNow Otto for RPA Hub application.

Option	Action
From *AI Admin Hub*	**a.** Navigate to **All** > *AI Admin Hub* > **Settings** > **Plugins**. **b.** On the **Available for you** tab, select *ServiceNow Otto for RPA Hub*. **c.** Select **Get plugins**. **d.** In the Install ServiceNow Otto for RPA Hub plugins, select **Install Plugin**. **e.** Select **Install**.
From System Applications	**a.** Navigate to **All** > **System Applications** > **All Available Applications** > **All**. **b.** Find the ServiceNow Otto for RPA Hub application (sn_rpa_na) using the filter criteria and search bar. You can search for the application by its name or ID. If you can't find the application, you might have to request it from the Service Now Store. In the list next to the **Install** button, the versions that are available to you are displayed. **c.** Select a version from the list and select **Install**.

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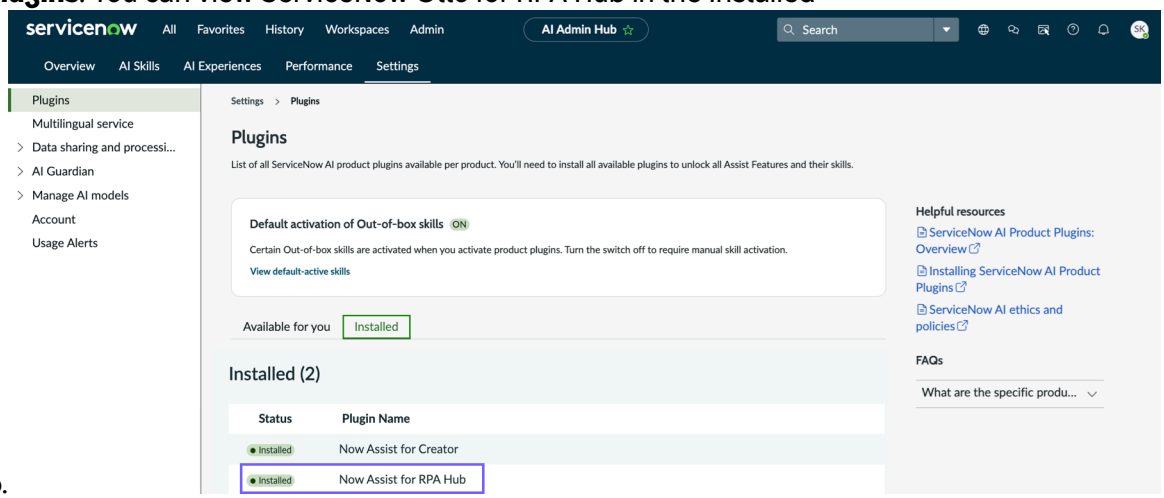
Option	Action
	In the Install dialog box that is displayed, any dependencies that are installed along with your application are listed. **d.** If you're prompted, follow the links to the ServiceNow Store to get any additional entitlements for dependencies. **e.** Select **Install**.

Result

To view the installed plugins, navigate to **All** > *AI Admin Hub* > **Settings** > **Plugins**. You can view ServiceNow Otto for RPA Hub in the Installed tab.



What to do next

If you're upgrading to the Yokohama Patch 3 release, reindex the data source. For more information, see Perform a full table index or reindex for multiple AI Search indexed sources. In the step 2 of this procedure, select the indexed source as RPA Component [sn_rpa_na_rpa_component].

Turn on the Robotic Process Automation (RPA) bot generation skill to use generative AI to create automations, activities, and automation logic additions from text instructions and preview options. For more information, see Turn on the RPA bot generation skill.

Turn on the RPA bot generation skill

Turn on the Robotic Process Automation (RPA) bot generation skill to use generative AI to create automations, activities, and automation logic additions from text instructions and preview options.

Before you begin

- Install the ServiceNow Otto for RPA Hub application to add the generative AI capability. For more information, see Install ServiceNow Otto for RPA Hub.
- Perform these steps in your ServiceNow instance.
- Ensure that the AI Search application is enabled on your instance by navigating to **All** > **AI Search** > **AI Search Status**. If AI search is not enabled, select **Request AI Search**.
- Role required: sn_nowassist_admin.nsa_admin or sn_skill_builder.admin

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About this task

Important: The ServiceNow Otto for RPA Hub requires a separate subscription to ServiceNow Otto for Creator.

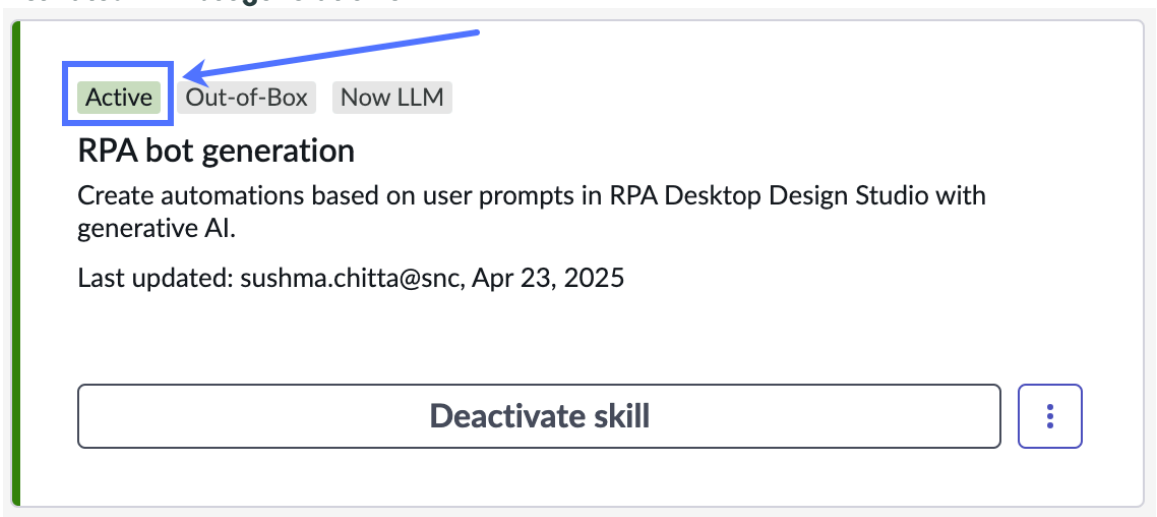
Procedure

1. Navigate to **All** > *AI Admin Hub* > **AI Skills**.
2. In the workflow list, select **Creator**.
3. On the RPA bot generation card, select **Turn on**.
   You view a dialog box with the message "Successfully activated".
4. On the Successfully activated dialog box, select **Back to skills**.
5. On the RPA bot generation card, verify that the RPA bot generation skill is activated.

Result

The following example shows that the RPA bot generation card displays the skill as active.

Activated RPA bot generation skill



What to do next

After activating the RPA bot generation skill, RPA Desktop Design Studio users must relaunch the RPA Desktop Design Studio application to apply the modified settings.

Related topics

Robotic Process Automation (RPA) bot generation skill

Obtaining client authentication and code signing certificates for RPA Hub

Use mTLS authentication for client authentication and verify authenticity of the automation packages by generating a code signing certificate.

Client authentication

Client authentication enables mutual TLS (mTLS) authentication between the Unattended Robot application and the ServiceNow server while making a connection.

You can either generate and install user certificates or export active directory certificates.

Code signing certificate

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A code signing certificate is used for signing and verifying the automation packages from RPA Desktop Design Studio. This certificate detects any tampering or corruption of scripts before they're run.

The code signing certificate is validated during the Unattended Robot and Attended Robot executions.

If you set the *sn_rpa_fdn.code_signing_required* system property to true in the RPA Hub scoped application, a code signing certificate is required while publishing an automation project. For more information, see Configure RPA Hub properties and Publish an automation project in RPA Desktop Design Studio.

Explore the following topics to generate a client authentication and a code signing certificate.

Generating and installing user certificates

You can generate and install a user certificate for client authentication and code signing in your Windows machine, if you have the admin role.

Client authentication

Client authentication enables mutual TLS (mTLS) authentication between the Unattended Robot application and the ServiceNow server while making a connection.

You can either generate and install user certificates or export active directory certificates.

Code signing certificate

A code signing certificate is used for signing and verifying the automation packages from RPA Desktop Design Studio. This certificate detects any tampering or corruption of scripts before they're run.

The code signing certificate is validated during the Unattended Robot and Attended Robot executions.

If you don't have the active directory certificates, do the tasks in the following topics to generate and install user certificates. For more information, see Exporting Microsoft Active Directory certificates.

Generate a user certificate from KeyStore Explorer

Generate a user certificate for secure client authentication and code signing in your Windows machine using the KeyStore Explorer application. This reference procedure is one of many methods to generate a user certificate.

Before you begin

Do this task in your Windows machine.

If user certificates are generated by your organization, then you can skip this procedure. You can proceed with installing the user certificate.

If user certificates are not generated by your organization, you can either use this procedure or any other procedure to generate a client authentication certificate.

Role required: admin

About this task

Important: The following procedure is for reference only. The steps may vary, depending on how certificates used within your organization are generated. Consult your IT administrator for more details.

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You can install the KeyStore Explorer application in your Windows machine and then generate a client authentication and code signing certificate from the KeyStore Explorer application. Skip this task, if you already have these certificates.

Generate a client authentication certificate for authenticating the Unattended Robot application.

Generate a code signing certificate for publishing an automation project from RPA Desktop Design Studio.

Procedure

1. Navigate to https://keystore-explorer.org/downloads.html.
2. Download the latest setup.exe file for the Windows machine.
3. To install the KeyStore Explorer, do the following actions:
   a. Open the downloaded setup.exe file.
   b. In the Select Setup Language dialog box, select a language to use during the installation and select **OK**.
   c. In the Welcome to the KeyStore Explorer Setup Wizard dialog box, select **Next**.
   d. In the Select Destination Location dialog box, select a folder to install the KeyStore Explorer and select **Next**.
   e. In the Select Start Menu Folder dialog box, to create shortcuts of the program in the default folder, select **Next**.
   f. In the Select Additional Tasks dialog box, select the additional tasks that you would like the setup to perform while installing the KeyStore Explorer and then select **Next**.
   g. In the Ready to Install dialog box, select **Install**.
   h. After the installation is complete, select **Finish** to exit.
4. From your desktop, double-click the KeyStore Explorer icon and select **Create a new KeyStore**.
5. In the New KeyStore Type dialog box, select **JKS** as a type of the new KeyStore and select **OK**. The new KeyStore appears as an additional **Untitled** tab.
6. On the **Untitled** tab, right-click the screen and select **Generate Key Pair**.
7. In the Generate Key Pair dialog box, select **OK**.
8. In the Generate Key Pair Certificate dialog box, enter a name for the certificate.
9. Generate a user certificate.

Certificate type	Steps
mTLS authentication for client certificate	**a.** In the Generate Key Pair Certificate dialog box, select **Add Extensions**. **b.** Select the  icon. **c.** In the Add Extension Type dialog box, se lect **Extended Key Usage (EKU)**. **d.** In the Extended Key Usage Extension (EKU) dialog box, select **Edit**.

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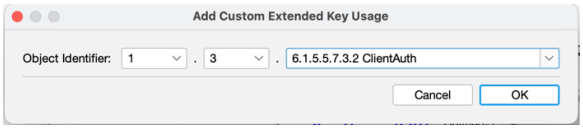
Certificate type	Steps
	e. In the Custom Extended Key Usage dialog box, select the  icon. **f.** In the Add Custom Extended Key Usage dia log box, in the Object Identifier field, enter `1.3.6.1.5.5.7.3.2 clientAuth`.  **g.** Select **OK**.
Code signing certificate	**a.** In the Generate Key Pair Certificate dialog box, select **Add Extensions**. **b.** In the Add Certificate Extensions dialog box, select **Use Standard Template**. **c.** In the Select a Standard Certificate dialog box, select **Code Signing**. **d.** Select **OK**. **e.** In the Add Certificate Extensions dialog box, select **OK**.

10. In the Generate Key Pair Certificate dialog box, select the book icon against the **Name** field, and then do the following actions:
    a. In the Name dialog box, fill in the details of your organization.
    b. Select **OK**.
11. In the Generate Key Pair Certificate dialog box, select **OK**.
12. In the New Key Pair Entry Alias dialog box, enter an alias name in the **Enter Alias** field and select **OK**.
13. In the New Key Pair Entry Password dialog box, do the following actions to generate a key pair:
    a. In the **Enter New Password:** field, enter a new password for the key pair.
    b. In the **Confirm New Password:** field, confirm the new password.
    c. Select **OK**.
    d. After the key pair is generated, select **OK**.
14. On the **Untitled** tab, right-click this key, select **View Details**, and then select **Certificate Chain Details**.
15. In the Certificate Details for Entry dialog box, select the **PEM** button.
16. In the Certificate PEM dialog box, select **Export**.
17. Select a location to save this file as a `.pem` file and select **Save**.
    Use this file to upload in the instance for creating a Certificate Authority (CA) chain record and user record.
18. After the PEM is exported successfully, select **OK** and close all the tabs.

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19. On the **Untitled** tab, do the following actions to generate a .p12 file:

    a. Right-click the key entry, select **Export**, and then select **Export Key Pair**.

    b. In the Export Key Pair from KeyStore Entry dialog box, enter a password in the **Password for Output File:** field.

    c. In the **Confirm Password** field, confirm the password.

    d. Select **Export**.
    This file is saved as .p12 file and is used in Unattended Robot for authentication.

    e. After the key pair is exported successfully, in the Export Key Pair dialog box, select **OK**.

What to do next

Activate the certificate-based authentication plugin, if you have the admin role. It is a prerequisite for registering the certificates on the instance. For more information, see Activate the certificate-based authentication.

Register user-generated client authentication certificate to make it available for authentication. For more information, see Register the CA certificate.

Map the user-generated client authentication certificate to the user. For more information, see Map the PEM certificate to user.

Install the generated client authentication and code signing certificate. For more information, see Install the user-generated certificates.

Install the user-generated certificates

Install the user generated (client authentication and code signing) certificates in your Windows machine, if you have the admin role.

Before you begin

Generate a client authentication and a code signing certificate. For more information, see Generate a user certificate from KeyStore Explorer.

Activate the certificate-based authentication plugin, if you have the admin role. It is a prerequisite for registering the certificates on the instance. For more information, see Activate the certificate-based authentication.

Register user-generated client authentication certificate to make it available for authentication. For more information, see Register the CA certificate.

Map the user-generated client authentication certificate to the user. For more information, see Map the PEM certificate to user.

Role required: admin

About this task

Important: The following procedure is for reference only. The installation steps may vary, depending on how certificates used within your organization are generated. Consult your IT administrator for more details.

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Procedure

1. Double-click the certificate file to open the Certificate Import Wizard dialog box.
2. From the Store Location list, select one of the following options:
   - If you're installing a client authentication certificate, select **Local Machine** to store a location for the certificate.
   - If you're installing a code signing certificate, select **Current User** to store a location for the certificate.
3. Select **Next**.
4. In the File to import dialog box, specify the file that you want to import in the **File name** field.
5. Select **Next**.
6. In the Private key protection dialog box, enter a password in the **Password** field for the private key.
7. In the Import options section, select the **Include all extended properties** option.
8. Select **Next**.
9. In the Certificate Store dialog box, select the **Automatically select the certificate store based on the type of certificate** option, to enable the Windows machine to automatically select a certificate store.
10. Select **Next**.
11. In the Completing the Certificate Import Wizard dialog box, select **Finish**.
12. In the Confirmation dialog box, select **OK**.

What to do next

Add the user to manage private keys. For more information, see Add user to manage private keys.

Add user to manage private keys

Add the user to manage private keys in your Windows machine, if you have the admin role, to complete the certificate generation.

Before you begin

Install the user-generated (client authentication and code signing) certificates in your Windows machine, if you have the admin role. For more information, see Install the user-generated certificates.

Role required: admin

Procedure

1. In your Windows machine, from the Search menu, enter `Manage computer certificates`.
2. In the Certificate Manager tool, navigate to **Certificates - Local Computer** > **Personal** > **Certificates**.
3. In the Certificate Import Wizard dialog box, right-click the installed certificate and then navigate to **All Tasks** > **Manage Private Keys**.
4. In the Permissions dialog box, select **Add**.
5. In the Select Users, Computers, Service Accounts, or Groups dialog box, in the **Enter the Object names to select** field, enter the user account that is used by the robot to log in to the machine.
6. Select **Check Names**.

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7. Select the user account and then select **OK**.
8. In the Permissions dialog box, select the added user, select the **Read** check box, and clear the **Full control** check box.
9. Select **Apply** and then select **OK**.

What to do next

Select the installed certificate in the **Certificate** field to do either of the following actions:

- To set up the Unattended Robot. For more information, see Set up Unattended Robot.
- To publish an automation project in RPA Desktop Design Studio. For more information, see Publish an automation project in RPA Desktop Design Studio.

Exporting Microsoft Active Directory certificates

You can export Microsoft Active Directory certificates, such as root, intermediate, and a client authentication certificate, for authentication purposes. You then register the exported root and intermediate certificate in the ServiceNow instance and map the exported client authentication certificate to the user.

You must do these tasks in your Windows machine.

If you don't have the user-generated certificates (client authentication and code signing), do the tasks in the following topics to export active directory certifications. For more information, see Generating and installing user certificates.

Export a root certificate

Export an active directory (AD) root certificate in your Windows machine to register the exported certificate on the ServiceNow instance.

Before you begin

Do this task in your Windows machine.

Role required: admin

Procedure

1. In your Windows machine, from the Search menu, enter `Manage computer certificates`.
2. To export the root certificate, do the following actions:

   a. In the Certificate Manager tool, navigate to **Certificates - Local Computer** > **Personal** > **Certificates**.

   b. Double-click the required client authentication-based certificate.

   c. On the **Certification Path** tab, double-click the root certificate.

   d. On the **Details** tab, verify the serial number and select **OK**.

   e. Navigate to **Certificates - Local Computer** > **Trusted Root Certification Authorities** > **Certificates**.

   f. To match the root certificate with the serial number, double-click a root certificate.

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g. On the **Details** tab, verify that the serial number matches and select **OK**.
Repeat this step until you find a match.

h. After you identify the root certificate, right-click the root certificate, select **All Tasks**, and then select **Export...**.

i. In the Welcome to the Certificate Export Wizard dialog box, select **Next**.

j. In the Export File Format dialog box, select the **Base-64 encoded X.509 (.CER)** file format, and then select **Next**.

k. In the File to Export dialog box, select the file name location in the **File name** field or select **Browse** to save the certificate file, and then select **Next**.

l. In the Completing to the Certificate Export Wizard dialog box, select **Finish**.

m. After the export is complete, in the Certificate Export Wizard dialog box, select **OK**.

3. To rename the file extension of the exported root certificate, do the following actions:

a. Locate the exported certificate file.

b. Right-click the certificate file and select **Rename**.

c. In the file name, rename the file extension from **.cer** to **.pem**.
For example, change the Root CA.cer file name to `Root CA.pem`.

d. In the confirmation dialog box, select **Yes**.

What to do next
Register the root certificate to make it available for authentication. For more information, see Register the CA certificate.

Export an intermediate certificate

Export an active directory (AD) intermediate certificate in your Windows machine to register the exported certificate on the ServiceNow instance.

Before you begin
Do this task in your Windows machine.

Role required: admin

About this task
If your organization doesn't require an intermediate certificate, skip this task.

Procedure
1. In your Windows machine, from the Search menu, enter `Manage computer certificates`.
2. To export the intermediate certificate based on your business requirement, do the following actions:

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a. In the Certificate Manager tool, navigate to **Certificates - Local Computer** > **Personal** > **Certificates**.

b. Double-click the required client authentication-based certificate.

c. On the **Certification Path** tab, double-click the intermediate certificate.

d. On the **Details** tab, verify the serial number and select **OK**.

e. Navigate to **Certificates - Local Computer** > **Intermediate Certification Authorities** > **Certificates**.

f. To match the intermediate certificate with the serial number, double-click an intermediate certificate.

g. On the **Details** tab, verify that the serial number matches and select **OK**.
Repeat this step until you find a match.

h. After you identify the intermediate certificate, right-click the intermediate certificate, select **All Tasks**, and then select **Export...**.

i. In the Welcome to the Certificate Export Wizard dialog box, select **Next**.

j. In the Export File Format dialog box, select the **Base-64 encoded X.509 (.CER)** file format, and select **Next**.

k. In the File to Export dialog box, select the file name location in the **File name** field or click **Browse** to save the certificate file, and then select **Next**.

l. In the Completing to the Certificate Export Wizard dialog box, select **Finish**.

m. After the export is complete, in the Certificate Export Wizard dialog box, select **OK**.

3. To rename the file extension of the exported intermediate certificate, do the following actions:

a. Locate the exported certificate file.

b. Right-click the certificate file and select **Rename**.

c. In the file name, rename the file extension from **.cer** to **.pem**.
For example, change the Intermediate CA.cer file name to `Intermediate CA.pem`.

d. In the confirmation dialog box, select **Yes**.

What to do next

Register the intermediate certificate to make it available for authentication. For more information, see Register the CA certificate.

Export a client authentication (active directory) certificate

Export an active directory (AD) client authentication certificate in your Windows machine to map the exported certificate to the user on the ServiceNow instance.

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Before you begin

Do this task in your Windows machine.

Role required: admin

Procedure

1. In your Windows machine, from the Search menu, enter `Manage computer certificates`.
2. To export the client authentication certificate, do the following actions:
   a. In the Certificate Manager tool, navigate to **Certificates - Local Computer** > **Personal** > **Certificates**.
   b. Right-click the client authentication certificate, select **All Tasks**, and then select **Export...**.
   c. In the Welcome to the Certificate Export Wizard dialog box, select **Next**.
   d. In the Export File Format dialog box, select the **Base-64 encoded X.509 (.CER)** file format, and then select **Next**.
   e. In the File to Export dialog box, select the file name location in the **File name** field or select **Browse** to save the certificate file, and then select **Next**.
   f. In the Completing to the Certificate Export Wizard dialog box, select **Finish**.
   g. After the export is complete, in the Certificate Export Wizard dialog box, select **OK**.
3. To rename the file extension of the exported client authentication certificate, do the following actions:
   a. Locate the exported certificate file.
   b. Right-click the certificate file and select **Rename**.
   c. In the file name, rename the file extension from **.cer** to **.pem**.
   For example, change the User CA.cer file name to `User CA.pem`.
   d. In the confirmation dialog box, select **Yes**.

What to do next

Map the PEM certificate to the user. For more information, see Map the PEM certificate to user.

Applying the CSDM guidelines to RPA Hub

Apply Common Service Data Model (CSDM) guidelines to RPA Hub.

CSDM is the data framework that you follow when you set up ServiceNow products and applications. You adhere to the CSDM guidelines when you define configuration items (CIs) and relationships between CIs in the CMDB. This process ensures that your data resides in the appropriate CMDB tables for maximum value from your ServiceNow AI Platform applications.

CSDM is the data model standard for all products that use the Configuration Management Database (CMDB).

- The CSDM guidelines ensure unified data access for ServiceNow AI Platform products.
- The CSDM gives you clear direct prescriptive guidelines for service modeling within the CMDB.
- CSDM terms and definitions ensure consistent and accurate service reporting.

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- The CSDM data model supports multiple configuration strategies and includes guidelines for using base-system tables and relationships.
- You can use the CMDB query builder to create reports showing CMDB configuration items (CIs) and their relationships.

For more information about the CSDM, see Common Service Data Model.

For more information about implementing the CSDM framework in stages, see Implementing the CSDM framework in stages.

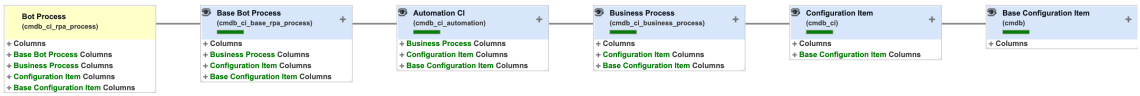
RPA Hub and CSDM tables

RPA Hub manages and uses CSDM tables. Several ServiceNow products benefit from and add value to RPA Hub.

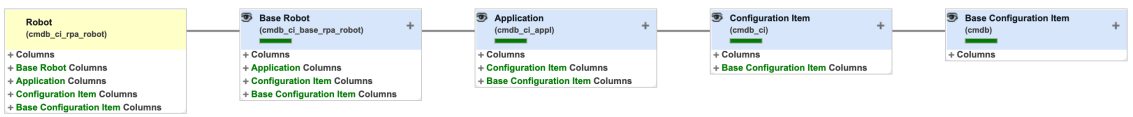
CSDM tables managed by RPA Hub

1. Bot Process [cmdb_ci_rpa_process]
2. Robot [cmdb_ci_rpa_robot]

The Bot Process table (cmdb_ci_rpa_process) contains the configuration details of a process that runs on a robot. This table extends from the Base Bot Process table (cmdb_ci_base_rpa_process). The following image is a visual depiction of the bot process table hierarchy.



The Robot table (cmdb_ci_rpa_robot) contains the details of a software agent that runs a bot process (cmdb_ci_rpa_process) that is built in the RPA Desktop Design Studio. This table extends from the Base Robot table (cmdb_ci_base_rpa_robot table). The following image is a visual depiction of the robot table hierarchy.



The bot process and the robot are associated with each other using CI relationship ‘Runs On::Runs’.

CSDM tables used by RPA Hub

1. Business Application [cmdb_ci_business_app] - For associating business applications to bot processes and later, defining the application credentials for the same.

   For more information about assigning a business application to a bot process, see Assign a business application to a bot process in RPA Hub.

2. Hardware [cmdb_ci_hardware] - For the machine name lookup feature on a robot record.

   For more information about machine name field, see Create an unattended robot in RPA Hub.

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Products that add value to RPA Hub

When you use RPA Hub with any of the following ServiceNow products, you increase the value you get from RPA Hub:

- Workflow Studio
- Integration Hub
- Automation Center
- Document Intelligence
- Adoption Services

Products that benefit from RPA Hub

The following ServiceNow products gain value from RPA Hub:

- Automation Center
- Document Intelligence
- ITSM

Configure RPA Hub properties

You can access system properties for RPA Hub by navigating to **All** > **Robotic Process Automation** > **Administration** > **Properties**.

RPA Hub Properties

Property	Description
Enable auto assignment of Attended Robot. sn_rpa_fdn.allow_rda_robot_auto_assignment	Auto assigns robot licenses to users fr on a first come first serve basis. • Type: Yes | No • Default value: No For more information, see Run an auto Attended Robot.
Sets the instance and robot machine authentication mechanism. sn_rpa_fdn.instance_authentication	Select an authentication type: • **mTLS**: Mutual Transport Layer Securi prerequisite, install the user certifica For more information about installing you have the admin role, see Install t certificates. • **Basic**: Authentication happens base password.
Enable auto session restore. sn_rpa_fdn.process.auto_session_restore	Restores auto session. • Type: Yes | No • Default value: No If it is set to Yes, then the **Auto Session** on a new bot process form is selected

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RPA Hub Properties (continued)

Property	Description
	no impact to the existing bot processes property value is changed. For more information about the bot pro Process form in RPA Hub. If enabled, when the unattended robot the machine to start the automation, th session is restored to the original state after the automation is completed.
Enable the code quality check at the instance level. sn_rpa_fdn.enable_code_quality_check	Enables the code quality check at the i • Type: Yes | No • Default value: Yes If it is set to Yes, then the configure the *sn_rpa_fdn.restrict_packag* and *sn_rpa_fdn.code_quality* system properties appropriately.
Sets restriction on publishing package from RPA Desktop Design Studio and publishing bot process in RPA Hub, if the package contains any of the defined selection. This property is effective only when code quality check feature is enabled. sn_rpa_fdn.restrict_package_by_severity	Sets a restriction on publishing packag Design Studio and publishing bot proc This property is effective only when co feature is enabled. Select a restriction type: • **No restriction** - Enables packages to Desktop Design Studio regardless of result. The packages with error or wa published from the RPA Desktop Des the publishing of bot processes rega quality result of the associated packa • **Error** - Restricts packages with Code as 'Error' to publish from RPA Deskto Restricts publishing of bot process if package versions whose code qualit as error. • **Error or Warning** - Restricts package Quality Result as 'Error' or 'Warning' t RPA Desktop Design Studio. Restricts process if it is using the package vers quality check is marked as 'Error' or ' Default value: **No restriction**
Maximum duration, in minutes, for the completion of the code quality check. Ensure to enter a positive integer value. This property is effective only when code quality check feature is enabled. sn_rpa_fdn.code_quality_check_timeout	Limit the processing time for code qual a maximum duration, in minutes, for the the code quality check. Ensure to enter value. This property is effective only wh check feature is enabled.

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RPA Hub Properties (continued)

Property	Description
	• Type: integer • Default value: 5
Enable this to ensure the security of the published packages via code signing, where the package is digitally verified. sn_rpa_fdn.code_signing_required	Ensures the security of the packages th from the RPA Desktop Design Studio. • Type: Yes | No • Default value: No It is validated by the Unattended Robot Robot.
Mark this as true in order to enable manual upload of automation package. sn_rpa_fdn.allow_manual_upload_of_automation_package	Enables RPA release managers to man automation package (zip file). • Type: Yes | No • Default value: No This property helps in controlling direc attachments in the existing package ve
Enable this to ignore certificate expiry while publishing digitally signed package/package version created with RPA Desktop Design Studio. sn_rpa_fdn.ignore_certificate_expiry_date	Ensures that the package is published RPA Desktop Design Studio even after certificate is expired. • Type: Yes | No • Default value: No
Enable to reference unattended robot's machine name from CMDB tables. sn_rpa_fdn.enable_unattended _robot_machine_name_lookup	Enables you to select one of the availal CMDB table. • Type: Yes | No • Default value: No If you enable this property as Yes, then *sn_rpa_fdn.machine_name_re* system property appropriately. **Note:** If you enable this system p there are any existing robot record retire the robot and create a new re
Provide names of CI tables to reference unattended robot's machine name. sn_rpa_fdn.machine_name_reference_fields	CI table names to reference the machi unattended robot. • Type: Comma separated list • Default value: `cmdb_ci_hardwar`

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RPA Hub Properties (continued)

Property	Description
Frequency, in seconds, to sync the execution logs. sn_rpa_fdn.process.sync_execution_logs	Defines the frequency, in seconds, for synchronize. • Type: integer • Default value: 60 When a new bot process is created, the define in this system property appears **Execution Logs (seconds)** field. There existing bot processes, when this syste changed. This system property is only applicable processes where the **Track Execution** enabled. The logs are saved locally and on the interval set in this property. For more information about the bot pro Process form in RPA Hub.
Maximum limit for frequency, in seconds, to sync the execution logs. sn_rpa_fdn.process.sync_execution_logs_max_value	Defines the maximum limit for frequenc execution logs to synchronize. • Type: integer • Default value: 300 This system property is only applicable processes where the **Track Execution** enabled and the value for the **Storage** For more information about the bot pro Process form in RPA Hub.
Enable tracking of execution logs. sn_rpa_fdn.process.track_execution_log	Tracks the execution logs. • Type: Yes | No • Default value: No If it is set to Yes, then the **Track Execut** on a new bot process form is selected no impact to the existing bot processes property value is changed. After you enable the **Track Execution L** on a bot process form, the logs are cap automation is executed by either an att unattended robot. These logs help in u the errors and the end-to-end logging execution. For more information about execution l Process form in RPA Hub.

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RPA Hub Properties (continued)

Property	Description
Maximum days to retain process job. sn_rpa_fdn.max_purge_days_process_job	Defines the maximum days to retain a p • Type: integer • Default value: 90 In a bot process record, process jobs a this system property. Based on this system property, the max **Job Purging (days)** field in a bot proce For more information about the bot pro Process form in RPA Hub.
Default value for the number of days to retain process job logs. sn_rpa_fdn.process.job_purge_days	Defines the number of days to retain jo • Type: integer • Default value: 30 In a bot process record, process jobs a this system property. When a new bot process is created, th define in this system property appears **(days)** field. For more information about the bot pro Process form in RPA Hub.
Enable attended automation to run in desktop-in-desktop. sn_rpa_fdn.process.rda_run_in_desktop_in_desktop	Ensures the attended automations to r Desktop window. • Type: Yes | No • Default value: No If it is set to Yes, then the **Enable Deskt** check box on a new bot process form i default. If it is set to No, then the **Enable Deskt** check box on a new bot process form i default. For more information about the bot pro Process form in RPA Hub.
Enable the robot to force start. sn_rpa_fdn.process.force_start	Forces the robot to start. • Type: Yes | No • Default value: No If it is set to Yes, then the **Force Start** c bot process form is selected by default

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RPA Hub Properties (continued)

Property	Description
	For more information about the bot pro Process form in RPA Hub. For example, a robot R1 is assigned to multiple bot processes BP1 and BP2, a currently executing BP1. Then, if BP2, w *sn_rpa_fdn.process.force_s* property is set to Yes, is triggered force terminated.
Keep bot monitor active. sn_rpa_fdn.process.keep_monitor_active	Ensures that the bot monitor is active. • Type: Yes | No • Default value: Yes This system property is set at the instar property is not set at the automation le If it is set to Yes, then the **Keep Monito** on a new bot process form is selected system is unlocked even after locking i If it is set to No, then the robot machine on idle time settings as per the organiz automation doesn't have any foregrour SendKeys or Mouse click. For more information about the bot pro Process form in RPA Hub.
List of screen resolutions in desktop-in-desktop. sn_rpa_fdn.process.rda_screen_resolution	Lists the screen resolutions in a Deskto window. • Type: string • Default value: 1920x1080
Expected duration for the bot process to run. sn_rpa_fdn.process.runtime_threshold	Defines the expected duration for the b • Type: integer • Default value: 60 If a value is defined here, then the sam the **Run Time Threshold (mins)** field o form. For more information about the bot pro Process form in RPA Hub. The value in the **Runtime Threshold (M** bot process form and the configuration property are used for plotting the even robot calendar.

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RPA Hub Properties (continued)

Property	Description
	For more information about the robot c the robot calendar for RPA Hub.
Enable work item name to be unique. sn_rpa_fdn.queue.is_queue_item_name_unique	Ensures that the work item name is uni • Type: Yes | No • Default value: Yes If it is set to Yes, then the **Is Work Item** check box on a new queue form is sele There is no impact to the existing queu For more information about the queue form in RPA Hub.
Maximum value of max attempts field on work queues. sn_rpa_fdn.queue.maximum_attempts_max_value	Defines the maximum value of the **Max** field in the Queue form. • Type: integer • Default value: 99 • Maximum value: 99
Sets the default number of days to retain work items. sn_rpa_fdn.queue.purge_days	Defines the default value of the **Purge** in the Queue form. • Type: integer • Default value: 30
Maximum number of days to retain work items. sn_rpa_fdn.max_purge_days_work_queue_item	Defines the maximum value of the **Purg** fields in the Queue form. • Type: integer • Default value: 90
Maximum duration after the last heart beat for robot to turn unresponsive. The value must be between 5 and 30 minutes. sn_rpa_fdn.robot.unresponsive	Defines the maximum duration after the for the robot to turn unresponsive. The between 5 and 30 minutes. • Type: integer • Default value: 5 If a robot is unresponsive, then the sch automations will not execute on that ma
Sets the default value of the order field in the bot process. 1 being the highest and 999999 the lowest. sn_rpa_fdn.process.order	Defines the default value of the **Order** process. 1 is the highest and 999999 is the lowe

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RPA Hub Properties (continued)

Property	Description
	• Type: integer • Default value: 1
Maximum days to retain alert triggers. The value must be between 1 and 30. sn_rpa_fdn.alert.trigger_purge_days	Defines the maximum days to retain ale value must be from 1 through 30. • Type: integer • Default value: 10
Maximum days to retain alert notifications. The value must be between 1 and 60. sn_rpa_fdn.alert.purge_days	Defines the maximum days to retain ale value must be from 1 through 60. • Type: integer • Default value: 30
Maximum number of days to retain client logs. The value must be between 1 and 90. sn_rpa_fdn.purge_client_logs	Defines the limit for maximum days to r (product and execution logs). Based or delete the files in robot machine. The v through 90. • Type: integer • Default value: 7 After 7 days, in this scenario, the logs a purged from your local folder.
Set to fetch the robots in the **Assign bot process** section of the RPA Desktop Design Studio, whose machine name matches the one on which the Studio is running. sn_rpa_fdn.restrict_robots_in_assign_bot_process_by_machine_name	Restrict robots in **Assign bot process** s name. • Type: Yes | No • Default value: No If this value is set to Yes, then you can i as robot from the RPA Desktop Design specific robot machine, along with the Assigned Studio Users tab in the Robo If this value is set to No, then the users Assigned Studio Users tab in the Robo impersonate as robot from the RPA Des Studio. For more information about adc studio users, see Add assigned studio unattended robot. For more information about assign bot an automation project, see Assign bot automation project.
Set the default value of the Screen Resolution field on the Robot form for high density robots.	Defines the default value of the **Screen** the Robot form for high density robots.

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RPA Hub Properties (continued)

Property	Description
sn_rpa_fdn.robot_screen_resolution	• Type: string • Default value: 1920x1080
Bypass Legal Notice sn_rpa_fdn.bypass_legal_notice	Enables the unattended robot to clear message set by the system-level policy a legal notice is not displayed during th process. • Type: Yes | No • Default value: No

Configure the system properties for an activity stream in RPA Hub

Configure the system properties for an activity stream of work queues, schedules, packages, process parameters, and shared parameters in RPA Hub. You can add or remove the fields that are captured in the work notes of an activity stream.

Before you begin

You must do this task in the classic environment.

Role required: admin

About this task

You can view work notes captured for few fields, that are configured by default.

Procedure

1. In the **All menu** filter, enter `sys_properties.LIST`.
2. In the search bar, search for the system properties that are listed in the following table.

System properties

System Property	Description	Existing Values (in .csv format)
sn_rpa_fdn.work_queue_work_note_fields	List of work queue fields that are captured in the work notes.	name,is_queue_item_name_unique,max_atte

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System Property	Description	Existing Values (in .csv format)
sn_rpa_fdn.process_schedule_work_note_fields	List of process schedule fields that are captured in the work notes.	name,start_date,end_date,active,start_time,w
sn_rpa_fdn.package_work_note_fields	List of package fields that are captured in the work notes.	name
sn_rpa_fdn.process_parameter_work_note_fields	List of process parameters fields that are captured in the work notes for the shared parameters and process parameters.	name,value,is_sensitive

3. Select the system property that you want to modify.
4. On the System Property form, add or remove the values in the **Value** field.

   For example, to display the changes for the **Interval Type** field on the Schedule form, open the *sn_rpa_fdn.process_schedule_work_note_fields* system property, and then add the `interval_type` value in the **Value** field.

   Ensure that the values are added in the CSV (Comma-Separated Values) format in the **Value** field.
5. Select **Update**.

Related topics

Robots in RPA Hub

Configuring a bot process record in RPA Hub

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Display an activity stream for bot processes and robots in RPA Hub

Configure the system property to display an activity stream for bot processes and robots in RPA Hub.

Before you begin

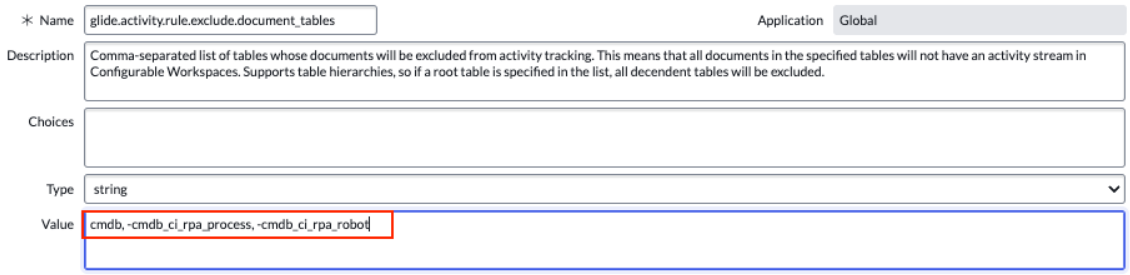
You must do this task in the classic environment.

Role required: admin

Procedure

1. In the **All menu** filter, enter `sys_properties.list`.
2. In the **Name** column, search for the *`glide.activity.rule.exclude.document_tables`* system property.
3. In the **Value** field, add the table names `-cmdb_ci_rpa_process` and `-cmdb_ci_rpa_robot` separated by a comma.
   Adding prefix (-) to the table name includes the documents of the table in the activity stream.

   Example

4. Select **Update**.

Add the ServiceNow RPA Chrome extension

Add the ServiceNow RPA Chrome extension to your Chrome browser to establish an interaction with the applications that are opened in this browser.

Before you begin

Role required: none

Procedure

1. Navigate to https://chrome.google.com/webstore/detail/servicenow-rpa-chrome-ext/bnaofpgjajbimmicdiipemhmheafhgkb.
2. Select **Add to Chrome**.
3. In the Add ServiceNow RPA Chrome Extension dialog box, select **Add extension**.
4. To verify if the extension is added, do the following actions:
   a. Select **Extensions**.
   b. In the Extensions dialog box, select **Manage Extensions**.
   c. Verify if the ServiceNow RPA Chrome Extension is enabled.
   d. **Optional:** To enable it, slide the toggle switch.

Result

You can see the ServiceNow RPA Chrome Extension on the Extensions page.

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What to do next
Restart the Chrome browser and the RPA Desktop Design Studio application.

Robot license distribution in RPA Hub

As a user who has the sn_rpa_fdn.rpa_admin role, you can create, write or delete robot license distribution record to define the consumption and distribution of licenses in your organization. You can create only one robot license distribution record per domain in a domain separated instance. Once you create this record, you can edit it, but you can't delete it.

If the instance you are using is not domain separated, then you can create only one robot license distribution record in global domain.

For more information about creating a robot license distribution record, see Create a robot license distribution record in RPA Hub.

For more information about executing RPA scripts, see Re-evaluate license distribution by executing RPA scripts.

For unattended robots, licenses are available for the robot that is created in the current domain only. Release managers or administrators create unattended robots and associate them with Windows or virtual machines. An unattended robot is mapped to only one Windows or virtual machine.

For attended robots, licenses are available for the domain that is associated to the robot. Release managers or administrators create attended robots and associate them with users. If the auto assignment of Attended Robot property (sn_rpa_fdn.allow_rda_robot_auto_assignment) is enabled, the robot records are automatically created on a first-come, first-served basis. An attended robot is mapped to only one user.

To unassign a user, you must retire the associated attended robot. For more information, see Unassign an attended user or group from an attended bot process in RPA Hub. To remove a user from a group, contact your organization.

To retire a robot if the robot machine is not working appropriately, retire the associated unattended robot. For more information, see Retire a robot in RPA Hub.

You can update a robot license distribution record. For more information, see Update a robot license distribution record in RPA Hub.

Create a robot license distribution record in RPA Hub

Define the consumption and distribution of licenses by creating a robot license distribution record in RPA Hub.

Before you begin
You must do this task in the classic environment.

Familiarize yourself with license distribution in RPA Hub concepts. For more information, see Robot license distribution in RPA Hub.

Install the RPA Hub. For more information, see Install Robotic Process Automation (RPA) Hub.

Role required: sn_rpa_fdn.rpa_admin

About this task
If the instance you are using is not domain separated, then create the license distribution record in the global domain.

If the instance you are using is domain separated, create a license distribution record in a top-down approach, starting with the top-level or primary domain. Do not create the license

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distribution record in the global domain. If the parent domain does not have a license distribution record, you can't create a license distribution record for child domains.

You can create only one license distribution record per domain.

A license distribution record is necessary to create any robots in the instance, for each domain.

For example, a domain separated instance with top domain and two child domains has 20 unattended robot licences and 45 attended robot licences. In each domain, you could assign 5 unattended robot licences and 15 attended robot licences. The **Available from Parent** field will show 10 unattended robot licences and 15 attended robot licences that are not yet assigned. When a robot is created in a child domain, a license is automatically utilized in that domain. In a license distribution record of a child domain, the **Utilized** field will show the value as 1 and the **Available to use or distribute** field will show the value as 4, which is remaining assigned licenses that are not yet utilized.

If you have more robots than the assigned licenses, then the instance or the specific domain (and its child domains) gets locked. Then, the robots do not execute automations in the current and child domains.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Administration** > **Robots License Distribution**.
2. Select **New**.
3. On the form, fill in the fields.

Robot License Distribution form

Field	Description
Number	Auto-generated robot license distribution record number. This is a read-only field.
Available from Parent (Unattended)	Maximum number of the unattended robot licenses that are available from the parent domain and are not yet assigned. This is a read-only field.
Assigned (Unattended)	Total number of the assigned licenses for unattended robots in the current domain. This value must not exceed the value in the **Available from Parent (Unattended)** field.
Utilized (Unattended)	Total number of utilized licenses by the non-retired unattended robots that are created in the current domain. This is a read-only field.
Available to use or distribute (Unattended)	Maximum number of the unattended robot licenses that can be either distributed to the child domains or can be utilized in the current domain.

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Field	Description
	This field shows difference of assigned and utilized licenses. This is a read-only field.
Domain	Name of the current domain. Only one record can be created per domain. Once created, this record can only be edited and can't be deleted. This is a read-only field.
Available from Parent (Attended)	Maximum number of the attended robot licenses that are available from the parent domain and are not yet assigned. This is a read-only field.
Assigned (Attended)	Total number of the assigned licenses for attended robots in the current domain. This value must not exceed the value in the **Available from Parent (Attended)** field.
Utilized (Attended)	Total number of utilized licenses by the non-retired attended robots that are created in the current domain. This is a read-only field.
Available to use or distribute (Attended)	Maximum number of the attended robot licenses that can be either distributed to the child domains or can be utilized in the current domain. This field shows difference of assigned and utilized licenses. This is a read-only field.

Note: Enter the values for the **Assigned (Unattended)** and **Assigned (Attended)** fields. Based on these values, the remaining fields are auto-populated.

4. Select **Submit**.

Related topics

Update a robot license distribution record in RPA Hub

Update a robot license distribution record in RPA Hub

Update a robot license distribution record in RPA Hub to evaluate the consumption and distribution of licenses in your organization.

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Before you begin

Familiarize yourself with license distribution in RPA Hub concepts. For more information, see Robot license distribution in RPA Hub.

You must do this task in the classic environment.

Role required: sn_rpa_fdn.rpa_admin

About this task

For example, a domain separated instance with top domain and two child domains has 20 unattended robot licences and 45 attended robot licences. In each domain, you could assign 5 unattended robot licences and 15 attended robot licences. The **Available from Parent** field will show 10 unattended robot licences and 15 attended robot licences that are not yet assigned. When a robot is created in a child domain, a license is automatically utilized in that domain. In a license distribution record of a child domain, the **Utilized** field will show the value as 1 and the **Available to use or distribute** field will show the value as 4, which is remaining assigned licenses that are not yet utilized.

If you have more robots than the assigned licenses, then the instance or the specific domain (and its child domains) gets locked. Then, the robots do not execute automations in the current and child domains.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Administration** > **Robots License Distribution**.
2. Open the license record that you want to update.
3. Update the following fields as appropriate.

Robot License Distribution form

Field	Description
Assigned (Unattended)	Total number of the assigned licenses for unattended robots in the current domain. This value must not exceed the value in the **Available from Parent (Unattended)** field.
Assigned (Attended)	Total number of the assigned licenses for attended robots in the current domain. This value must not exceed the value in the **Available from Parent (Attended)** field.

4. Select **Update**.

Related topics

Create a robot license distribution record in RPA Hub

Re-evaluate license distribution by executing RPA scripts

Run the Robotic Process Automation (RPA) script on demand to validate and unlock the robots in a domain and its child domains.

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Before you begin

Familiarise with license distribution in RPA Hub concepts. For more information, see Robot license distribution in RPA Hub.

To unlock the robots in a domain, ensure that the license entitlement and consumption is compliant.

A schedule script runs every 12 hours to evaluate the utilized robots.

You must do this task in the classic environment.

Role required: sn_rpa_fdn.rpa_admin

About this task

An RPA script is a scheduled job that is executed on demand.
If you want to execute this script on demand, follow the steps in this topic.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Administration** > **RPA Scripts**.
2. Select **Re-evaluate License Distribution**.
3. Select **Execute Now**.
   A scheduled job runs to reevaluate the distribution of attended and unattended robots across different domains. If there is any discrepancy, it locks that particular domain and related child domains.

Using RPA Hub

Developers, support users, release managers, and administrators can use the RPA Hub application to start and stop a bot process, launch a bot process in the RPA Desktop Design Studio, execute skills, view the HashCode of a package version, and retire a bot process, package, and a robot.

Configuring a bot process record in RPA Hub

In RPA Hub, you can create a bot process configuration record and assign assets to associate it with a bot process. Or you can just save the bot process configuration record, however it won't be associated to a bot process. It remains orphaned.

What is a bot process

A bot process is a predefined sequence of actions that a robot follows to accomplish a specific task or achieve a particular goal.

Let's say that you have an Accounting System Update bot process. The associated robot logs in to your company's accounting system, such as SAP. The robot enters the extracted invoice data, which creates the entries for your accounts payable. The robot then attaches the original invoice to the accounting system for reference.

Benefits of a bot process

A bot process enables you to do the following:

- streamline operations
- enhance efficiency
- improve overall productivity

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What is a bot process configuration

A bot process configuration is a record that contains the bot process settings. The bot process configuration record is mapped to a bot process record. It is a one to one mapping.

You assign a package and schedule the bot process run that will be executed by the robot. You can add other details that pertain to the bot process, such as business applications, credential groups, robots, process robot credentials, process parameters, attended users, or groups. For more information about these terms, see Robotic Process Automation (RPA) Hub glossary.

Life-cycle stage statuses (LLCS) of a bot process in RPA Hub

The State transition of a bot process guides you through the stages of its life cycle.

Bot process life-cycle stage status

Life-cycle stage status	Description
Build	Default value for a new bot process.
Published	The bot process is ready to be active.
In Maintenance	When changes are to be done in the bot process. If a bot process is in **In Maintenance** status, you cannot start or stop a bot process or launch a bot process in RPA Desktop Design Studio.
Retired	Bot process is inactive. After you retire a bot process, you cannot change the stage.

Related topics

Configuring a bot process record in RPA Hub

Execution priority of bot processes in RPA Hub

Learn how to prioritize bot processes efficiently and avoid triggering multiple automations on the same robot. The bot processes are organized by both robots and Windows user credentials.

Scheduled trigger

When multiple bot processes are scheduled to run at the same time, consider the following scenarios to understand how bot process execution is prioritized based on order number and Windows credentials.

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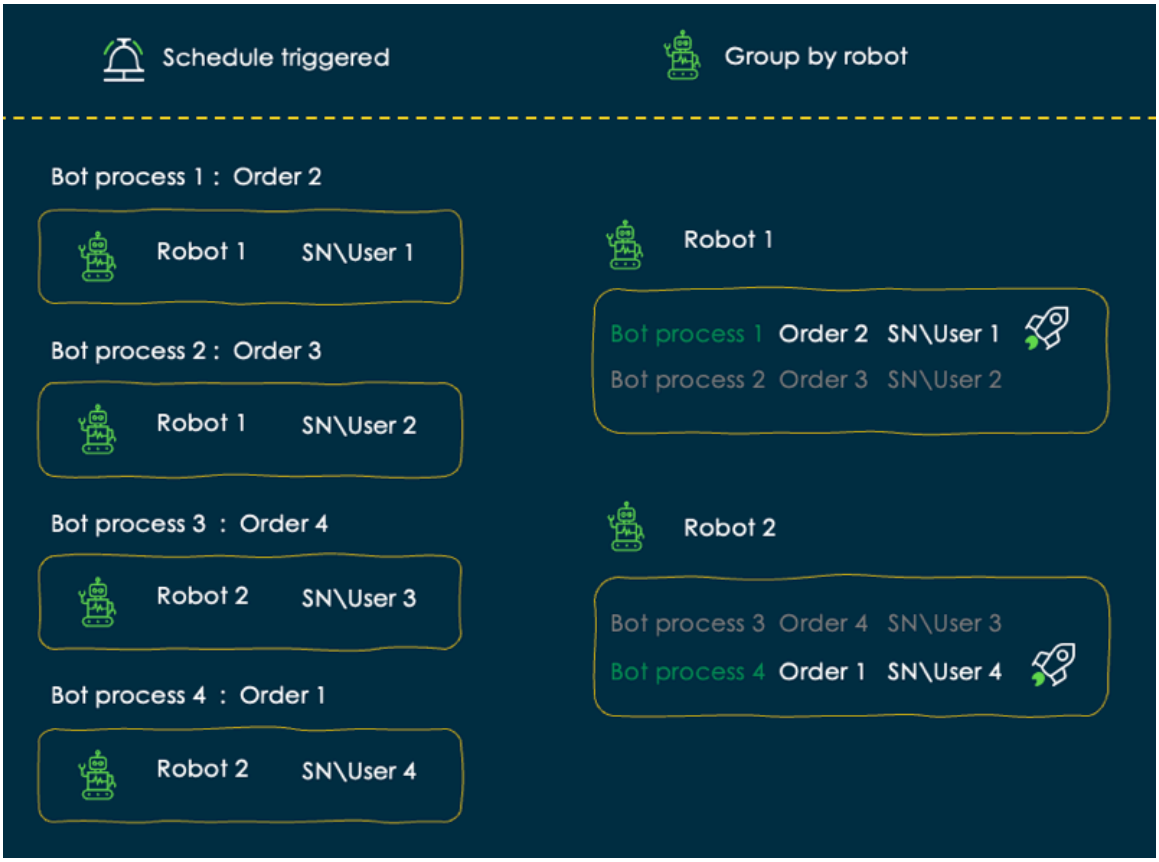
Scenario 1: Robots with different Windows credentials



The following bot processes use robots 1 and 2 with different priority orders and the robots use different credentials to login to a Windows machine.

- Bot process 1
  - Robot: Robot 1
  - Order: 2
  - Windows credential: SN\User 1
- Bot process 2
  - Robot: Robot 1
  - Order: 3
  - Windows credential: SN\User 2
- Bot process 3
  - Robot: Robot 2
  - Order: 4
  - Windows credential: SN\User 3
- Bot process 4
  - Robot: Robot 2
  - Order: 1
  - Windows credential: SN\User 4

When all bot processes are scheduled to start simultaneously, execution is determined based on the following logic:

1. Bot processes are grouped by the robot.
2. Within each group, the bot process with the lowest priority number is executed.

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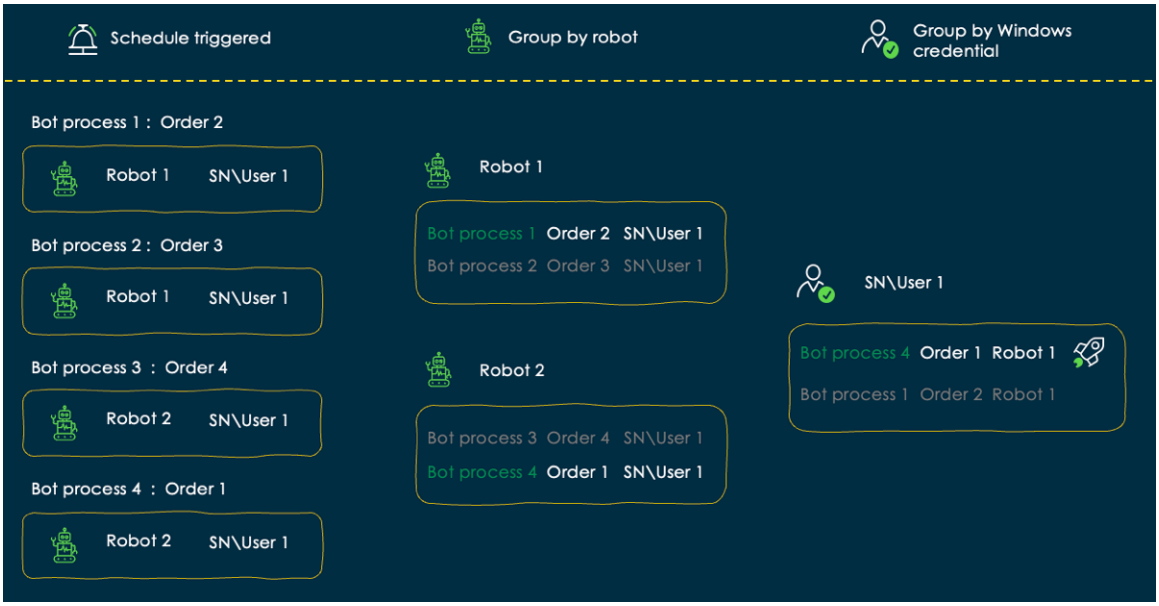
Scenario 2: Robots with the same Windows credential



The following bot processes use high-density robots 1 and 2 with different priority orders and use same credentials to login to a Windows machine.

- Bot process 1
  - Robot: Robot 1
  - Order: 2
  - Windows credential: SN\User 1
- Bot process 2
  - Robot: Robot 1
  - Order: 3
  - Windows credential: SN\User 1
- Bot process 3
  - Robot: Robot 2
  - Order: 4
  - Windows credential: SN\User 1
- Bot process 4
  - Robot: Robot 2
  - Order: 1
  - Windows credential: SN\User 1

When all bot processes are scheduled to start simultaneously, priority is determined based on the following logic:

1. Bot processes are first grouped by the robot.
2. Within each group, the bot process with the lowest priority number is selected.

Intermediate priority results:

- Robot 1: Bot Process 1 (priority 2) is selected over Bot Process 2 (priority 3).
- Robot 2: Bot Process 4 (priority 1) is selected over Bot Process 3 (priority 4).

However, Bot Process 1 and Bot Process 4 cannot be launched in the same Windows session simultaneously due to shared credentials (SN\User1). To resolve

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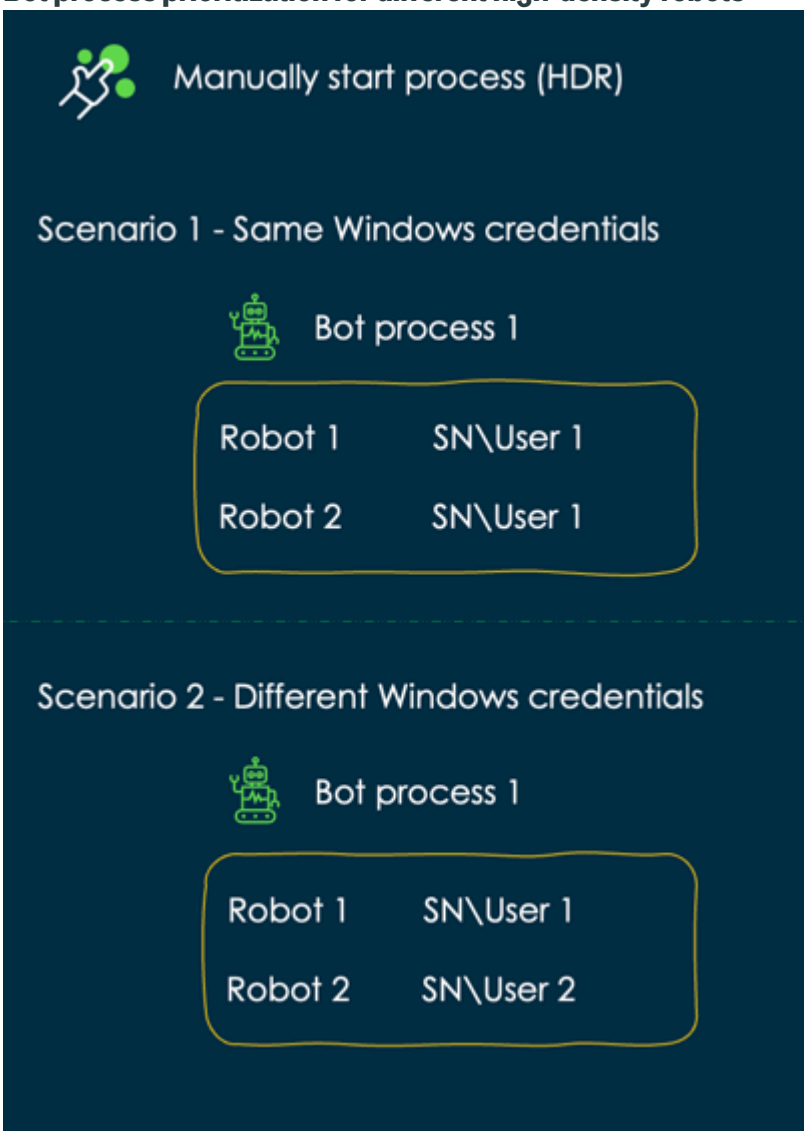
Manual trigger

When a bot process with multiple high-density robots is triggered using the **Start Process** button, consider the following scenarios to understand how bot process execution is prioritized for a robot.

Bot process prioritization for different high-density robots



Scenario 1: Robots with the same Windows credentials

The Bot process 1 uses high-density robots 1 and 2 with the same credentials to login to a Windows machine. When the **Start Process** button is clicked on the Bot process 1 for Robot 1 and Robot 2, any one robot is picked randomly to execute the bot process. The process job with the **Skipped** status is created for the other robot.

Scenario 2: Robots with different Windows credentials

The Bot process 1 uses high-density robots 1 and 2 with different credentials to login to a Windows machine. When the **Start Process** button is clicked on the Bot process 1 for Robot 1 and Robot 2, both the robots execute the bot process simultaneously.

Create a bot process configuration record in RPA Hub

Create a bot process configuration record in RPA Hub so that you can define the preliminary fields for a bot process record.

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Before you begin

Create a package. For more information, see Create a package to assign to a bot process.

Create a robot. For more information, see Robots in RPA Hub.

Configure the related system property to view the activity stream. For more information, see Display an activity stream for bot processes and robots in RPA Hub.

Before you can access a bot process, ensure that the RPA business user (sn_rpa_fdn.rpa_business_user), RPA developer (sn_rpa_fdn.rpa_developer), or the RPA support user (sn_rpa_fdn.rpa_support_user) are in the Managed by Group list.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

A bot process is a predefined sequence of actions that a robot follows to accomplish a specific task or achieve a particular goal.

A bot process configuration record contains the bot process settings.

The bot process configuration record is mapped to a bot process record. It is a one to one mapping.

When you associate the bot process configuration record with a bot process record, you can't dissociate the mapping, regardless of the life-cycle stage status of the bot process.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Create a bot process configuration record from either the list icon or from the plus icon.

Option	Action
Create a bot process configuration record from the list icon	**a.** Select the list icon ( ). **b.** On the **Lists** tab, in **Build**, select **Bot Process**. **c.** Select **Create Configuration**.
Create a bot process configuration record from the plus icon	**a.** Select the plus icon (+). **b.** Select **New Bot Process Configuration**.

3. On the form, fill in the fields.
   For a description of the field values, see Bot process configuration form in RPA Hub.
4. Save the configuration record only or create a configuration record and bot process and then associate the record with the bot process.

Option	Action
Only save the bot process configuration record	Select **Save**. Skip the post-requisite task. This configuration record is not associated to a bot process. It remains orphaned.

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Option	Action
	If you want to associate it with a bot process record later, follow the steps in Associate a bot process to a bot process configuration record.
Create a bot process and bot process configuration record. Then associate the record with the bot process	**a.** Select **Assign Assets**. **b.** On the form, complete the remaining fields. For a description of the field values, see Bot Process form in RPA Hub. **c.** Select **Save**. **d.** On the **Details** tab, under **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

What to do next

You can add other details to the bot process, such as the business applications, credential groups, robots, process robot credential sets, schedules, process parameters, attended users, or groups. For more information, see Adding details to your bot process in RPA Hub.

(Optional) On the bot process configuration record, select the **Bot Process** button to navigate to the Overview tab of the bot process. You can't view this Bot Process button if the bot process configuration record is not associated to any bot process.

Related topics

- Edit a bot process in RPA Hub
- Publish a bot process in RPA Hub
- Retire a bot process in RPA Hub
- View Audit History

Bot process configuration form in RPA Hub

Use the Bot Process Configuration form to define the preliminary fields for a bot process record.

Bot Process Configuration form

Field	Description
Name	Unique name of the bot process configuration. The name of the bot process configuration is reused for the bot process that is associated with this configuration record.
Process Type	Type of the bot process: • **Unattended**: Automations that don't require any human intervention. • **Attended**: Automations that require human intervention.

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Bot Process Configuration form (continued)

Field	Description
Order	Execution priority of the bot process: • **1**: Highest priority • **999999**: Least priority The default value is set to 1. RPA business user can view this field. This field appears only when **Unattended** is selected from the **Process Type** field.
Package	Associated package of the bot process. For an unattended bot process, associate an unattended type package. For an attended bot process, associate an attended type package. Only published packages can be associated.
Package Version	Version of the active package in use. Only published package versions can be associated. Ensure that the version belongs to the populated package.
Application	Application that contains this record. This field is auto-generated. Role required to view this field: admin.
Run Time Threshold (mins)	Expected duration for the bot process to run. The default value is 60 minutes. RPA business user can view this field. This field appears only when **Unattended** is selected from the **Process Type** field. This is a required field.
Job Purging (days)	Number of days after which the job data is deleted.
Description	Description of the bot process.

Related topics

Configuring a bot process record in RPA Hub

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Associate a bot process to a bot process configuration record

Select a bot process configuration record to associate it with a bot process. This action creates a bot process record in RPA Hub.

Before you begin

Create a package. For more information, see Create a package to assign to a bot process.

Create a robot. For more information, see Robots in RPA Hub.

Configure the related system property to view the activity stream. For more information, see Display an activity stream for bot processes and robots in RPA Hub.

Before you can access a bot process, ensure that the RPA business user (sn_rpa_fdn.rpa_business_user), RPA developer (sn_rpa_fdn.rpa_developer), or the RPA support user (sn_rpa_fdn.rpa_support_user) are in the Managed by Group list.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

A bot process is a predefined sequence of actions that a robot follows to accomplish a specific task or achieve a particular goal.

A bot process configuration record contains the bot process settings. The bot process configuration record is mapped to a bot process record. It is a one to one mapping. You can only select one bot process record to associate with a bot process configuration record. You can't edit a bot process configuration record that is associated with a bot process.

When you retire a bot process record, you can't associate the related bot process configuration record to other bot processes.

You can create a bot process configuration record in two ways. The first way is when you create and save a bot process configuration record.

The second way is when you move an update set from a lower environment to a higher environment, an orphan bot process configuration record is created. After you select the **Assign Configuration** button and its record, the bot process record that is associated to the bot process configuration is created.

For more information about migrating your metadata from a lower environment to a higher environment, see Migrating your data from a lower environment to a higher environment in RPA Hub.

Procedure

You can associate a bot process to a bot process configuration record by choosing one of these options.

Option	Action
Perform this task in workspace	**a.** Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**. **b.** Select the list icon ( ). **c.** On the **Lists** tab, under **Build**, select **Bot Process**. **d.** In the form header, select the down arrow in the **Create Configuration** button.

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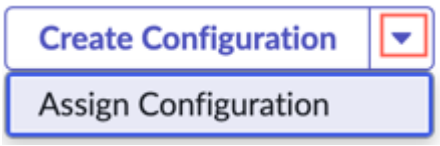
Option	Action
	Down arrow in the Create Con figuration button  **e.** Select **Assign Configuration**. **f.** Select a bot process configuration record to associate it with a bot process. **g.** Select **Submit**. **h.** On the form, fill in the fields. For a description of the field values, see Bot Process form in RPA Hub. **i.** Select **Save**. **j.** On the **Details** tab, in **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.
Perform this task in the classic environment	**a.** Switch to the classic environment. **b.** Navigate to **All** > **Robotic Process Automa tion** > **Build** > **Bot Process**. **c.** In the form header, select **New**. **d.** Select a bot process configuration record to associate it with a bot process. **e.** Select **Submit**. **f.** On the form, fill in the fields. For a description of the field values, see Bot Process form in RPA Hub. **g.** Select **Save**.

What to do next

You can add other details that pertain to the bot process, such as the business applications, credential groups, robots, process robot credential sets, schedules, process parameters, attended users, or groups. For more information, see Adding details to your bot process in RPA Hub.

Related topics

- Create a bot process configuration record in RPA Hub
- Bot process configuration form in RPA Hub
- Edit a bot process in RPA Hub
- Publish a bot process in RPA Hub

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Retire a bot process in RPA Hub

View Audit History

Bot Process form in RPA Hub

Use the Bot Process form to associate it to the bot process configuration and populate the remaining fields required for a bot process.

Bot process form

Field	Description
Bot Process	
Name	Unique name of the bot process.
Process Type	Type of the bot process: • **Unattended**: Automations that don't require any human intervention. • **Attended**: Automations that require human intervention.
Bot Process Configuration	[Auto-generated] Associated bot process configuration of the bot process.
Order	Priority order of execution for the bot process. • **1**: Highest priority • **999999**: Least priority If more than one unattended bot process is scheduled to start at the same time, the one with the highest priority runs, and the others are marked as **Skipped**. If multiple bot processes have the same priority and schedule, one bot process is chosen at random to run.For more information, see Execution priority of bot processes in RPA Hub. The default value is set to `1`. RPA business user can view this field. This field appears only when **Unattended** is selected from the **Process Type** field.
Package	Associated package of the bot process. For an unattended bot process, associate an unattended type package. For an attended bot process, associate an attended type package. Only published packages can be associated.
Package Version	Version of the active package in use. Only published package versions can be associated.
Life Cycle Stage Status	[Auto-generated] Life cycle stage status of bot process configuration.

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Bot process form (continued)

Field	Description
Run Time Threshold (mins)	Expected duration for the bot process to run. The default value is 60 minutes. This field appears only when **Unattended** is selected from the **Process Type** field. RPA business user can view this field. This field is required.
Job Purging (days)	Number of days after which the job data is deleted.
Managed by	IT owner of the business process. This field appears only for an existing record. Roles required to edit this field: RPA release manager and RPA admin.
Owned by	Business user who is part of the managed by a group and is responsible for the business process. This field appears only for an existing record. This field depends on what you entered in the **Managed By Group** field. If an entry in the **Managed By Group** field is populated, then only those users who are a part of the **Managed By Group** field and have an RPA business user role can be added to the **Owned By** field. If the **Managed by Group** field is empty, then the **Owned By** field is read-only. Roles required to edit this field: RPA release manager and RPA admin.
Enable Embedded Task Automation	Option to trigger the attended bot process (automation) from the associated ServiceNow form that is mapped in the attended configuration record. For more information about the attended configuration record, see Attended Configuration form in RPA Hub. On enabling the **Embedded Task Automation** check box, two additional tabs, **Process Field Parameters** and **Attended Configuration**, are displayed on the bot process form. For more information about Embedded Task Automation, see Embedded Task Automation (ETA) in RPA Hub.
Description	Description of the bot process.
Session Settings	
Keep Monitor Active	Option to keep the monitor active of the machine where the robot is running the bot process.

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Bot process form (continued)

Field	Description
	This field appears only when **Unattended** is selected from the **Process Type** field.
Auto Session Restore	Option to restore the state of the robot to the initial stage before the automation is executed. This field appears only when **Unattended** is selected from the **Process Type** field.
Force Start	Option to force start a bot process on a robot to override any other bot process already running on it. If the **Force Start** option is enabled for a bot process P1 and if bot process P2 is running on the same robot, P2 stops and P1 executes. Then, the process job of P2 moves to **Canceled** state. The **Force Start** option does not override the **Order** field. The **Force Start** option is applicable for the existing running bot processes and is not applicable for the bot processes that are yet to be launched. This field appears only when **Unattended** is selected from the **Process Type** field.
Enable Desktop In Desktop	Option to enable attended automation to run in Desktop In Desktop window. This option creates a new session on the same machine and the automation can be executed on this session without interrupting actual manual work on the main session. On enabling this option, the **End Desktop In Desktop on Complete** check box is also selected. This field appears only when **Attended** is selected from the **Process Type** field.
End Desktop In Desktop on Complete	Option to close the Desktop In Desktop window after the bot process execution is completed. This option is automatically selected when you select **Enable Desktop In Desktop**. To leave the Desktop In Desktop window open after the bot process completes, clear the check box. This field appears only when **Attended** is selected from the **Process Type** field.
Screen Resolution	Screen resolution for the Desktop In Desktop window. This field appears only when **Attended** is selected from the **Process Type** field.
Log Settings	
Track Execution Logs	Option to enable the tracking of process execution logs.

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Bot process form (continued)

Field	Description
	After you enable this check box, the logs are captured when an automation is executed by either an attended or an unattended robot. These logs help in understanding the errors and the end-to-end logging of automation execution. If process jobs are purged, then the corresponding execution logs are purged. By using the Attach feature in RPA Desktop Design Studio, these execution logs can be used to replay the automation to understand where the automation has failed. For example, at which component the automation has failed or details of the inputs passed to that component. **Note:** The **Attach** feature doesn't support Flat file output type.
Synchronize Execution Logs (seconds)	Frequency, in seconds, for execution logs to synchronize. This field appears only when the **Track Execution Logs** option is selected. If you select **Robot Machine** in the **Storage** field, then this field is hidden.
Storage	**Note:** This field appears only when the **Track Execution Logs** option is selected. Storage location options for the execution logs: • **Instance**: Only error information is logged in the execution log, on the instance. If you select **Instance**, then the value for the **Log Level** field is set to Error and it can't be edited. • **Robot Machine**: The log files are stored in the robot machine where the automation is executed. If you select **Robot Machine**, then you can view two options to select from the **Log Level** field - **Error** or **Verbose**. To view the end-to-end execution logs of all the components, select **Robot Machine** from the **Storage** field and then select **Verbose** from the **Log Level** field. For optimum utilization of disk space in the robot machine, the existing logs are purged, based on the *sn_rpa_fdn.purge_client_logs* system property setting. If you select **Robot Machine**, then • **Synchronize Execution Logs** field is hidden. • The execution logs are stored in the machine on which the attended or unattended robot is installed.

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Bot process form (continued)

Field	Description
Output Type	Output type of the execution log file. This log file is generated during the robot execution on the machine. There are two types of output: • **DB File**: Default value. It's a lite database file that stores the process job metadata and the process automation execution details. After the process job completion, you can attach the DB file using the **Attach** option in the RPA Desktop Design Studio project to replay the automation on the design surface. • **Flat File**: It's a file format that stores the process job metadata and the process automation execution details in plain text. It stores the execution data in a JSON format. This **Output Type** field appears when the **Track Execution Logs** option is selected and when the **Robot Machine** is selected from the **Storage** field. If a bot process, with Flat File as the Output Type, is triggered, then the execution log file is added to the process job folder in .txt format in the given locations. Similarly, for DB output type you will view .db format in the given locations. The location of both the flat files and the DB files is in the machine on which the attended or unattended robot is installed. • During execution: `Users\<Userprofile>\ServiceNow RPA Logs\.executionlogs\{InstanceName}\{ProcessJob number}`. For example, `Users\john.smith\ServiceNow RPA Logs\.executionlogs\{InstanceName}\PJB0001165`. • After execution is complete: `Users\<Userprofile>\ServiceNow RPA Logs\.executionlogs\{InstanceName}\.archive\{ProcessJob number}`. For example: `Users\john.smith\ServiceNow RPA Logs\.executionlogs\{InstanceName}\.archive\PJB0001165`. The content in the flat files is in JSON format. The following image gives the content structure. When you choose the **Flat File** option to store the execution logs, two flat files are generated and stored in the locations given. • `ExecutionJobMetadata.txt`: Contains information on the process job such as the Process ID, Robot ID, and the log level. The image shows the structure of the content in the file. **Structure of content in Flat File**  • File name in the format `ddMMMyyyy HHmmss.txt` (For example, `28Dec2023 125036.txt`): Contains the execution log entries.

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Bot process form (continued)

Field	Description
	For example, the file gives the name of the Activity, component execution start and end time, duration, and the result in boolean, if applicable. The flat files follow the rules on data purging set in the *sn_rpa_fdn.purge_client_logs* system property. For more information about the system property, see Configure RPA Hub properties. **Important:** In RPA Desktop Design Studio, if you mark one or more input or output ports of one or more components or methods in an automation as **Mark Data as Sensitive**, the flat file does not log the execution data of its corresponding process job. Instead, in the JSON file the data corresponding to the port appears as **SENSITIVE**. The following image gives an example. **Port indicated as sensitive**  For more information about marking an input or output port as **Mark Data as Sensitive**, see Configure port properties Since the actual data for the execution logs contain abundant data, the required data is only preserved. The content in text file is JSON type. To modify the value of this field for an existing bot process, ensure that the associated bot process is **In Maintenance** state.
Log Level	Select a log level to capture: • **Error**- Only error information is stored during automation execution. • **Verbose**- Error information and end-to-end component execution logs, such as inputs and outputs and execution steps with timestamps are stored during automation execution. When you select **Verbose**, the flat files record details of the execution of all components in the automation. If the size of the flat file exceeds 10 MB while the process job executes, the flat file continues to split into multiple flat files with the log sequence appended in the file-naming convention until it executes the complete automation. The naming conventions of such files are `<timestamp>_<LogSequence>`. This option appears only when Robot machine is selected as storage type. This field appears only when the **Track Execution Logs** option is selected.

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Bot process form (continued)

Field	Description
Track Automation Logs	Track automation logs that are generated by the robot. The robot logs the automation execution in automation logs. The logs help the RPA users to track the automation progress. For more information about viewing the automation logs, see View automation logs in RPA Hub. To view automation logs of a bot process, in RPA Desktop Design Studio, use the Log component in the associated automation and populate the required details. For more information about the Log component, see Use the Log component.
Access	
Managed by Group	Group that can access the bot process.
Robot Pool Roles required to edit this field: RPA release manager and RPA admin. If an RPA developer and RPA support user are a part of the Managed by Group, then they can view and edit these fields. RPA business user can view these fields.	
Enable Robot Pool	Option to enable the robot pool for the bot process. On enabling this option, the **Assign Robots** tab on the bot process is hidden. For more information about robot pool, see Robot pool in RPA Hub.
Robot Pool	Robots that you can allocate dynamically from a selected robot pool. Select a robot pool from a list of existing robot pool names. This field appears only when the **Enable Robot Pool** option is selected.
Allocation Type	Robots that you can allocate based on the Service Level Agreement (SLA) of the work items or the percentage of efficiency gain. Select the allocation type: • **SLA Based**: Allocation of robots from the pool based on the SLA of the work item. The work items are sorted and prioritized based on the SLA. If you select the allocation type as SLA Based, ensure that the work items must contain a Service Level Agreement (SLA). • **Percentage Reduction**: Allocation of robots from the pool based on the efficiency percentage. The default value is SLA Based.

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Bot process form (continued)

Field	Description
	This field appears only when **Enable Robot Pool** option is selected.
Percentage Reduction	This field appears only when **Percentage Reduction** is selected from the **Allocation Type** field. Reduce the total execution time of a bot process by allocating more robots by a selected percentage. For example, if there are 100 work items assigned to a bot process. It might take 100 minutes to execute the bot process. If you want to reduce that time to 75 minutes, you define a value 25 in this field. After you provide a value in this field, multiple robots are allocated to distribute the work load. Thus, the automation performs faster by that percentage. The default value is 25. Robots are allocated to distribute the workload, based on the percentage you select: • If you select a value from 5 to 50, 2 robots are allocated. • If you select 55, 60, or 65, 3 robots are allocated. • If you select 70 or 75, 4 robots are allocated. • If you select 80, 6 robots are allocated. • If you select 85, 7 robots are allocated.
Compose	
Work notes (Private)	Work notes for the bot process. View the changes executed on the associated package, package version, process parameter, shared parameter, queue, and schedule.
Additional Comments	Additional comments that are related to the bot process.

Related topics

Create a bot process configuration record in RPA Hub

Configuring a bot process record in RPA Hub

Adding details to your bot process in RPA Hub

After you create a bot process in RPA Hub, you can add some details for your bot process, such as information about the credential groups, business applications, and more.

You can add the following details that pertain to the bot process:

- Business applications
- Process credential mappings
- Robots or Robot Pool
- Process robot credentials
- Schedules

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- Process parameters
- Attended users or groups
- Queues
- Skill overrides

Depending on what you selected for the **Process Type** field on the Bot Process Configuration form, you can add related details to the bot process.

If you can't view the activity stream, configure the system property to display the activity stream. For more information, see Display an activity stream for bot processes and robots in RPA Hub.

For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

Assign a business application to a bot process in RPA Hub

Assign a business application to a bot process for an effective event correlation or to get information about assigned business applications. For example, you might want to see information about the SAP application.

Before you begin

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Verify that the business application exists on this ServiceNow instance. To add a new business application, navigate to **All** > **Self-service** > **Business Applications**.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

You can add any credentials for assigned business applications. If you remove a business application, the associated application credentials are also removed.

You can't remove or edit an associated business application for a published or a retired bot process.

An RPA business user [sn_rpa_fdn.rpa_business_user] can view the business applications.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process that you want to associate a business application to.
5. On the **Business Applications** tab, select **Add**.
6. On the **Available Business Applications** tab, select the required business application.
7. Select **Add**.
8. Select **Save**.
9. **Optional:** To remove a business application, select the business application, and select **Remove**.

Associate a credential group to a bot process in RPA Hub

Enable a robot to perform an automation in RPA Hub by mapping a credential group to an unattended bot process.

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Before you begin

Do this task only when you select the **Process Type** field as **Unattended** on the Bot process configuration form while you're creating a bot process. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Create a credential group. For more information, see Create a credential group in RPA Hub.

You can associate the credential group to an unattended bot process that doesn't have the life-cycle stage status set to **Retired** or **Published**. For more information, see Life-cycle stage statuses (LLCS) of a bot process in RPA Hub.

You can't edit the **Process Credential Mappings** record when the life-cycle stage status of the associated bot process is set to **Published**.

Only the RPA developers who have created the credential groups can associate credential groups to a bot process.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

A credential group includes application credentials and a robot credential.

Note: If you're upgrading to Xanadu and have customized the bot process related-list tabs, the **Process Credential Mappings** tab might not appear to you. However, you can add this tab in the bot process record by navigating to **Additional actions** > **Configure** > **Related Lists** in the classic environment.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Select the bot process that you want to map a credential group to.
5. On the **Process Credential Mappings** tab, select **Add**.
6. Select the required credential groups.
7. Select **Add**.
8. Provide access to authorized users.
   For more information, see Provide users with access to a credential group in RPA Hub.
9. Select **Save**.

Assign a robot to a bot process in RPA Hub

Assign a robot to an unattended bot process to execute the automation (package) that is mapped to it.

Before you begin

Ensure that the **Enable Robot Pool** option isn't selected in the Robot Pool section of the Details tab of the bot process.

Familiarize yourself with robot pool concepts. For more information, see Robot pool in RPA Hub.

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You can assign robots with a life cycle stage status of **In Use** to a bot process.

Do this task only when you select the **Process Type** field as **Unattended** on the Bot process configuration form while you're creating a bot process. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

If the bot process has enabled the robot pool option, then you can't assign robots. The **Assigned Robots** tab is hidden.

To assign robots via robot pool, enable the robot pool option on the bot process form. For more information, see Enable robot pool for a bot process in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process that you want to associate a robot to.
5. On the **Assigned Robots** tab, select **Add**.
6. On the **Available Robots** tab, select the required robot.
7. Select **Add**.
8. Select **Save**.

Assign a process robot credential within a bot process in RPA Hub

Assign a process robot credential within an unattended bot process so that the selected robot can perform the automation in the Windows machine.

Before you begin

Do this task only when you select the **Process Type** field as **Unattended** on the Bot process configuration form while you're creating a bot process. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

Assign a robot to the bot process. For more information, see Assign a robot to a bot process in RPA Hub.

Create a credential group. For more information, see Create a credential group in RPA Hub.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

About this task

One credential group can be associated to more than one robot, but one robot can't have more than one credential groups. All the robots assigned to the bot process must be mapped to a process robot credential record. After the mapping is done, if you delete the credential group or robot, the process robot credential record is also deleted.

If a robot is a part of a robot pool, ensure to map process robot credentials for each robot in the robot pool.

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If any robot in the robot pool is deleted, then the associated process credentials for all the related bot processes are also deleted.

If the bot process using the robot pool is deleted or if the robot pool is deactivated on the bot process, then all the process credentials for that bot process are also deleted.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process that you want to assign the credentials to a robot to.
5. On the **Process Robot Credentials** tab, select **New**.
6. On the form, fill in the fields.

Process Robot Credential form

Field	Description
Credential Group	Credential group to be associated with this bot process and the assigned robot.
Robot	Robot to associate with this bot process and the credential group combination.
Process	Name of the bot process. This field is read-only.

7. Select **Save**.
8. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Create a schedule within a bot process in RPA Hub

Create a schedule within an unattended bot process to enable users to execute jobs in a planned manner at regular intervals. More than one schedule can be associated with one bot process.

Before you begin

Do this task only when you select the **Process Type** field as **Unattended** on the Bot process configuration form, while you are creating a bot process. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

(Optional) Configure the system properties related to **Activity Stream**, to add or remove the fields. The changes to these fields are captured in the work notes. For more information, see Configure the system properties for an activity stream in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

About this task

You cannot delete a schedule that is associated to a published bot process.

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You can also create a schedule from the Robot Calendar tab. For more information, see Create a schedule on the robot calendar in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process that you want to create and associate a schedule to.
5. On the **Schedules** tab, select **New**.
6. On the form, fill in the fields.
7. Select **Save**.
8. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Related topics

Schedule form in RPA Hub

View Audit History

Create a process parameter within a bot process in RPA Hub

Create a process parameter to store the variables that are used within a bot process. The process parameter that you just created can only be used by this bot process.

Before you begin

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Before you can access a bot process, ensure that the RPA business user (sn_rpa_fdn.rpa_business_user), RPA developer (sn_rpa_fdn.rpa_developer), or the RPA support user (sn_rpa_fdn.rpa_support_user) are in the Managed by Group list.

(Optional) Configure the system properties related to **Activity Stream**, to add or remove the fields. The changes to these fields are captured in the work notes. For more information, see Configure the system properties for an activity stream in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

You cannot delete a process parameter that is associated to a published bot process.

Note: To use a variable in multiple processes, create a shared parameter. For more information, see Create a shared parameter in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process that you want to create and associate a process parameter to.
5. On the **Process Parameters** tab, select **New**.
6. On the form, fill in the fields.

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7. Select **Save**.
8. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Related topics

Process parameter form in RPA Hub

View Audit History

Process parameter form in RPA Hub

Use the process parameter form to create a process parameter and a shared parameter.

Process parameter form

Field	Description
Name	Unique name of the process parameter.
Value	Value of the process parameter.
Application	[Auto generated] Application containing this record. Role required to view this field: admin.
Sensitive	Option for hiding the data of the **Value** field.
Description	Description about the process parameter.
Compose	
Work notes (Private)	Work notes for the process parameter.
Additional Comments	Additional comments related to the process parameter.

Related topics

Create a process parameter within a bot process in RPA Hub

Create a shared parameter in RPA Hub

Assign an attended user or group to an attended bot process

Assign an attended user or group to an attended bot process in RPA Hub, so that your user or group can access and execute this automation on Windows machines.

Before you begin

Do this task only when you select the **Process Type** field as **Attended** on the Bot process configuration form, while creating a bot process. You can't perform this task unless you select that field. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

About this task

Assign users or groups to an attended bot process. You must assign only those users who have the RPA assisted user role (sn_rpa_fdn.rpa_assisted_user).

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Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process that you want to assign an attended user or a group to.
5. On the **Attended Users/Groups** tab, select **New**.
6. On the form, fill in the fields.

Attended User Group form

Field	Description
Process	Name of the associated bot process.
Assigned User	Assigned user for the attended bot process.
Assigned Group	Assigned group for the selected assigned user.

7. Select **Save**.

Related topics

Workflow Studio actions and subflow in RPA Hub

Unassign an attended user or group from an attended bot process in RPA Hub

Unassign an attended user or a group from an attended bot process if the user is moving out of the business process.

Before you begin

Do this task only when you select the **Process Type** field as **Attended** on the Bot process configuration form, while creating a bot process. You can't perform this task unless you select that field. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open an attended bot process that you want to unassign an attended user or a group from.
5. On the **Attended Users/Groups** tab, do one of the following actions.

Option	Action
To delete a user	**a.** Select a user record that you want to unas sign. **b.** Select **Delete**.

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Option	Action
To delete a group	**a.** Select a group record that you want to unas sign. **b.** Select **Delete**.

Related topics

Robot license distribution in RPA Hub

Create a process field parameter in RPA Hub

Define process field parameters (dynamic parameters) that are required in the automation (bot process).

Before you begin

Familiarize yourself with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Verify that you've completed the tasks that are related to configuring the Embedded Task Automation in RPA Hub. For more information, see List of steps for configuring embedded task automation.

Create an attended bot process. For more information about creating an attended bot process, see Configuring a bot process record in RPA Hub.

Verify that the **Enable Embedded Task Automation** check box is selected in the associated attended bot process form. For more information about the bot process form, see Bot Process form in RPA Hub.

Important: After selecting the **Enable Embedded Task Automation** check box, if the **Process Field Parameters** tab isn't displayed on the bot process, then it's possible that your related lists are customized. Add the related list manually.

Verify that the RPA developer (sn_rpa_fdn.rpa_developer) is in the Managed by Group list of the associated bot process.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

About this task

Process field parameters are used for setting the value or getting the value of a field on a particular form.

You can create a process field parameter in two ways. Perform this task to create it from a bot process.

Otherwise, create it while mapping the field parameters by selecting the **Create parameter** button from the **Field Parameter Mappings** tab. For more information, see Map a table field to a bot process field parameter in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.

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4. Open an attended bot process that you want to create and associate a process field parameter to.
5. On the **Process Field Parameters** tab, select **New**.
6. On the form, fill in the fields.

Process Field Parameter form

Field	Description
Name	Unique name of the process field parameter for the associated bot process. For example, Location, First Name, Title
Description	Brief description of the parameter.

7. Select **Save**.
8. **Optional:** To delete a process field parameter record, select the record and then select **Delete**.

Note: If a parameter is mapped in the attended configuration record, then you must delete the mapping to delete the parameter. You can't delete a parameter, if the associated bot process is published.

Related topics

Create an attended configuration record in RPA Hub

Attended Configuration form in RPA Hub

Deactivate an attended configuration record in RPA Hub

Delete an attended configuration record in RPA Hub

Invoke Embedded Task Automation via API in RPA Hub

Conditions for the visibility of UI action (button)

c to the bot process from the related list

Associate a queue to a bot process in RPA Hub so that the bot process can interact with this queue. You can associate a bot process to multiple queues. If the bot process is enabled for robot pool, then only one queue (that is not associated with any other bot process) can be mapped to the current bot process.

Before you begin

Ensure the bot process is not in published state.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

To assign a bot process to a queue from the Queues menu, see Assign a bot process to a queue from Queues menu in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.

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4. Open the bot process that you want to assign a queue to.
5. On the **Queues** tab, select **New**.
6. In the **Work Queue** field, select the required queue.
7. Select **Save**.

Related topics

- Queue form in RPA Hub
- Unassign a bot process from a queue in RPA Hub
- Queue implementation in RPA Hub

View skill package versions in a bot process

View a list of skill package versions used in a bot process in RPA Hub to make sure that you're using the correct version.

Before you begin

You can only see skill package versions in the Skill Overrides tab when the attended or unattended packages have the skill package associated to them.

For upgrading customers, to view the existing skill package versions in the Skill Overrides tab of a bot process, publish the attended or unattended package again and associate the package to the bot process.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_business_user, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open a bot process that you want to view a skill package version for.
5. On the **Skill Overrides** tab, view a list of skill package versions associated to your bot process.

Related topics

- Override a skill version for a bot process in RPA Hub

Override a skill version for a bot process in RPA Hub

Override a skill package version in RPA Hub to use a specific version of a skill package for a bot process. When the bot process executes, it uses the selected version instead of the version that you defined in the automation.

Before you begin

Verify that the life-cycle stage status of the bot process isn't set to **Published**. For more information, see Life-cycle stage statuses (LLCS) of a bot process in RPA Hub.

You can see the skill package versions in the **Skill Overrides** tab of the bot process when the attended or unattended packages have the skill package associated with them. For more information, see Create a package to assign to a bot process.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

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About this task

You can use different versions of the skill for different bot processes based on your specific requirements.

To use the latest version of a skill package, you can override the skill package version in RPA Hub without publishing the attended or unattended package again from RPA Desktop Design Studio.

If you're upgrading to Xanadu and can't view the existing skill package versions in the **Skill Overrides** tab, then publish the attended or unattended package again and associate the package with the bot process.

In the skill package version, you can select the bot processes that you want the skill package version to override. For more information, see Override a skill package version for multiple bot processes in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open a bot process that you want to override a skill package version for.
5. On the **Skill Overrides** tab, select the skill version that you want to override.
6. In the **Overridden version** field, select the version to override.

Publish a bot process in RPA Hub

Publish a bot process so that you can get it ready to execute a process.

Before you begin

Ensure that the associated package version complies with the code quality check system property *sn_rpa_fdn.restrict_package_by_severity*, to verify if the code quality check is enabled in the RPA Hub instance. For more information about the system property, see Configure RPA Hub properties. For more information about the compliance rules, see Code quality check compliance for RPA Hub.

Ensure that you complete the following tasks to publish an unattended bot process in the order that they're presented.

1. Create a bot process. For more information, see Configuring a bot process record in RPA Hub.
2. Associate a credential group. For more information, see Associate a credential group to a bot process in RPA Hub.
3. Assign a robot to a bot process. For more information, see Assign a robot to a bot process in RPA Hub.
4. Assign a process robot credential within a bot process. For more information, see Assign a process robot credential within a bot process in RPA Hub.
5. Verify that all the assigned robots are mapped to a credential group.

Ensure that you complete the following tasks to publish an attended bot process in the order that they're presented.

1. Create a bot process. For more information, see Configuring a bot process record in RPA Hub.
2. Assign an attended user or group to an attended bot process. For more information, see Assign an attended user or group to an attended bot process.

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If you are publishing an unattended bot process that is assigned to a robot pool, then ensure that the following conditions are met:

- Associate a queue to the bot process. For more information, see c to the bot process from the related list.
- The queue is not associated to another bot process.
- The bot process is not associated with multiple queues.
- Assign a process robot credential to each robots of the robot pool within a bot process. For more information, see Assign a process robot credential within a bot process in RPA Hub.

If you are publishing a bot process that is enabled with external credential, then ensure that the associated external credential vault is active. This scenario is valid if one or more Robot Credentials, Application Credentials, or TOTP Authenticators are associated with inactive External Credential Vault record. For more information about the external credential settings in Robot Credentials, Application Credentials, and TOTP Authenticators, see Create a robot credential in RPA Hub, Create an application credential in RPA Hub, and Create a TOTP authenticator in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

About this task

Publishing a bot process is one of the life-cycle stages of a bot process. For more information, see Life-cycle stage statuses (LLCS) of a bot process in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open a bot process that you want to publish.

   Tip: To modify the details of a bot process, change the life cycle stage of the bot process to **In-maintenance**. For more information, see Edit a bot process in RPA Hub.

5. In the form header, select **Publish**.

   Warning: After you publish a bot process, you can't change or delete the entries in the bot process form, associated business applications, robots, process credential mappings, process robot credential sets, and schedules.

Result

After you publish a bot process, the added schedule (if any) takes effect.

If there is no schedule, the published bot process is ready to be triggered by the API.

Edit a bot process in RPA Hub

Edit an existing bot process in RPA Hub to modify a few details.

Before you begin

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Verify that the life cycle stage of the bot process is **In-maintenance** on the bot process form.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

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Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process that you want to modify.
5. On the **Details** tab, update the following fields as appropriate:
   - Name
   - Order
   - Package
   - Package Version
   - Run Time Threshold (mins)
   - Job Purging (days)
   - Description
   - Keep Monitor Active
   - Force Start
   - Auto Session Restore
   - Track Execution Logs
   - Managed By Group
   - Enable Desktop In Desktop
   - End Desktop In Desktop on Complete
   - Screen Resolution
6. Select **Save**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Related topics

Bot Process form in RPA Hub

Retire a bot process in RPA Hub

Retire a bot process to turn it off. It's one of the life-cycle stages of a bot process. After you retire a bot process, you can't use it anymore.

Before you begin

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

If you are retiring an attended bot process that is enabled with Embedded Task Automation, then the following configurations are deleted:

- All the associated attended configurations.
- Corresponding buttons (UI actions) that are associated to the attended configuration on the related forms.

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For more information, see Embedded Task Automation (ETA) in RPA Hub.

If you are retire an unattended bot process, the associated credential groups and process robot credential mappings are removed.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process that you want to retire.
5. In the form header, select **Retire**.
6. In the Confirmation dialog box, select **Retire**.

Related topics

Retire an MFA authenticator in RPA Hub

Robots in RPA Hub

Mimic human actions to perform repetitive, rule-based tasks using robots in RPA Hub. These robots interact with user interfaces and automate tasks.

What is a robot

A robot runs a bot process (automation). Robots are designed to interact with software applications, data sources, and user interfaces like a human operator would, but in a more efficient, accurate, and consistent manner.

Types of robots in RPA Hub

These two types of robots serve different purposes and are designed to automate different types of tasks within an organization.

Unattended robots

These robots run unattended automations that don't require any human intervention. They work autonomously without human intervention. These robots are typically deployed on servers and can perform tasks without requiring a human user to be present. Unattended robots are best suited for tasks that are highly repetitive, rule-based, and do not require human decision-making during execution. For example, Invoice Processing for Finance Department.

Attended robots

These robots run attended automations that require human intervention. They work alongside humans to assist them in their tasks. These robots are typically deployed on the desktops of human users and collaborate with them in real-time. Attended robots are best suited for tasks that require human decision-making, involve interactions with user interfaces, or need input from employees. For example, Guided Data Entry and Validation for Order Processing.

Related topics

Create an unattended robot in RPA Hub

Create an attended robot in RPA Hub

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- Add assigned studio users to an unattended robot
- High density robots in RPA Hub

High density robots in RPA Hub

Execute multiple automations (bot processes) simultaneously and independently on a single Windows Server machine using high density robots.

High density robots overview

High density robots leverage the Remote Desktop Services to execute multiple automations simultaneously on the same Windows Server machine. High density robots can run the same automation or run different automations in separate user sessions on the same machine. The machine must support multiple user sessions at the same time. This setup maximizes resource utilization by leveraging the machine's capacity to execute several bot processes in parallel.

While configuring unattended robot, you can select the **High Density Robot** option to create multiple robots with the same machine name. All the high density robots with the same machine name can have different screen resolutions. But it is ideal for all high density robots associated to the same bot process to have same screen resolution value. For more information about these fields, see Create an unattended robot in RPA Hub.

Note:

The machine that is associated with high density robots can't be associated with a non-high density robot. If there are multiple robots with the same machine name marked as high density robots, then none of the robot can be converted as a non-high density robot.

High density robots can't be added to the robot pool.

High density robots key features

- Runs multiple automations independently on the same machine.
- Reduces the number of machines required, lowering infrastructure costs.
- Enables each robot to operate in its isolated session, which helps preventing overlap or interference.

Configuring high density robots

To configure the high density robots, see Create an unattended robot in RPA Hub.

To convert existing unattended robots to high density robots, see Convert existing unattended robots to high density robots in RPA Hub.

Related topics

- High density robots in Unattended Robot
- Set up Windows Server machine for high density robots
- Set up Unattended Robot

Life-cycle stage statuses (LLCS) of a robot in RPA Hub

The state transition of a robot guides you through the stages of its life cycle.

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Robot life-cycle stage statuses

Life-cycle stage status	Description
In Use	Default value when a new robot is created or saved.
In Maintenance	Robot or a robot machine that is under maintenance.
Retired	Robot is inactive. After you retire a robot, you cannot change the stage. You cannot retire a robot which is assigned to a bot process.

Related topics

Robots in RPA Hub

Create an unattended robot in RPA Hub

Create an unattended robot in RPA Hub to run the unattended bot process.

Before you begin

Configure the related system property to view the activity stream. For more information, see Display an activity stream for bot processes and robots in RPA Hub.

Make sure that the *sn_rpa_fdn.enable_unattended_robot_user_mapping* system property is set to True to allow only the authorized users to access the robot and robot assets. This system property enables the **User** field on the Unattended Robot form. If you have the admin role, you can edit this system property. By default, this property is set to True.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

A robot runs a bot process, which is an automation.

An unattended robot can execute an unattended bot process, which is an automation that requires no human intervention.

By using the Unattended Robot application, you can enable an unattended robot to execute an unattended bot process that is triggered either by a schedule, API, or manually set.

You can map multiple unattended robots as high density robots to one virtual machine. For more information, see High density robots in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Create an unattended robot from either the list icon or from the plus icon.

Option	Action
Create an unattended robot from the list icon	**a.** Select the list icon ( ). **b.** On the **Lists** tab, under **Administration**, se lect **Robots**. **c.** Select **New**.

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Option	Action
Create an unattended robot from the plus icon	**a.** Select the plus icon (+). **b.** Select **New Robot**.

3. On the form, fill in the fields.

Robot form

Field	Description
Name	Unique name of the unattended robot.
Robot Type	Type of the robot. **Unattended**: Robot for an unattended automation.
Machine Name	Computer name of the physical or virtual machine on which the Unattended Robot application is installed. This field appears only when **Unattended** is selected from the **Robot Type** field. The machine name is a string-type field that you use when you don't want to enable the *sn_rpa_fdn.enable_unattended_robot_machine_name_lookup* system property. If you enable the *sn_rpa_fdn.enable_unattended_robot_machine_name_lookup* system property, this string type field changes to a reference type field on the robot form. The machine name fetches the unique value references from the Configuration Item (CI) tables that are defined in the *sn_rpa_fdn.machine_name_reference_fields* system property. The bot process table (cmdb_ci_rpa_process) and robot table (cmdb_ci_rpa_robot) are excluded from the search results when you provide the names of the CI tables to reference the unattended robot's machine name in the *sn_rpa_fdn.machine_name_reference_fields* system property. The *Machine Lookup value change* scheduled job validates the values in the *Machine Name Lookup* field and *Machine Name* field. For more information, see the Scheduled jobs installed section in Components installed with RPA Hub and Configure RPA Hub properties.
High density robot	Option to create multiple robots with the same machine name. The machine must support multiple user sessions at the same time so that you can run multiple automations simultaneously. This field appears only when **Unattended** is selected from the **Robot Type** field.
Screen resolution	Screen resolution used by a high density robot while establishing the RDP connection before executing the automation.

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Field	Description
	High density robots can operate with different screen resolutions for each robot on the same machine without any issues if they are running different bot processes. However, if all high density robots on the same machine are executing the same process and utilizing Computer Vision actions, they must maintain the same resolution. Otherwise, the automation may fail. This field appears only when the robot is marked as high density robot. **Note:** You can change the default value of the screen resolution using the *sn_rpa_fdn.robot_screen_resolution* RPA Hub system property.
User	Authorized user who can access this robot. If you're upgrading to Xanadu, the **User** field is automatically mapped with the user name (the user) who has recently created the process job for the selected unattended robots. If no process jobs are found for a selected robot, the robot is moved to the In Maintenance status. An RPA release manager must manually map the appropriate users to the robots. **Note:** This field appears when the *sn_rpa_fdn.enable_unattended_robot_user_mapping* system property is enabled.
Department	Associated department of the robot. This field is automatically filled in with the information that is based on the department in the associated Attended Robot User's record. The value in this field corresponds to the value at the time that the Robot record is created and isn't based on real-time data.
Description	Brief description of the robot.

4. Select **Save**.
5. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

What to do next

Install Unattended Robot. For more information, see Install Unattended Robot

Set up the Unattended Robot application. For more information, see Set up Unattended Robot.

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Related topics

Edit an unattended robot in RPA Hub

Retire a robot in RPA Hub

View Audit History

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Add assigned studio users to an unattended robot

In RPA Hub, assign one or more users (RPA developers or RPA admins) to an unattended robot, so that the users can access the specific robot in the **Assigned Bot Process** section of the RPA Desktop Design Studio application.

Before you begin

Familiarise yourself with the Assigned Bot Process feature in RPA Desktop Design Studio. For more information, see Assign bot process to an automation project.

Only users with RPA developer or RPA admin roles can be associated to a robot.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

The Assign Bot Process feature provides a capability for the users to access the bot process information (such as queues, process parameters, and so on) in RPA Hub and debug the automation in the RPA Desktop Design Studio. The users listed in the **Assigned Studio Users** tab can utilize the robots from RPA Desktop Design Studio, depending on the associated bot process access.

This helps in impersonating as a robot, so that the following benefits are achieved from the RPA Desktop Design Studio:

- Get the process and shared parameters
- Interact with work items and other RPA Hub related components (wherever applicable).

You can select a robot for impersonating as a robot in two ways. One way is by enabling *sn_rpa_fdn.restrict_robots_in_assign_bot_process_by_machine_name* system property. Then, the robots assigned to the bot process are filtered based on the robot machine name, where the RPA Desktop Design Studio is launched. For example, if the user launches the RPA Desktop Design Studio from the ABC robot machine, then the user can access only the ABC robot machine.

For more information about this system property, see Configure RPA Hub properties.

Important:

The users listed in the **Assigned Studio Users** tab are purged based on the time interval defined. The default time interval is 4 hours.

To change the time interval, enter `sys_auto_flush.LIST` in the navigation filter and search for the **sn_rpa_fdn_assigned_studio_user** table name. Modify the value in the **Age in seconds** field. To deactivate this setting, clear the **Active** check box. Only admins can access the `sys_auto_flush.LIST` table.

The other way is by adding one or more users to an unattended robot from the **Assigned Studio Users** tab in RPA Hub. To do so, perform this task.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Robots**.
4. Open the robot that you want to associate a studio user to.
5. On the **Assigned Studio Users** tab, select **Add**.

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6. On the **Available Studio Users** tab, select the required user.
7. Select **Add**.
8. Select **Save**.

Edit an unattended robot in RPA Hub

Edit an existing unattended robot in RPA Hub to modify a few details of the robot, convert the robot to a high density robot, and view the robot state.

Before you begin

Create an unattended robot. Ensure to select the **Robot Type** field as **Unattended**. For more information, see Create an unattended robot in RPA Hub.

You cannot edit an attended robot.

Verify that the life-cycle stage of the robot is **In Maintenance** on the robot form.

When changing the robot type from high density robot to standard or vice-versa, you must reconnect the unattended robot to ensure seamless execution of automations.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Robots**.
4. Select the unattended robot that you want to modify.
5. On the **Details** tab, update the following fields as appropriate.

Robot form

Field	Description
Name	Name of the robot.
Department	Associated department of the robot. This field is auto-populated based on the department information in the associated Attended Robot User's record. The value in this field corresponds to the value at the time the Robot record is created and not on real-time data.
Description	Brief description of the robot.
High density robot	Option to create multiple robots with the same machine name. The machine must support multiple user sessions at the same time so that you can run multiple automations simultaneously.

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Field	Description
	Note: If you change the robot type from high density robot to standard or vice-versa, you must reconnect the unattended robot to ensure seamless execution of automations.
Screen resolution	Screen resolution used by a high density robot while establishing the RDP connection before executing the automation. You can have different screen resolutions for different high density robots that use the same machine name. But, it is ideal for all high density robots associated to the same bot process to have same screen resolution value. This field appears only when the robot is marked as high density robot. **Note:** You can change the default value of the screen resolution using the *sn_rpa_fdn.robot_screen_resolution* RPA Hub system property.
User	Authorized user who can access this robot. If you're upgrading to Xanadu, the **User** field is automatically mapped with the user name (the user) who has recently created the process job for the selected unattended robots. If no process jobs are found for a selected robot, the robot is moved to the In Maintenance status. An RPA release manager must manually map the appropriate users to the robots. **Note:** This field appears when the *sn_rpa_fdn.enable_unattended_robot_user* system property is enabled.

6. On the form, view the states of the unattended and attended robots.

Robot states form

State	Description for Unattended Robot	Description for Attended Robot
New	Default value when a new robot is created or saved.	Default value when a new robot is created or saved.

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State	Description for Unattended Robot	Description for Attended Robot
Available	Robot is connected to the Unattended Robot application.	Attended user is connected to the Attended Robot application.
Busy	Robot has executed executing the automation.	Attended user started the automation by selecting the run icon ( ) or desktop in desktop icon ( ).
Disconnected	Robot is disconnected from the Unattended Robot application.	Either the attended user closed or logged out from the Attended Robot application.
Unresponsive	Robot runtime isn't responding. This state occurs when the difference between current time and last heart beat time equals or greater than the value specified in the *sn_rpa_fdn.robot.unresponsive* property.	

7. Select **Save**.
8. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Convert existing unattended robots to high density robots in RPA Hub

Run multiple unattended automations simultaneously on a single machine by batch converting one or more existing robots to high density robots using the **Actions on selected rows** option.

Before you begin

You must do this task in the classic environment.

Familiarise yourself with the high density robot concept in RPA Hub. For more information, see High density robots in RPA Hub.

Only the unattended robots that are in **New** or **Disconnected** states and are not associated with any robot pool can be converted to high density robots.

When changing the robot type from high density robot to standard or vice-versa, you must reconnect the unattended robot to ensure seamless execution of automations.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Administration** > **Robots**.
2. Select one or more unattended robots from the list.
   The selected robots must be in **New** or **Disconnected** states and must not be associated with any robot pool.
3. From the **Actions on selected rows** drop-down menu, select **Convert to High density robots**.

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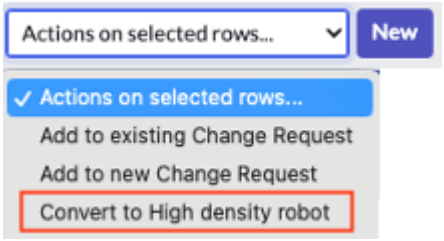

4. In the **Machine Name** field, enter the computer name of the physical or virtual machine that supports multiple user sessions and on which the Unattended Robot application is installed.
5. In the **Screen Resolution** field, select the screen resolution for the user sessions used by the high density robots.

Result
The unattended robots are converted to high density robots with the state set to **New**.

Create an attended robot in RPA Hub

Create an attended robot in RPA Hub to run the attended bot process.

Before you begin
Configure the related system property to view the activity stream. For more information, see Display an activity stream for bot processes and robots in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

About this task
A robot runs a bot process (automation).

Attended robots can execute attended automations that require human intervention. Using the Attended Robot application, you can run an attended robot to execute the attended bot process (attended automations).

An attended robot is mapped to only one user.

Procedure
1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Create a robot by doing one of the following actions.

Option	Action
From the list icon	**a.** Select the list icon ( ). **b.** On the **Lists** tab, under **Administration**, select **Robots**. **c.** Select **New**.
From the plus icon	**a.** Select the plus icon (+). **b.** Select **New Robot**.

3. On the form, fill in the fields.

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Robot form

Field	Description
Name	Unique name of the attended robot.
Robot Type	Type of the robot. **Attended**: Robot for an attended automation.
Attended Robot User	Assigned user for the attended robot. The assigned user must have the RPA assisted user role (sn_rpa_fdn.rpa_assisted_user). This field appears only when **Attended** is selected from the **Robot Type** field.
Department	Associated department of the robot. This field is automatically filled in based on the department information in the associated Attended Robot User's record. The value in this field corresponds to the value at the time that the Robot record is created and is not based on real-time data.
Description	Brief description of the robot.

4. Select **Save**.
5. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

What to do next
Install Attended Robot. For more information, see Install Attended Robot.

Set up the Attended Robot application. For more information, see Set up Attended Robot.

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Related topics
Retire a robot in RPA Hub

View Audit History

Retire a robot in RPA Hub

Retire a robot to turn it off. It is one of the life-cycle stages of a robot. After you retire a robot, it cannot be used further.

Before you begin
Create a robot. For more information, see Robots in RPA Hub.

Verify that the robot is not assigned to any bot process or robot pool.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task
Retiring an attended robot removes the associated user from all the associated bot processes.

If the associated user is a part of a bot process in the assigned users, that record gets deleted.

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If there are no attended assigned users or groups associated to an attended robot, the life cycle stage status of the associated bot process is moved from Publish to In-Maintenance.

You cannot retire an unattended robot if it is associated to an unattended bot process.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Robots**.
4. Open the robot that you want to retire.
5. In the form header, select **Retire**.
6. In the Confirmation dialog box, select **Retire**.

Package and package version in RPA Hub

A package is a container that groups together one or more automation logic and their related files, configurations, and dependencies. A package version is a specific release of a package.

A package refers to a set of workflows, scripts, configurations, and dependencies that are designed to automate specific tasks or processes. These packages can be published or imported onto the RPA platforms to quickly deploy automation solutions.

Packages are used to encapsulate functionalities, libraries, or applications, making it simpler for developers or RPA administrators to deploy software components.

You can create a package in two ways. Follow this procedure to create a package from RPA Hub.

To create a package from RPA Desktop Design Studio while you're publishing an automation file, follow the steps as mentioned in Publish an automation project in RPA Desktop Design Studio.

After a package is created, the RPA developer publishes an automation from RPA Desktop Design Studio. This process results in a new package version.

Life-cycle stage statuses (LLCS) of a package in RPA Hub

The State transition of a package guides you through the stages of its life cycle.

Package life-cycle stage statuses

Life-cycle stage statuses	Description
Published	Default value for a new package.
In-maintenance	Package is under maintenance. If a package is in the **In-maintenance** status, it cannot be associated with a bot process record.
Retired	Package is inactive. After you retire a package, you can't change the stage.

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Package life-cycle stage statuses (continued)

Life-cycle stage statuses	Description
	When you retire a package, the package versions that are associated with this package are also retired.

Related topics

Create a package to assign to a bot process

Create a package to assign to a bot process

Create an unattended or attended package in RPA Hub to assign it to a bot process to execute an automation.

Before you begin

(Optional) Configure the system properties related to **Activity Stream**, to add or remove the fields. The changes to these fields are captured in the work notes. For more information, see Configure the system properties for an activity stream in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Packages**.
4. Select **New**.
5. On the form, fill in the fields.

Package form

Field	Description
Name	Unique name of the published package.
Package Type	Type of the package: ○ **Unattended**: Unattended automation ○ **Attended**: Attended automation ○ **Skill**: Reusable automation ○ **Unattended Template**: Template for creating unattended automations in RPA Desktop Design Studio ○ **Attended Template**: Template for creating attended automations in RPA Desktop Design Studio
Application	[Auto generated] Application containing this record. Role required to view this field: admin.

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Field	Description
Mark As Default	Option to enable this package as a default package for the current domain. Only one package can be selected as a default package for any domain. This field appears only when **Unattended Template** or **Attended Template** is selected from the Package Type field. Roles required to edit this field: RPA admin.
Description	Description of the package.

6. Select **Save**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Result

After a package is created, the RPA developer publishes an automation from RPA Desktop Design Studio. This process results in a new package version.

Related topics

- Retire a package in RPA Hub
- Download a package version in RPA Hub
- View Audit History
- Publish an automation project in RPA Desktop Design Studio

Package Version form in RPA Hub

Use the Package Version form to view the code quality result.

Package Version form

Name of the rule	Description
Package	Associated package of the package version.
Version	Version number that identifies the set of components uploaded in a package
Application	Application that contains this record. This field is auto-generated. Role required to view this field: admin.
Life Cycle Stage Status	Life-cycle stage statuses of a package version.
Active	Option to set this package version as active. The active version of the template is used when a template is selected for creating automation in RPA Desktop Design Studio. Only one package version can be set as active. This field is applicable only for **Unattended Template** and **Attended Template** package types. For more information

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Package Version form (continued)

Name of the rule	Description
	about package types, see Create a package to assign to a bot process. Roles required to edit this field: RPA admin and RPA release manager.
Code Quality Result	Indicates if the **Code Quality Check** feature in RPA Desktop Design Studio has detected any errors, warnings, or information in the package. • **Error** - If a package that is published from RPA Desktop Design Studio with the code quality check as error. If a package has both error and warning, then the code quality check result is error. If a package has both error and info, then the code quality check result is error. • **Warning** - If a package that is published from RPA Desktop Design Studio with the code quality check as warning. If a package has both warning and info, then the code quality check result is warning. • **Pass** - If a package that is published from RPA Desktop Design Studio without any code quality check error or warning or info. If the Code Quality Check feature is not enabled, then the value in this field is **Not Applicable**. Code quality status of package versions are set with highest severity. To review the error or warning, open the package version file in RPA Desktop Design Studio. For more information about code quality check feature, see Code quality check in RPA Hub.
Comments	Brief description of the package version.

Related topics

View a package version in RPA Hub

Edit a package in RPA Hub

Edit an existing package in RPA Hub to modify the details such as the name or description.

Before you begin

Create a package. For more information, see Create a package to assign to a bot process.

Ensure that the package isn't associated to a bot process. Verify that the life-cycle stage of the package is **In-maintenance** on the package form.

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Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Packages**.
4. Open the package that you want to edit.
5. Update the following fields as appropriate:
   - Name
   - Description
6. Select **Save**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Related topics

Bot Process form in RPA Hub

Retire a package in RPA Hub

Retire a package to turn it off. It is one of the life-cycle stages of a package. After you retire a package, it cannot be used further.

Before you begin

Create a package. For more information, see Create a package to assign to a bot process.

Verify that the package and associated package versions are not assigned to any other bot process.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

⚠ **Warning:** When you retire a package, all the associated package versions are also retired automatically.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Packages**.
4. Open the package that you want to retire.
5. In the form header, select **Retire**.
6. In the Confirmation dialog box, select **Retire**.

Related topics

Retire a package version in RPA Hub

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Download a package version in RPA Hub

Download a package version in RPA Hub so that it can be opened from the RPA Desktop Design Studio to build, debug, or modify the automation.

Before you begin

Create a package. For more information, see Create a package to assign to a bot process.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_robot, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_assisted_user, or sn_rpa_fdn.rpa_admin

About this task

Package version file is an iBot file that contains the automation logic that you can open in RPA Desktop Design Studio. To view this automation file (ibot), install the RPA Desktop Design Studio application in your machine. For more information, see Install RPA Desktop Design Studio.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Packages**.
4. Open a package whose package version you want to download.
5. On the **Package Versions** tab, select a version that you want to download.
6. In the Attachments section, select an attachment, select the three-dot menu, and select **Download**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Override a skill package version for multiple bot processes in RPA Hub

Override a skill package version in RPA Hub for multiple bot processes that are associated with the same attended or unattended package. You can select the latest version of the skill package without publishing the attended or unattended package again from RPA Desktop Design Studio.

Before you begin

If you're upgrading to Xanadu, to view the associated bot processes in the **Bot Process** tab of the Skill Package Version form, publish the attended or unattended packages again and associate the packages to the bot processes.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

In the **Bot Process** tab of the Skill package version form, you can override a skill package version for multiple bot processes instead of overriding the version individually for each bot process.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Packages**.
4. Select the skill package.
5. On the **Package Versions** tab, select the version that you want to override.

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6. On the **Bot Process** tab, select **Edit**.
7. Select the bot processes from the list that you want to override this skill version.
   The list shows the bot processes for the attended or unattended packages that are associated with the selected skill package.

Verify the HashCode of a package version in RPA Hub

Verify the HashCode of a package version in RPA Hub so that you can validate the HashCode of the manually uploaded automation zip file with the associated package version record.

Before you begin

You must do this task in the classic environment.

Ensure that you've completed the tasks that are related to migrating your data from a lower environment to a higher environment. For more information, see Migrating your data from a lower environment to a higher environment in RPA Hub.

Ensure that the *sn_rpa_fdn.allow_manual_upload_of_automation_package* system property is marked as true. If you have the admin role, you can edit this system property.

Upload an automation package. For more information, see Upload an automation package attachment in RPA Hub.

Verify that the life-cycle stage of the package version isn't set to **Retired**.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

A HashCode is a unique, auto-generated alphanumeric value of a published package version that is used to validate the integrity of the package version. The system verifies the HashCode of the first attachment that is uploaded on the package version record. To ensure a successful validation, upload only the correct attachment.

Another way to verify the HashCode of a package version is via triggering the **Verify HashCode of a Package Version** Action in Workflow Studio. For more information, see Workflow Studio actions and subflow in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Build** > **Packages**.
2. Open a package to view the HashCode.
3. On the **Package Versions** tab, select a version.
4. In the form header, select **Verify Hash Code**.

What to do next

If the HashCode validation fails, remove the invalid attachment and upload the correct automation package. For more information, see Upload an automation package attachment in RPA Hub.

Retire a package version in RPA Hub

Retire a package version in RPA Hub so that the version can't be used again. After a package version is retired, it can't be used again.

Before you begin

Create a package. For more information, see Create a package to assign to a bot process.

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Verify that the package and associated package versions aren't assigned to any non-retired bot process.

For a skill package version, verify that the version is not associated to any attended or unattended package versions or a bot process.

Role required: sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin

About this task

You can retire a package in two ways:

- Retire a package and all the associated package versions are also retired automatically. For more information about retiring a package, see Retire a package in RPA Hub.
- Retire only the package version, by following the steps mentioned in this task.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Packages**.
4. Open the package to retire the related package version.
5. In the form header, select **Retire**.
6. When you see the confirmation prompt, select **Retire**.

Credential Management in RPA Hub

Streamline the credentials that robots use to perform the automation that you defined in the bot process. Instead of creating the same set of credentials for each bot process, you can create a credential group that includes a robot credential, application credentials, and external credentials. You can then associate the credential group to multiple bot processes.

Credential management overview

If you're an RPA release manager, RPA administrator, or RPA developer, you can create and associate credential groups to an unattended bot process. You can also set up an external credential vault to retrieve the robot credentials, application credentials, or a Time-based One-time Password (TOTP) seed from an external source. The seed is the secret key of the authenticator that is used to generate the TOTP. An external credential vault is a secure storage system often used to store and manage sensitive information such as user names, passwords, and other access credentials for various applications, services, or systems.

Benefits of credential management

With credential management, you can do the following tasks:

- Define the credentials once and reuse them in multiple bot processes to improve the overall productivity of your resources.
- Reduce the number of errors that occur when you're configuring the same credential groups for different bot processes.
- Improve how credentials are accessed with centralized credential management.
- Securely retrieve the credentials from an external storage system by configuring the external credential vault.

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Robot credentials

By creating robot credentials, you can enable robots to log in to a Windows machine and perform the automation. For more information, see Create a robot credential in RPA Hub.

In the following table, learn what users with different roles can do or can't do.

Access control list for robot credentials

Role	Can do	Can't do
RPA release manager and RPA administrator	Create, view, update, or delete the robot credentials.	-
RPA developer	• Create the robot credentials. • View the robot credentials that are created by them or the robot credentials that are mapped to the bot processes that they're assigned to. • Update or delete the robot credentials that are created by them.	Can't view, update, or delete the robot credentials of the bot process that they aren't assigned to or robot credentials that aren't created by them.
RPA robot user	View all robot credentials.	Can't create, update, and delete the robot credentials.
RPA support user	View the robot credentials that are mapped to the bot processes that they're assigned to.	Can't create, update, or delete the robot credentials.

Application credentials

By creating application credentials, you can add the user name and password that the robot can use to log in to a specific application at the time of the automation execution. For more information, see Create an application credential in RPA Hub.

In the following table, learn what users with different roles can do or can't do.

Access control list for application credentials

Role	Can do	Can't do
RPA release manager and RPA administrator	Create, view, update, or delete the application credentials.	-
RPA developer	• Create or view the application credentials. • Update or delete the application credentials that are created by them.	Can't view the application credentials that aren't created by them.

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Access control list for application credentials (continued)

Role	Can do	Can't do
RPA business user	• Create the application credentials. • View the application credentials that are created by them or the application credentials that are mapped to the bot processes that they're assigned to. • Update or delete the application credentials that are created by them.	Can't add the external credentials.
RPA robot user	View or edit all the application credentials.	Can't create or delete the application credentials.
RPA support user	View the application credentials that are mapped to the bot processes that they're assigned to.	Can't create, update, or delete the robot credentials.

TOTP authentication

By setting up Time-based One-time Password (TOTP) seeds, you can enable the unattended robots to authenticate seamlessly against multi-factor authentication (MFA)-enabled applications. MFA-enabled applications provide additional security for users and their accounts.

You can't edit a TOTP authenticator record. If changes are required to an existing TOTP authenticator record, you must retire an existing record and then create a TOTP authenticator record. For more information, see TOTP authentication in RPA Hub and Create a TOTP authenticator in RPA Hub.

In the following table, learn what users with different roles can do or can't do.

Access control list for TOTP authentication

Roles	Can do	Can't do
RPA release manager and RPA administrator	Create, view, or delete the TOTP authenticators.	Can't update the TOTP authenticators.
RPA developer	• Create the TOTP authenticators. • View the TOTP authenticators that are created by them or TOTP authenticators that are mapped to the bot processes that they're assigned to.	Can't update or delete the TOTP authenticators.

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Access control list for TOTP authentication (continued)

Roles	Can do	Can't do
RPA robot user	View all TOTP authenticators.	Can't create, update, or delete the TOTP authenticators.

Credential groups

By configuring the credential groups, you can map the application credentials and a robot credential to one or more bot processes. For more information, see Create a credential group in RPA Hub.

In the following table, learn what users with different roles can do or can't do.

Access control list for credential groups

Roles	Can do	Can't do
RPA release manager and RPA administrator	Create, view, update, or delete the credential groups.	-
RPA developer	• Create the credential groups. • View the credential groups that are created by them or the credential groups that are mapped to the bot processes that they're assigned to. • Update or delete the credential groups that are created by them.	Can't view, update, or delete the credential groups of the bot process that they aren't assigned to or the credential groups that aren't created by them.
RPA robot user	View all the credential groups.	Can't create, update, or delete the credential groups.
RPA support user	View the credential groups that are mapped to the bot processes that they're assigned to.	Can't create, update, or delete the credential groups.

External credential vault

By configuring an external credential vault, you can retrieve a robot credential, application credentials, or Time-based One-time Password (TOTP) seed from an external source instead of a ServiceNow credentials record. For more information, see External credential vault in RPA Hub and Create an external credential vault record in RPA Hub.

In the following table, learn what users with different roles can do or can't do.

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Access control list for the external credential vault

Roles	Can do	Can't do
RPA release manager and RPA administrator	Create, view, or update the external credentials.	Can't delete external credentials.
RPA developers	View the external credentials.	Can't create, update, or delete the external credentials.
RPA support user	View the external credentials.	Can't create, update, or delete the external credentials.
RPA business user	View the external credentials.	Can't create, update, or delete the external credentials.

Create a robot credential in RPA Hub

Create a robot credential so that the unattended robot can log in to a Windows machine and perform the automation.

Before you begin

Familiarize yourself with the credential management concept. For more information, see Credential Management in RPA Hub.

Do this task only when you select the **Process Type** field as **Unattended** on the Bot process configuration form while you're creating a bot process. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

About this task

You can't delete a robot credential if it's associated with any credential group. For more information, see Create a credential group in RPA Hub.

You can't edit the **Robot Username** field when the life-cycle stage status of the associated bot process is set to **Published**. You can edit the password irrespective of what the life-cycle stage is of the associated bot process. For more information, see Life-cycle stage statuses (LLCS) of a bot process in RPA Hub.

You can't edit the **External Credential** field when the life-cycle stage status of the associated bot process is set to **Published**.

If a robot credential uses an external credential vault, you must make sure that the associated external credential vault is active.

In RPA Hub, you can retrieve the robot credentials, application credentials, or a Time-based One-time Password (TOTP) seed in two ways:

- From a ServiceNow credentials record (application credential, robot credential, or TOTP authenticator).
- From an external credential vault. For more information, see External credential vault in RPA Hub.

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Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Credential Management**, select **Robot Credentials**.
4. Select **New**.
5. On the form, fill in the fields.

Robot Credentials form

Field	Description
Name	Unique name of the robot credential.
Authentication Type	The type of authentication for the robot login: ○ **Windows Credentials** - Uses Windows username and password for robot authentication. ○ **Smart Card** - Uses user principle name (UPN) and smart card PIN for robot authentication.
Robot Username	For **Windows Credentials** - User name of the Windows machine to be used by the robot. Enter the user name in the `DOMAIN\Username` format. For **Smart Card** - User principle name (UPN) to be used by the robot. This field doesn't appear if the **External Credential** option is selected.
Robot Password	For **Windows Credentials** - Password for the Windows machine to be used by the robot. For **Smart Card** - Smart card PIN to be used by the robot. This field doesn't appear if the **External Credential** option is selected.
External Credential	Option that you can select to fetch the credentials from the external credential vaults. External credential is not supported for Smart Card.
External Credential Vault	External credential vault record that is used for fetching the credentials from an external credential vault.

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Field	Description
	Use the search icon to select an external credential vault record. For example, DemoCyberArk. Only active external credential vault records are listed here. This field appears only when the **External Credential** option is selected.
Subflow Input	JSON that acts as an input to the subflow mapped in the selected external credential record. This JSON is used by the Subflow REST Step and must contain the necessary information for retrieving the credentials from the external credential vault. The value must be in a JSON format. You can't enter an empty JSON value. For more information about the JSON, see Steps to configure an external credential vault in RPA Hub. This field appears only when the **External Credential** option is selected.

6. Select **Save**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Smart Card in RPA Hub

Smart card login for a Windows machine is a secure method of logging into the system using a physical smart card instead of a username and password. It's commonly used in organizations to enhance security, particularly in environments with high security requirements.

With Robotic Process Automation (RPA), you can run unattended automations on the machines that use smart cards for authentication. While configuring a robot credential, you can store the smart card username and password to allow the unattended robot to log in to machines that use smart card.

Smart Card limitations

An intermittent issue is observed where Smart Card auto-login fails after a full sign-out, displaying the message: "Signing in with a smart card isn't supported for your account." This occurs only during automated login attempts post sign-out, while lock/unlock scenarios remain unaffected. The issue is a known infrastructure limitation. As a workaround, users are advised to use lock/unlock flows or implement a delay or retry mechanism after sign-out.

Robotic Process Automation (RPA)

For more information and how to set up RPA, see RPA Hub.

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Configure a robot credential in RPA Hub for smart card

Create a robot credential so that the unattended robot can log in to a Windows machine that uses smart card for login and perform the automation.

Before you begin

Ensure that the latest MSIs for Unattended Robot and Unattended Robot Login Agent (version 10.1.0) are installed.

Do this task only when you select the **Process Type** field as **Unattended** on the Bot process configuration form while you're creating a bot process. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

External credentials are not supported for smart cards.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Credential Management**, select **Robot Credentials**.
4. Select **New**.
5. Provide a unique name for the robot credential.
6. From the **Authentication Type** field, select **Smart Card**.
7. In the **Robot Username** field, enter the user principle name (UPN) to be used by the robot.
8. In the **Robot Password** field, enter the smart card PIN to be used by the robot.
9. Select **Save**.

TOTP authentication in RPA Hub

You can configure the Time-based One-time Password (TOTP) fields in RPA Hub that enable the unattended robots to seamlessly authenticate against multi-factor authentication (MFA)-enabled applications.

Overview of TOTP authentication

An authenticator application is third-party software that generates temporary passcodes. Users can use these passcodes with their password to log in into an instance that requires multi-factor authentication (MFA).

TOTP authentication secures the seed storage of the authenticator at the instance level. The seed is the secret key of the authenticator that is used to generate the TOTP.

Familiarize yourself with multi-factor authentication (MFA) concepts. For more information, see Multi-factor authentication .

TOTP authentication architecture

The secret key (**Seed**) resides in the RPA Hub server.

The decrypted TOTP is passed to the Unattended Robot and RPA Desktop Design Studio through a secure channel.

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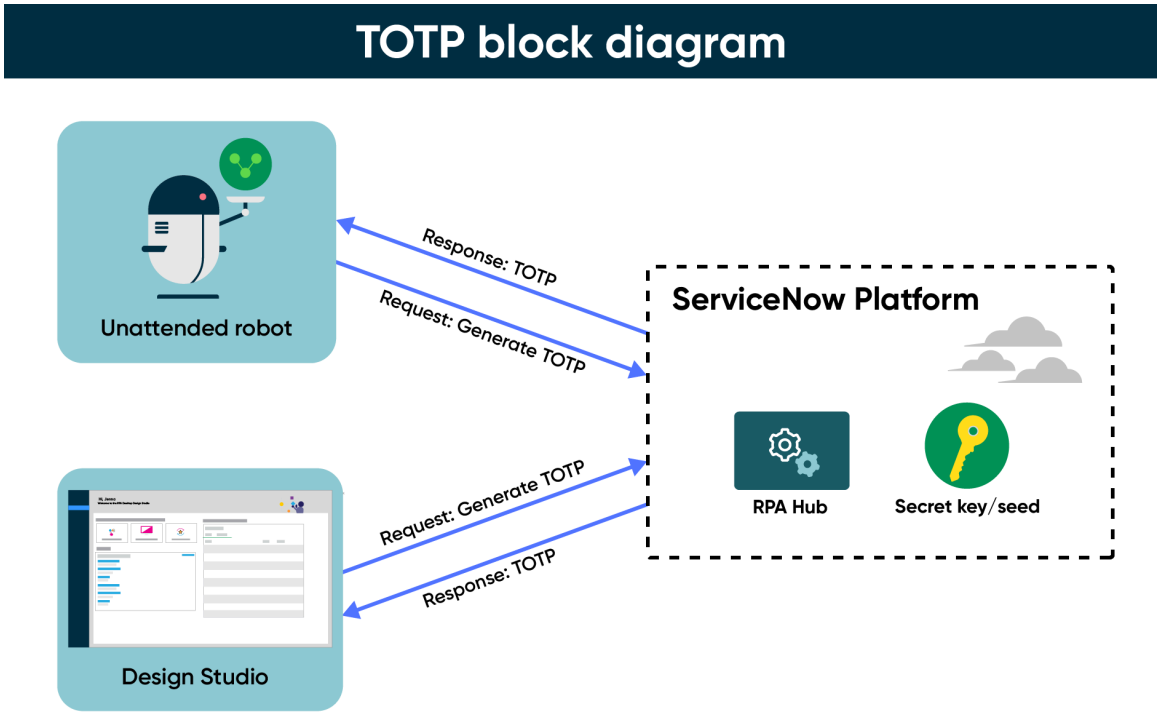
The following diagram shows the architecture of the TOTP authentication in RPA Hub.

Architecture of the TOTP authentication in RPA Hub



New fields and tables configuration

To enable TOTP authentication in the RPA Hub, do the following actions:

- Create a multi-factor authentication (MFA) authenticator record in the classic environment. For more information, see Create an MFA authenticator in RPA Hub.
- Associate a TOTP authenticator to a robot credential with the secret key (Seed). You can do this task in the workspace and classic environment. For more information, see Create a TOTP authenticator in RPA Hub.

In the RPA Desktop Design Studio, as an RPA developer, you can define the GetTOTP component (previously known as the getOKTAtoken component) with AuthenticatorName as an input parameter. The authenticator name that you provide from the component is compared against the unique authenticator name in the TOTP record. If the comparison is successful, the TOTP password is generated. For more information, see Use the GetTOTP component.

Related topics

Delete a TOTP authenticator in RPA Hub

Retire an MFA authenticator in RPA Hub

Create a TOTP authenticator in RPA Hub

Map a multi-factor authentication (MFA) authenticator record with a seed in a robot credential. This mapping results in creating a Time-based One-time Password (TOTP) authenticator record in RPA Hub.

Before you begin

Familiarize yourself with multi-factor authentication (MFA) concepts. For more information, see Multi-factor authentication.

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Familiarize yourself with the TOTP authentication in RPA Hub. For more information, see TOTP authentication in RPA Hub.

Create an MFA authenticator record. For more information, see Create an MFA authenticator in RPA Hub.

Create a robot credential. For more information, see Create a robot credential in RPA Hub.

Do this task only when you select the **Process Type** field as **Unattended** on the Bot process configuration form while you're creating a bot process. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

Verify that the life-cycle stage status of the associated bot process is set to either **Build** or **In Maintenance**.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

A seed is a secret key of the authenticator that is used to generate the TOTP.

An authenticator application is a third-party software that generates temporary passcodes. Users can use these passcodes with their password to log in to an instance that requires multi-factor authentication (MFA).

With TOTP authentication, you can store the seed of the authenticator at the instance level so that your unattended robots can seamlessly authenticate against MFA-enabled applications.

If a TOTP authenticator is using external credential vault, then ensure that the associated external credential vault is active.

In RPA Hub, you can retrieve robot credentials, application credentials, or TOTP seed in two ways:

- From ServiceNow credentials record (application credential, robot credential, or TOTP authenticator).
- From an external credential vault. For more information, see External credential vault in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Credential Management**, select **Robot Credentials**.
4. Select the robot credential record that you want to associate an MFA authenticator record to.
5. On the **TOTP Authenticators** tab, select **New**.
6. On the form, fill in the fields.

TOTP Authenticator form

Field	Description
Authenticator	MFA authenticator to be mapped to this robot credential.

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Field	Description
	Alternatively, you can select the search icon and select the MFA authenticator. For example, Okta.
Seed	Secret key of the authenticator that is used to generate the TOTP. This field does not appear if the **External Credential** check box is selected.
External Credential	Select this check box to fetch the seed from external credential vaults.
External Credential Vault	Select an external credential vault record that is used for fetching the seed from an external credential vault. Use the search icon to select an external credential vault record. For example, DemoCyberArk. Only active external credential vault records are listed here. This field appears only when the **External Credential** check box is selected.
Subflow Input	Provide a JSON that acts as an input to the subflow mapped in the selected external credential record. This JSON is used by the Subflow REST Step and must contain the necessary information for retrieving seed from the external credential vault. The value must be in JSON format. You cannot enter an empty JSON value. For more information about the JSON, see Steps to configure an external credential vault in RPA Hub. This field appears only when the **External Credential** check box is selected.

7. Select **Save**.
8. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

What to do next

Use the GetTOTP component in the RPA Desktop Design Studio to generate TOTP.

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Related topics

Delete a TOTP authenticator in RPA Hub

Retire an MFA authenticator in RPA Hub

Delete a TOTP authenticator in RPA Hub

Delete a Time-based One-time Password (TOTP) authenticator record in RPA Hub so that you can dissociate it from a bot process.

Before you begin

Familiarize yourself with multi-factor authentication (MFA) concepts. For more information, see Multi-factor authentication.

Familiarize yourself with the TOTP authentication in RPA Hub. For more information, see TOTP authentication in RPA Hub.

Create a multi-factor authentication (MFA) authenticator record. For more information, see Create an MFA authenticator in RPA Hub.

Map a TOTP authenticator to a robot credential in RPA Hub. For more information, see Create a TOTP authenticator in RPA Hub.

Verify if the life-cycle stage status of the associated bot process is either set to **Build** or **In Maintenance**.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Credential Management**, select **Robot Credentials**.
4. Open the robot credential record that you want to dissociate the TOTP authenticator record from.
5. On the **TOTP Authenticators** tab, select the TOTP authenticator that you want to delete.
6. Select **Delete**.

Related topics

Retire an MFA authenticator in RPA Hub

Create an application credential in RPA Hub

Create an application credential to add the application user name and password. An unattended robot can use this application credential to log in to an application when the automation is executed.

Before you begin

Familiarize yourself with the credential management concept. For more information, see Credential Management in RPA Hub.

Do this task only when you select the **Process Type** field as **Unattended** on the Bot process configuration form while you're creating a bot process. For more information, see Configuring a bot process record in RPA Hub, Bot process configuration form in RPA Hub, and Bot Process form in RPA Hub.

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Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_business_user, or sn_rpa_fdn.rpa_admin

About this task

You can't delete an application credential when the life-cycle stage status of the associated bot process is set to **Published**. For more information, see Life-cycle stage statuses (LLCS) of a bot process in RPA Hub.

You can't edit the **Name** and **Application Name** fields when the life-cycle stage status of the associated bot process is set to **Published**. You can edit the application password irrespective of what the life-cycle stage is of the associated bot process.

You can't edit the **External Credential** field when the life-cycle stage status of the associated bot process is set to **Published**.

If an application credential uses an external credential vault, make sure that the associated external credential vault is active.

In RPA Hub, you can retrieve the robot credentials, application credentials, or a Time-based One-time Password (TOTP) seed in two ways:

- From ServiceNow credentials record (application credential, robot credential, or TOTP authenticator).
- From an external credential vault. For more information, see External credential vault in RPA Hub.

If the **External Credential** check box is selected in an application credential record, then the **SetApplicationCredential** component in RPA Desktop Design Studio doesn't set the credentials and an error is displayed. For more information about the component, see Use the SetApplicationCredential component.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Credential Management**, select **Application Credentials**.
4. Select **New**.
5. On the form, fill in the fields.

Application credentials form

Field	Description
Name	Unique name of this application credential.
Application Name	Name of the business application. Alternatively, you can use the search icon and select the available business application.
User name	User name for the application. This field doesn't appear if the **External Credential** option is selected.
Password	Password for the application.

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Field	Description
	This field doesn’t appear if the **External Credential** option is selected.
External Credential	Option that you can select to fetch the credentials from the external credential vaults. This field doesn't appear to an RPA business user.
External Credential Vault	Option that you can for an external credential vault record that is used for fetching the credentials from an external credential vault. Use the search icon to select an external credential vault record. For example, DemoCyberArk. Only the active external credential vault records are listed here. This field appears only when the **External Credential** option is selected. This field doesn't appear to an RPA business user.
Subflow Input	JSON that acts as an input to the subflow mapped in the selected external credential record. This JSON is used by the Subflow REST Step and must contain the necessary information for retrieving the credentials from the external credential vault. The value must be in a JSON format. You can’t enter an empty JSON value. For more information about the JSON, see Steps to configure an external credential vault in RPA Hub. This field appears only when the **External Credential** option is selected. This field doesn't appear to an RPA business user.

6. Select **Save**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

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Related topics

View Audit History

Create a credential group in RPA Hub

Create a credential group to include a robot credential and application credentials that you can reuse in multiple bot processes. Unattended robots leverage the credential group to perform an automation that you defined in the associated bot process.

Before you begin

Familiarize yourself with the credential management concept. For more information, see Credential Management in RPA Hub.

Create a robot credential. For more information, see Create a robot credential in RPA Hub.

Create one or more application credentials. For more information, see Create an application credential in RPA Hub.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Credential Management**, select **Credential Groups**.
4. Select **New**.
5. On the form, fill in the fields.

Credential Group form

Field	Description
Name	Unique name of the credential group.
Robot Credential	Robot credential to be associated with this credential group. Robots use the robot credentials to authenticate on a system.

6. Select **Save**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Related topics

Associate a credential group to a bot process in RPA Hub

Assign a process robot credential within a bot process in RPA Hub

Associate an application credential to the credential group in RPA Hub

Associate one or more application credentials to the credential group in RPA Hub so that a robot can perform automation by logging in to the applications.

Before you begin

Familiarize yourself with the credential management concept. For more information, see Credential Management in RPA Hub.

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Create a credential group. For more information, see Create a credential group in RPA Hub.

Create application credentials. For more information, see Create an application credential in RPA Hub.

Developers can only associate application credentials that are created by them to the credential group.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Credential Management**, select **Credential Groups**.
4. In the Credential Groups list, select a credential group to associate an application credential to.
5. On the **Application Credential** tab, select **Add**.
6. Select one or more application credentials to associate with this credential group.
7. Select **Add**.
8. Select **Save**.

Associate a bot process to a credential group

Associate one or more unattended bot processes to a credential group in RPA Hub so that the associated robot can perform automation using the credential group.

Before you begin

Familiarize yourself with the credential management concept. For more information, see Credential Management in RPA Hub.

Create a credential group. For more information, see Create a credential group in RPA Hub.

Create a robot credential. For more information, see Create a robot credential in RPA Hub.

Create an unattended bot process. For more information, see Configuring a bot process record in RPA Hub.

You can't edit the **Process Credential Mappings** record when the life-cycle stage status of the associated bot process is set to **Published**.

Only the developers who are part of the managed by group can associate the bot process to the credential group.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Credential Management**, select **Credential Groups**.

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4. In the Credential Groups list, select a credential group to create a process credential mapping for.
5. On the **Process Credential Mappings** tab, select **Add**.
6. Select one or more bot processes from the list to associate with this credential group.

   The list displays all the unattended bot processes that don't have the life-cycle stage status set to **Published** or **Retired**.

   After selecting the bot processes and selecting **Add**, the process credential-mapping records for all corresponding bot processes are created.
7. Select **Save**.
8. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.
9. **Optional:** To remove a process credential mapping, select the process credential mapping, and select **Remove**.
   You can't remove process credential mappings that are associated with a published bot process.

What to do next

For providing access to this credential group to all users in the Managed by group or to specific users, see Provide users with access to a credential group in RPA Hub.

Provide users with access to a credential group in RPA Hub

Provide access to either all users or specific users in the Managed by group of the associated bot processes in RPA Hub. This way, you can make sure that the correct users have access to the credentials.

Before you begin

Familiarize yourself with the credential management concept. For more information, see Credential Management in RPA Hub.

Create a credential group. For more information, see Create a credential group in RPA Hub.

Add a bot process in the **Process Credential Mapping** tab of the credential group. For more information, see Associate a bot process to a credential group.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

Provide all users from the Managed by group of the associated bot process with access to a credential group by selecting the **Shared** option. Provide specific users from the Managed by group of the associated bot process with access to a credential group to by clearing the **Shared** option.

When the **Shared** option isn't selected, the **Authorized Users** tab appears. You can add the users from the Managed by group of the associated bot process in the **Authorized Users** tab. These authorized users can create the process robot credentials in the associated bot process.

By selecting the **Shared** option, you grant access to all the users in the Managed by group.
If **Shared** is selected on the Process Credential Mapping record, you can't add users in the **Authorized Users** tab.

If you remove an authorized user from the list, the Process Robot Credential record that was created by the user is deleted.

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You can't edit the **Shared** option and add or remove the users in the **Authorized Users** tab when the life-cycle stage status of the associated bot process is set to **Published**.

Important: If you're upgrading to Brazil, the **Shared** option is pre-selected. When you clear the **Shared** option, the Process Robot Credential records that were created by an RPA release manager and an RPA administrator are retained. However, the Process Robot Credential records that were created by the developers from the Managed by group are deleted.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Credential Management**, select **Credential Groups**.
4. In the Credential Groups list, select the credential group.
5. On the **Process Credential Mappings** tab, select the record that you want to modify.
6. Provide access to users.

Option	Action
Provide access to all users in the Managed by group	Select the **Shared** option.
Provide access to the selected users in the Managed by group	**a.** If selected, clear the **Shared** option. By default, this field is set to false. **Note:** When you clear the **Shared** option, the Process Robot Credential records that were created by an RPA release manager and RPA administra tor are retained. However, the Process Robot Credential records that were created by the developers from the Managed by group are deleted. **b.** Select the **Authorized Users** tab. **c.** Add the users that you want to provide ac cess from the Managed by group of the as sociated bot process.

7. Select **Save**.

External credential vault in RPA Hub

With the external credential vault feature, you can retrieve robot credentials, application credentials, or Time-based One-time Password (TOTP) seed.

External credential vault integration with RPA Hub

The following diagram shows the integration of an external credential vault with RPA Hub.

A robot resides in the customers' environment. If the robot requires sensitive data during the automation execution, then the robot makes a GraphQL Application Programming Interface (API)

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call to the RPA Hub. An example of the sensitive data is user name and password details while logging in to an SAP application.

Based on the input provided in the **External Credential** check box, either on a robot credential form, an application credential form, or a TOTP authenticator form:

- If the input is false (if the check box isn't selected), the credentials are saved or retrieved from the instance.
- If the input is true (if the check box is selected in the robot credential form, an application credential form), the credentials are fetched from a configured external credential vault. If the check box is selected in the TOTP authenticator form, the seed is fetched from a configured external credential vault.

For more information about configuring these fields, see Create a robot credential in RPA Hub, Create an application credential in RPA Hub, and Create a TOTP authenticator in RPA Hub.

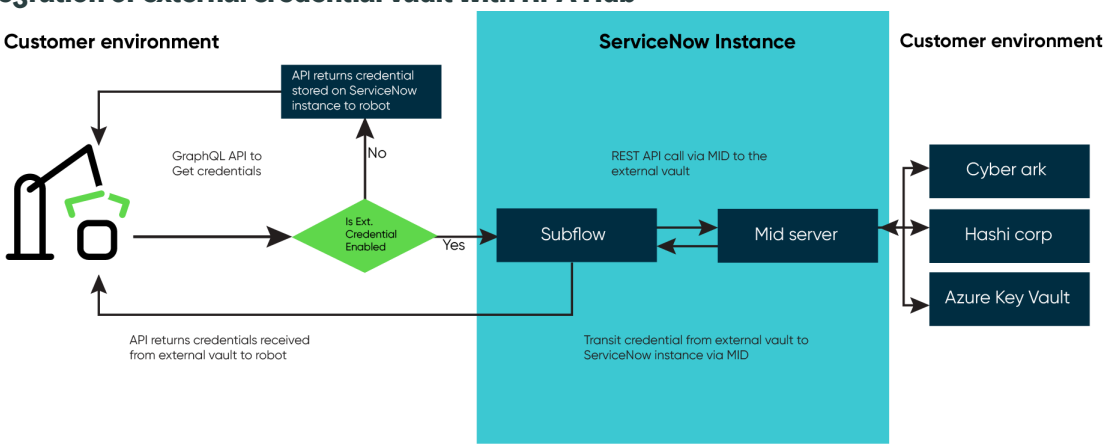
Examples of an external credential vault are CyberArk, Azure key Vault, and so on.

If the **External Credential** check box isn't enabled, the API returns the data stored in the **Password2** field of the ServiceNow instance and then the robot uses the sensitive data for the automation execution.

If the **External Credential** check box is enabled, the credentials are fetched from a configured external credential vault. In this scenario, the API internally triggers a subflow. This subflow makes a REST API call to the external credential vault. You can route this REST API call via MID Server. Or, you can directly establish a connection with the external credential vault. This implementation is dependent on your organizational requirements. The MID Server resides in the customers' environment. For more information about MID Server, see MID Server.

After the REST API call fetches the credential from the vault, the credentials are sent to the robot.

Integration of external credential vault with RPA Hub



Important information

You must configure the external credential settings appropriately, so that the data isn't stored or logged in the ServiceNow instance.

Verify that the value of the **Reporting** field is set to **Off** for the subflow of your external credential vault, for example **Demo CyberArk Subflow**. This setting verifies that the sensitive data isn't captured or logged. For more information about configuring this setting, see Activate flow reporting.

To configure the external credential vault in RPA Hub, see Steps to configure an external credential vault in RPA Hub.

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Outbound request logging enables you to understand what third party services your instance accesses and the volume of outbound requests. Additionally, logging can provide valuable information when debugging outbound integrations. For more information about system logging or outbound logging, see Configure outbound logging and Outbound web service logging properties.

Steps to configure an external credential vault in RPA Hub

Use this list of steps to guide you through all the tasks of configuring an external credential vault in RPA Hub.

Complete all the tasks for a step before moving on to the next step.

Do the steps in the order that they're presented.

Steps to configure an external credential vault in RPA Hub

Task	Reference
1. Create a subflow to integrate your external credential vault. For more information, see Create a subflow in Workflow Studio.	For reference, see the sample **Demo CyberArk Subflow** in your ServiceNow instance.
1.A. Verify that the subflow that you're creating to integrate with the External Credential Vault, must have an input type as JSON. This input takes the value from the **Subflow Input** field of the Robot Credential, Application Credential, or Time-based One-time Password (TOTP) Authenticator. For example, the robot credential or application credential or TOTP authenticators that are using the **Demo CyberArk** external credential vault, must align with the following JSON format: `{ "appID" : "", "query" : "" }` Populate values for **appID** and **query**.	
1.B. You can use the REST Step in the subflow to connect with the external credential vault. You can also use other integration steps such as SOAP. For more information, see Workflow Studio steps.	
1.C. Verify that the output of your subflow must be aligned with the following JSON schema. `{ "$schema": "http://json-schema.org/draft-07/schema#", "type": "object", "properties": { "result": {`	This schema is used by the Robotic Process Automation (RPA) GraphQL APIs to validate the subflow output. If the output isn't aligned with this schema, an error is encountered. Error Message: `The JSON received from the subflow deviates from the expected JSON schema. Rectify the JSON structure by`

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Steps to configure an external credential vault in RPA Hub (continued)

Task	Reference

<pre>"type": "object",
"properties": {
"status": {
"type": "string",
"enum": ["success", "failure"]
},
"data": {
"type": "object",
"properties": {
"username": {
"type": "string"
},
"sensitiveValue": {
"type": "string"
},
"additionalData": {
"type": "object"
}
},
"required": ["sensitiveValue"]
},
"error": {
"type": "object",
"properties": {
"errorType": {
"type": "string"
},
"errorMessage": {
"type": "string"
},
"additionalErrorData": {
"type": "object"
}</pre>
	aligning it with the specified schema in the documentation.

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Steps to configure an external credential vault in RPA Hub (continued)

Task	Reference

<pre>},
"required": ["errorMessage"]
}
},
"required":
["status"]
}
},
"required": ["result"]
};</pre>	

1.D. You can align with the expected JSON schema (mentioned in 1.C) by defining a JSON output with the name 'result' for the Subflow. For success status, this result output must be assigned with a JSON object of the following structure. Populate values for the keys defined in the JSON. The **status** and **sensitiveValue** keys are required.
<pre>{
"status":
"success", //Mandatory
"data": {
"username": "",
"sensitiveValue":
"" //Mandatory
"additionalData": {}
}
}</pre>For failure status, this result output must be assigned with a JSON object of the following structure. Populate values for the keys defined in the JSON. The **status** and **errorMessage** keys are required.
<pre>{
"status":
"failure", //Mandatory
"error": {
"errorType": "",
"errorMessage":
"", //Mandatory
"additionalErrorData": {}
}
}</pre>	

2. Create an external credential vault record. For more information, see Create an external credential vault record in RPA Hub.	For reference, see the sample **Demo CyberArk** external credential vault in your ServiceNow instance.

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Steps to configure an external credential vault in RPA Hub (continued)

Task	Reference
3. Establish a connection with an external credential vault by using the ServiceNow Connections and Credentials. For more information about creating an active connection, see Create an HTTP(s) connection. While configuring the connection record, verify to align with your organizational security requirements.	For reference, see the sample **Demo CyberArk Subflow** that uses **RPA CyberArk** connection and credential alias. Create a connection record in this connection and credential alias to establish connection with your CyberArk external vault.
4. To use the external credential vault record, that you created in step 2, navigate to either robot credential, application credential, or TOTP authenticator and select the **External Credential** check box. Also, select a record in the **External Credential Vault** field and populate the **Subflow Input** field with a valid JSON object. The JSON must contain the necessary information for retrieving credentials from the external credential vault.	For more information about configuring these fields, see Create a robot credential in RPA Hub, Create an application credential in RPA Hub, and Create a TOTP authenticator in RPA Hub.

Create an external credential vault record in RPA Hub

Create an external credential vault record in RPA Hub to register your external credential vault for further usage by the robot.

Before you begin

Familiarize yourself with the external credentials concepts. For more information, see External credential vault in RPA Hub.

Verify that you've completed the tasks that are related to configuring the external credentials in RPA Hub. For more information, see Steps to configure an external credential vault in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

An external credential vault is a secure storage system often used to store and manage sensitive information. For example, user names, passwords, and other access credentials for various applications, services, or systems.

To edit an existing external credential vault record, clear the **Active** check box.

You can't deactivate an external credential vault record, if it's associated with a published bot process.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Credential Management**, select **External Credential Vaults**.

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4. Select **New**.
5. On the External Credential Vault form, fill in the fields.

External Credential Vault form

Field	Description
Name	Unique name of the external credential vault. For example, Demo CyberArk.
Subflow	Associated subflow that fetches the credentials from the external credential vault. Only published and active subflows are listed here, that aren't associated with any existing External Credential Vault record. Subflow and External Credential Vault names have a one-on-one mapping.
Active	Option to activate the external credential vault. Clear the **Active** check box to edit an existing external credential vault record.
Description	Brief description of the external credential vault.

6. Select **Save**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Create an MFA authenticator in RPA Hub

Define the authenticator and token length that acts as an enabler for the Time-based One-time Password (TOTP) authentication in RPA Hub so that the unattended robots can seamlessly authenticate against multi-factor authentication (MFA)-enabled applications.

Before you begin

Familiarize yourself with multi-factor authentication (MFA) concepts. For more information, see Multi-factor authentication.

Familiarize yourself with the TOTP authentication in RPA Hub. For more information, see TOTP authentication in RPA Hub.

You must do this task in the classic environment.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

An authenticator application is a third-party software that generates temporary passcodes. Users can use these passcodes along with their password to log in to an instance that requires multi-factor authentication (MFA). For example, the following applications support Time-based One-time Passwords (TOTP):

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- Google Authenticator
- Microsoft Authenticator
- Okta Verify

For more detail on these applications, see Authenticator applications.

The MFA authenticator record acts as an input to the Time-based One-time Password (TOTP) authenticator.

After you create an MFA authenticator record, all the fields are read-only.

You can't edit an MFA authenticator record. If changes are required to an existing MFA record, you must retire an existing record and then create an MFA authenticator record.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Administration** > **Authenticators**.
2. Select **New**.
3. On the form, fill in the fields.

MFA Authenticator form

Field	Description
Name	Unique name of the MFA authenticator. For example, Google Authenticator.
Token Length	Length of the generated Time-based One-time Password (TOTP) that depends on the authenticator you have selected: ○ **6**- The minimum length of the TOTP that is generated. ○ 7 ○ 8 ○ **9**- The maximum length of the TOTP that is generated.
Life Cycle Stage Status	Status of the life-cycle stage of the MFA authenticator: ○ **In Use**- This value is the default. ○ **Retired**

4. Select **Submit**.

What to do next

Create a TOTP authenticator. For more information, see Create a TOTP authenticator in RPA Hub.

Related topics

Retire an MFA authenticator in RPA Hub

Delete a TOTP authenticator in RPA Hub

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Retire an MFA authenticator in RPA Hub

Retire a multi-factor authentication (MFA) authenticator in RPA Hub so that you can turn off the authentication. After you retire an MFA authenticator, it can't be used again.

Before you begin

Familiarize yourself with multi-factor authentication (MFA) concepts. For more information, see Multi-factor authentication.

Familiarize yourself with the TOTP authentication in RPA Hub. For more information, see TOTP authentication in RPA Hub.

You must do this task in the classic environment.

Create an MFA authenticator record. For more information, see Create an MFA authenticator in RPA Hub.

Verify that the MFA authenticator record isn't associated to a bot process whose life-cycle stage status is **Build**, **Published**, or **Retired**. If it's not associated to one of those statuses, dissociate it to retire the MFA authenticator.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Administration** > **Authenticators**.
2. Open the MFA authenticator that you want to retire.
3. In the form header, select **Retire**.
4. In the Confirmation dialog box, select **Retire**.

Related topics

Retire a bot process in RPA Hub

Shared parameters in RPA Hub

Shared parameters enable you to store the global variables or configurable items in one place. These variables are used across bot processes.

Instead of hard-coding these values directly into each individual bot process, the shared parameters are stored in a central location, making it easier to update them universally and avoid duplication.

You cannot delete a shared parameter that is associated to a published bot process.

Shared parameters offer numerous benefits such as consistency, centralized management that contributes to efficient and maintainable development practices.

Create a shared parameter in RPA Hub

Create a shared parameter so that you can store the global variables or configurable items in one place. These variables are used across bot processes.

Before you begin

(Optional) Configure the system properties related to **Activity Stream**, to add or remove the fields. The changes to these fields are captured in the work notes. For more information, see Configure the system properties for an activity stream in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

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Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Shared Parameters**.
4. Select **New**.
5. On the form, fill in the fields.
6. Select **Submit**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.
8. **Optional:** To delete a shared parameter, select the three-dot icon next to the **Save** button and select **Delete**.

Note: Verify that the shared parameter is not associated to any bot process. You can delete a shared parameter which is associated to a retired bot process.

Related topics

Process parameter form in RPA Hub

Assign a bot process to a shared parameter in RPA Hub

Unassign a bot process from a shared parameter in RPA Hub

View Audit History

Assign a bot process to a shared parameter in RPA Hub

Assign a bot process to a shared parameter in RPA Hub so that it can interact with this shared parameter. You can assign more than one bot process to a shared parameter.

Before you begin

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Create a shared parameter. For more information, see Create a shared parameter in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Shared Parameters**.
4. Open the shared parameter that you want to assign a bot process to.
5. On the **Bot Process Configuration** tab, select **Add**.
6. On the **Available Bot Processes** tab, select the required bot process.
7. Select **Add**.
8. Select **Save**.

Related topics

Process parameter form in RPA Hub

Unassign a bot process from a shared parameter in RPA Hub

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Unassign a bot process from a shared parameter in RPA Hub

Unassign a bot process from a shared parameter in RPA Hub to stop an interaction with this shared parameter.

Before you begin

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Create a shared parameter. For more information, see Create a shared parameter in RPA Hub.

Assign a bot process to a shared parameter. For more information, see Assign a bot process to a shared parameter in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Shared Parameters**.
4. Open the shared parameter that you want to unassign a bot process from.
5. On the **Bot Process Configuration** tab, select the required bot process.
6. Select **Remove**.
7. Select **Save**.

Related topics

Process parameter form in RPA Hub

Queue implementation in RPA Hub

In RPA Hub, the queues are implemented to distribute the workload among various robots. Work Items (WI) within a queue are processed simultaneously by two or more robots.

Queue implementation overview

A queue is a repository that can hold a number of work items. Work items can store multiple types of data, such as transaction information, customer details, or information from a document.

A queue refers to a structured data storage mechanism used to manage and control the distribution of tasks, work items, or cases to different robots for processing. RPA queues play a crucial role in orchestrating the execution of automated processes and ensuring that tasks are processed efficiently, accurately, and in the desired order.

Queues facilitate task distribution, coordination, and efficient processing across multiple bots or processes. Queues are particularly useful in scenarios where automation needs to handle a dynamic workload with different tasks arriving at different times, such as processing incoming emails, customer orders, or data entries.

In RPA Hub, you cannot delete a queue that is associated to a published bot process.

Work item lifecycle

The State transition of a work item guides you through the stages of its life cycle.

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1. Work items are created from upstream systems using the **Add WorkItem to Queue** flow action or by robots, using the **CreateStringWorkItem** or **CreateJSONWorkItem** component.
2. Using the **PickWorkItem** component, robots pick a work item for processing.
3. After a work item is picked, the robot is stamped on the work item.

   Note: No other robot can pick this work item.

4. Work items are processed by the criteria that you specified. There are various conditions to determine which item must be picked and it varies for each automation. This criterion is the input for the **PickWorkItem** component.
5. After a work item is picked, the robot updates it multiple times while processing it using the **UpdateWorkItem** component.

   This robot can also release this work item by partially processing it, so that other robots can pick it. This process is performed by the input in the **ReleaseMode** field, in the **UpdateWorkItem** component.

6. After the robot completes the processing, it updates the work item to complete using the **UpdateWorkItem** component and picks the next work item that is Step 2.

Related topics

Create a queue in RPA Hub

Assign a bot process to a queue from Queues menu in RPA Hub

Manage your work items in RPA Hub

Using auto-retry functionality for your failed work items in RPA Hub

Queue form in RPA Hub

Work item form in RPA Hub

Queue

Create a queue in RPA Hub

Create a queue in RPA Hub to manage the work items that you want the robot to process.

Before you begin

To access a queue, an RPA business user or a support user must be a part of **Managed by Group** and must have relevant roles such as RPA business user, RPA developer, RPA support user.

(Optional) Configure the system properties related to **Activity Stream**, to add or remove the fields. The changes to these fields are captured in the work notes. For more information, see Configure the system properties for an activity stream in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

Queues are used in automations to distribute transactional data or the workload among different robots.

A queue is a repository that can hold a number of work items. Work items can store multiple types of data, such as transaction information, customer details, or information from a document.

You can't delete a queue that is associated to a published bot process.

For more information on queues implementation in RPA Hub, see Queue implementation in RPA Hub.

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You can use the guided tour to get instructions on how to create a queue in the classic environment. For more information, see Use Guided Tours in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Queues**.
4. Select **New**.
5. On the form, fill in the fields.
6. Select **Save**.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.
8. **Optional:** To delete a queue, select the three-dot icon next to the **Save** button and select **Delete**.

> **Note:** Verify that the queue is not associated to any bot process. You can delete a queue which is associated to a retired bot process. Deleting a queue also deletes the associated work items.

Related topics

Assign a bot process to a queue from Queues menu in RPA Hub

Unassign a bot process from a queue in RPA Hub

View Audit History

Queue form in RPA Hub

Use the Work Queue form to create a queue. A queue lists the work items that you want the robot to process.

Work Queue form

Field	Description
Name	Name of the work queue.
Is Work Item Name Unique	Option to select if the name of each item in this queue is unique.
Application	[Auto generated] Application containing this record. Role required to view this field: admin.
Maximum Attempts	Number of attempts for failed work items. Enter a value between 1 and 99 [maximum value from system properties]. The default value is 1. Roles required to edit this field: RPA release manager and RPA admin.

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Work Queue form (continued)

Field	Description
Attempt Delay (mins)	Maximum delay, in minutes, before the work item is attempted again. The default value is 0. Roles required to edit this field: RPA release manager and RPA admin. This field appears only when the value of the **Maximum Attempts** field is more than 1.
Description	Brief description of the work queue.
Purge-Work Items	
Purge Status	Status of the work items that need to get purged.
Purge After (days)	Number of days after which the work items get deleted based on the date of creation.
Average Handling Time (AHT) - Work Items Work items with Success status and that are not purged, are included for AHT calculation.	
Include All Work Items	Successful work items that are considered for the Average Handling Time (AHT) calculation. For more information about robot pool, see Robot pool in RPA Hub.
Work Item Count	Number of recent successful work items that are considered for the Average Handling Time (AHT) calculation. Enter a value between 20 and 1000. The default value is 100. This field appears only when the value of the **Include All Work Items** option is cleared. For more information about robot pool, see Robot pool in RPA Hub.
Compose	
Work notes (Private)	Work notes for the work queue.
Additional Comments	Additional comments related to the work queue.

Related topics

- Using auto-retry functionality for your failed work items in RPA Hub
- Work item form in RPA Hub
- Queue implementation in RPA Hub

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Assign a bot process to a queue from Queues menu in RPA Hub

Assign a bot process to a queue in RPA Hub so that it can interact with this queue. You can assign more than one bot process to a queue. Any robot that is associated with the assigned bot process can insert the work item, pick the work item, and update the work item.

Before you begin

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Create a queue. For more information, see Create a queue in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

If the bot process is enabled for robot pool, then only one queue (that is not associated with any other bot process) can be mapped to the current bot process.

To associate a queue to a bot process from the bot process related list, see c to the bot process from the related list.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Build**, select **Queues**.
4. Open the queue that you want to assign a bot process to.
5. On the **Bot Process Configuration** tab, select **Add**.
6. On the **Available Bot Process** tab, select the required bot process.
7. Select **Add**.
8. Select **Save**.

Related topics

- Queue form in RPA Hub
- Unassign a bot process from a queue in RPA Hub
- Queue implementation in RPA Hub

Unassign a bot process from a queue in RPA Hub

Unassign a bot process from a queue in RPA Hub to stop an interaction with this queue.

Before you begin

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Create a queue. For more information, see Create a queue in RPA Hub.

Assign a bot process to a queue. For more information, see Assign a bot process to a queue from Queues menu in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().

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3. On the **Lists** tab, under **Build**, select **Queues**.
4. Open the queue that you want to unassign a bot process from.
5. On the **Bot Process Configuration** tab, select the required bot process.
6. Select **Remove**.
7. Select **Save**.

Related topics

Queue form in RPA Hub

Queue implementation in RPA Hub

Embedded Task Automation (ETA) in RPA Hub

With the embedded task automation feature, trigger attended bot processes (attended automations) from the ServiceNow forms, apart from initiating them from the Attended Robot application.

Important: The embedded task automation runs only for published attended bot processes.

Invoke Embedded Task Automation via API

To trigger a bot process (automation) from a Workspace, a playbook, or any other service portal, you can create corresponding actions and call the *RPAInstanceFormHooks* Application Programming Interface (API). For more information about invoking an embedded task automation via an API, see Invoke Embedded Task Automation via API in RPA Hub.

Embedded Task Automation overview

Use the embedded task automation feature to initiate an automation seamlessly from ServiceNow screens in an attended mode. It provides users with a transparent view of the robot executing tasks directly on their machines. This feature provides a user-friendly experience by enabling individuals to observe and monitor the automation process in real-time.

Why Embedded Task Automation

Since existing attended automations interact with forms that are built within the automation itself, form development is required. Use the Embedded Task Automation feature for attended automations that use the ServiceNow screens. The Embedded Task Automation feature enables the reuse of the existing ServiceNow screen without a need to develop forms with in automation.

How Embedded Task Automation works

Let's consider an employee badge creation use case.

1. In the Service Catalog, a request is created for an employee badge generation. Details such as **Requested for** and **Location** are included in this request form, for printing the badge on a third party application. After the badge is generated in the application, the badge ID is populated in the request form.
2. In RPA Desktop Design Studio, build an automation using the new components and publish it to the ServiceNow instance. For more information about the new components, see Forms. Ensure to use the Terminate component for each UI action automation logic that helps in completing the automation execution for the respective UI action. For more information about the component, Use the Terminate component.

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3. In the RPA Hub, create an attended bot process (for example, Employee Badge Generation). For more information about creating an attended bot process, see Configuring a bot process record in RPA Hub.
4. To trigger this bot process (automation) from the ServiceNow form, select the **Enable Embedded Task Automation** check box in the associated attended bot process form. On enabling this check box, two additional tabs, Process Field Parameters and Attended Configuration, are available on the bot process form. For more information about the bot process form, see Bot Process form in RPA Hub.
5. On the Process Field Parameters tab, create dynamic parameters that are used in the automation. Process field parameters are used for setting the value or getting the value of a field on a particular form. Examples of process field parameters are the user's title, first name, last name, and location. These details are used in the automation workflow while generating a badge. For more information about creating process field parameters, see Create a process field parameter in RPA Hub.
6. In the RPA Hub, create an attended configuration record. For more information about creating an attended configuration record, see Create an attended configuration record in RPA Hub.
7. In this attended configuration record, select the table associated with the required form from the **Table** field, from where this bot process must be triggered. Then, define the criteria in the **Conditions** field, to trigger the bot process. In this example, set the conditions for approved requests that are required for badge generation. For more information about the Attended Configuration form, see Attended Configuration form in RPA Hub.
8. On the Field Parameter Mappings tab, map the form fields to the process field parameters that are used in the automations. This process enables an easy data flow during the execution of a bot process. For example, if "Full name" is the process field parameter used in the automation, then map it to the form's 'Name' field. For more information about mapping field parameters, see Map a table field to a bot process field parameter in RPA Hub.
9. On the Attended Configuration tab, the form is activated by selecting the **Activate** button. In the background, a UI action (button) is created on the corresponding request form. For more information about activating an attended configuration, see Activate an attended configuration record in RPA Hub.
10. Publish the bot process with the corresponding package published from the RPA Desktop Design Studio. For more information, see Publish a bot process in RPA Hub.

    To publish the bot process, assign the user with RPA AU (RPA assisted user) in the **Assigned User** or **Assigned Group** field in the Attended Users/Groups tab of the attended bot process record. If the auto assignment system property *sn_rpa_fdn.allow_rda_robot_auto_assignment* is false, the attended robot record is available for the assigned RPA Assisted User. If the auto assignment system property is true, an attended robot license is available to auto create an attended robot at the time of triggering. For more information about this system property, see Configure RPA Hub properties.
11. Then, the assigned user can view the UI action (button) (for example, Generate Badge) on the corresponding ServiceNow form. Using this button, the user can trigger the attended bot process (attended automation). There are certain conditions to view this button (UI action). For more information, see Conditions for the visibility of UI action (button).

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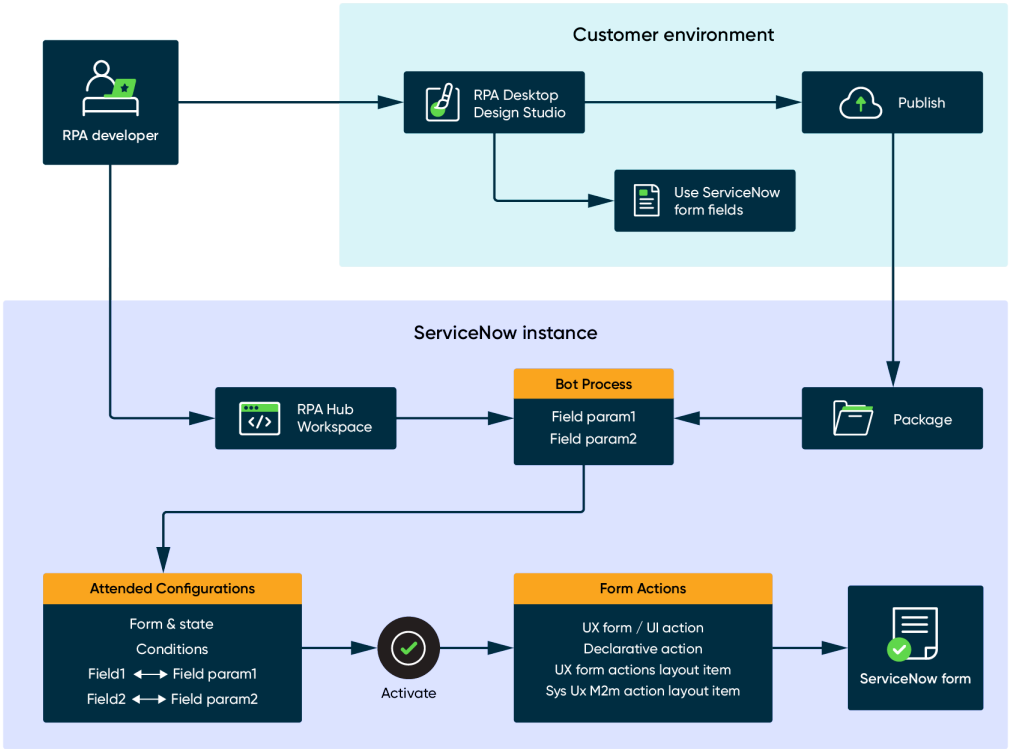
Configuration of Embedded Task Automation in RPA Hub



Configuring Embedded Task Automation

To configure the embedded task automation, see List of steps for configuring embedded task automation.

New components for Embedded Task Automation in RPA Desktop Design Studio

The following four new components are added to the new **Forms** section in RPA Desktop Design Studio. These components are available under the new ServiceNow category in the Toolbox pane.

- **AttendedConfigurations**: Segregate the execution of the automations in a single automation project and call the respective logic according to the action invoked. For more information, see Use the AttendedConfigurations component.
- **GetProcessFieldParameters**: Fetch the values of the ServiceNow form fields associated in the Field Parameter Mapping of the corresponding attended configuration record in RPA Hub. For more information, see Use the GetProcessFieldParameters component.
- **GetRecordContextID**: Fetch the current record sys_id of the ServiceNow form, from where the automation is triggered. For more information, see Use the GetRecordContextID component.
- **SetProcessFieldParameters**: Update the values of the ServiceNow form fields associated in the Field Parameter Mapping of the corresponding attended configuration record in RPA Hub. For more information, see Use the SetProcessFieldParameters component.

Terminate component in attended automations

Use the **Terminate** component in attended automations to complete the automation execution. For more information about the component, Use the Terminate component.

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Launch attended automations from ServiceNow forms

Learn about the restrictions to launch an attended automation from the ServiceNow forms and launching the attended automations. For more information, see Attended Robot authentication journey and automation execution in Embedded Task Automation.

Attended Robot authentication journey and automation execution

Learn about the authentication process in the Attended Robot application and the automation execution. For more information, see Attended Robot authentication journey and automation execution in Embedded Task Automation.

Important:

If a new version exists to the existing automation, to reflect those changes the Attended Robot application must be closed. Until then, it continues to use the existing version, as the Attended Robot application is already launched and running.

If a new version of RPA Hub is installed on the instance, to reflect those changes the Attended Robot application must be closed. Until then, it continues to use the existing set of plugins, as the Attended Robot application is already launched and running.

Runtime Phase of the Embedded Task Automation

Learn more about the triggering of an attended automation from a ServiceNow form. For more information, see Runtime Phase of the Embedded Task Automation (ETA).

Related topics

Deactivate an attended configuration record in RPA Hub

Delete an attended configuration record in RPA Hub

Edit an attended configuration record in RPA Hub

List of steps for configuring embedded task automation

Use this list of steps to guide you through all the tasks for configuring an embedded task automation.

Complete all the tasks for a step before moving on to the next step.

Do the steps in the order that they're presented.

List of steps for configuring an embedded task automation

Task	Reference
1) Familiarize yourself with Embedded Task Automation concepts.	For more information, see Embedded Task Automation (ETA) in RPA Hub.
2) Build an automation by using the new components in RPA Desktop Design Studio and publish it to the ServiceNow instance.	For more information about the new components, see Forms. For more information about publishing the automation RPA Desktop Design Studio, see Publish an automation project in RPA Desktop Design Studio.

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List of steps for configuring an embedded task automation (continued)

Task	Reference
3) Create an attended bot process. Associate it with the package that is published in step 2.	For more information, see Configuring a bot process record in RPA Hub.
4) Select the **Enable Embedded Task Automation** check box in the associated attended bot process form. On enabling this check box, two additional tabs, **Process Field Parameters** and **Attended Configuration**, are available on the bot process form.	For more information, see Bot Process form in RPA Hub.
5) On the Process Field Parameters tab, create dynamic parameters that are used in the automation.	For more information, see Create a process field parameter in RPA Hub.
6) Create an attended configuration record.	For more information, see Create an attended configuration record in RPA Hub.
7) On the Field Parameter Mappings tab, map the form fields to the process field parameters that are used in the automations.	For more information, see Map a table field to a bot process field parameter in RPA Hub.
8) Activate an attended configuration record to enable the UI action that triggers the attended automation on the associated ServiceNow form.	For more information, see Activate an attended configuration record in RPA Hub.
9) To trigger a bot process (automation) from a Workspace, a playbook, or any other service portal, you can create corresponding actions and call the `RPAInstanceFormHooks` Application Programming Interface (API).	For more information, see Invoke Embedded Task Automation via API in RPA Hub.
10) To publish the bot process, assign the user with RPA AU (RPA assisted user) in the **Assigned User** or **Assigned Group** field in the Attended Users/Groups tab of the attended bot process record. If the auto assignment system property `sn_rpa_fdn.allow_rda_robot_auto_assignment` is false, the attended robot record is available for the assigned RPA Assisted User. If the auto assignment system property is true, an attended robot license is available to auto create an attended robot at the time of triggering.	For more information about assigning the user with RPA AU, see Assign an attended user or group to an attended bot process. For more information about this system property, see Configure RPA Hub properties.
11) Publish the bot process with the corresponding package published from the RPA Desktop Design Studio.	For more information, see Publish a bot process in RPA Hub.

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List of steps for configuring an embedded task automation (continued)

Task	Reference
12) The assigned user can view the UI action (button) on the corresponding ServiceNow form. Using this button, the user can trigger the attended bot process (attended automation). There are certain conditions to view this button (UI action).	For more information about the visibility conditions, see Conditions for the visibility of UI action (button).

Runtime Phase of the Embedded Task Automation (ETA)

Learn more about the triggering of an attended automation from a ServiceNow form.

Workflow of the Runtime Phase of an Embedded Task Automation

Familiarize yourself with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

A user with RPA Assisted User role logs into the ServiceNow instance.

Navigates to the corresponding ServiceNow form from where the automation must be triggered.

The user selects the form action, that is created when you activate the attended configuration.

- If any changes are made on the ServiceNow form, a confirmation message is displayed to save before triggering the UI Action. If the user selects **Proceed** or **OK**, the form is saved. The automation is triggered. If the user selects **Cancel**, the automation is not triggered and the ServiceNow form is not saved.
- When the user selects the UI action, if it is successful, an attempt is made to start attended automation. Make sure that the Attended Robot is installed on the machine. If it is not successful, a connection to initiate the Attended Robot is not established. An information message is displayed to try again or contact system administrator.

A URL is generated that initiates the Attended Robot with details such as OAuth Entity ID, code challenge, ServiceNow form record SysID (from where the automation is triggered), Bot Process Sys ID, and Package SysID (Automation SysID).

Using these details, the Attended Robot makes a call to the OAuth to get the access and refresh token. Learn about the authentication journey in the Attended Robot application and the automation execution. For more information, see Attended Robot authentication journey and automation execution in Embedded Task Automation.

With these token details, the Attended Robot shares the session details with the ServiceNow form and starts executing the automation.

The **GetProcessFieldParameters** component makes a GraphQL API to the ServiceNow instance to read the form field values that are mapped to the dynamic process field parameters. For more information about the **GetProcessFieldParameters** component, see Use the GetProcessFieldParameters component.

After the automation is executed, the data is passed to the downstream applications.

The **SetProcessFieldParameters** component makes a GraphQL API to the ServiceNow instance to set the form field values that are mapped to the dynamic process field parameters. For more information about the **SetProcessFieldParameters** component, see Use the SetProcessFieldParameters component.

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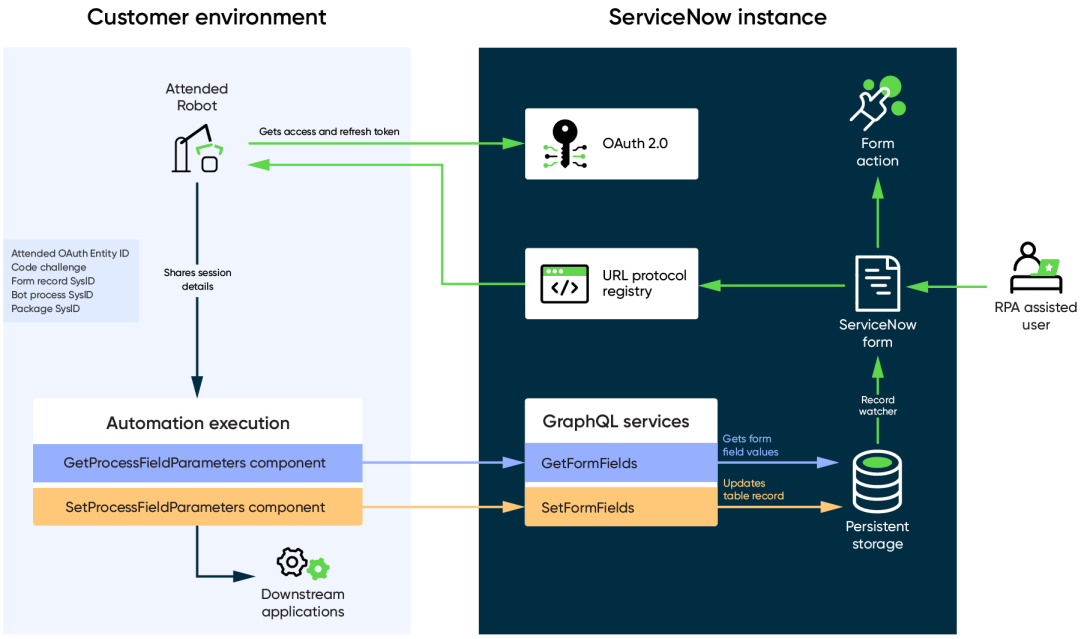
Workflow of the Runtime Phase of an Embedded Task Automation



Launch attended automations from ServiceNow forms

Learn about the restrictions to launch an attended automation from ServiceNow forms and launching the attended automations. For more information, see Attended Robot authentication journey and automation execution in Embedded Task Automation.

Related topics

List of steps for configuring embedded task automation

Create an attended configuration record in RPA Hub

Create an attended configuration record in RPA Hub to trigger an attended bot process that is enabled with embedded task automation.

Before you begin

Familiarize yourself with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Verify that you've completed the tasks that are related to configuring the Embedded Task Automation in RPA Hub. For more information, see List of steps for configuring embedded task automation.

Create an attended bot process. For more information about creating an attended bot process, see Configuring a bot process record in RPA Hub.

Verify that the **Enable Embedded Task Automation** check box is selected in the associated attended bot process form. For more information about the bot process form, see Bot Process form in RPA Hub.

Verify that the Robotic Process Automation (RPA) developer (sn_rpa_fdn.rpa_developer) is in the Managed by Group list of the associated bot process.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

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Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. Create an attended configuration record from either the menu list or from an attended bot process record's related list.

Option	Action
Create an attended configuration record from the menu list	**a.** On the **Lists** tab, under **Build**, select **Attended Configurations**. **b.** Select **New**.
Create an attended configuration record from an attended bot process record's related list	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open an attended bot process that you want to create and associate an attended configuration to. **c.** On the Attended Configurations tab, select **New**.

4. On the Attended Configuration form, fill in the fields.
   For more information, see Attended Configuration form in RPA Hub.
5. Select **Save**.

Related topics

- Attended Configuration form in RPA Hub
- Activate an attended configuration record in RPA Hub
- Deactivate an attended configuration record in RPA Hub
- Delete an attended configuration record in RPA Hub
- Create a process field parameter in RPA Hub
- Invoke Embedded Task Automation via API in RPA Hub
- Conditions for the visibility of UI action (button)

Map a table field to a bot process field parameter in RPA Hub

Map form fields of the associated attended configuration table (**Table** field) to the process field parameters used in the automations. For example, if "`First name`" is the process field parameter used in the automation, then it's mapped to the form's '`requested_for.first_name`' field.

Before you begin

Familiarize yourself with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Verify that you've completed the tasks that are related to configuring the Embedded Task Automation in RPA Hub. For more information, see List of steps for configuring embedded task automation.

Create an attended bot process. For more information about creating an attended bot process, see Configuring a bot process record in RPA Hub.

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Verify that the **Enable Embedded Task Automation** check box is selected in the associated attended bot process form. For more information about the bot process form, see Bot Process form in RPA Hub.

Create an attended configuration record. For more information, see Create an attended configuration record in RPA Hub.

Create process field parameters that are used in the automations.

- For more information about creating process field parameters from a bot process, see Create a process field parameter in RPA Hub.
- You can create a process field parameter by performing step 7 of this task. Verify that the associated bot process isn't published. Also verify that the associated attended configuration record is either in **Draft** or **Inactive** state.

Verify that the RPA developer (sn_rpa_fdn.rpa_developer) is in the Managed by Group list of the associated bot process that is assigned to an Attended Configuration record. Verify that the Attended Configuration record that is assigned to the given field parameter mapping, must be either in **Inactive** or **Draft** state.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

About this task

Field parameter mapping enables an easy data flow during the execution of a bot process.

You can't map the same process field parameter with multiple fields. A process field parameter, for example, Name, can't be mapped with more than one field, for example, First name and Last name.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. Map a field parameter from either the Attended Configuration menu list or from an attended bot process record's related list.

Option	Action
Map a field parameter from an Attended Configuration menu list	**a.** On the **Lists** tab, in **Build**, select **Attended Configurations**. **b.** Open an attended configuration record.
Map a field parameter from an attended bot process record's related list	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open an attended bot process. **c.** On the Attended Configurations tab, select an attended configuration record.

4. On the **Field Parameter Mappings** tab, select **New**.
5. On the Field and parameter mapping dialog box, fill in the fields.

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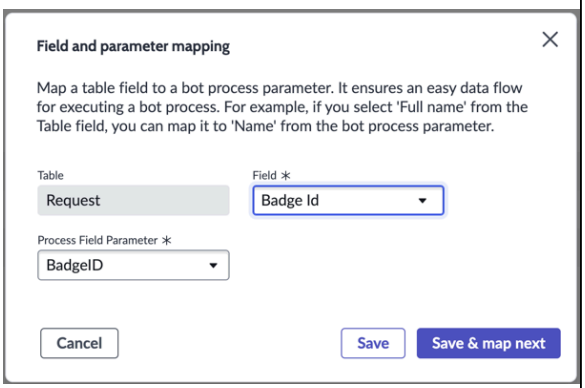
Field parameter mapping dialog box

Field	Description
Table	[Auto-generated] Associated attended configuration table.
Process Field Parameter	Select a process field parameter to set or get the value of a field from the particular ServiceNow form. For example, if you select 'BadgeID' in the **Process Field Parameter** field, select '`Badge Id`' in the **Field**. To set the value in the "Badge Id" field of the request table, you can update the value of the "BadgeID" process field parameter.  Process field parameters that are already mapped to the fields are unavailable for mapping.
Field	Select a form field to map with a process field parameter.

6. Perform any of the following tasks to save the mapping.

Option	Action
Only save the mapping	Select **Save**.
Save the mapping and map another field parameter	Select **Save & map next**. Repeat step 5 to map another field to another process field parameter.

7. To create a process field parameter that can be used in the automation, perform the following steps:

   a. On the **Field Parameter Mappings** tab, select **Create parameter**.

   b. On the create a parameter dialog box, fill in the fields.

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Create a parameter dialog box

Field	Description
Name	Unique name of the form process field parameter. Process field parameters are used for setting the value or getting the value of a field on a particular form.
Description	Brief description of the process field parameter.

c. Select **Create**.

d. Refer to step 5 to map this process field parameter to the form field.

e. Select **Save**.

8. **Optional:** Repeat steps 5 and 6 to map more field parameters.

What to do next

Activate an attended configuration record. For more information, see Activate an attended configuration record in RPA Hub.

Related topics

- Attended Configuration form in RPA Hub
- Deactivate an attended configuration record in RPA Hub
- Delete an attended configuration record in RPA Hub
- Invoke Embedded Task Automation via API in RPA Hub
- Conditions for the visibility of UI action (button)

Activate an attended configuration record in RPA Hub

Activate an attended configuration record to enable the UI action that triggers the attended automation on the associated ServiceNow form.

Before you begin

Familiarize yourself with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Create an attended configuration record. For more information, see Create an attended configuration record in RPA Hub.

Verify that the attended configuration record is either in **Draft** state or **Inactive** state.

Verify that the RPA developer (sn_rpa_fdn.rpa_developer) is in the Managed by Group list of the associated bot process that is assigned to an Attended Configuration record.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

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Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. Navigate to the Attended Configuration record either from the Attended Configuration menu list or from an attended bot process record's related list.

Option	Action
From an Attended Configuration menu list	**a.** On the **Lists** tab, in **Build**, select **Attended Configurations**. **b.** Open an attended configuration record.
From an attended bot process record's related list	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open an attended bot process. **c.** On the Attended Configurations tab, select an attended configuration record.

4. In the form header, select **Activate**.

Result

The corresponding UI action is created on the ServiceNow form. On selecting this UI action, if there are any unsaved changes, the save confirmation dialog box is displayed. Otherwise, corresponding bot process (automation) is triggered. If the UI action isn't visible, refer to the visibility conditions. For more information, see Conditions for the visibility of UI action (button).

Related topics

Deactivate an attended configuration record in RPA Hub

Delete an attended configuration record in RPA Hub

Edit an attended configuration record in RPA Hub

Invoke Embedded Task Automation via API in RPA Hub

Conditions for the visibility of UI action (button)

Deactivate an attended configuration record in RPA Hub

Deactivate an attended configuration to move the record to inactive state.

Before you begin

Ensure you are familiar with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Create an attended configuration record. For more information, see Create an attended configuration record in RPA Hub.

Ensure that the RPA developer (sn_rpa_fdn.rpa_developer) is in the Managed by Group list of the associated bot process that is assigned to an Attended Configuration record.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

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About this task

Deactivating an attended configuration record moves the state from **Active** to **Inactive**, opens the form for editing, and the configuration disconnects from the associated ServiceNow form. The created UI action on the associated ServiceNow form will not be visible.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. Navigate to the Attended Configuration record either from the Attended Configuration menu list or from an attended bot process record's related list.

Option	Action
From an Attended Configuration menu list	**a.** On the **Lists** tab, under **Build**, select **Attended Configurations**. **b.** Open an attended configuration record.
From an attended bot process record's related list	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open an attended bot process. **c.** On the Attended Configurations tab, select an attended configuration record.

4. In the form header, select **Deactivate**.

Related topics

- Activate an attended configuration record in RPA Hub
- Delete an attended configuration record in RPA Hub
- Edit an attended configuration record in RPA Hub
- Invoke Embedded Task Automation via API in RPA Hub
- Conditions for the visibility of UI action (button)

Edit an attended configuration record in RPA Hub

Edit an existing attended configuration record in RPA Hub to modify a few details of the record.

Before you begin

Ensure you are familiar with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Create an attended configuration record. For more information, see Create an attended configuration record in RPA Hub.

Ensure that the attended configuration record is in **Active** state.

Ensure that the RPA developer (sn_rpa_fdn.rpa_developer) is in the Managed by Group list of the associated bot process that is assigned to an Attended Configuration record.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

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About this task

Editing an attended configuration record moves the state from **Active** to **Inactive**, opens the form for editing, and the configuration disconnects from the associated ServiceNow form.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. Navigate to the Attended Configuration record either from the Attended Configuration menu list or from an attended bot process record's related list.

Option	Action
From an Attended Configuration menu list	**a.** On the **Lists** tab, under **Build**, select **Attended Configurations**. **b.** Open the attended configuration record that you want to modify.
From an attended bot process record's related list	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open an attended bot process. **c.** On the Attended Configurations tab, select the attended configuration record that you want to modify.

4. In the form header, select **Edit**.
5. In the confirmation dialog box, select **Edit**.
6. Update the following fields as appropriate.
   Table, **Bot Process Configuration**, **Action Label** fields cannot be edited.
7. Select **Save**.

Related topics

- Activate an attended configuration record in RPA Hub
- Deactivate an attended configuration record in RPA Hub
- Delete an attended configuration record in RPA Hub
- Invoke Embedded Task Automation via API in RPA Hub
- Conditions for the visibility of UI action (button)

Delete an attended configuration record in RPA Hub

Delete an attended configuration record that you no longer need.

Before you begin

Ensure you are familiar with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Create an attended configuration record. For more information, see Create an attended configuration record in RPA Hub.

Ensure that the attended configuration record is either in **Draft** state or **Inactive** state.

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Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

If you delete an attended configuration record, the associated mapping records and the UI Actions (if any) that are created for the ServiceNow form upon activation are also deleted. The created UI action on the associated ServiceNow form will not be visible.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. Navigate to the Attended Configuration record either from the Attended Configuration menu list or from an attended bot process record's related list.

Option	Action
From an Attended Configuration menu list	**a.** On the **Lists** tab, under **Build**, select **Attended Configurations**. **b.** Open an attended configuration record.
From an attended bot process record's related list	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open an attended bot process. **c.** On the Attended Configurations tab, select an attended configuration record.

4. In the form header, select **Delete**.

Related topics

- Activate an attended configuration record in RPA Hub
- Deactivate an attended configuration record in RPA Hub
- Edit an attended configuration record in RPA Hub
- Invoke Embedded Task Automation via API in RPA Hub
- Conditions for the visibility of UI action (button)

Attended Configuration form in RPA Hub

Use the Attended Configurations form to associate the table form, from where the automation must be initiated, associate the respective attended bot process, and other related conditions.

Attended Configuration form

Field	Description
Name	Name of the attended configuration.
Bot Process Configuration	Select an attended bot process that executes the automation. Attended bot processes that aren't retired and also have the **Enable Embedded Task**

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Attended Configuration form (continued)

Field	Description
	Automation option selected in the bot process form are displayed here.
Table	Select the table for the form, from where the automation (bot process) is triggered on. For example, Request [sc_request]. Then the automation (bot process) is triggered from the Request form.
Action Label	Provide a label for the action (UI button) that the users would view on the associated table form. The value you entered in the **Name** field is the default value. The Action Label must be unique for a table, in a particular domain, if the instance is domain separated.
Description	Brief description of the attended configuration.
Define Trigger Provide the criteria details that activate the action (UI button) on the associated table form that triggers bot process only when the following conditions are met. If criteria are not defined, automation can be triggered from all associated table forms.	
Set Conditions	Define the criteria that activate the UI action on the associated table form that is selected in the **Table** field. Build a filter by adding conditions that contain a field, operator, and values. For example, to view the UI action when the associated form is active. In that case, select **Active** from the **Select field** list, **is** from the **Select operator** list, and **true** from the **Enter value** list. Within the **Condition** section, you can use the **+New condition set** to add a new condition. After you build a filter, select **Set**.

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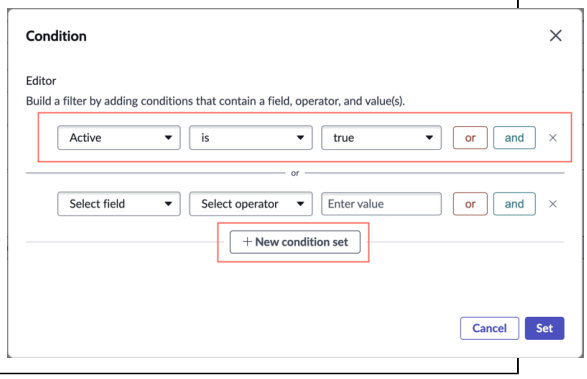
Attended Configuration form (continued)

Field	Description
	Example: Selected filter condition to activate the UI action 

Related topics

- Create an attended configuration record in RPA Hub
- Embedded Task Automation (ETA) in RPA Hub
- List of steps for configuring embedded task automation

Invoke Embedded Task Automation via API in RPA Hub

Invoke an attended bot process (attended automation) from the UI experiences by creating an action.

The limitation to trigger the attended bot process (attended automation) from other UI experiences such as playbook can be resolved by performing the following customisation. By default, the UI action is created for classic or workspace experience to trigger the attended bot process (attended automation) when attended configuration is activated.

To create a UI action or edit an existing one, see Create a UI action.

In the corresponding action, verify that the action visibility is `new sn_rpa_fdn.RPAInstanceFormHooks().canTriggerAutomation(current,'<attended_cor`

Populate the `<attended_config_sys_id>` with the associated Attended Configuration Sys ID.

The following code must be added to the **Script** section of the corresponding Action form:

```
var rpaFormHooks = new
 GlideAjax('sn_rpa_fdn.RPAInstanceFormHooks');

rpaFormHooks.addParam('sysparm_name',
 'generateRuntimeLaunchUrl');

rpaFormHooks.addParam('attendedConfigId',
 '<attended_config_sys_id>');

rpaFormHooks.addParam('recordId', g_form.getUniqueValue());

rpaFormHooks.getXMLAnswer(function(response) {

var result = JSON.parse(response);
```

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```
if (!result.error)

top.window.open(result.url);

});
```

Related topics

Embedded Task Automation (ETA) in RPA Hub

Conditions for the visibility of UI action (button)

Conditions for the visibility of UI action (button)

Ensure the following conditions are met to view the UI action (button) on the corresponding ServiceNow form, for the associated table that is selected in the Attended Configuration record.

For other screens such as workspaces, playbook, the UI action must be created manually. For more information, see Invoke Embedded Task Automation via API in RPA Hub.

Familiarize yourself with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

List of conditions to view the UI action (button)

Condition	Reference
The life cycle stage status of the associated bot process selected in the Attended Configuration record is **Published**. You cannot view the associated UI action on the ServiceNow form if the associated bot process is not available or is in **In Maintenance** state.	For more information, see Bot Process form in RPA Hub.
The **Enable Embedded Task Automation** check box must be selected in the associated attended bot process record.	For more information, see Bot Process form in RPA Hub.
The Attended Configuration record must be activated.	For more information, see Activate an attended configuration record in RPA Hub.
User must have the RPA Assisted user role.	For more information, see Components installed with RPA Hub.
Robot record for that user must be available if the auto assignment system property *sn_rpa_fdn.allow_rda_robot_auto_assignment* is false.	For more information about this system property, see Configure RPA Hub properties.
If the auto assignment system property *sn_rpa_fdn.allow_rda_robot_auto_assignment* is true, you must have the license to create an attended robot.	For more information about this system property, see Configure RPA Hub properties. For more information about license, see Robot license distribution in RPA Hub and Create a robot license distribution record in RPA Hub.

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List of conditions to view the UI action (button) (continued)

Condition	Reference
User must be associated to **Assigned Users/Groups** tab of the corresponding attended bot process selected in the Attended Configuration record.	For more information about license, see Assign an attended user or group to an attended bot process.
Existing ServiceNow form record must match the conditions selected in attended configuration record.	For more information about creating an attended configuration record, see Create an attended configuration record in RPA Hub.

Related topics

List of steps for configuring embedded task automation

Robot pool in RPA Hub

Create a robot pool in RPA Hub to distribute and manage the workload among multiple unattended robots for unattended bot processes.

Note:

After you enable the robot pool option for a bot process, you can't assign robots from the **Assign Robots** tab. It is hidden.

Robot pool feature is applicable for unattended robots only.

Types of robot assignment

There are two ways to assign robots:

- Manual robot assignment: After you create a bot process, assign robots from the **Assign Robots** tab. For more information, see Assign a robot to a bot process in RPA Hub.
- Robot Pool: On the Details tab of the bot process form, enable the robot pool option. For more information, see Enable robot pool for a bot process in RPA Hub.

Challenges with manual robot assignment

With the manual assignment of robots, RPA release managers need to anticipate the workload for a process and assign the robots accordingly.

If there is a change in the workload on specific days of the week, RPA release managers must reassign robots between different processes.

It can result in over consumption of resources or robots, irrespective of workload.

Benefits of robot pool

By using the robot pool in RPA Hub, you get the following benefits:

- Eliminates the need for manual reassignment, since robots are automatically assigned.
- Allocates robots per bot process based on pending workload and Average Handling Time (AHT).
- Maximizes robot utilization by automatically reallocating available robots in pool.

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Robot assignment process

The following diagram shows an example of assigning robots in RPA Hub.

If the robot pool option is not enabled, robots are assigned to a bot process directly from the **Assigned Robots** tab.

For example, in the Order Management bot process, even if the work items are less, the execution starts on all the robots. The workload is not taken into consideration.

Another example, if the Invoice Queue has a lot of work items. It runs only on two assigned robots, since there is no dynamic allocation of robots.

After the robot pool option is enabled, the execution starts with one robot initially. Based on the configuration of the allocation type (SLA or percentage reduction), the robots are automatically allocated depending on the workload.

For example, in robot pool RP1, there are two robots in Available state, R1 and R2. RP1 is used in two bot processes, Invoice Processing and Order Management. The Order Management bot process uses SLA based allocation type. When the **Start Process** button is selected for this bot process, two robots from the assigned robot pool execute the bot process. R1 and R2 are now in Running state.

The Invoice bot process also uses SLA based allocation type and has high priority invoices to be processed. Order Management bot process requires 2 robots to complete all the work items within SLA. To start the execution of invoices that are highest priority, one robot is required for Invoice Processing and one robot for Order Management. So with the help of graceful stop feature, you can stop the Order Management bot process. When you select the **Stop Process** button for the Order Management bot process, enable the **Graceful Stop** toggle switch, and select R1 robot to gracefully exit. Then, R1 gracefully exits the bot process after executing the current order processing.

After R1 gracefully completes Order Management bot process execution, it can be used to start the execution on Invoicing Processing. After all the invoices are processed, R1 can be considered again to execute the Order Processing bot process with the help of a new execution. That is, by triggering the Invoice Processing bot process via the **Start Process** action manually or via a schedule.

For more details about start process action, see Workflow Studio actions and subflow in RPA Hub. For more information about graceful stop and stopping a bot process, see Using Graceful Stop functionality in RPA Hub and Stop an unattended bot process in RPA Hub.

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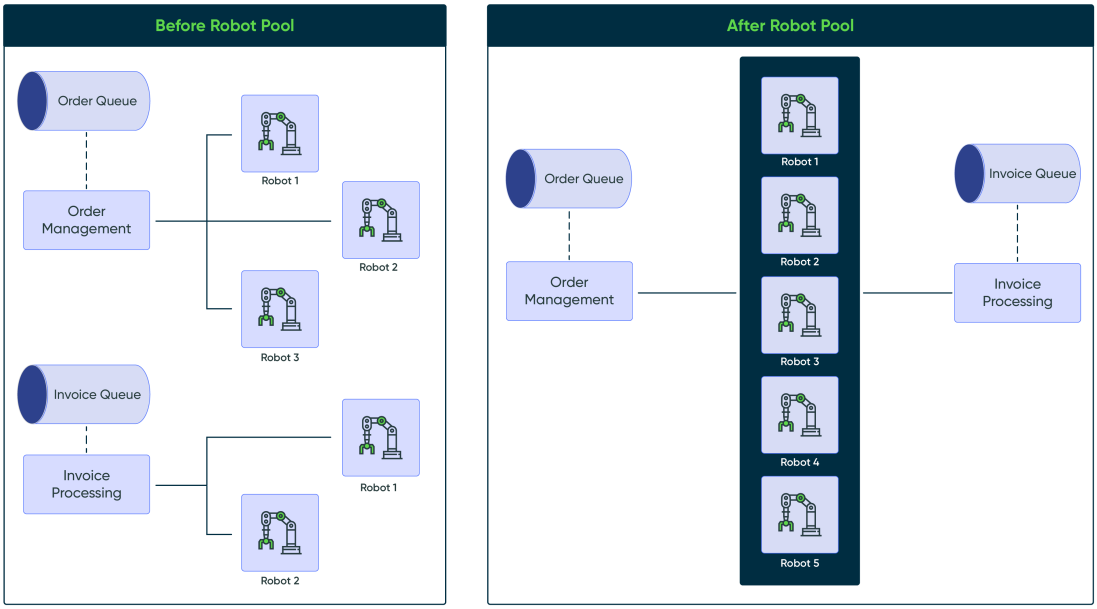
Robot assignment in RPA Hub



New fields on the Bot Process form related to Robot Pool

To enable the robot pool feature for a bot process in RPA Hub, do the following actions:

- Create a robot pool. For more information, see Create a robot pool in RPA Hub.
- Enable robot pool option for a bot process to map a bot process to the robot pool. For more information, see Enable robot pool for a bot process in RPA Hub.

Note: A queue must be associated to a bot process for enabling robot pool. One queue is mapped to one bot process.

You can associate a queue to bot process from the related list. For more information, see c to the bot process from the related list.

On the Bot Process form, as an Robotic Process Automation (RPA) release manager or an RPA admin, you can configure the following new fields in the Robot Pool section:

- **Enable Robot Pool**
- **Robot Pool**
- **Allocation Type**
- **Percentage Reduction** (if you select the **Allocation Type** as **Percentage Reduction**)

For more information about these fields, see Bot Process form in RPA Hub.

Robots calculation

You can calculate the number of robots required to complete a bot process execution by selecting the **Calculate** button on the Bot Process form.

New fields on the Queue form related to Robot Pool

On the Queue form, as an RPA release manager or an RPA admin, you can configure the following new fields in the Average Handling Time (AHT) - Work Items section:

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- **Include All Work Items**
- **Work Item Count**

For more information about these fields, see Queue form in RPA Hub. Configure these fields to calculate the number of robots required in robot pool for a successful execution of a bot process.

Create a robot pool in RPA Hub

Create a robot pool in RPA Hub for an optimum utilization of robots to execute the bot processes.

Before you begin

Familiarize yourself with robot pool concepts. For more information, see Robot pool in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

Robot pool is used to distribute the workload among multiple robots.

To add or remove robots from the pool that are associated with one or more published bot processes, move the bot process to In Maintenance state.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Robot Pool**.
4. Select **New**.
5. On the form, in the **Name** field, enter a unique robot pool name for a domain.
6. Select **Save**.
7. To assign robots to the robot pool, do the following steps:

   a. On the Robots tab, select **Add**.

   b. On the **Available Robots** tab, select the required robot.

   > **Note:** You can add an unattended robot (whose life cycle stage status isn't Retired) to an existing robot pool at any time. Robots that aren't associated to any bot process or robot pool are displayed in the **Available Robots** tab.
   >
   > The high density robots and attended robots aren't displayed in the **Available Robots** tab.

   c. Select **Add**.

   d. Select **Save**.

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e. To remove a robot, select the robot and select **Remove**.

Note:

If you associate a robot pool to a bot process, you can't remove that robot if it's the only robot in the pool.

Robots with process jobs in running state must not be removed from the Robot Pool until the process job is either completed or cancelled.

8. **Optional:** To delete a robot pool, select the three-dot icon next to the **Save** button and select **Delete**.

Note: Verify that the robot pool isn't associated to any bot process.

9. In the **Activity** and **Compose** fields, view the activity of the robot pool and robot, work notes, and additional comments.

What to do next

Enable robot pool option for a bot process to map a bot process to the robot pool. For more information, see Enable robot pool for a bot process in RPA Hub.

(Optional) Calculate the number of robots required to allocate those robots from the selected pool to execute the bot process. For more information, see Calculate the number of robots in RPA Hub.

Enable robot pool for a bot process in RPA Hub

Enable robot pool for a bot process in RPA Hub to effectively allocate robots for it's execution and for distribution of work load.

Before you begin

Familiarize yourself with robot pool concepts. For more information, see Robot pool in RPA Hub.

Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Create a robot pool. For more information, see Create a robot pool in RPA Hub.

Associate a queue to the bot process. For more information, see c to the bot process from the related list.

If an RPA developer and RPA support user are a part of the Managed by Group, then they can view and edit these fields.

RPA business user can view these fields.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open a bot process.
5. On the **Details** tab, in the Robot Pool section, fill in the fields.

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Bot Process form

Field	Description
Enable Robot Pool	Option to enable the robot pool for the bot process. On enabling this option, the **Assign Robots** tab on the bot process is hidden. For more information about robot pool, see Robot pool in RPA Hub.
Robot Pool	Robots that you can allocate dynamically from a selected robot pool. Select a robot pool from a list of existing robot pool names. This field appears only when the **Enable Robot Pool** option is selected.
Allocation Type	Robots that you can allocate based on the Service Level Agreement (SLA) of the work items or the percentage of efficiency gain. Select the allocation type: ○ **SLA Based**: Allocation of robots from the pool based on the SLA of the work item. The work items are sorted and prioritized based on the SLA. If you select the allocation type as SLA Based, ensure that the work items must contain a Service Level Agreement (SLA). ○ **Percentage Reduction**: Allocation of robots from the pool based on the efficiency percentage. The default value is SLA Based. This field appears only when **Enable Robot Pool** option is selected.
Percentage Reduction	This field appears only when **Percentage Reduction** is selected from the **Allocation Type** field. Reduce the total execution time of a bot process by allocating more robots by a selected percentage. For example, if there are 100 work items assigned to a bot process. It might take 100 minutes to execute the bot process. If you want to reduce that time to 75 minutes, you define a value 25 in this field. After you provide a value in this field, multiple robots are allocated to distribute the work load. Thus, the automation performs faster by that percentage. The default value is 25.

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Field	Description
	Robots are allocated to distribute the workload, based on the percentage you select: ○ If you select a value from 5 to 50, 2 robots are allocated. ○ If you select 55, 60, or 65, 3 robots are allocated. ○ If you select 70 or 75, 4 robots are allocated. ○ If you select 80, 6 robots are allocated. ○ If you select 85, 7 robots are allocated.

Calculate the number of robots in RPA Hub

Calculate the number of robots that you need to complete an unattended bot process execution that is based on the allocation type, for example, the SLA Based and Percentage Reduction.

Before you begin

Familiarize yourself with robot pool concepts. For more information, see Robot pool in RPA Hub.

Create a robot pool. For more information, see Create a robot pool in RPA Hub.

Enable robot pool for the bot process. For more information, see Bot Process form in RPA Hub.

Associate a queue to the bot process. For more information, see c to the bot process from the related list.

Define Average Handling Time (AHT) details on the queue form. For more information, see Queue form in RPA Hub.

Ensure that multiple queues are not associated to a bot process.

Ensure that the pending work items are available in the queue.

If you select the allocation type as SLA Based on the Bot Process form, ensure that the work items must contain a Service Level Agreement (SLA).

If you select the **Percentage Reduction** allocation type on the Bot Process form, make sure that you define a value in the **Percentage Reduction** field.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

If the value of the calculation is in decimals, the value is rounded off to the next higher value. For example, if the calculation result is 2.2 robots, the result that is displayed is 3. That means that 3 robots are required to execute the bot process.

queryConditions included in the PickWorkItem component are considered for calculating the number of robots required to complete an unattended bot process execution, if the bot process is enabled with robot pool. For more information about PickWorkItem component, see Queue connector methods.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).

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3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open a bot process.
5. In the form header, select the down arrow in the **Start Process** button.
6. Select **Calculate**.
   A message is displayed about the number of robots that are required to execute the bot process.

Alert rule and variable in RPA Hub

A rule that defines when and how the system should notify users about issues in automation execution.

Alert rules are configurations that define conditions in which an alert or a notification must be triggered. These rules help in managing and responding to issues identified in automations. These alert rules specify the condition or set of conditions that must be met for the alert to be triggered. For example, a trigger condition could be a certain error message, a performance metric exceeding a threshold, or the absence of expected data.

Alert variable refers to a variable or parameter associated with alerts of RPA Hub. It serves as a dynamic token within alert messages, and its value can be linked to a table's field or determined through conditional scripting.

Create an alert rule to generate custom notifications in RPA Hub

Create an alert rule to generate custom notifications for robots, schedules, process jobs, and other RPA Hub related tables.

Before you begin

You must do this task in the classic environment.

Role required: sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

About this task

Alert rules are configurations that define conditions in which an alert or a notification must be triggered. These rules help in managing and responding to issues identified in automations. These alert rules specify the condition or set of conditions that must be met for the alert to be triggered. For example, a trigger condition could be a certain error message, a performance metric exceeding a threshold, or the absence of expected data.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Monitor** > **Alert Rules**.
2. Select **New**.
3. On the form, fill in the fields.
4. Select **Save**.

Alert rule form in RPA Hub

Use the Alert rule form to create an alert rule.

Alert rule form

Field	Description
Name	Unique name of the alert rule.

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Alert rule form (continued)

Field	Description
Active	Option to verify the usability of the alert rule. On clearing this option, the notifications will not be generated from this alert rule.
Application	Field that indicates which applications can use this alert rule. Role required to view this field: admin.
Alert Priority	Priority of the alert: • **Critical** • **High** • **Medium** • **Low** The default value is set to **Medium**.
Alert Type	Type of alert: • **Info** • **Warning** • **Error**
Description	Brief description of the alert rule.
Alert Trigger	
Applies To	Table that the alert rule is applied on. For example, Bot Process [cmdb_ci_rpa_process]. Based on the table selected, after saving the record, a new related tab appears in the related list. For example, if you select a bot process related table in this field, the **Bot process** tab appears in the related list.
Trigger Type	Trigger type of the alert rule: • **Check Periodically**: The alert rule is triggered periodically, based on the settings in the Time duration (hours) list. • **When something happens**: The alert rule is triggered when something happens on

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Alert rule form (continued)

Field	Description
	a record that is selected in the Applies to table. For example, if **Bot process** is selected from the Applies To list, an alert rule is triggered when a record is updated in the bot process.
Time Duration (hours)	Frequency, in hours, at which the alert rule is triggered. For example, if **Bot process** is selected from the Applies To list, an alert rule is triggered when a record is updated in the bot process every **24** hours. This field appears only when **Check Periodically** is selected from the Trigger Type list.
Trigger Conditions	Conditions at which the alerts are triggered. Select a table from the Applies To list before modifying this field. Within the **Trigger Conditions** section, you can use the **Add Filter Condition** to add a trigger condition. For example, you might want to generate an alert rule when the life-cycle stage status of a bot process is not retired. In that case, select **Life Cycle Stage Status** from the – choose field – list, **is not** from the – oper – list, and **Retired** from the – value – list. **Selected filter condition to trigger alert rule** 
Apply Threshold	Option to verify the usability of the threshold. For example, if a **Process job** is selected from the Applies To list and a percentage or a number of process jobs fail in a given time period, to trigger an alert rule for the failure message, this option must be selected for the configuration of the threshold condition.
Threshold Type	Type of threshold: • **Count** • **Percentage**

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Alert rule form (continued)

Field	Description
	This field appears only when the **Apply Threshold** option is selected.
Set Condition (Threshold)	Threshold conditions to trigger alerts. Select a table from the Applies To list before modifying this field. This field appears only when **Percentage** is selected from the Threshold Type list. For example, you might want to generate an alert rule when a percentage of process jobs fail in a given time period. In that case, select **Created** in the – choose field – list, **on** in the – oper – list, and **Today** in the – value – list. **Set threshold condition to trigger alerts** 
Comparison	Qualifier to trigger alerts: • **Is equal to** • **Is less than** • **Is more than** • **Is less than or equal to** • **Is more than or equal to** This field appears only when the **Apply Threshold** option is selected.
Threshold Value	Value to determine if an alert rule must be triggered based on the qualifier selected in the **Comparison** field. For example, if a few process jobs fail in a day. To set a condition, select **Count** in the Threshold Type list, **Is more than** in the Comparison list, and **10** in the Threshold Value list. This field appears only when the **Apply Threshold** option is selected.
Alert Message	
Message	Alert message. For example, `{0}% of process jobs failed in a day.`

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Alert rule form (continued)

Field	Description
	To configure the variables, such as {0}, see Create an alert variable for an alert rule in RPA Hub.
Send Email	Option to send an email notification of the alert message.
Users	Users who can receive the alert message email. This field appears only when you select the **Send Email** option.
Groups	Groups who can receive the alert message email. This field appears only when you select the **Send Email** option.

Create an alert variable for an alert rule in RPA Hub

Create a variable to configure the messages of an alert rule.

Before you begin

You must do this task in the classic environment.

Create an alert rule. For more information, see Create an alert rule to generate custom notifications in RPA Hub.

Role required: sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

About this task

Alert variable refers to a variable or parameter associated with alerts of RPA Hub. It serves as a dynamic token within alert messages, and its value can be linked to a table's field or determined through conditional scripting.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Monitor** > **Alert Rules**.
2. Open an alert rule that you want to create and associate an alert variable to.
3. In the Alert Variables related list, select **New**.
4. On the form, fill in the fields.
5. Select **Submit**.

Alert variable form in RPA Hub

Use the Alert variable form to create a variable for an alert rule message configuration.

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Alert variable form

Field	Description
Variable Name	Name of the alert variable.
Alert Rule	Name of the alert rule.
Index	Order of the alert variables in the message. Default sort order for alert variables is ascending order.
Is Scripted	Option to verify the usability of the script. This option adds an advanced data fetch script.
Is Threshold value	Option to verify the usability of the threshold value.
Table	Field that indicates the table that is selected for this alert variable. For example, the bot process.
Field	Field of the table to be mapped. For example, the name of the bot process.
Script	Text field that accepts JavaScript code input and provides controls, such as syntax checking and formatting. For example, to return a value that is data for an alert variable, enter `data` as follows: `return { value: data};` . This field appears when the **Is Scripted** option is selected.

Alerts form in RPA Hub

Use the Alerts form to view the notifications that are generated by the alert rules.

Alerts form

Field	Description
Number	Number of the alert.
Alert Type	Type of alert: • **Info** • **Warning** • **Error**

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Alerts form (continued)

Field	Description
Source Record	Name of the bot process.
Alert Rule	Name of the alert rule.
Alert Priority	Priority of the alert: • **Critical** • **High** • **Medium** • **Low**
Alert Message	Message that describes the alert.

Related topics

View alerts in RPA Hub

Work items in RPA Hub

A work item is a record in a work queue that stores the data a robot needs to perform a specific task.

Each item in the queue is processed separately, allowing robots to handle large workloads in smaller, manageable parts.

Key benefits

- Scalability: Distributes workload across multiple robots.
- Resilience: Failed items can be retried without restarting the whole process.
- Visibility: Tracks progress and outcomes for each unit of work.
- Flexibility: Enables parallel processing of large data sets.

Manage your work items in RPA Hub

Manage your work items more efficiently in RPA Hub. You can view your work items, mark them as complete, and reassign a work item.

Before you begin

Create a queue. For more information, see Create a queue in RPA Hub.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Build**, select **Queues**.

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4. Open the queue to view your work items.
5. **Optional:** To mark a work item as complete or reassign a work item, select the appropriate action on the **Work Items** tab.

Option	Action
To mark a work item as complete	**a.** From the list, select one or more work items. **b.** In the form header, select **Mark as Complete**. **c.** Enter a comment for marking the work item as complete. **d.** Select **Mark as Complete**. The status of the work item changes to `Success`.
To reassign a work item	**a.** From the list, select one or more work items. **b.** In the form header, select **Reassign**. **c.** Enter a comment for reassigning the work item. **d.** Select **Reassign**. The status of the work item changes to `Pending`. You can reassign a work item that is in In Progress, Pending, Failed, or Success state. Upon reassigning, the values of the following fields on the Work Item form are reset to: ○ **Started On**- <empty> ○ **Completed On**- <empty> ○ **Robot**- <empty> ○ **Last Started Time**- <empty> ○ **Attempts Count**- 0 ○ **Exception Type**- <empty> ○ **Status**- Pending ○ **Remarks**- <from the modal> Roles required to reassign a failed or a success work item: RPA developer, RPA release manager, and RPA admin.

6. On the **Work Items** tab, open a work item to view the details on the form.
7. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

Related topics

Queue implementation in RPA Hub

View Audit History

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Work item form in RPA Hub

Use the Work item form to view more details of the executed work items.

Work Item form

Field	Description
Name	Name of the work item.
Work Queue	Name of the queue.
Status	Status of the work item.
Exception Type	Type of the exception: • **Application** - For example, if an issue persists with an associated application such as SAP. • **Business** - For example, if an issue requires a manual intervention to fix it. The auto retry functionality retries the work items based on the exception type. If the **Exception Type** field is **Application**, then the work item is auto retried. Roles required to edit this field: RPA robot.
Started On	Start date and time of the work item.
Completed On	Completion date and time of the work item.
Attempts Count	Number of times the work item is picked for auto retry. The minimum value is 0.
Details	
Priority	Priority of the work item: • **Critical** • **High** • **Medium** • **Low** The assigned robot executes the bot process as per the defined priority in the work queue.
Type	String field to define the type of work item.
Stage	Custom field for the robot to maintain different stages of the transaction.
SLA	Time and date that the SLA was started.
Robot	Name of the robot that is assigned to the work queue.
Created	Creation date and time of the work item.

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Work Item form (continued)

Field	Description
Last Started Time	Last start time of the work item.
Deferred Till	Work item that is not picked until the specified date and time.
Completed By	Name of the robot who has completed the work item.
Remarks	Remarks updated by the robot runtimes.
Content	
Request Content	Non sensitive content which is displayed in plain text in the Work Item form and can be used for work item processing.
Sensitive Request Content	Sensitive request content which is encrypted and masked in the Work Item form and can be used for work item processing. When the work item is picked, the sensitive data is decrypted and passed to the RPA Desktop Design Studio or robots. With this option, you can pass sensitive information through queues. For example, credit card details are encrypted.
Response Content	Content that is added or updated when a work item is picked after the transaction.
Transaction Activity	
Work notes	Work notes for the work item.
Additional Comments	Comments for updating this work item.
Activity	Transaction logs for the selected work item.

Related topics

- Queue form in RPA Hub
- Using auto-retry functionality for your failed work items in RPA Hub
- Queue implementation in RPA Hub

Using auto-retry functionality for your failed work items in RPA Hub

You can use auto-retry functionality in RPA Hub to retry the failed items automatically in your work queue. The retry functionality is based on the **Application** exception type only.

Auto-retry overview

Usually, in an existing Robotic Process Automation (RPA) work queue, the items are processed by the criteria that you specified. The items in this type of work queue are picked by the robots for execution.

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Let's consider a scenario where the first item in your work queue is processed successfully, and the status is updated to success. But, when the robot picks the second item in the work queue for execution, it isn't processed successfully and the status is updated to failure.

By using auto-retry functionality instead in this scenario, the work items are retried automatically based on the value in the **Exception Type** field on the Work Item form, and based on the values that you enter in the **Maximum Attempts** field and the **Attempt Delay** field on the Queue form.

There are two exception types: application and business.

In the Work Item form, if the value of the **Exception Type** field is **Application**, the value of the **Maximum Attempts** field is greater than 1, and the current value in the **Attempts Count** field is less than the value in the **Maximum Attempts** field, the failed item in the work queue is automatically retried.

Note: If the value in the **Exception Type** field is **Business**, the auto-retry functionality isn't enabled.

Queue fields and system property configuration

To enable auto-retry functionality, you must define the values in the *sn_rpa_fdn.queue.maximum_attempts_max_value* system property. For more information about these values, see Configure RPA Hub properties.

You can enable auto-retry functionality by configuring the following fields on the Queue form:

- **Maximum Attempts**
- **Attempt Delay (mins)**

In the **Maximum Attempts** field, you define the number of attempts for the failed work items. In the **Attempt Delay (mins)**, you define the maximum delay, in minutes, before the work item is attempted again. For more information about these fields, see Queue form in RPA Hub and Create a queue in RPA Hub.

You can view the following fields that are related to the auto-retry functionality on the Work Item form:

- **Exception Type**
- **Attempts Count**

Based on the value in the **Exception Type** field, the auto retry functionality retries the work items. In the **Attempts Count** field, you can view the number of times the work item is picked for auto retry. For more information about these fields, see Work item form in RPA Hub.

Auto-retry workflow

When the status of the work item that is selected in the automation is **In progress**, the auto-retry workflow is as follows:

- If the **Exception Type** field is Application, the **Attempts Count** field is incremented by 1, and the current value in the **Attempts Count** field is equal to the value in the **Maximum Attempts** field, the status of the work item is updated to **Failed** and the **Exception Type** field is updated to Application. The work item isn't available for auto-retry.
- If the **Exception Type** field is Application, the **Attempts Count** field is incremented by 1, and the current value in the **Attempts Count** field is less than the value in the **Maximum Attempts** field, the status of the work item is updated to **In progress** and the **Exception Type** is updated to Application. The work item is available for auto-retry only after you set the duration (if any) in minutes in the **Attempts Count** field.

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- If the **Exception Type** field is Business and the **Attempts Count** field is incremented by 1, the status of the work item is updated to **Failed**, and the **Exception Type** field is updated to Business. The work item isn't available for auto-retry.
- When there's no value in the **Exception Type** field and the **Attempts Count** field isn't incremented by 1, the status of the work item is updated to **In progress**. The **Exception Type** isn't updated. The work item is available for auto-retry only after you set the duration (if any) in minutes in the **Attempts Count** field.

Note: If the value in the **ReleaseMode** field is locked, then you can't increment the value in the **Attempts Count** field because the robot is still executing the work item. The value in the **Attempts Count** field must be incremented only when the value in the **ReleaseMode** field is release. The value in the **Attempts Count** field is incremented when an item is released by the robot or when an item's status is set to **Failure**.

The following table shows the auto-retry workflow for an **In progress** work item.

Auto-retry workflow for an In progress work item

Exception Type	Attempts Count (Increment by 1)	Condition	Status updated to	Exception Type updated to
Application	Yes	If the current value in the **Attempts Count** field is equal to the value in the **Maximum Attempts** field.	Failed	Application
Application	Yes	If the current value in the **Attempts Count** field is less than the value in the **Maximum Attempts** field.	In progress	Application
Business	Yes	<No condition>	Failed	Business
<empty>	No	<No condition>	In progress	<No update>

When the status of a work item that is selected in the automation is **Success**, the auto-retry workflow is as follows:

- If the **Exception Type** field is Application and the **Attempts Count** field is incremented by 1, the status of the work item is updated to **Success** and the **Exception Type** is updated to blank. The work item isn't available for auto-retry.
- If the **Exception Type** field is Business and the **Attempts Count** field is incremented by 1, the status of the work item is updated to **Success**. The **Exception Type** is updated to blank, and the work item isn't available for auto-retry.
- If there's no value in the **Exception Type** field and the **Attempts Count** field is incremented by 1, the status of the work item is updated to **Success**. The **Exception Type** field is updated to blank, and the work item isn't available for auto-retry.

The following table shows the auto-retry workflow for a **Success** work item.

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Auto-retry workflow for a Success work item

Exception Type	Attempts Count (Increment by 1)	Status updated to	Exception Type updated to
Application	Yes	Success	<blank>
Business	Yes	Success	<blank>
<blank>	Yes	Success	<blank>

When the status of work item that is selected in the automation is **Failed**, the auto-retry workflow is as follows:

- If the **Exception Type** is Application, the **Attempts Count** field is incremented by 1, and the current value in the **Attempts Count** field is less than the value in the **Maximum Attempts** field, the status of the work item is updated to **In progress**. The **Exception Type** field is updated to Application, and the work item is available for auto-retry only after the duration that you set in the **Attempts Count** field.
- If the **Exception Type** field is Application, the **Attempts Count** field is increment by 1, and the current value in the **Attempts Count** field is equal to the value in the **Maximum Attempts** field, the status of the work item is updated to **Failed**. The **Exception Type** field is updated to Application, and the work item isn't available for auto-retry.
- If the **Exception Type** is Business, the **Attempts Count** field is incremented by 1, the status of the work item is updated to **Failed**. The **Exception Type** field is updated to Business, and the work item isn't available for auto-retry.
- If there's no **Exception Type** field and the **Attempts Count** field is incremented by 1, the status of the work item is updated as **Failed**. The **Exception Type** field isn't updated, and the work item isn't available for auto-retry.

The following table shows the auto-retry workflow when the **Failed** status is selected in the automation.

Auto-retry workflow for a Failed work item

Exception Type	Attempts Count (Increment by 1)	Condition	Status updated to	Exception Type updated to
Application	Yes	If the current value in the **Attempts Count** field is less than the value in the **Maximum Attempts** field.	In progress	Application
Application	Yes	If the current value in the **Attempts Count** field is equal to the value in the **Maximum Attempts** field.	Failed	Application
Business	Yes	<No condition>	Failed	Business
<empty>	Yes	<No condition>	Failed	<No update>

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Note: The value in the **Deferred Till** field is obtained from the component. This field always takes precedence over the **Attempt Delay (mins)** field. The **Deferred Till** field is a read-only field on the work item form. For more information, see Work item form in RPA Hub.

Related topics

Queue implementation in RPA Hub

Code quality check in RPA Hub

A code quality check refers to the process of evaluating the automation file or script to assess its adherence to coding standards, best practices, maintainability, and overall quality.

Code quality check overview

Code quality checks are essential in RPA development life cycle, to ensure that the automation file is robust, efficient, and free from common issues that could lead to errors or difficulties in the future.

RPA release managers or RPA admins select code quality check rules from a pre-defined set of rules in the RPA Hub instance.

Then, the RPA Desktop Design Studio performs an in-built code quality check before publishing a package. RPA developers can also perform pro-active code quality check on a package in the RPA Desktop Design Studio by inspecting an activity or a complete automation project for any issues, using the **Code Quality Check** feature.

The issues and their details are displayed in the **Code Quality Check Results** window. Double-click an individual entry to view the component that has displayed an error or a warning. Troubleshoot the issues before you publish the automation project to RPA Hub. For more information on how to perform Code Quality Check in RPA Desktop Design Studio, see Code quality check in RPA Desktop Design Studio.

If an error or a warning occurs in the automation, a decision is derived if the package can be published successfully or not, based on the system property [*sn_rpa_fdn.restrict_package_by_severity*] configuration (error, warning, or no restrictions). For more information about compliance rules for RPA Desktop Design Studio, see Code quality check compliance for RPA Desktop Design Studio.

If a package version is marked with code quality result as error or warning, a decision is derived if the bot process can be published successfully or not, based on the system property [*sn_rpa_fdn.restrict_package_by_severity*] configuration (error, warning, or no restrictions). For more information about compliance rules for RPA Hub, see Code quality check compliance for RPA Hub.

View a list of the pre-defined code quality rules in the RPA Hub instance. For more information, see Code quality rules list in RPA Hub.

View a code quality rule form along with the type and description. For more information, see Code quality rule form in RPA Hub.

In the code quality rule form, RPA release managers and admins can edit the **Severity**, **Regular Expression**, **Active**, and **Value** fields.

View the result of the code quality check, in the **Code Quality Result** field of an associated package version in RPA Hub. For more information, see Package Version form in RPA Hub.

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Configuration

To enable the code quality check at the instance level, ensure that you mark the new system property *sn_rpa_fdn.enable_code_quality_check* as true.

Additionally, configure the following system properties:

- *sn_rpa_fdn.restrict_package_by_severity* - To set a restriction on publishing a package from RPA Desktop Design Studio and publishing a bot process in RPA Hub.
- *sn_rpa_fdn.code_quality_check_timeout* - To enter a maximum duration, in minutes, for the completion of the code quality check.

These system properties are effective only when code quality check feature *sn_rpa_fdn.enable_code_quality_check* is enabled. For more information about these properties and values, see Configure RPA Hub properties.

Code quality rules list in RPA Hub

View a list of pre-defined rules that RPA admins can set for the RPA developers to follow as a code quality standard.

Code quality rule list

	Name of the rule	Description
CQR0011	Activity naming convention	Inspects if the activities naming convention is as per the defined Regular expression.
CQR0002	Empty activities	Inspects if there are any empty activities in the automation.
CQR0005	Hard-coded passwords	Inspects if there are any hard-coded passwords in the automation.
CQR0009	Infinite loop	Inspects the possibility of an infinite loop sequence in the automation.
CQR0012	Nested activities	Inspects if the depth of nested activities is as per the defined value. Activities are nested when you add another activity within the activity. For example, if 'Activity A' calling 'Activity B', 'Activity B' calling 'Activity C', and so on.
CQR0006	Startup activity	Inspects if an activity is marked as the start activity for the automation.
CQR0001	Try Catch - Exception handling	Inspects if the 'On Error' and 'Error Message' output ports of the Try Catch component are not used in the automation.
CQR0003	Unreferenced activities	Inspects if there are any activities that are not referenced in the automation.
CQR0004	Unused components	Inspects if there are any components that are not referenced in the automation.

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Code quality rule list (continued)

	Name of the rule	Description
CQR0008	Unused plugins or user plugins	Inspects if there are any plugins or user plugins that are not referenced in the automation.
CQR0007	Unused variables or global objects	Inspects if there any variables or global objects that are not referenced in the automation.
CQR0010	Variable naming convention	Inspects if the variables naming convention is as per the defined Regular expression.

Related topics

- Code quality check in RPA Hub
- View the code quality rules list in RPA Hub
- Code quality rule form in RPA Hub

Code quality check compliance for RPA Desktop Design Studio

View a list of compliance rules that the Code Quality Check feature follows if a package is published from RPA Desktop Design Studio.

Code quality check compliance for RPA Desktop Design Studio

Code Quality Check status of the automation project	Restriction on publishing (Based on the system property *sn_rpa_fdn.restrict_package_*	Publish of package to connected instance
Error	Error	Error to publish
Error	Error or Warning	Error to publish
Error	No restriction	Success
Warning	Error	Success
Warning	Error or Warning	Error to publish
Warning	No restriction	Success
Pass	Error	Success
Pass	Error or Warning	Success
Pass	No restriction	Success

Related topics

- Publish an automation project in RPA Desktop Design Studio
- Code quality check in RPA Desktop Design Studio
- Code quality check compliance for RPA Hub
- Code quality check in RPA Hub

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Code quality check compliance for RPA Hub

View a list of compliance rules that the Code Quality Check feature follows if a bot process is published from RPA Hub.

Code quality check compliance for RPA Hub

Code Quality Check status of the package version	Restriction on publishing (Based on the system property *sn_rpa_fdn.restrict_package_*	Publish of bot process created from package version
Error	Error	Error to publish
Error	Error or Warning	Error to publish
Error	No restriction	Success
Warning	Error	Success
Warning	Error or Warning	Error to publish
Warning	No restriction	Success
Pass	Error	Success
Pass	Error or Warning	Success
Pass	No restriction	Success

Related topics

- Publish a bot process in RPA Hub
- Code quality check compliance for RPA Desktop Design Studio
- Code quality check in RPA Hub

View the code quality rules list in RPA Hub

View a list of the pre-defined code quality check rules along with their active status and severity.

Before you begin

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_robot, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Code Quality Rules**.
4. Open a rule to view the details.

Related topics

- Code quality rules list in RPA Hub
- Code quality rule form in RPA Hub

Update a code quality rules form in RPA Hub

Update few fields in the code quality rule form to set the code quality check standard.

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Before you begin

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Code Quality Rules**.
4. Open a rule that you want to modify.
5. Update the following fields as appropriate:
   - **Severity**
   - **Regular Expression** or **Value**
   - **Active**
6. Select **Save**.

Code quality rule form in RPA Hub

Use the Code quality rule form to view a rule along with description and type.

Code quality rule form

Name of the rule	Description
Code	Unique number of the rule.
Name	Short description of the rule.
Type	Type of the rule. • Regular Expression • Integer • None
Active	Sets the rule as active or inactive. On clearing this option, the **Code Quality Check** feature in RPA Desktop Design Studio will not consider this rule while inspecting an automation or an activity for a code quality check.
Severity	Severity type of the rule. • Error • Warning • Information
Regular Expression	Expression to define naming conventions. This field appears only when the type is **Regular Expression**.
Value	Value based on the type of the rule and description.

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Code quality rule form (continued)

Name of the rule	Description
	This field appears when the type is **Integer**.
Description	Brief description of the rule.

Related topics

Code quality check in RPA Hub

View the code quality rules list in RPA Hub

Code quality rules list in RPA Hub

Using the robot calendar for RPA Hub

You can use the robot calendar in RPA Hub to view and create the schedule for the unattended robots. It's a simple, efficient, and interactive way to work with robots and schedules. By using the calendar, you can manage and plan a robot's schedule in a single view.

Note:

Robot calendar is applicable for unattended robots and unattended bot processes only.

Robot calendar overview

By using the robot calendar in RPA Hub, you get the following benefits:

- Manage robots with multiple schedules across different time zones.
- Create and manage robot schedules.
- Check the robot availability, avoid potential conflicts, and schedule a run for the bot process.
- Perform robot capacity planning with better visibility and rich visual plotting in a single view.
- Optimize the robot utilization and avoid any potential issues related to scheduled maintenance windows.

Robot Calendar button

You can view the calendar from either a robot or a bot process in the workspace. If the robot is associated with a bot process that has active, inactive, or no schedules, you can view the **Robot Calendar** button.

The following roles are required to view the **Robot Calendar** button:

- sn_rpa_fdn.rpa_release_manager
- sn_rpa_fdn.rpa_business_user
- sn_rpa_fdn.rpa_developer
- sn_rpa_fdn.rpa_support_user
- sn_rpa_fdn.rpa_admin

The following example shows the robot landing page with the **Robot Calendar** button, when accessed from a robot.

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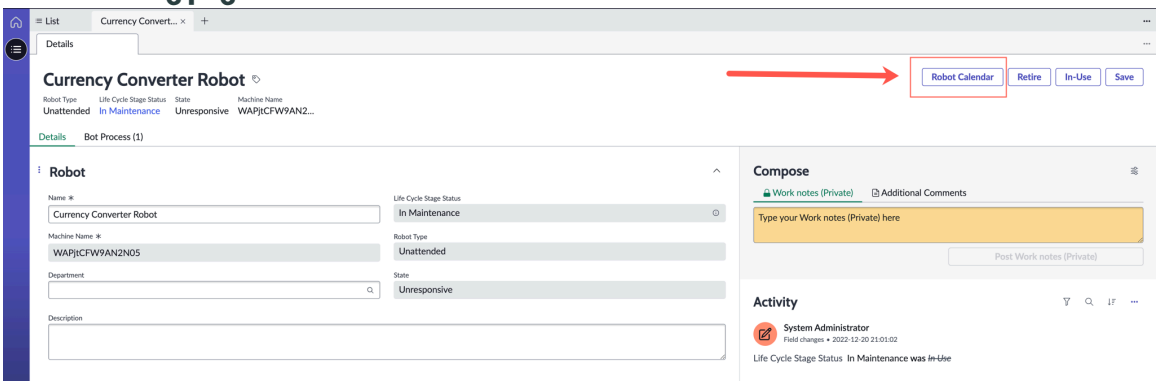
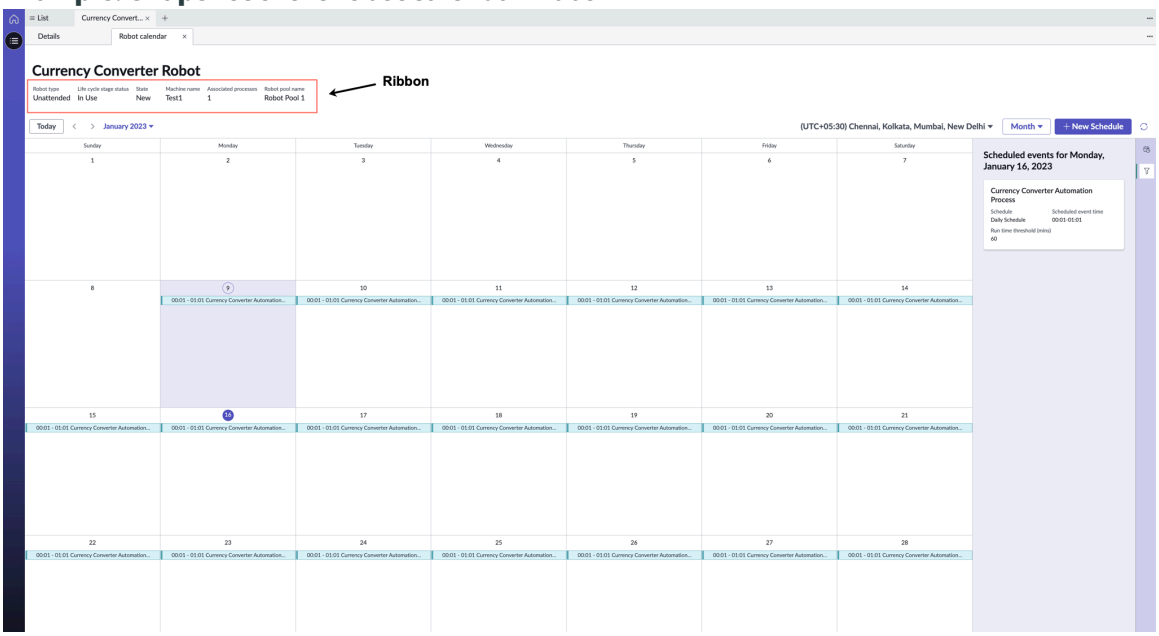
Robot landing page with the Robot Calendar button



On the ribbon of the robot calendar, you can see the robot type, life cycle stage status, robot state, machine name, the associated bot processes, and the associated robot pool name.

Example: Snapshot of the robot calendar ribbon



You can view the calendar from a bot process in the workspace, by selecting the **Show Robot Calendar** button. In the **Select the robot to view the calendar** dialog box, you can select a robot from the Robot list. Then, select **Continue**.

The following example shows the robot calendar when accessed from a bot process.

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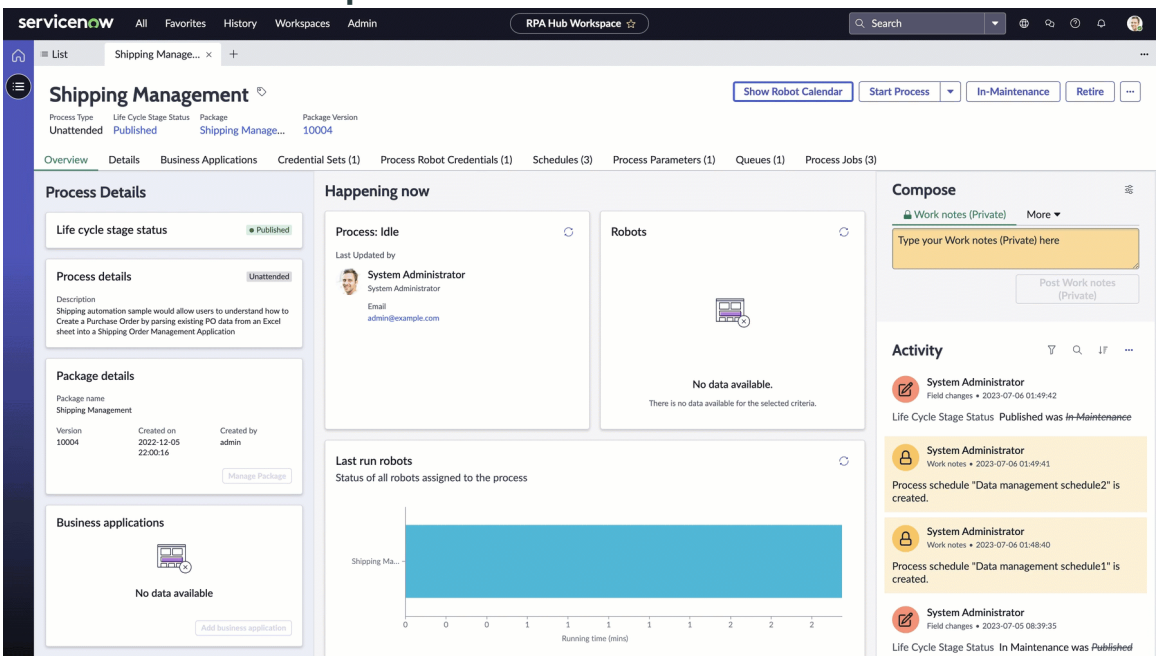
Robot Calendar from a bot process



Robot calendar landing page

On the landing page of the robot calendar, you can view the events of the bot processes. The schedules are for different interval types such as minutes, hourly, daily, weekly, or monthly. For more information about viewing the robot events, see View current robot events in RPA Hub. However, you can't see the past events on the robot calendar.

You can view the robot calendar by the day, week, or month.

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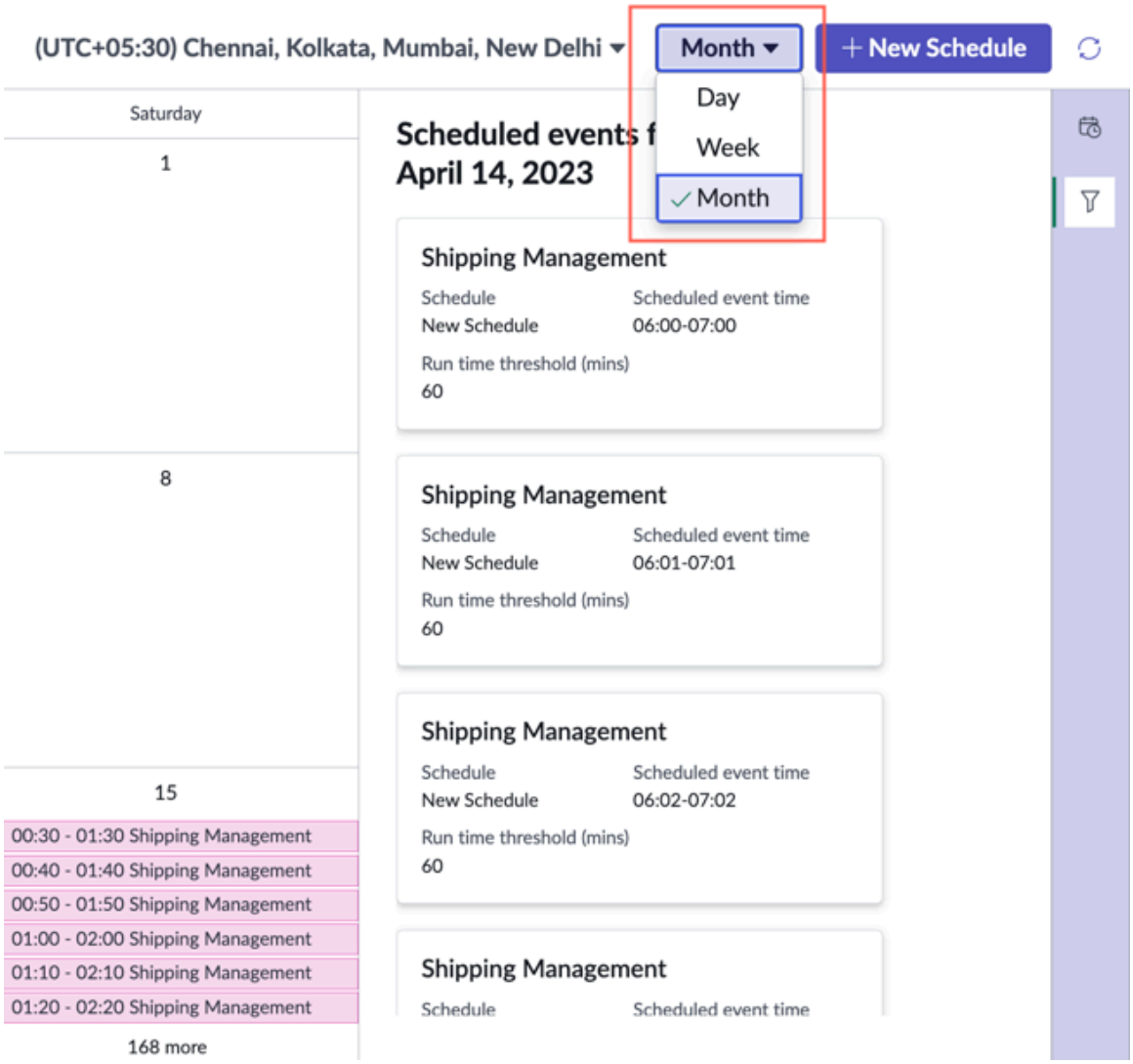
Robot calendar views - day, week, and month



If the robot is associated with multiple bot processes, events of each bot process is differentiated with unique color.

Week view

The following example shows the week view of the landing page of the robot calendar, with two bot processes. The week view starts from Sunday to Saturday.

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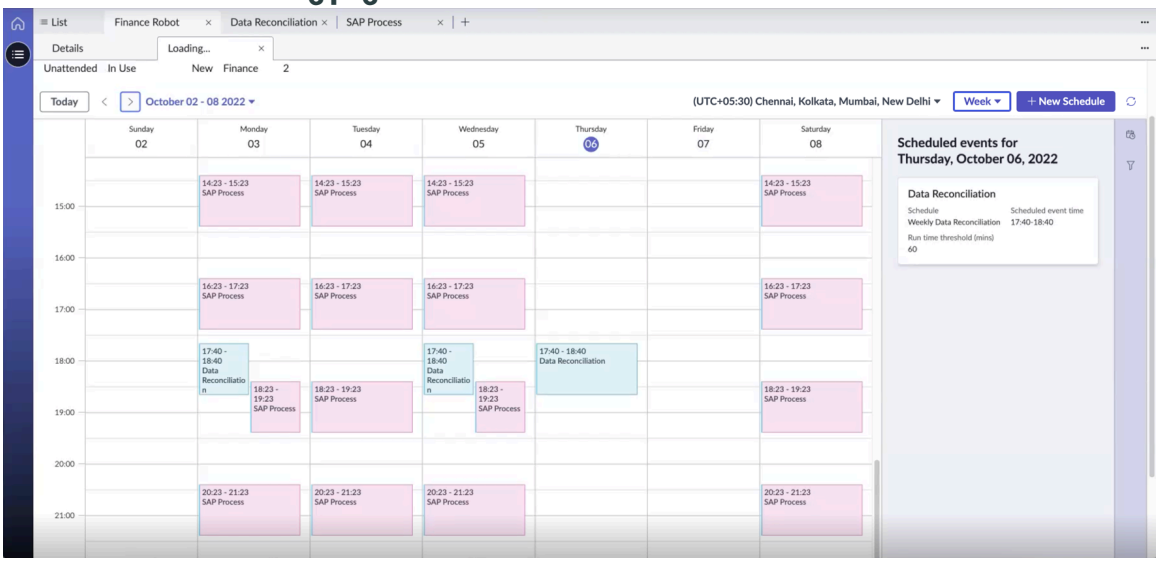
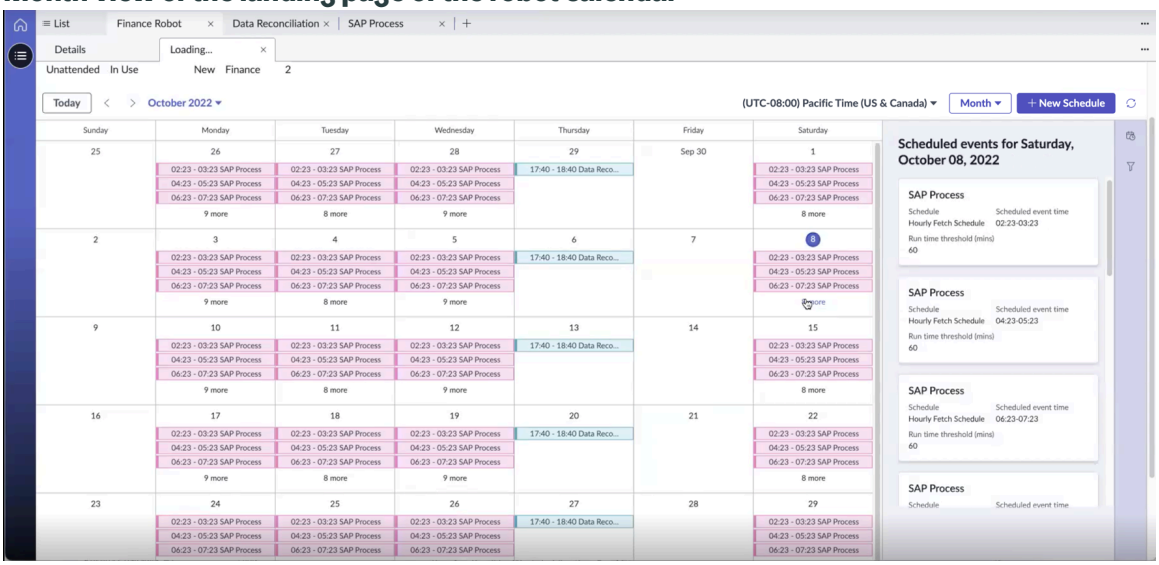
Week view of the landing page of the robot calendar



Month view

The following example shows the month view of the landing page of the robot calendar.

Month view of the landing page of the robot calendar



Manage schedules

You can create a schedule on the **Robot Calendar** tab in RPA Hub to execute unattended robots. You can also identify any conflicts in the schedule by selecting the **Preview** button. For more information, see Create a schedule on the robot calendar in RPA Hub.

You can edit a robot schedule to resolve any scheduling conflicts or to modify the details on the schedule form. You can also delete an existing robot schedule that you no longer need. For more information, see Edit a robot schedule in RPA Hub and Delete a robot schedule in RPA Hub.

Scheduled maintenance days

You can track scheduled maintenance (SM) days on the robot calendar to manage your future automations. Robotic Process Automation (RPA) release managers and RPA admins have visibility to the potential impacts of current or future automation executions to take an

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appropriate call to action, such as, either accepting or rejecting an associated SM event card on the robot calendar.

For more information, see Scheduled maintenance days in RPA Hub and Manage scheduled maintenance days in RPA Hub.

Plotting event duration

The value in the **Runtime Threshold (Mins)** field on the bot process form and the configuration in the related *sn_rpa_fdn.process.runtime_threshold* system property are used for plotting the event duration in the robot calendar. Based on value in the **Runtime Threshold (Mins)** field, the robot calendar shows as busy. For example, if this value is set to 60 (that is 1 hour), then in the robot calendar of this robot, it is displayed as blocked for that one hour.

For more information about the bot process form, see Bot Process form in RPA Hub.

For more information about the system property, see Configure RPA Hub properties.

View current robot events in RPA Hub

View the current robot events on the **Robot Calendar** tab in RPA Hub for unattended robots. By using the calendar, you can manage and plan a robot's schedule in a single view.

Before you begin

Create an unattended robot. On the robot form, ensure that you select the **Robot Type** field as **Unattended**. For more information, see Create an unattended robot in RPA Hub.

Establish the robot connection to an unattended bot process. For more information, see Assign a robot to a bot process in RPA Hub.

Create a schedule within an unattended bot process to view some schedules on the robot calendar. Ensure that one or more active schedules are associated with the robot. For more information, see Create a schedule within a bot process in RPA Hub.

Verify that the life-cycle stage of the associated bot process isn't set to **Retired**.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

About this task

If a robot is associated to multiple bot processes, the landing page of the robot calendar is the schedule view of a published bot process. There can be more than one published bot process associated with a robot.

To view more robot events, add the appropriate **Life Cycle Stage Status** filter in the Robot Calendar.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. View a robot calendar either from a robot or from a bot process.

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Option	Action
View a robot calendar from a robot	**a.** On the **Lists** tab, under **Administration**, se lect **Robots**. **b.** Open a robot to view the robot calendar. **c.** In the form header, select **Robot Calendar**.
View a robot calendar from a bot process	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open a bot process to view the robot calen dar. **c.** In the form header, select **Show Robot Cal endar**. **d.** In the **Select the robot to view the calen dar** dialog box, select a robot from the Ro bot list. **e.** Select **Continue**.

4. On the **Robot Calendar** tab, perform any of the following actions.

Option	Action
Today	Highlights the current date.
Date range (<, >)	Select the arrow buttons (**<**, **>**) to view the next calendar view that is based on the defined date range.
Schedule Timezones	View the time zones that are defined for the robot, such as, the robot time zone (workstation time zone), user profile time zone, and schedule time zone. This field is a drop down list. There can be multiple schedule time zones, based on various schedules defined across different time zones. The time zones are sorted alphabetically in ascending order and the user profile time zone is the default time zone. The workstation time zone contains the time zone information of the machine on which robot is running. The workstation time zone appears in the time zone list only when at least one schedule is defined with the workstation time zone and the robot is connected to the same RPA Hub in stance at least once. The user profile time zone is defined at the instance level, you can modify it from your profile. The schedule time zone is defined in the **Timezone** field while creating a schedule for a bot process. The schedule time zone is mapped to the Windows time zone.

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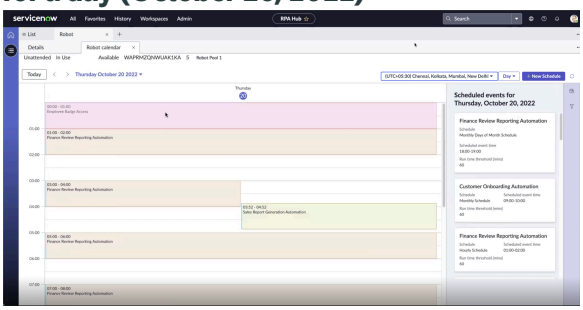
Option	Action
	The schedule time zone appears in the time zone list only when at least one active schedule is defined with a specific time zone instead of a workstation time zone. If the robot is associated with bot processes that have sched ules to be triggered in different time zones, then all those time zones are displayed in the time zone list. Along with these scheduled timezones, timezone of current user is also be added to the list. This user profile time zone be comes the default time zone. If the robot is associated with a bot process whose schedule has to be triggered based on workstation time zone, then those workstation time zones are displayed in the time zone list.
Day	View events in the calendar for a particular day. See the follow ing example for a snapshot of the Robot calendar view. **Example: Snapshot of the Robot calendar view for a day (October 20, 2022)** 
Week	View events in the calendar for a particular week. The week view starts from Sunday to Saturday. The default first day of the week is Sunday. See the following example for a snapshot of the Robot calendar view. This is the default view of the robot calendar. Every event must be specific to the start date and end date of the schedule. The cadence of the events must be based on weekdays that are mentioned in the schedule. The events are generated based on the **Start Date** field on the schedule form. For more information, see Schedule form in RPA Hub.

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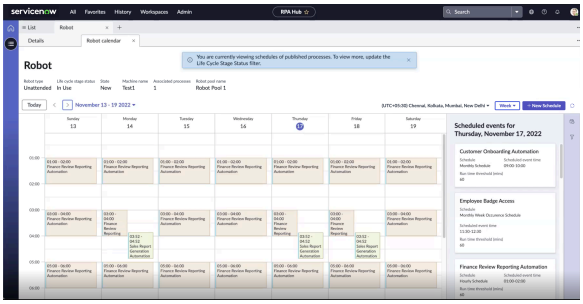
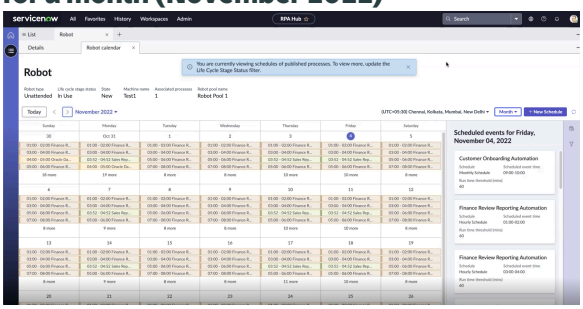
Option	Action
	Example: Snapshot of the Robot calendar view for a week (November 13 to 19, 2022) 
Month	View events in the calendar for a particular month. See the fol lowing example for a snapshot of the Robot calendar view. **Example: Snapshot of the Robot calendar view for a month (November 2022)** 
New Schedule	Create a schedule on the **Robot Calendar** tab by selecting the **New Schedule** button, to execute unattended robots. You can also create a schedule by right-clicking or double-click ing an empty slot of the robot calendar. For more information about creating a schedule, see Create a schedule on the robot calendar in RPA Hub.
Refresh	View new or updated schedules on the robot calendar by se lecting the refresh icon ( ).
Show or hide agenda view	Show or hide events for the particular day, week, or month by selecting the agenda icon ( ). See the following example for a snapshot of the show or hide agenda filter view.

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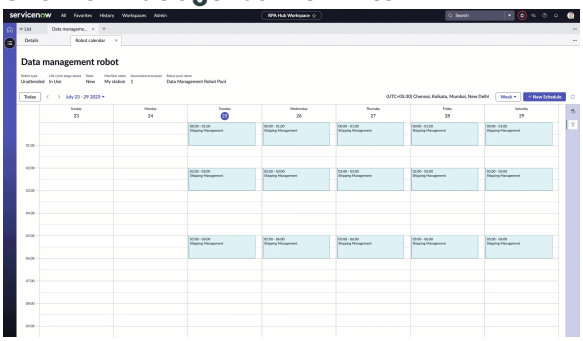
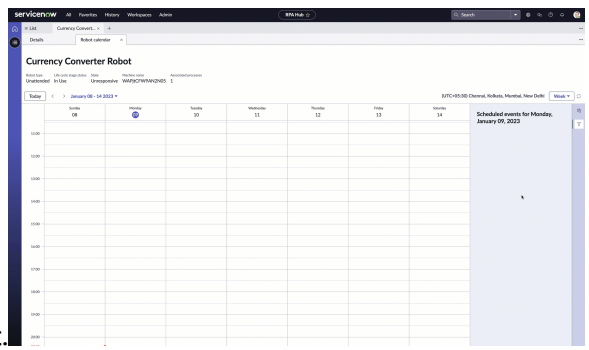
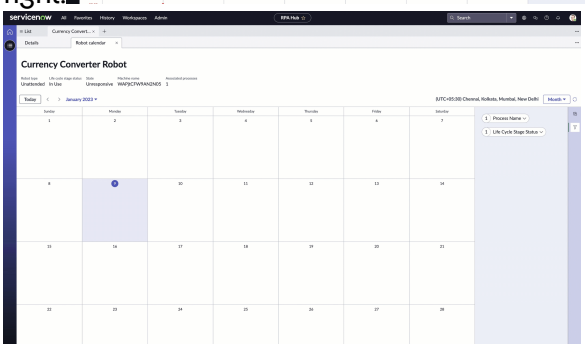
Option	Action
	Show or hide agenda view filter 
Show Filter	View the filter options to display the schedules on the life-cy cle stage status of the bot process and the bot process name. You can view schedules and scheduled maintenance days of a published bot processes. Select the filter icon ( ) to view the filter options. In the Process Name list or the Life Cycle Stage Status list, per form any of the following actions: ○ To add items to the selection, double-click an available item on the left or select an item and select the add icon (**>**). Then, select **Apply**. The new item is added at the bottom of the selected items column on the right.   ○ To remove items from the selection, double-click the item on the right, or select the item and select the remove icon (**<**). Then, select **Apply**.
Event cards	View the event cards in the Scheduled events section.

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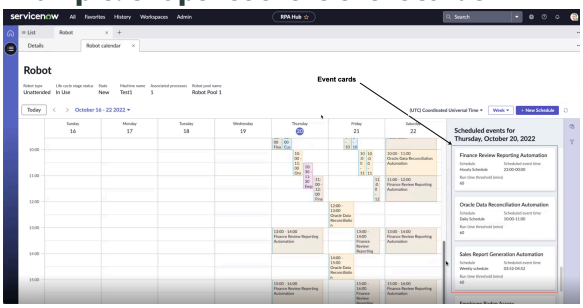
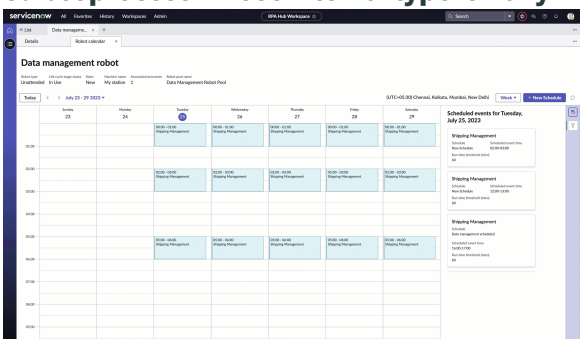
Option	Action
	Limited information about the associated bot process and its schedule is displayed. **Example: Snapshot of the event cards** 
Event details	To view more event details of the bot process and its schedule, double-click an event card. **Example: Event details snapshot of the associated bot process whose interval type is Daily** 

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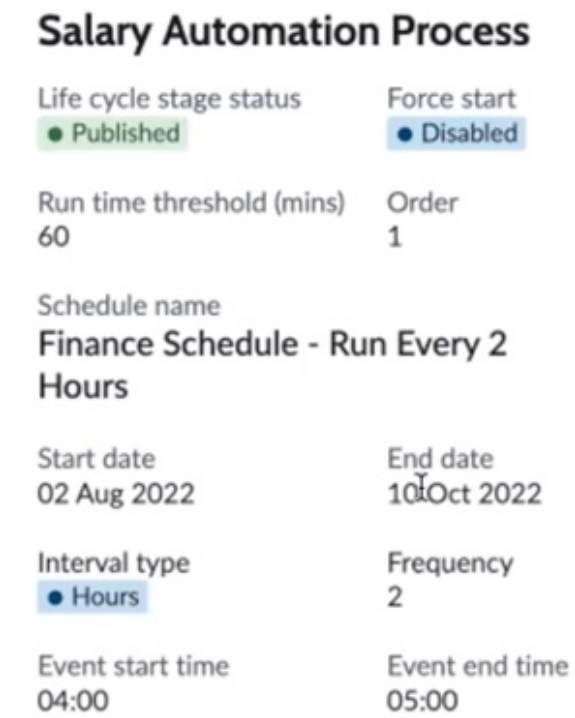
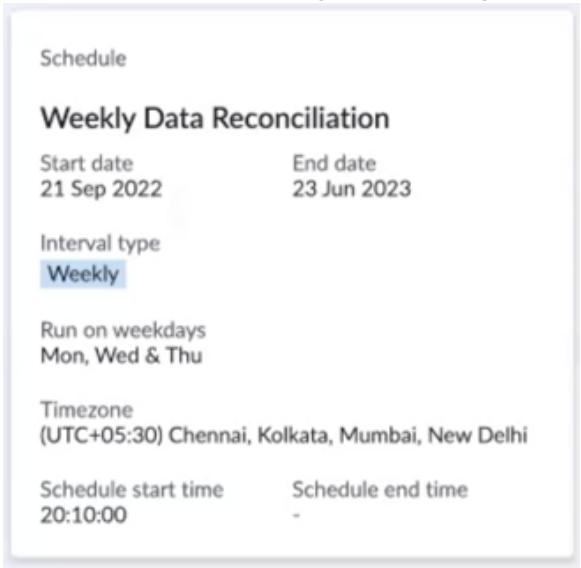
Option	Action
	Example: Event details snapshot of the associated bot process whose interval type is Hours  **Event details snapshot of the associated bot process whose interval type is Weekly** 
Event pop-up windows	On the event pop-up window, select the following icons to view, edit, and delete a schedule: ○ Select the view bot process details icon ( ) to get the bot process details in a new tab. ○ Select the view event details icon ( ) to view more details about the schedule in the contextual side panel.

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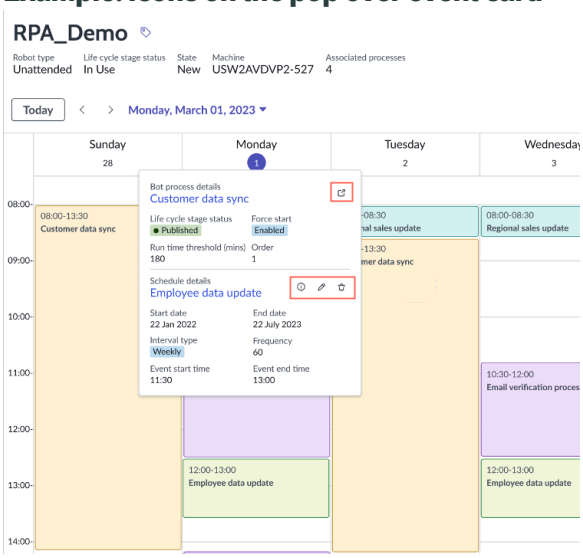
Option	Action
	○ Select the edit schedule icon ( ) to edit an existing schedule. ○ Select the delete schedule icon ( ) to delete a schedule that you no longer need. **Example: Icons on the pop over event card**  For more information, see Create a schedule on the robot calendar in RPA Hub, Edit a robot schedule in RPA Hub, and Delete a robot schedule in RPA Hub.

Create a schedule on the robot calendar in RPA Hub

Create a schedule on the **Robot Calendar** tab in RPA Hub to execute unattended robots. You can also identify any conflicts in the schedule by selecting the **Preview** button.

Before you begin

Perform the following tasks before you create a schedule on the robot calendar:

- Ensure you are familiar with robot calendar concepts. For more information, see Using the robot calendar for RPA Hub and View current robot events in RPA Hub.
- Create an unattended robot. On the robot form, ensure that you select the **Robot Type** field as **Unattended**. For more information, see Create an unattended robot in RPA Hub.
- Establish the robot connection to an unattended bot process. For more information, see Assign a robot to a bot process in RPA Hub.
- Verify that the life-cycle stage of the associated bot process isn't set to **Retired**.
- Ensure that the RPA developer (sn_rpa_fdn.rpa_developer) or the RPA support user (sn_rpa_fdn.rpa_support_user) are in the Managed by Group list of the associated bot process.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

About this task

To create a schedule within an unattended bot process, see Create a schedule within a bot process in RPA Hub.

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Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. View a robot calendar either from a robot or from a bot process.

Option	Action
View a robot calendar from a robot	**a.** On the **Lists** tab, under **Administration**, se lect **Robots**. **b.** Open a robot to view the robot calendar. **c.** In the form header, select **Robot Calendar**.
View a robot calendar from a bot process	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open a bot process to view the robot calen dar. **c.** In the form header, select **Show Robot Cal endar**. **d.** In the **Select the robot to view the calen dar** dialog box, select a robot from the Ro bot list. **e.** Select **Continue**.

4. To create a new schedule, perform any of the following tasks:
   - On the **Robot Calendar** tab, select **New Schedule**.
   - Right-click an empty slot of the calendar. Then, select **New Schedule**.
   - Double-click an empty slot of the calendar.

   The **Create a new schedule** contextual side panel opens.
5. **Optional:** To view more bot processes, select the filter icon ( ) and add the appropriate **Process Name** filter and **Life Cycle Stage Status** filter.
6. In the **Create a new schedule** contextual side panel, select a bot process that you want to create a schedule for.
7. Select one of the following options, depending on what the life cycle stage status is of your bot process:
   - If the life cycle stage status of the bot process is either Build or In Maintenance, select **Continue**.
   - If the life cycle stage status of the bot process is Published, to change the status to In Maintenance, in the Confirmation dialog box, select **Continue**.
8. On the schedule form, update the fields as appropriate.
   For more information, see Schedule form in RPA Hub.
9. **Optional:** To identify any conflicts in the schedule or preview the schedule, select **Preview**.

   (Optional) To edit or delete a schedule, see Edit a robot schedule in RPA Hub and Delete a robot schedule in RPA Hub.
10. **Optional:** To view more details about an event, perform any of the following tasks:

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- Select the view event details icon ( ) on the event pop-up window.
- Right-click an event and select **View event details**.

An event card with details of the schedule appears in the contextual side panel.

11. **Optional:** To view the bot process details in a new tab, select the view bot process details icon ( ) on the event pop-up window.
12. Perform any of the following tasks to save the schedule.

Option	Action
Only save the schedule	Select **Save**.
Save the schedule and publish the bot process	Select the down arrow in the **Save** button and then select **Save and Publish**.

Schedule form in RPA Hub

Use the Schedule form to create a schedule within a Unattended Robot bot process. A schedule enables the users to execute jobs in a planned manner at regular intervals. More than one schedule can be associated with one bot process.

Schedule form

Field	Description
Process Schedule	
Name	Name of the process schedule.
Start Date	Start date of the schedule.
Active	Option to activate the schedule. On clearing this option, the schedule becomes inactive.
Application	[Auto generated] Application containing this record. Role required to view this field: admin.
Bot Process Configuration	Name of the associated bot process.
End Date	End date of the schedule.
Frequency & Time	
Interval Type	Schedule execution interval: • **Minutes**: The bot process executes every n minutes that are specified in the **Frequency** field. • **Hours**: The bot process executes every n hours that are specified in the **Frequency** field. • **Daily**: The bot process executes every day at the time that is specified in the **Start time** field.

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Schedule form (continued)

Field	Description
	• **Weekly**: The bot process executes on the specific days that are selected in the **Weekdays** field at a specified time in the **Start time** field. • **Monthly**: The bot process executes every n days at t time based on the value that is selected in the **On** field. “t” is the time that is specified in the **Start time** field. “n” is the value of the **Frequency** field. The default value is set to `Daily`.
Frequency	Frequency of the schedule execution interval. This field appears only when **Minutes**, **Hours**, or **Monthly** is selected from the **Interval Type** field. If the frequency is too low, the performance in the Robot Calendar can be impacted.
Weekdays	Specific days of the week for the robot to run. For example, if the robot must run on Monday, select **Monday** in this field. This field does not appear if you select either **Days of Month** or **Week Occurrence** in the **On** field. This field appears only when **Minutes**, **Hours**, **Weekly**, or **Monthly** is selected from the **Interval Type** field.
Workstation Timezone	Option to consider the robot machine time zone. On enabling this option, the **Timezone** field does not appear.
Timezone	Time zone of the schedule.
Start Time	Time of the day to start the schedule.
End Time Required	Option to consider if the robot is not supposed to pick up a new job after a specific time. On enabling this option, the **End Time** field appears. This option appears only when either **Minutes** or **Hours** is selected from the **Interval Type** field.

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Schedule form (continued)

Field	Description
End Time	Time of the day to end the schedule. The bot process triggered before this time will continue execution. This option appears only when the **End Time Required** field is selected.
On	Frequency of the execution: • Weekdays • Days of Month • Week Occurrence This field appears only when **Monthly** is selected from the **Interval Type** field.
Days of Month	Specific days of the month for the schedule to run. For example, if the robot must run on the 5th, 6th, and 7th day of the month, select **5**, **6**, and **7** in this field. This field appears only when **Days of Month** is selected from the **On** field.
Occur On	Specific week of a month for the robot to run. For example, if the robot must run on the first Friday of a month, select **First** in this field. This field appears only when **Week Occurrence** is selected from the **On** field.
Day	Specific day of a month for the robot to run. For example, if the robot must run on the first Friday of a month, select **Friday** in this field. This field appears only when **Week Occurrence** is selected from the **On** field.
Compose	
Work notes (Private)	Work notes for the process schedule.
Additional Comments	Additional comments related to the schedule.

Edit a robot schedule in RPA Hub

Edit a robot schedule of a bot process on the **Robot Calendar** tab in RPA Hub to resolve any scheduling conflicts or to modify the details on the schedule form.

Before you begin

Perform the following tasks before you edit a robot schedule:

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- Ensure you are familiar with robot calendar concepts. For more information, see Using the robot calendar for RPA Hub and View current robot events in RPA Hub.
- Create an unattended robot. On the robot form, ensure that you select the **Robot Type** field as **Unattended**. For more information, see Create an unattended robot in RPA Hub.
- Establish the robot connection to an unattended bot process. For more information, see Assign a robot to a bot process in RPA Hub.
- Create a schedule for a unattended bot process to view some schedules on the robot calendar. For more information, see Create a schedule on the robot calendar in RPA Hub or Create a schedule within a bot process in RPA Hub.
- Verify that the life-cycle stage of the associated bot process isn't set to **Retired**.
- Ensure that the RPA developer (sn_rpa_fdn.rpa_developer) or the RPA support user (sn_rpa_fdn.rpa_support_user) are in the Managed by Group list of the associated bot process.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. View a robot calendar either from a robot or from a bot process.

Option	Action
View a robot calendar from a robot	**a.** On the **Lists** tab, under **Administration**, select **Robots**. **b.** Open a robot to view the robot calendar. **c.** In the form header, select **Robot Calendar**.
View a robot calendar from a bot process	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open a bot process to view the robot calendar. **c.** In the form header, select **Show Robot Calendar**. **d.** In the **Select the robot to view the calendar** dialog box, select a robot from the Robot list. **e.** Select **Continue**.

4. **Optional:** To view more bot processes, select the filter icon ( ) and add the appropriate **Process Name** filter and **Life Cycle Stage Status** filter.
5. To edit a schedule, perform any of the following tasks.

Option	Action
Right-click an event	Right-click an event (schedule) and select **Edit schedule**.

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Option	Action
Select the event pop-up window	Select the edit schedule icon ( ) on the event pop-up window.

6. **Optional:** If the life-cycle stage status of the bot process is set to **Published** and you want to change the status to **In Maintenance**, select **Continue** in the Confirmation dialog box.
7. On the Edit schedule form, update the fields as appropriate.
8. **Optional:** To identify any further conflicts in the schedule or preview the schedule, select **Preview**.
9. Perform any of the following tasks to save the schedule:
   - To save the schedule, select **Save**.
   - To save the schedule and publish the bot process, select the down arrow in the **Save** button and select **Save and Publish**.

Related topics

Schedule form in RPA Hub

Delete a robot schedule in RPA Hub

Delete a robot schedule in RPA Hub

Delete an existing robot schedule of a bot process on the **Robot Calendar** tab in RPA Hub that you no longer need.

Before you begin

Perform the following tasks before you delete a robot schedule:

- Create an unattended robot. On the robot form, ensure that you select the **Robot Type** field as **Unattended**. For more information, see Create an unattended robot in RPA Hub.
- Establish the robot connection to an unattended bot process. For more information, see Assign a robot to a bot process in RPA Hub.
- Create a schedule for a unattended bot process to view some schedules on the robot calendar. For more information, see Create a schedule on the robot calendar in RPA Hub or Create a schedule within a bot process in RPA Hub.
- Verify that the life-cycle stage of the associated bot process isn't set to **Retired**.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. View a robot calendar either from a robot or from a bot process.

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Option	Action
View a robot calendar from a robot	**a.** On the **Lists** tab, under **Administration**, select **Robots**. **b.** Open a robot to view the robot calendar. **c.** In the form header, select **Robot Calendar**.
View a robot calendar from a bot process	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Open a bot process to view the robot calendar. **c.** In the form header, select **Show Robot Calendar**. **d.** In the **Select the robot to view the calendar** dialog box, select a robot from the Robot list. **e.** Select **Continue**.

4. **Optional:** To view more bot processes, select the filter icon ( ) and add the appropriate **Process Name** filter and **Life Cycle Stage Status** filter.
5. To delete a schedule, perform any of the following tasks.

Option	Action
Right-click an event	**a.** Right-click an event (schedule) and select **Delete schedule**. **b.** In the Confirmation dialog box, select **Delete schedule**.
Select the event pop-up window	Select the delete schedule icon ( ) on the event pop-up window.

If you are deleting a published bot process, the life cycle change status is changed to **In Maintenance**.

Related topics

Schedule form in RPA Hub

Edit a robot schedule in RPA Hub

View current robot events in RPA Hub

Using the robot calendar for RPA Hub

Scheduled maintenance days in RPA Hub

Track the scheduled maintenance (SM) days on the robot calendar so that the bot processes can function optimally. If an issue occurs, you can take preventive measures. For example, you can know in advance about the days when the robot or the bot process is unavailable so that you can avoid the number of skipped process jobs.

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Scheduled maintenance days overview

A scheduled maintenance (SM) day is when a configuration item (CI), such as, a robot or a bot process, is unavailable for execution. When a change request for a robot or a bot process is accepted by the Robotic Process Automation (RPA) release manager or RPA admin to create a scheduled maintenance day. Then the robot or the bot process can't be executed at that time.

An RPA support user, RPA developer, and RPA business user can view the scheduled maintenance days on the robot calendar. You can make sure that the RPA business user is also added to the Managed by Group list.

Scheduled maintenance days also apply to the robots that are in the robot pool.

Benefits of scheduled maintenance days

With the scheduled maintenance days on the robot calendar, you get the following benefits:

- Perform robot capacity planning with better visibility and rich visual plotting in a single view.
- Optimize the robot utilization and avoid any potential issues related to scheduled maintenance windows.
- Enables you to take proactive measures instead of being reactive for a configuration item (robot or a bot process).

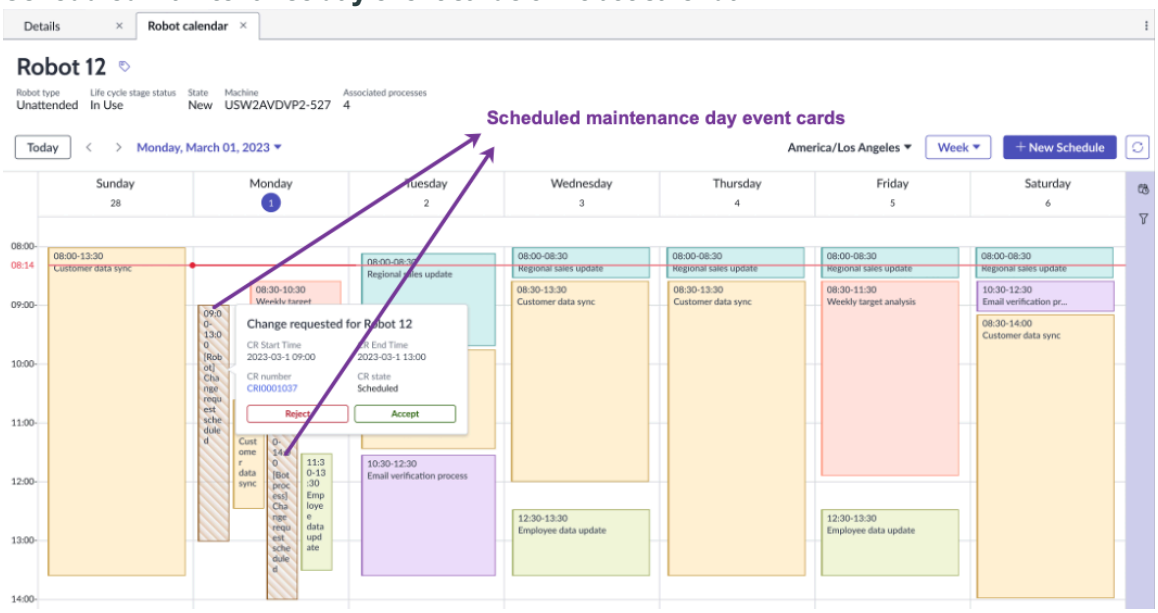
Workflow

In RPA Hub, a Change Request (CR) with details of planned start and end dates along with time is created. This CR reflects as a scheduled maintenance day on the robot calendar, only when the change request is either in Scheduled, Implement, or Review states. For more information about the CR states, see State model and transitions.

An associated SM event card appears on the robot calendar to display the scheduled maintenance days.

See the following example for a snapshot of scheduled maintenance day event cards on the robot calendar.

Scheduled maintenance day event cards on robot calendar



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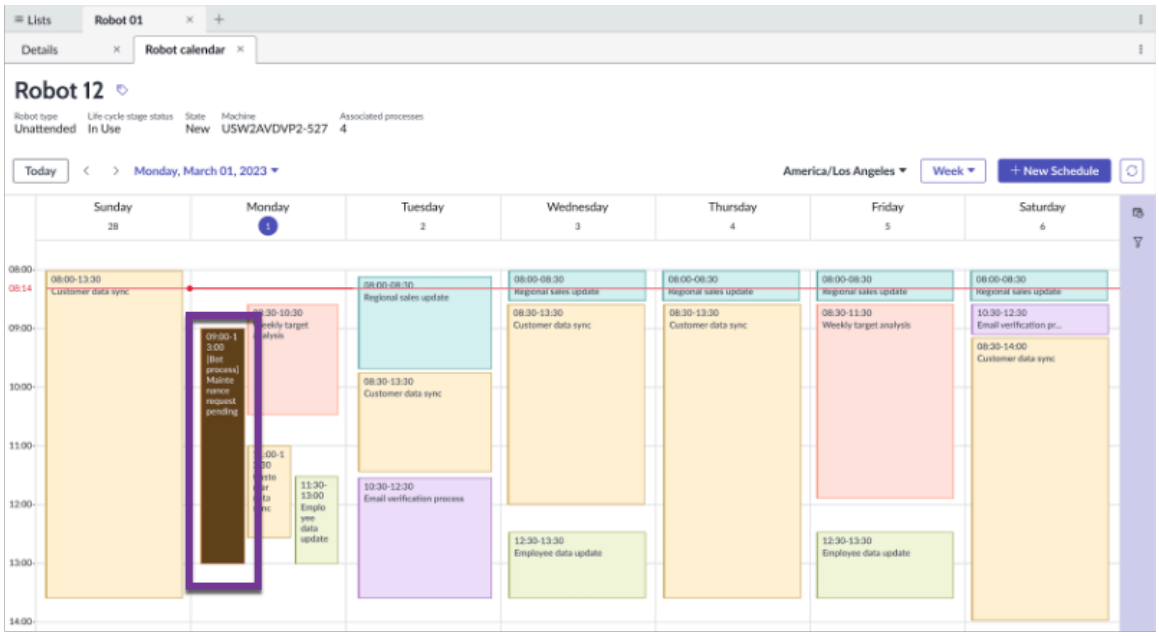
RPA business users, RPA release managers, RPA support users, RPA developers, and RPA admins have visibility to the potential impacts of current or future automation executions. RPA release managers and RPA admins can take an appropriate call to action, such as, either accepting or rejecting an associated SM event card for the CI on the robot calendar.

If the SM event card is accepted, a Maintenance Request (MR) is created on the robot calendar, with Pending state.

See the following example for a snapshot of an accepted SM day event card on the robot calendar.

Snapshot of an accepted scheduled maintenance day event card on the robot calendar



If the associated CI is in Published state, then the associated CI moves to In Maintenance state during the planned scheduled maintenance time frame. The executions are stopped until the CR is closed. Then, the CI automatically moves to the Published state.

See the following example for a snapshot of accepting the SM event card when the associated CI (bot process) is in Published state.

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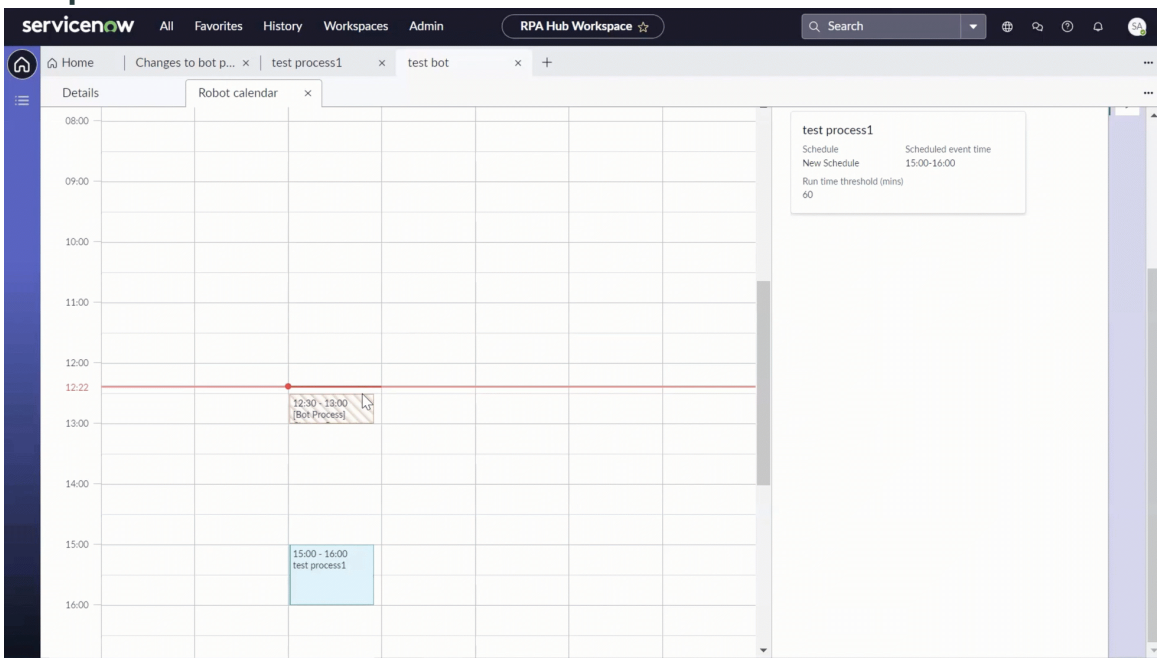
Accept a scheduled maintenance event card on the robot calendar



If the SM event card is rejected, it does not reflect on the robot calendar. An MR is created with Rejected state.

You can view the maintenance request for tracking the state of the scheduled maintenance. For more information, see View maintenance requests in RPA Hub and Maintenance request form in RPA Hub.

For more information about managing scheduled maintenance days, see Manage scheduled maintenance days in RPA Hub.

Mapping between a change request and a maintenance request

A one-to-one mapping exists between a Change Request (CR) and a Maintenance Request (MR). If an existing MR is mapped to a CR and you want to create an MR for the same CR. Then, you must cancel the previous MR and create an MR for the same CR. For example, if CR1 is mapped to MR1 (CR1:MR1). To create MR2, you must cancel MR1 and map CR1 to MR2 (CR1:MR2).

If multiple or duplicate CRs are created for the same CI, then the MRs are considered against any one CR. The RPA release manager takes the decision.

Scheduled maintenance days behavior for various CR states

If the CR is in either Schedule, Implement, or Review states and the **Planned Start Date** and **Planned End Date** fields on the CR form are mentioned. Then, the scheduled maintenance day occurs as per these dates. The MR is updated in a sequence as follows:

- An MR is created with Pending state.
- The MR is then updated to In Progress state after the **Planned Start Date** is initiated.
- The associated CI moves to In Maintenance state.

If the CR is in either Schedule, Implement, or Review states and the **Planned Start Date** field on the CR form is empty. Then, the SM day doesn't reflect on the robot calendar and the existing MR isn't executed.

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If the CR is in either Schedule, Implement, or Review states and the **Planned End Date** field on the CR form is empty. For example, the **Planned Start Date** is January 21. Then, the SM day reflects for only one day starting from the planned start date until 11:59PM on the same day. An MR is created for January 21. The CI is in In Maintenance state till the CR is closed, even if the date passed. But the schedule maintenance does not reflect on the robot calendar after the end date passes.

If the CR is in either Schedule, Implement, or Review states, the **Planned Start Date** and **Planned End Date** fields on the CR form are empty. Then the SM day doesn't reflect on the robot calendar and the existing MR isn't executed.

If the CR is in either Schedule, Implement, or Review states and the **Planned Start Date** and **Planned End Date** on the CR form are rescheduled. Then, the scheduled maintenance is updated to the rescheduled date automatically. The previous MR is canceled and the RPA release manager creates an MR for the rescheduled date by accepting the SM event card.

If the **On Hold** option on the CR form is selected, then the SM day doesn't reflect on the robot calendar and the existing MR isn't executed.

If the CR of the respective CI isn't in Closed state, however the CI is functional. Then, the RPA release manager can update the life cycle stage status of the CI to Published or In Use.

If the CR is closed, then the life cycle stage status of the respective CI is updated to Published or In Use.

If the CR is canceled and the MR is in Pending state, the MR isn't executed. If the MR is picked for execution, then cancel the MR. For more information, see Manage scheduled maintenance days in RPA Hub.

If the CR is canceled and the MR is in In Progress state. Then, the life cycle stage status of the CI moves to Published state and the MR is updated to complete state.

The following table shows the scheduled maintenance days behavior for various CR states.

Scheduled maintenance days behavior for various CR states

CR State	Planned Start Date	Planned End Date	Rescheduled Planned Start Date	Rescheduled Planned End Date	Applicable for Scheduled maintenance	MR State
Schedule/ Implement/ Review	21-Jan	22-Jan	Empty	Empty	Yes.	MR is created for January 21. On January 21, it moves to In progress. The CI is updated to In Maintenance.
Schedule/ Implement/ Review	Empty	22-Jan	Empty	Empty	SM day doesn't reflect on	Not executed.

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Scheduled maintenance days behavior for various CR states (continued)

CR State	Planned Start Date	Planned End Date	Rescheduled Planned Start Date	Rescheduled Planned End Date	Applicable for Scheduled maintenance	MR State
					the robot calendar.	
Schedule/ Implement/ Review	21-Jan	Empty	Empty	Empty	SM day reflects on January 21, until 11:59PM. But the schedule maintenance does not reflect on the robot calendar after the end date passes.	MR is created for January 21. CI is in In Maintenance state till the CR is closed, even if the date passed.
Schedule/ Implement/ Review	Empty	Empty	Empty	Empty	SM day doesn't reflect on the robot calendar.	Not executed.
Schedule/ Implement/ Review	21-Jan	22-Jan	23-Jan	24-Jan	Scheduled maintenance is updated to the rescheduled date automatically.	The previous MR is canceled (that is due on January 21. The RPA release manager creates an MR for the rescheduled date by accepting the SM event card.
On Hold option on the CR form is selected	21-Jan	22-Jan	Empty	Empty	SM day doesn't reflect on the robot calendar.	Not executed.

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Scheduled maintenance days behavior for various CR states (continued)

CR State	Planned Start Date	Planned End Date	Rescheduled Planned Start Date	Rescheduled Planned End Date	Applicable for Scheduled maintenance	MR State
Closed	21-Jan	22-Jan	Empty	Empty	Not applicable	The life cycle stage status of the respective CI is updated to Published or In Use
Canceled	21-Jan	22-Jan	Empty	Empty	Not applicable	If the MR is in Pending state, the MR isn't executed. If the MR is picked for execution, then cancel the MR. If the MR is in In Progress state. Then, the life cycle stage status of the CI moves to Published state and the MR is updated to complete state.

Manage scheduled maintenance days in RPA Hub

Track scheduled maintenance days on the **Robot Calendar** tab to manage your current and future automations.

Before you begin

Ensure you're familiar with scheduled maintenance days concepts. For more information, see Scheduled maintenance days in RPA Hub.

Create a change request from the **Change** module. For more information, see Create a change request. Ensure to do the following tasks while creating a change request:

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- On the Change Request (CR) form, in the **Configuration item** field, select the associated bot process, robot, or machine (for which the robot is associated when a machine name look up is enabled). Also, select an assignment group.
- On the Schedule tab, enter the planned scheduled maintenance start and end dates along with time, in **Planned start date** and **Planned end date** fields, respectively. Ensure that the **Planned start date** is not empty.
- After you save the change request, select **Request Approval** to move it to the Assess state.
- Next, approve the change request. For more information, see Process a change request. To view the scheduled maintenance on a robot calendar, the change request can either be in either Scheduled, Implement, or Review states.

Ensure to enable the *sn_rpa_fdn.enable_unattended_robot_machine_name_lookup* system property, to map the robot to the virtual machine.

Ensure to map the logged-in user timezone in the RPA timezone for scheduled maintenance reflection on the robot calendar.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. On the RPA Hub workspace home page, select a change request depending on the configuration item (CI):
   - If the CI is a robot, select a change request from the **Changes to robots** section.
   - If the CI is a bot process, select a change request from the **Changes to bot processes** section.
3. From the Configuration Item column, select the associated robot or the bot process.
   The associated robot form or the bot process form opens.
4. Navigate to the robot calendar from the form header, depending on the CI:
   - If the CI is a robot, select **Robot Calendar**.
   - If the CI is a bot process, select **Show Robot Calendar**.
5. **Optional:** If the CI is a bot process, in the **Select the robot to view the calendar** dialog box, select a robot from the Robot list and then, select **Continue**.
   If the robot pool feature is enabled, all the robots associated to that pool appear in the Robots list. Else, all the robots in the assigned robots appear in the Robots list.
6. On the **Robot Calendar** tab, perform any of the following tasks:

Option	Action	Result
To create a scheduled maintenance on the robot calendar, if the associated CI is either in Build or In Maintenance state.	Select a scheduled maintenance (SM) event card and select **Accept**.	A maintenance request (MR) is created with Pending state. The executions are stopped until the CR is closed.

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Option	Action	Result
To create a scheduled maintenance on the robot calendar, if the associated CI is in Published state.	○ Select an SM event card and select **Accept**. ○ In the **Do you want to accept the CR?** confirmation dialog box, select **Accept**.	An MR is created with Pending state. The associated CI moves to In Maintenance state during the planned scheduled maintenance time frame. The executions are stopped until the CR is closed. Then, the CI automatically moves to the Published state.
To remove a scheduled maintenance from the robot calendar.	Select an SM event card and select **Reject**.	An MR is created with Rejected state.
To cancel a scheduled maintenance day on the robot calendar.	○ Select an accepted SM event card and select **Cancel Maintenance**. ○ In the **Cancel Maintenance Request?** confirmation dialog box, select **Cancel**.	If the MR is In Progress state, it is updated to complete state. If the MR is in Pending state, it is canceled, then the CI moves to Published state automatically.

7. **Optional:** To view the maintenance request for tracking, select the maintenance request.
8. **Optional:** To view the updates of the CI, perform the following steps:
   a. Navigate to the CI (robot or bot process).
   b. Open the record.
   c. In the **Activity** and **Compose** fields, view the notifications of the source of the CI from where it is published or is in use.

Related topics

View maintenance requests in RPA Hub

Maintenance request form in RPA Hub

Using Graceful Stop functionality in RPA Hub

Graceful Stop functionality provides a capability for robots to exit the automation smoothly. You can define a secure termination point within an automation process. It also enables you to perform clean-up tasks such as closing in-use applications. It is applicable for assigned robots as well as robots in a robot pool.

Challenges prior to Graceful Stop functionality

- Prior to Graceful Stop, when you select the **Stop Process** button on a bot process, the robots exit the automation abruptly leading to data inconsistency and data inefficiencies.
- RPA developers cannot perform the house-keeping activities.

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Benefits of Graceful Stop functionality

- Data sanity is maintained as the robot completes the existing transaction items.
- RPA developers can perform the house-keeping activities, such as, closing the downstream application.

How Graceful Stop works

Let's consider a shipping order use case that contains 10 order detail records in a spreadsheet. These order details are populated into a downstream application, for example, Shipping Management application.

RPA developer builds an automation for this use case in the RPA Desktop Design Studio. Since the spreadsheet has 10 records, queues are used in the automation to synchronise the data to be populated into the Shipping Management application.

Each robot picks the work item, performs the logic, and pushes the data into the Shipping Management application.

If the bot process is stopped by selecting **Stop Process** for all or a subset of robots and the **Graceful Stop** is not enabled, then the robots end the automation execution abruptly. For example, if there are 6 columns in the spreadsheet, the robot stops at column C abruptly, without populating the information in columns D, E, and F. The application which is open, might not be closed.

In the RPA Hub, when you enable the **Graceful Stop** toggle switch in **Stop Process** section, the data in all the columns (D,E,F) are populated and the downstream application is closed. For more information, see Stop an unattended bot process in RPA Hub.

In the RPA Desktop Design Studio, when you use the **GracefulStop** component in your automation logic, it ensures that the automation is completed. For more information, see Use the GracefulStop component. It completes the existing work items, populates the data into the downstream application, and helps the developer to perform house-keeping activities such as closing the application.

New MSI for Unattended Robot

For the graceful stop functionality to be applicable on robots in a robot pool, upgrade to the latest Washington DC release specific Unattended Robot MSI. For more information, see Download the RPA applications from RPA Hub.

If the latest MSI is not installed and if the robot pool is enabled for a particular bot process, then the execution is stopped for all the robots of the robot pool. For these bot processes, you can't use a graceful stop for robots in a robot pool.

Workflow Studio actions and subflow in RPA Hub

Two-way integration of actions and subflows in Workflow Studio and RPA Hub for a seamless robot execution.

Flows and actions overview

The flows and actions are built using ServiceNow Workflow Studio, so make sure you're familiar with the Building actions in Workflow Studio and Building subflows in Workflow Studio basics.

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Invoke flows or subflow

Invoke the flow or subflow via RPA Desktop Design Studio, Unattended Robot, or Attended Robot. For more information, see the topics listed in Flow Designer components.

Enable the client callable option for a flow or subflow

Enable a client script to trigger an RPA Hub flow or subflow. For more information, see Enable the client callable option on a flow or subflow in RPA Hub.

RPA Hub actions

The following table shows the detailed descriptions, action inputs, and action outputs of RPA Hub actions.

RPA actions

Action	Description	Action inputs	Action outputs
Add WorkItem to Queue Action	Adds WorkItem in a specified queue in the RPA Hub application and returns the WorkItem ID.	• **Queue Name**: Record • **Name**: String • **Content**: String • **Type**: String • **Priority**: String.Choice • **Stage**: String • **SLA**: Date/Time The maximum limit for **Content** field (Request Content and Response Content) is 8000 characters. If the **Is Work Item Name Sensitive** check box on the associated work queue form is selected, the data in the **Request Content** field is encrypted. Sensitive data with encryption is stored in the work item, so that it can be passed to the RPA Desktop Design Studio or robots.	• **Action Status**: Object • **WorkItemID**: GUID • **IsNameExists**: Boolean • **status**: String • **message**: String
Assign User to Attended Automation Process Action	Assigns a user to the attended automation process.	• **Process Name**: Record • **Username**: Record	• **Action Status**: Object • **status**: String • **Message**: String

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RPA actions (continued)

Action	Description	Action inputs	Action outputs
Assign User to Attended Robot Action	Assigns a user to the attended robot.	**Username**: Record	• **Action Status**: Object • **status**: String • **Message**: String
Change Life Cycle Stage Status of a Bot Process Action	Changes the life cycle stage status of a bot process that is not retired. If a bot process is in **Build** life cycle stage status, if you have the required role, you can update it to **Published** state, but you cannot update it to **In Maintenance**. If a bot process is in **Published** life cycle stage status, if you have the required role, you can update it to **In Maintenance** state, and vice versa.	• **Process name**: Record • **Life cycle stage status**: Choice	• **result**: String • **message**: String • **Action Status**: Object
Fetch Created Jobs Action	Fetches the process jobs in RPA Hub.	• **Process Number**: String • **Robots**: Array[String]	• **Action Status**: Object • **Result**: String • **Jobs**: Array[String] • **startedRobots**: Array[String] • **pendingRobots**: Array[String]

Fetch Execution Status Action	Fetches the execution status of a specific process job in RPA Hub.	**Process Job Number**: String	• **Action Status**: Object
			• **ProcessJob**: Object
			  ○ **Process Name**: String
			  ○ **Robot Name**: String
			  ○ **State**: String
			  ○ **Started At**: Date/Time

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RPA actions (continued)

Action	Description	Action inputs	Action outputs
			○ **Completed At**: Date/Time ○ **Message**: String • **status**: String • **message**: String
Fetch Work Item Status Action	Fetches the status of specific work queue items, asynchronously.	**Work Queue Item ID**: GUID	• **Action Status**: Object ○ **Code**: Integer ○ **Message**: String • **WorkItem**: Object ○ **sysId**: String ○ **name**: String ○ **type**: String ○ **priority**: String ○ **status**: String ○ **lockedBy**: String ○ **additionalComments**: String ○ **requestContent**: String ○ **responseContent**: String ○ **deferredTill**: Date/Time ○ **sla**: Date/Time ○ **created**: Date/Time ○ **startedOn**: Date/Time ○ **completedOn**: Date/Time ○ **lastStartedTime**: Date/Time • **status**: String • **message**: String
Start Process Action	Triggers a specific bot process in RPA Hub and returns the status.	• **Process Name**: Record • **Robots**: Array[String] Ignore an entry in this field if a robot pool is	• **Action Status**: Object • **Result**: String • **Robots**: Array[String]

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RPA actions (continued)

Action	Description	Action inputs	Action outputs
		assigned to the bot process. When invoking the **Start Process** Workflow Studio action, the robots that are in the **In Maintenance** life-cycle stage status are treated as failed robots.	• **Process**: String • **Failed Robots**: Array[Object]
Stop Process Action	Stops a bot process. If Graceful Stop is enabled, this action gracefully stops the bot process.	• **Process Name**: Record • **Robots**: Array[String] • **Wait For Graceful Stop**: True/False If this check box is selected, then bot process must stop gracefully. For more information about stopping a bot process, see Stop an unattended bot process in RPA Hub. For more information about Graceful stop, see Using Graceful Stop functionality in RPA Hub. For more information about Robot Pool, see Robot pool in RPA Hub.	• **Result**: String • **Action Status**: Object • **Robots**: Array[String] • **Process**: String • **Failed Robots**: Array[Object]
Unassign User from Attended Automation Process Action	Unassigns the user from the attended automation process.	• **Process Name**: Record • **Username**: Record	• **status**: String • **message**: String • **Action Status**: Object
Unassign User from Attended Robot Action	Unassigns the user from the attended robot and retires the attended robot.	**Username**: Record	• **Action Status**: Object • **Status**: String • **Message**: String

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RPA actions (continued)

Action	Description	Action inputs	Action outputs
Update Process Parameter Action	Updates the **Value** field for the process parameter.	• **Process**: Record • **Parameter Name**: String • **Value**: String	• **status**: String • **Action Status**: Object • **message**: String
Update WorkItem Action	Updates work queue items.	• **Queue Name**: Record • **WorkItemID**: String • **Stage**: String • **DefferedTill**: Date/Time • **Name**: String • **Priority**: Choice • **Status**: Choice • **Request Content**: String • **Type**: String • **Remarks**: String • **SLA**: Date/Time • **Response Content**: String The maximum limit for **Request Content** and **Response Content** fields is 8000 characters. If the **Is Work Item Name Sensitive** check box on the associated work queue form is selected, the data in the **Request Content** field is encrypted. Sensitive data with encryption is stored in the work item, so that it can be passed to the RPA Desktop Design Studio or robots.	• **IsNameExist**: True/False • **Status**: String • **Message**: String • **Action Status**: Object
Verify HashCode of a Package Version	Verifies the HashCode of a package version in RPA Hub to validate the HashCode of the manually uploaded automation zip file with the associated	**Package Version**: Record	• **Action Status**: Object • **Message**: String • **isAttachmentValid**: True/False

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RPA actions (continued)

Action	Description	Action inputs	Action outputs
	package version record. For more information about verifying the HashCode of a package version, see Verify the HashCode of a package version in RPA Hub.		

RPA Hub subflow

The following table shows the detailed description, action input, and action output of RPA Hub subflow.

RPA subflow

Subflow	Description	Subflow inputs	Subflow outputs
Import Package Version Attachment Subflow	Imports the package version attachments automatically for a package version. To automatically migrate the package attachment (automation zip file) from a lower (non-production) to a higher (production) environment. For more information about importing a package version attachment in RPA Hub, see Import a package version attachment in RPA Hub.	• **Email**: Email • **Package Version**: Record	After the attachment is uploaded successfully or if an error occurs while uploading the attachment, an email notification (if email is provided as an input) is sent to the user who performs this import attachment action.
Start Process Subflow	Triggers a specific bot process in RPA Hub. Returns process job details.	• **Process Name**: Record • **Robots**: Array[String] Ignore an entry in this field if a robot pool is assigned to the bot process.	• **Failed Robots**: Array[Object] • **Stopped Robots**: Array[String] • **Pending Robots**: Array[String]

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RPA subflow (continued)

Subflow	Description	Subflow inputs	Subflow outputs
		If a process job is not in the **Running** status, the robot that is associated with the process job is treated as **Failed** in the **Start Process** subflow output.	• **Process Jobs**: Array[String] • **Result**: String • **Message**: String
Stop Process Subflow	Triggers a specific bot process to stop in RPA Hub. Returns robots details and process job status. If Graceful Stop is enabled, this subflow gracefully stops the bot process.	• **Graceful Stop**: True/False • **Process Name**: Record • **Robots**: Array[String]	• **Failed Robots**: Array[Object] • **Stopped Robots**: Array[String] • **Pending Robots**: Array[String] • **Process Jobs**: Array[String] • **Message**: String • **Result**: String

Enable the client callable option on a flow or subflow in RPA Hub

Enable a client script to trigger an RPA Hub flow or subflow.

Before you begin

You must do this task in the classic environment.

Make sure that you're familiar with the RPA Hub actions and subflow. For more information, see Workflow Studio actions and subflow in RPA Hub.

Invoke a flow or a subflow from Workflow Studio by using the InvokeFlow component or InvokeSubFlow component. For more information, see Use the InvokeFlow component and Use the InvokeSubFlow component.

By default, the flows, subflows, and actions can only be called by the FlowAPI within a server script. Flow and action designers can make individual flows, subflows, or actions available to client calls by enabling the Client callable option during design.

Consider the implications of making a flow or subflow client callable, such as whether it exposes protected data or bypasses validation logic.

Role required: security_admin

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Procedure

1. Navigate to **All** > **Process Automation** > **Workflow Studio**.
2. Open the flow or subflow that you want to make the client callable on.
3. In the More Actions menu, select **Manage security**.
4. Select **Callable by Client API**.
5. Add the RPA Flow Designer ACL record that you created earlier to the **ACLs** field.
6. Select **Update**.

Migrating data in RPA Hub

Learn how to migrate your data from a lower (non-production) environment to a higher (production) environment.

Restructuring RPA Hub tables

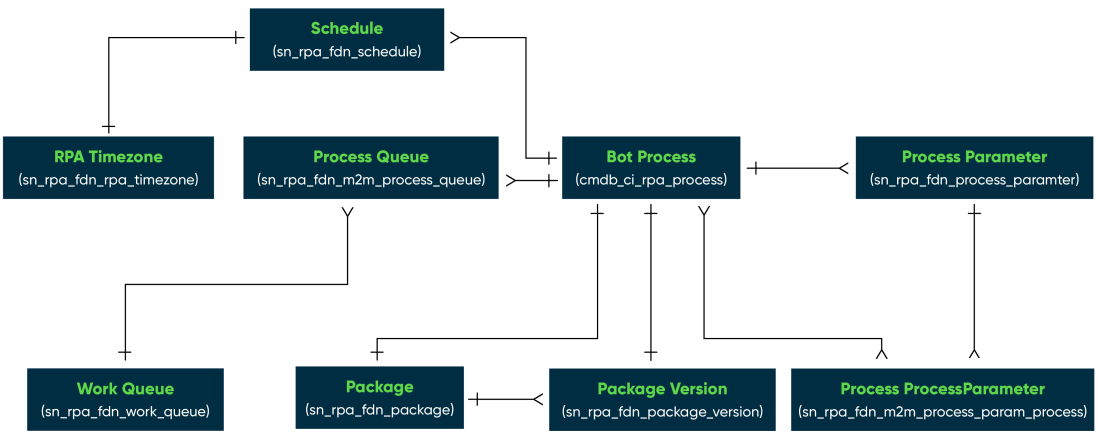
Starting with the Utah release, the Robotic Process Automation (RPA) tables are restructured to an application file, so that changes that you make to these tables are captured in the update sets and can be moved seamlessly across environments. With this process, you don't have to re-create the data records in the targeted environment.

The table architecture that supports the RPA Hub application has been restructured to extend the Application file (sys_metadata). This action automatically captures all the data into the update sets.

If you are upgrading from Tokyo or older to Brazil, the bot process definitions change to the new structure, that is the bot process configuration.

The following diagram shows the tables of RPA Hub before restructuring.

RPA Hub tables before restructuring



The following diagram shows the tables of RPA Hub after restructuring.

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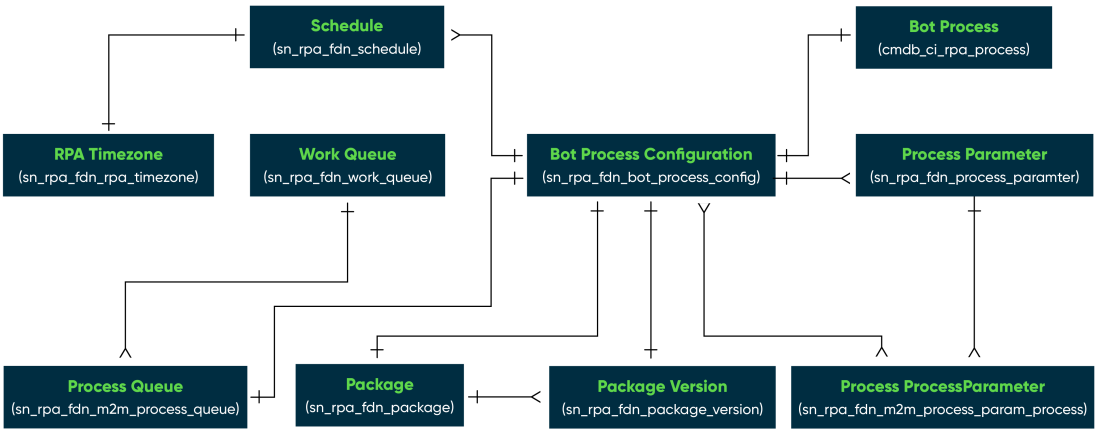
RPA Hub tables after restructuring



For detailed information about the script that restructures the tables during an upgrade, see the Restructuring RPA Hub tables to sys_metadata in Utah article in the Now Support Knowledge Base.

Verify the associated schedules, parameters, packages, and queues in RPA Hub

Verify that the bot process has the associated schedule, process parameters, shared parameters, package, package version, and work queues in RPA Hub. You do this task when you're migrating your data from a lower (non-production) environment to a higher (production) environment.

Before you begin

Role required: sn_rpa_fdn.rpa_release_manager or admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process that you want to verify and select one or more of the following options.

Option	Action
To verify schedules	On the **Schedules** tab, verify the schedules.
To verify process parameters	On the **Process Parameters** tab, verify the process parameters.
To verify the package and package version	On the **Details** tab, verify the package and package versions.

5. To verify the queues, do the following actions:
   a. On the **Lists** tab, under **Build**, select **Queues**.
   b. Open the queue that you want to verify.
   c. On the **Bot Process Configuration** tab, verify the association.
6. To verify the shared parameters, do the following actions:

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a. On the **Lists** tab, under **Build**, select **Shared Parameters**.

b. Open the shared parameter that you want to verify.

c. On the **Bot Process Configuration** tab, verify the association.

Related topics

Create a package to assign to a bot process

Create a schedule within a bot process in RPA Hub

Create a process parameter within a bot process in RPA Hub

Create a shared parameter in RPA Hub

Create a queue in RPA Hub

Assign a bot process to a queue from Queues menu in RPA Hub

Assign a bot process to a shared parameter in RPA Hub

Schedule form in RPA Hub

Process parameter form in RPA Hub

Migrating your data from a lower environment to a higher environment in RPA Hub

As a system administrator, after you restructure the RPA Hub tables to extend the Application file (sys_metadata), you can use the update set capability to migrate your data from a lower (non-production) environment to a higher (production) environment for real-time use.

There are two ways you can migrate your data from a lower environment to a higher environment:

- Using the update set capability described in this page for migrating your data from one environment to another environment
- Using the **Migrate** button in RPA Hub

  In RPA Hub, you can migrate the bot process configuration and associated assets from one environment to another environment with a click of a button. After the migration is complete, you will have to create a bot process record, create credentials, make necessary changes, and then publish the bot process. For more information, see Migrating the bot process configuration in RPA Hub.

Restructured RPA Hub tables (Tokyo and earlier releases)

For more information about the restructuring of the RPA Hub tables, see Restructuring RPA Hub tables.

For more information about update sets, see Get started with update sets.

Functionality

The metadata of the automation (package, package version, schedules, and so on) is captured in the update set. System administrator then moves the update set to a higher (production) environment.

The metadata records are moved to the higher (production) environment but the package version does not contain an automation zip file.

RPA release manager manually downloads the zip file from the lower (non-production) environment and then uploads it to a higher (production environment). RPA admin can also perform this action. However, this task is restricted to classic environment.

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RPA release manager automatically imports package version attachments by selecting the **Import Attachment** button on a package version. RPA admin can also perform this action. A flow is then triggered asynchronously and pulls the attachment from the configured connection using API. The automation zip file is attached to the package version and HashCode validation is performed automatically. An email is also sent to the user who performs the import attachment action.

To execute the orchestration of RPA Hub update sets from third-party tools, it is essential to recreate bot process on the higher environment. The **Change Life Cycle Stage Status of a Bot Process** action in Workflow Studio helps in ensuring the deployment and enablement of RPA Hub process is automated. For more information about this action, see Workflow Studio actions and subflow in RPA Hub.

List of steps for the migration tasks

Use this list of steps to guide you through all the tasks of the migration.

Complete all the tasks for a step before moving on to the next step.

Do the steps in the order that they're presented.

Checklist

Task	Environment
1. Create and select an update set as the current set.	Lower (non-production) environment
2. Create a bot process configuration record in RPA Hub.	Lower (non-production) environment
3. Adding details to your bot process in RPA Hub.	Lower (non-production) environment
4. Mark your current update set complete.	Lower (non-production) environment
5. Export to XML.	Lower (non-production) environment
6. Download a package version in RPA Hub. Perform this task, if you are manually migrating the package attachment (automation zip file) from a lower (non-production) to a higher (production) environment. You can skip step 12.	Lower (non-production) environment
7. Switch to higher instance. Retrieve an update set.	Higher (production) environment
8. Preview a remote update set.	Higher (production) environment
9. Commit an update set.	Higher (production) environment
10. Associate a bot process to a bot process configuration record.	Higher (production) environment
11. Verify the associated schedules, parameters, packages, and queues in RPA Hub.	Higher (production) environment

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Checklist (continued)

Task	Environment
12. If the instance connection is established with a required lower (non-production) instance, perform this import task. To establish an instance connection, create an active connection in the **RPA Automation Package** connection and credential alias. Ensure to provide the lower (non-production) environment in the **Connection URL** field. For more information, see Create an HTTP(s) connection. Perform this task if you are automatically migrating the package attachment (automation zip file) from a lower (non-production) to a higher (production) environment. Import a package version attachment in RPA Hub. You can skip step 13 and 14.	Higher (production) environment
13. Upload an automation package attachment in RPA Hub. Perform this task in classic environment.	Higher (production) environment
14. Verify the HashCode of a package version in RPA Hub.	Higher (production) environment
15. Assign a business application to a bot process in RPA Hub.	Higher (production) environment
16. Create a credential group in RPA Hub.	Higher (production) environment
17. Assign a robot to a bot process in RPA Hub.	Higher (production) environment
18. Assign a process robot credential within a bot process in RPA Hub.	Higher (production) environment
19. Assign an attended user or group to an attended bot process.	Higher (production) environment

Import a package version attachment in RPA Hub

Import package version attachments automatically instead of manually uploading a package version attachment, by selecting the **Import Attachment** button on a package version.

Before you begin

Perform the following tasks before you import a package version attachment:

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- Ensure that you've completed the tasks that are related to migrating your data from a lower environment to a higher environment. For more information, see Migrating your data from a lower environment to a higher environment in RPA Hub.
- Ensure that the *sn_rpa_fdn.allow_manual_upload_of_automation_package* system property is marked as true. If you have the admin role, you can edit this system property.
- Ensure that there is no valid attachment associated to the package version.
- Verify that the life-cycle stage of the package version isn't set to **Retired**.
- Create an active connection in the **RPA Automation Package** connection and credential alias. Ensure to provide the lower (non-production) environment in the **Connection URL** field. For more information, see Create an HTTP(s) connection.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

The maximum package size is determined by the *com.glide.attachment.max_size* system property. For more information about this system property, Maximum allowed attachment size.

Perform this task if you are automatically migrating the package attachment (automation zip file) from a lower (non-production) to a higher (production) environment.

Another way to import package version attachments automatically is via triggering the **Import Package Version Attachment** Subflow in Workflow Studio. For more information, see Workflow Studio actions and subflow in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Packages**.
4. Open a package whose package version you want to import.
5. On the **Package Versions** tab, select a version that you want to import.
6. Select **Import Attachment**.
7. In the Confirmation dialog box, select **Import Attachment**.

Result

After the attachment is uploaded successfully or if an error occurs while uploading the attachment, an email notification is sent to the user who performs this import attachment action.

What to do next

For a quick integrity check, verify the HashCode of a package version again. For more information, see Verify the HashCode of a package version in RPA Hub.

Upload an automation package attachment in RPA Hub

Upload a zip file of the automation package in RPA Hub to manually migrate the package from a lower (non-production) to a higher (production) environment.

Before you begin

You must do this task in the classic environment.

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Ensure that you've completed the tasks that are related to migrating your data from a lower environment to a higher environment. For more information, see Migrating your data from a lower environment to a higher environment in RPA Hub.

Download the package version attachment from a lower instance. For more information, see Download a package version in RPA Hub.

Ensure that the *sn_rpa_fdn.allow_manual_upload_of_automation_package* system property is marked as true. If you have the admin role, you can edit this system property.

Verify that the life-cycle stage of the package version isn't set to **Retired**.

Ensure that there's no valid attachment that is associated with the package version record.

For a quick integrity check, verify that the HashCode of a package version is correct. If the validation fails, remove the incorrect attachment that you previously uploaded by selecting **Manage Attachments**. Then, proceed with this task to upload a correct attachment. For more information about verifying the HashCode, see Verify the HashCode of a package version in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager

About this task

You can upload the valid attachment only one time. The **Upload Attachment** button to upload attachments is turned off after you upload a valid attachment.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **Build** > **Packages**.
2. Open a package that you want to upload a package version for.
3. On the **Package Versions** tab, select a version.
4. In the form header, select **Upload Attachment** to upload a zip file of the automation package.
5. In the Confirmation dialog box, select **Choose file**.

What to do next

For a quick integrity check, verify the HashCode of a package version again. For more information, see Verify the HashCode of a package version in RPA Hub.

Migrating the bot process configuration in RPA Hub

In RPA Hub, you can migrate the bot process configuration and associated assets for an attended or unattended bot process from one environment to another environment. With this feature, you can create an automation and test it in a lower environment and then migrate it to a higher or production environment.

Bot process migration overview

You can migrate the bot processes from any environment to any environment. For example, when a bot process is ready to be migrated from a developer's environment to a UAT environment, an RPA developer or RPA administrator can select the **Ready for Migration** button on a published bot process. This action enables the **Migrate** button to appear. This button is only visible when the bot process migration isn't in progress. Then, an RPA release manager or RPA administrator can initiate the migration process by selecting the **Migrate** button. After the bot process and associated assets are migrated, a release manager can make any necessary changes (such as creating more process parameters, shared parameters, or credential mapping), create and associate credentials, create an associated bot process record, and publish the bot process on the UAT (target) environment.

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What's migrated with the bot process

In an unattended bot process migration, the following records and associated assets are also migrated:

- Bot process configuration
- Packages
- Package versions with attachments
- Process parameters
- Shared process parameters, if assigned to the bot process
- Schedules
- Queues
- Associated skills

Note: Only skills that are directly used in the automation are migrated.

In an attended bot process migration, the following records and associated assets are also migrated:

- Bot process configuration
- Packages
- Package versions with attachments
- Process parameters
- Shared process parameters, if assigned to the bot process
- Process field parameters, if Embedded Task Automation (ETA) is enabled
- Attended configurations, if ETA is enabled
- Queues
- Associated skills

Note: Only skills that are directly used in the automation are migrated.

What's not migrated with the bot process

The robot credentials, application credentials, and credential group that are associated with the bot process configuration aren't migrated. After the bot process configuration is migrated, the credentials must be created or updated in the target environment.

If any shared parameters or process parameters are marked as sensitive in the bot process, the sensitive values that are stored in these parameters aren't migrated and the parameter values are empty in the target environment.

Only the default field values are migrated. The custom field values aren't migrated.

Restructured RPA Hub tables (Tokyo and earlier releases)

For Tokyo and earlier releases, you must restructure the RPA Hub tables before migration. For more information, see Restructuring RPA Hub tables.

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Related topics

Mark the bot process as ready for migration in RPA Hub

Migrate the bot process configuration to another environment in RPA Hub

Mark the bot process as ready for migration in RPA Hub

Mark the bot process as ready for migration in RPA Hub so that the bot process configuration and associated assets can be migrated to another environment. With this feature, you can create an automation and test it in a lower environment and then migrate it to a higher or production environment.

Before you begin

Familiarize yourself with the bot process migration concept. For more information, see Migrating the bot process configuration in RPA Hub.

Verify that you've completed the tasks that are related to setting up the target environment. For more information, see Set up the ServiceNow Remote Instance spoke.

Verify that the life-cycle stage status of the bot process in the source environment is set to **Published**. For more information, see Life-cycle stage statuses (LLCS) of a bot process in RPA Hub.

Verify that the Robotic Process Automation (RPA) developer (sn_rpa_fdn.rpa_developer) is in the Managed by Group list of the bot process.

Role required: sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Select the bot process that you want to mark as ready for migration.
5. In the form header, select **Ready for Migration**.
   You can't see the **Ready for Migration** button when the bot process migration is in progress.

Migrate the bot process configuration to another environment in RPA Hub

Migrate the bot process configuration and associated assets to another environment in RPA Hub. With this feature, you can create an automation and test it in a lower environment and then migrate it to a higher or production environment.

Before you begin

Familiarize yourself with the bot process migration concept. For more information, see Migrating the bot process configuration in RPA Hub.

Verify that you've completed the tasks that are related to setting up the target environment. For more information, see Set up the ServiceNow Remote Instance spoke.

The bot process must be marked ready for migration. For more information, see Mark the bot process as ready for migration in RPA Hub.

Verify that the life-cycle stage status of the bot process in the source environment is set to **Published**. For more information, see Life-cycle stage statuses (LLCS) of a bot process in RPA Hub.

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When you re-migrate, verify that the life-cycle stage status of the bot process in the target environment isn't set to **Published** or **Retired**. If **Published**, the values are overridden in the target environment.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Select the bot process that you want to migrate.
5. In the form header, select **Migrate**.
   You can't see the **Migrate** button when the bot process migration is in progress.
6. In the Confirmation dialog box, select **Migrate**.

Result

After the migration is completed successfully or if an error occurs, an email notification is sent to the user who performs the migration. To receive the email notification, the email address of the user must be added to the user profile.

What to do next

- Associate a bot process to a bot process configuration record
- Credential Management in RPA Hub
- Adding details to your bot process in RPA Hub
- Publish a bot process in RPA Hub

Monitoring automations

Trigger attended or unattended automations or view process jobs, installed plugins, automation logs, maintenance requests, and alerts.

Start an unattended bot process in RPA Hub

Start an unattended bot process in the specified robot machine to execute the automation by the selected robot.

Before you begin

Associate a package and a package version to the bot process. For more information, see Configuring a bot process record in RPA Hub.

Verify that the life cycle stage status of the bot process is either in **Published**, **In Maintenance**, or **Build**. For more information, see Bot Process form in RPA Hub.

If the **External Credential** check box is selected in a robot credential record, then ensure that the associated external credential vault record is active. For more information, see Create a robot credential in RPA Hub.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_business_user, or sn_rpa_fdn.rpa_admin

About this task

If robot pool is enabled, after you select the **Start Process** button, a certain number of robots from the assigned robot pool execute the bot process based on the following conditions:

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- Based on the value selected in the **Allocation Type** field on the Bot Process form.
- Based on the pending work items and average handling time of previous successfully completed work items, calculate the number of robots needed.
- Minimum value of calculated robots is 1.
- Maximum value of calculated robots is equal to the number of robots in the pool.

Note: When a bot process is either in the **In Maintenance** or **Build** life-cycle stage status and is using a robot pool, new robots are not deployed for dynamic allocation. Dynamic allocation in the robot pool is only activated for published bot processes.

Only robots with an assigned credential group and in the **Available** and **Busy** states are displayed here to facilitate process job queuing. A job queue contains processes that are executed in a defined order.

You can also run an unattended automation using the Unattended Robot. For more information, see Run an automation using Unattended Robot.

Another way to start an unattended bot process is via triggering the **Start Process** Action in Workflow Studio. For more information, see Workflow Studio actions and subflow in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open the bot process to execute the unattended automation.
5. In the form header, select **Start Process**.
6. Select the robot that is assigned to the current bot process that you want to start.
   The robots that are in the **In Maintenance** life-cycle stage status are not displayed in the list.
7. Select **Start Process**.
   Your organisation's security policy may flag or prevent the automation from executing. To avoid that, consider allow listing the folders that store the binaries, user plugins, and script connectors on your computer. For example,
   - For binaries, you can allow list the ServiceNowRPA folder in the path `Users\<username>\AppData\Local`
   - For user plugins, you can allow list the user plugins folder in the path `<project folder name>\UserPlugins\<User plugin name>`
   - For script connectors, you can allow list the Dependencies folder in the path `<project folder name>\Dependencies`

Related topics

Edit a bot process in RPA Hub

Stop an unattended bot process in RPA Hub

Launch in Studio from RPA Hub

Publish a bot process in RPA Hub

Retire a bot process in RPA Hub

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Stop an unattended bot process in RPA Hub

Stop the unattended bot process to abort the automation by the selected robot. If robot pool is enabled for a particular bot process, then the execution is stopped for all the robots of the robot pool.

Before you begin

Start a bot process. For more information, see Start an unattended bot process in RPA Hub.

Verify that the life cycle stage status of the bot process is either in **Published**, **In Maintenance**, or **Build**. For more information, see Bot Process form in RPA Hub.

Verify that the life cycle stage status of the assigned robot is **In Use** and the state of the robot is **Busy**.

Ensure you are familiar with graceful stop concepts. For more information, see Using Graceful Stop functionality in RPA Hub.

To use the **Graceful Stop** toggle, ensure the Graceful Stop component is used in the selected package version in RPA Desktop Design Studio. Graceful stop is applicable for assigned robots as well as robots in robot pool.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_business_user, or sn_rpa_fdn.rpa_admin

About this task

Another way to stop an unattended bot process is via triggering the **Stop Process** Action in Workflow Studio. For more information, see Workflow Studio actions and subflow in RPA Hub.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. To stop the unattended automation, open the bot process.
5. In the form header, select the down arrow in the **Start Process** button.
6. Select **Stop Process**.
7. **Optional:** To terminate the bot process gracefully, enable the **Graceful Stop** toggle switch.
8. Select the robot that is assigned to the current bot process that you want to stop.

   Note: Only the robots that are assigned to the current bot process and execute the same bot process are displayed.

9. Select **Stop Process**.

Related topics

- Edit a bot process in RPA Hub
- Launch in Studio from RPA Hub
- Publish a bot process in RPA Hub
- Retire a bot process in RPA Hub

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Launch in Studio from RPA Hub

Review, edit, and debug automations by opening the associated package version of the bot process in the RPA Desktop Design Studio.

Before you begin

Associate a package and a package version to the bot process. For more information, see Configuring a bot process record in RPA Hub.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open a bot process.
5. In the form header, select the down arrow in the **Start Process** button.
6. Select **Launch In Studio**.
7. Select one of the following options depending on whether you are on a remote or local machine.

Option	Action and description
Remote Machine	**Note:** Ensure to add the robot and connect to the Unattended Robot application. If robot pool option is enabled, select one robot from the associated robot pool and select **Launch**. Only robots that have mapped assigned process robot credential sets and are in the **Available** and **Busy** states are available. If robot pool option is not enabled, select one assigned robot and select **Launch**. Only robots that have an assigned credential group and are in the **Available** and **Busy** states are available. The associated package version opens in the selected robot machine.
Local Machine	**Note:** Ensure that the package and associated package version is available in bot process. Select **Launch**. The associated package version opens in the Windows machine (where your instance is rendering), within the RPA Desktop Design Studio.

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Using the Overview tab to view the bot processes in RPA Hub

By using the **Overview** tab in RPA Hub, you can quickly view the bot process details in one place.

Introduction of the Overview tab

The **Overview** tab appears after a bot process is in published, in maintenance, or a retired stage. You can see the status of all life-cycle stages (but not for the Build stage) for both the attended and unattended bot processes.

Sections of the Overview tab

The **Overview** tab is divided into the following six sections:

- Process information
- Happening now
- Upcoming changes
- Performance
- Work queues
- Contacts

Note: The descriptions of these sections are in a table later in this topic.

Roles required

To access the **Overview** tab, you must have one of the following roles:

- RPA developer
- RPA release manager
- RPA business manager
- RPA support user
- RPA admin

Examples

The **Overview** tab for an unattended bot process is shown in the following example.

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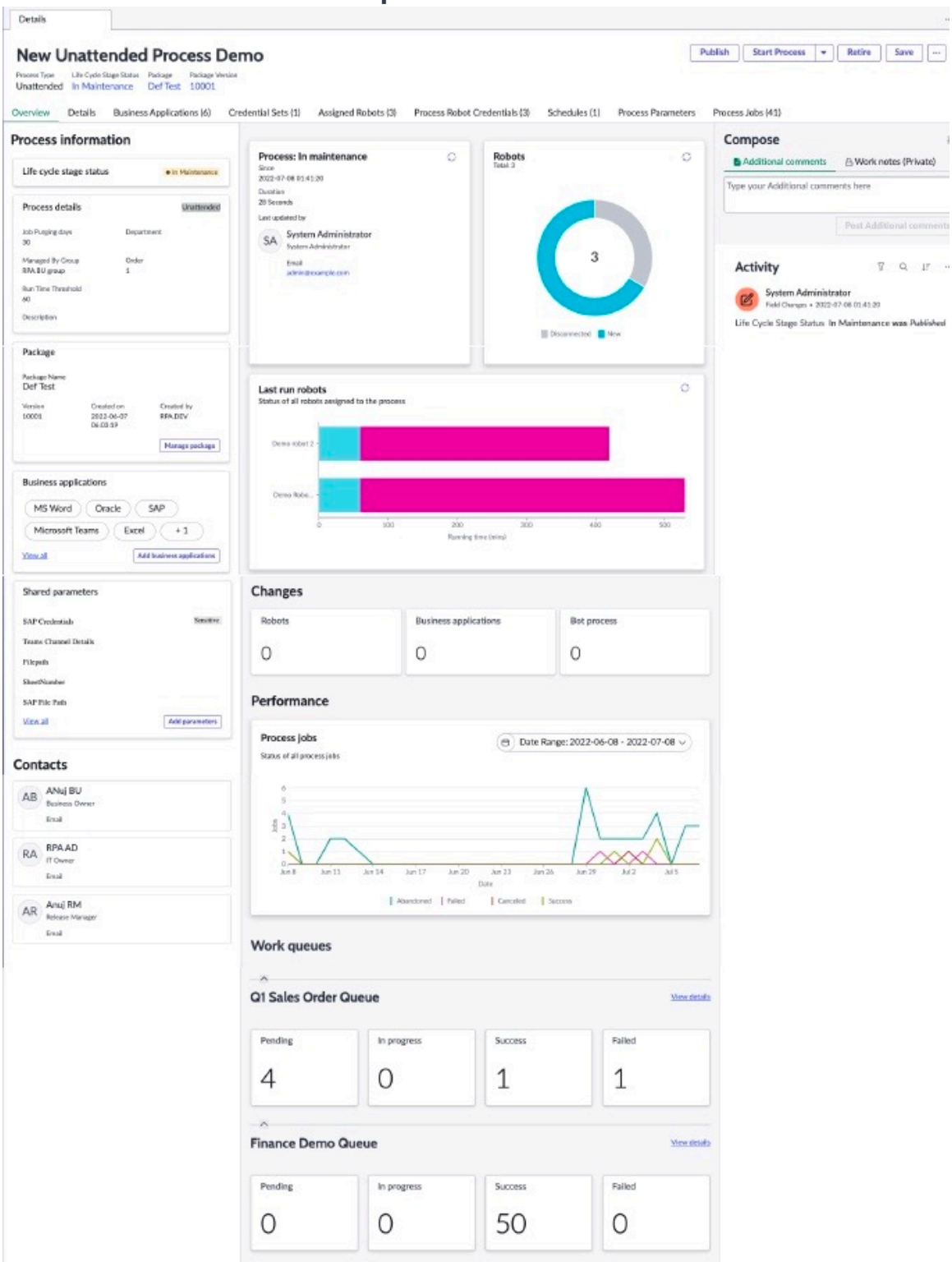
Overview tab for an unattended bot process



The **Overview** tab for an attended bot process is shown in the following example.

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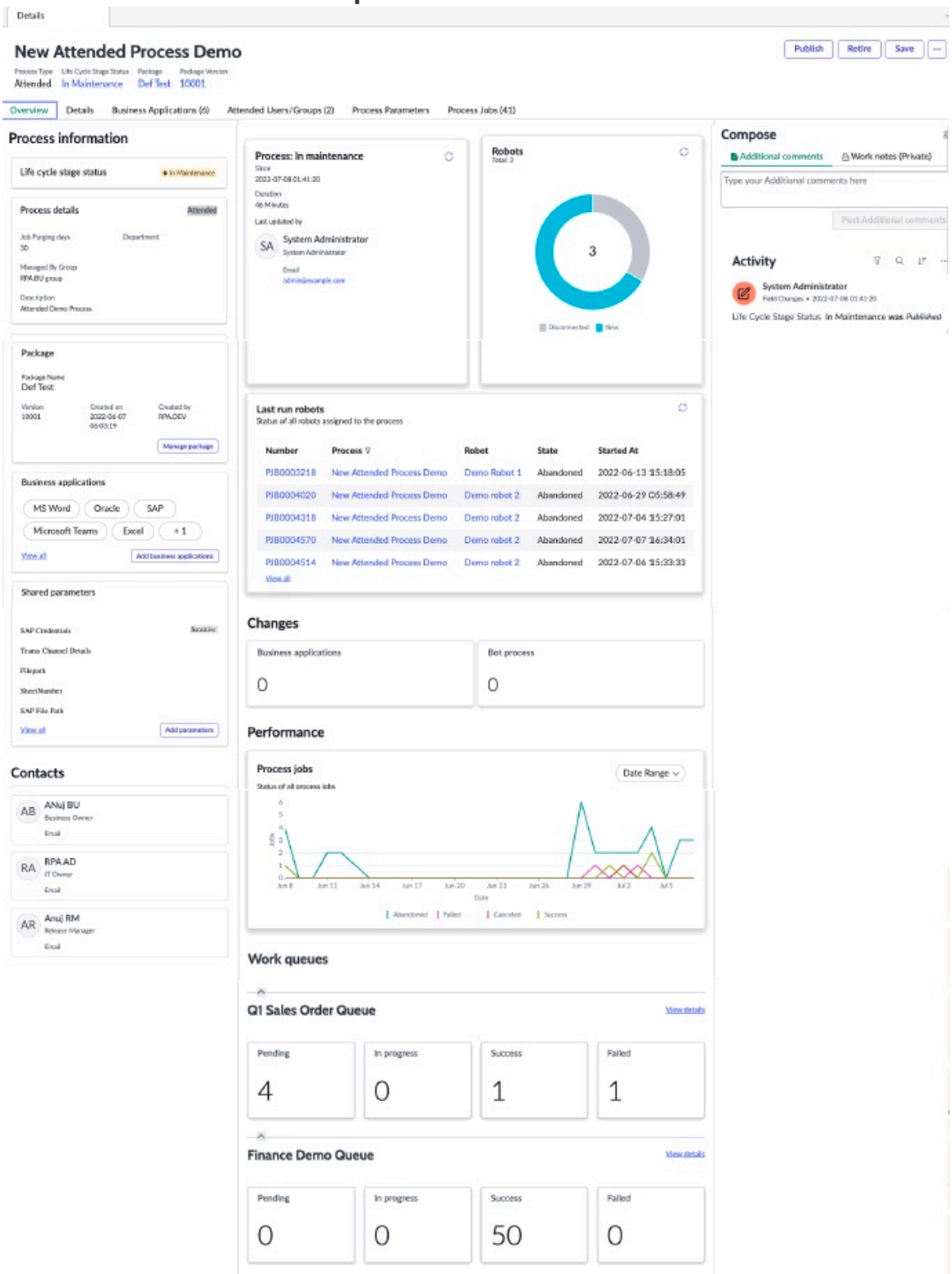
Overview tab for an attended bot process



Details of the sections in the Overview tab

For more information about the **Overview** tab, see Get a snapshot of a bot process.

Note: If you don't have access to a particular table, you can't see that table in the **Overview** tab.

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The following table shows the detailed descriptions of the sections and actions that are available.

Visualized overall data on the Overview tab

Visualization	Descriptions and action
Process details	
Life cycle stage status	Status of the life-cycle stage of the bot process: • **Published** • **In Maintenance** • **Retired**
Process details	Snapshot of the bot process details: • Bot process type • Job Purging days • Run Time Threshold • Order • Managed By Group • Description of the bot process
Package	Snapshot of the associated package details: • Package name • Version • Created on • Created by To update the package details, select **Manage package**. You can't update the package details when the bot process is published.
Business applications	Associated business applications. For example, Ariba, Microsoft Excel, or Google Chrome. To view more business applications, select **View all**. To add a business application, select **Add business application**. For more information about adding a business application, see Assign a business application to a bot process in RPA Hub.

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Visualized overall data on the Overview tab (continued)

Visualization	Descriptions and action
	You can't add a business application when the bot process is published.
Shared parameters	Associated shared parameters. To view more shared parameters, select **View all**. To add a shared parameter, select **Add parameters**. For more information about adding a shared parameter, see Create a shared parameter in RPA Hub. You can't add a shared parameter when the bot process is published.
Happening now This label appears only when the life-cycle stage of the bot process is **In Maintenance**.	
Process	State of the process job along with the time stamp and duration: • **Running**: When at least one process job is in the running state. • **Idle**: No process jobs are in the running state. This state also shows the contact details of the last update.
Robots	Total number of robots: • **Total**: Total number of non-retired robots that are associated with the bot process. • **In-Maintenance**: Total number of robots that are associated with the in-maintenance life-cycle stage status. The summary includes a donut report of robot states.
Currently running robots	Information about the unattended bot process. This state is only for a published bot process when the process job is in the running state. Information about the attended bot process.
Last run robots	Information about the last completed process job for the current bot process.

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Visualized overall data on the Overview tab (continued)

Visualization	Descriptions and action
	This state is for both the published and in-maintenance bot process, when the process job is in the idle state.
Upcoming changes	Upcoming changes to the associated robots, business applications, and bot processes. This state is only for a published bot process.
Changes	Changes to the associated robots, business applications,and bot processes. This state is only for an in-maintenance bot process.
Performance	Performance of the associated process jobs.
Work queues	Associated work queues for both published and in-maintenance bot processes. To view additional details about the queue, select **View details**.
Contacts	Contact card details of the IT Owner, Business Owner, Release Manager, and Support User.
Compose	
Additional Comments or Work notes (Private)	Additional comments or work notes that you can add.
Activity	Activity of the form, work notes, and additional comments that you can view. Configure the related system property to view the activity stream. For more information, see Display an activity stream for bot processes and robots in RPA Hub.

Get a snapshot of a bot process

Get a snapshot of both your unattended and attended processes in one view.

Before you begin

Configure the related system property to view the activity stream. For more information, see Display an activity stream for bot processes and robots in RPA Hub.

Verify that the life-cycle stage of the bot process is either **Published**, **In Maintenance**, or **Retired**. For more information, see Bot Process form in RPA Hub.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

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About this task
For more information about the overview tab, see Using the Overview tab to view the bot processes in RPA Hub.

Procedure
1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open a bot process.
5. On the **Overview** tab, view the summary details of the bot process.
6. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

View a package version in RPA Hub

View a package version in RPA Hub so that it can be opened from the RPA Desktop Design Studio to build, debug, or modify the automation.

Before you begin
Create a package. For more information, see Create a package to assign to a bot process.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_robot, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_assisted_user, or sn_rpa_fdn.rpa_admin

Procedure
1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Packages**.
4. Open a package whose package version you want to view.
5. On the **Package Versions** tab, select a version that you want to view.

Related topics
- Package Version form in RPA Hub
- Retire a package in RPA Hub
- Download a package version in RPA Hub

View the process jobs of a bot process in RPA Hub

View a list of execution logs of a bot process in RPA Hub.

Before you begin
Create a bot process. For more information, see Configuring a bot process record in RPA Hub.

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_business_user, or sn_rpa_fdn.rpa_admin

About this task
A process job represents the execution of a bot process on a robot.

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Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Build**, select **Bot Process**.
4. Open a bot process to view the related process jobs.
5. On the **Process Jobs** tab, select the process job that you want to view.
   For more information, see Process job states in RPA Hub.
6. Open a process job record to view an associated automation log.
7. In the Automation Logs tab, view the details.

Process job form in RPA Hub

Use the Process job form to view a list of the execution logs of a bot process.

Process job form

Field	Description
Name	Name of the process job.
Process	Name of the associated bot process.
Robot	Assigned robot that is running on the bot process.
State	State of the process job: • Success • Failed • Running • Skipped • Canceled • Abandoned For more information about process job states and their scenarios, see Process job states in RPA Hub.
Storage	Storage location of the logs: • **Instance** • **Robot Machine**
Triggered By	Source of the trigger. • **Schedule**- If the automation is triggered via a schedule. • **API**- If the automation is triggered by a flow • **Manual**- If the attended automation is triggered by a user or if the unattended automation is triggered by **Start Process**.

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Process job form (continued)

Field	Description
	• **Embedded Task Automation**- If the attended automation is triggered from the ServiceNow form. For more information, see Embedded Task Automation (ETA) in RPA Hub.
Execution Log Status	Status on the availability of the execution logs: • **No Logs** • **Sync in progress** • **Complete** The available logs are viewed on the RPA Desktop Design Studio.
Graceful Stop	Indicates whether the Graceful Stop is executed or not. If it is marked true, the associated bot process is stopped gracefully instead of stopping abruptly.
Started At	Start date and time of the process job.
Completed At	End date and time of the process job.
Duration	Time taken to complete the automation.
Message	Any information or error message returned by the robot.

Related topics

View the process jobs of a bot process in RPA Hub

View process jobs for all bot processes in RPA Hub

Process job states in RPA Hub

A process job represents the execution of a bot process on a robot.

Process job state scenarios

State	Scenario
Running	When a bot process is being executed by a robot, the status of the process job is updated to **Running**.
Canceled	When a bot process execution is canceled manually, the process job status is updated to **Canceled**.

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Process job state scenarios (continued)

State	Scenario
	If Bot process 1 is already executing, and Bot process 2 with force start enabled is triggered, then the process job status of Bot process 1 is updated to **Canceled**, and the process job status of Bot process 2 is updated to **Running**.
Success	After a bot process is executed successfully by a robot, the process job status is updated to **Success**.
Failed	When a bot process execution fails to complete, the process job status is updated to **Failed**.
Skipped	Consider the following scenarios when more than one bot processes are triggered for the same unattended robot: • If Bot process 1 is already executing and Bot process 2 with force start disabled is triggered, then the process job status of Bot process 2 is updated to **Skipped**. • If two bot processes, BP1 and BP2, are scheduled to run on the same robot at the same time and BP2 has lower priority (higher priority order number), then the process job status of BP2 is updated to **Skipped**. • If two bot processes, BP1 and BP2, with the same priority order are scheduled to run on the same robot at the same time, then only one of the bot process would be selected randomly for running and the process job status of the other one is updated to **Skipped**. • If Bot process 1 is triggered and robot is waiting to login, and in the mean time Bot process 2 is triggered, then process job status of Bot process 2 is updated to **Skipped**. • The **Start process** action is invoked for Bot process 1. Until the execution starts, if other bot processes are triggered then the process jobs of all other start process requests are updated to **Skipped**. • When a robot comes back to responsive state, it will start to receive start process requests that were triggered when the robot was in the unresponsive state. The latest

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Process job state scenarios (continued)

State	Scenario
	request which falls under the configured threshold is updated to **Running** and all the older requests are updated to **Skipped**.
Abandoned	• For any robot type, if a bot process was previously executing and the process job status was not updated to **Completed**, and a new process job is created, then the status of the previously executing process job is updated to **Abandoned**. • When a process job is running, the robot state is moved from **Busy** state to any other state. For example, when a process job is executing locally in the robot machine, a robot may fail to update RPA Hub with its heartbeat call due to network failure, certificate authentication failure, machine user profile corruption, and so on. In all such scenarios, when the robot calls the RPA Hub after an interruption, and then updates its status from **Busy** or **Disconnected** to **Available**, then the status of the last known process job is changed to **Abandoned**.

View process jobs for all bot processes in RPA Hub

View a list of execution logs for all bot processes.

Before you begin

Role required: sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_robot, or sn_rpa_fdn.rpa_admin

About this task

A process job represents the execution of a bot process by a robot.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Monitor**, select **Process Jobs**.
4. Open a process job to view the details.
   For more information, see Process job states in RPA Hub.
5. **Optional:** In the **Activity** and **Compose** fields, view the activity of the form, work notes, and additional comments.

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Related topics

- Process job form in RPA Hub
- View the process jobs of a bot process in RPA Hub

View alerts in RPA Hub

View notifications that are generated by the alert rules. For example, you can view alerts that pertain to robots, schedules, process jobs, and so on.

Before you begin

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, in **Monitor**, select **Alerts**.
4. Open an alert to view the details.

Related topics

- Alerts form in RPA Hub
- Alert rule form in RPA Hub

View installed RPA Hub plugins

View a list of available RPA Hub plugins, the plugin versions, and dependency packs to verify the availability of a specific version that you want to install and use on the RPA Desktop Design Studio.

Before you begin

Role required: sn_rpa_fdn.rpa_release_manager, sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_robot, or sn_rpa_fdn.rpa_admin

About this task

Plugin is a software component that adds a specific feature for an interaction with third party applications such as Microsoft Office 365, Google Chrome, Windows, and so on.

These Plugins are automatically downloaded from via APIs and then used in the automation. They are downloaded as zip files which contain the required DLLs.

Robotic Process Automation (RPA) plugins are beneficial as they reduce the development efforts, error rates, and implementation time. These plugins extend the capability of the RPA product. For example, RPA Chrome Plugin enables the RPA application to automate tasks on the Google Chrome browser. Similarly, RPA Excel plugin enables RPA applications to interact with excel files.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Administration**, select **Installed RPA Plugins**.
4. Open an installed RPA Hub plugin to view the details.

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5. On the **Installed RPA Plugin Version** tab, select a version to view the plugin version details.
6. On the **Installed RPA Plugin - Dependency Pack** tab, select a dependency pack to view the details.

Installed RPA plugins form

Use the installed RPA plugins form to view a list of available RPA Hub plugins, the plugin versions, and dependency packs to verify the availability of a specific version that you want to install and use on the RPA Desktop Design Studio.

Installed RPA plugins form

Field	Description
Name	Name of the installed RPA plugin.
Latest Installed Version	Latest version of the installed RPA plugin.
Available to Project Type	Type of the installed RPA plugin.
Author	Author of the installed RPA plugin.
Install Order	Order of the installation of the installed RPA plugin.
Load Default	Option if the installed RPA plugin is loaded by default.
Obsolete	Option if the installed RPA plugin is supported.
Demised	Option if the installed RPA plugin is not available.
Visible	Option if the installed RPA plugin is visible.
Mandatory	Option if the installed RPA plugin is required.
Description	Description of the installed RPA plugin.

View maintenance requests in RPA Hub

After a scheduled maintenance event card is accepted or rejected on the robot calendar, a maintenance request is created for tracking.

Before you begin

Ensure that the RPA business user, RPA developer, and RPA support user are in the Managed by Group list of the bot process which is associated to the request. This is applicable with the associated CI is a bot process.

Role required: sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ( ).
3. On the **Lists** tab, under **Monitor**, select **Maintenance Requests**.
4. Open a maintenance request to view the details.

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Related topics

- Manage scheduled maintenance days in RPA Hub
- Scheduled maintenance days in RPA Hub

Maintenance request form in RPA Hub

Use the Maintenance request form to track the status of the scheduled maintenance (SM) days on the robot calendar. After a scheduled maintenance event card is accepted or rejected on the robot calendar by an RPA release manager or an admin, then a maintenance request is created for tracking.

Maintenance request form

Field	Description
Number	Auto-generated number of the maintenance request.
Change request	Associated change request.
Planned Start Date	Planned start date and time of the scheduled maintenance.
Planned End Date	Planned end date and time of the scheduled maintenance.
State	State of the maintenance request: • **Pending** - An MR is created when you accept the associated SM event card. • **In Progress** - When the planned start date begins, the MR is executed. The life cycle stage status of the configuration item (robot or bot process) moves to In Maintenance state. • **Complete** - When the MR completes execution of the configuration item (robot or bot process). When the associated CR is closed, then the life cycle stage status of the Configuration Item (CI) moves to Published state. • **Canceled** - When an MR is canceled. For more information about canceling an MR, see Scheduled maintenance days in RPA Hub and Manage scheduled maintenance days in RPA Hub. • **Failed** - When a CI (robot or bot process) fails due to any issue. When the system tries to update the CI to either in Published or In Maintenance, but unable to update. Then the MR fails. • **Rejected** - When you reject the associated SM event card.
Configuration Item	Name of the associated bot process or robot.
Class	Type of the configuration item. For example, bot process or robot.

Note: Maintenance Request (MR) is unique for Change Request (CR), except for **Canceled** and **Failed** states.

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View automation logs in RPA Hub

Automation logs are series of succession stages or a series of checkpoints that occur during the execution of a bot process. It enables monitoring and auditing the automation process. These logs are generated from the robot for unattended and attended bot processes.

Before you begin

Ensure that the **Track Automation Logs** check box on the Bot Process form is enabled. For more information, see Bot Process form in RPA Hub.

Ensure to use the log component in the associated automation and populate the required details in RPA Desktop Design Studio. For more information about the component, see Use the Log component.

Role required: sn_rpa_fdn.rpa_business_user, sn_rpa_fdn.rpa_support_user, sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_release_manager, or sn_rpa_fdn.rpa_admin

About this task

Automation logs help in tracking the execution state of robots ensuring that automation processes run smoothly. The detailed logs show each step completed by the robot and any errors encountered. Reports are generated in real-time.

For example, when a robot executes an Invoice Processing bot process, view the following messages in the **Message** field of an automation log:

- Bot started the invoice processing automation.
- Emails retrieved successfully.
- Invoice data extraction in progress.
- Invoice categorization initiated.
- Update to accounting system in progress.
- Invoice processed successfully.

The automation logs store up to 8,000 records that are latest. Every 5 minutes, older records beyond this limit are automatically deleted.

Procedure

1. Navigate to **All** > **Robotic Process Automation** > **RPA Hub Workspace**.
2. Select the list icon ().
3. Navigate to the automation logs in one of the following ways.

Option	Action
From Bot Process menu	**a.** On the **Lists** tab, under **Build**, select **Bot Process**. **b.** Select a bot process. **c.** On the Process Jobs tab, open a process job record. **d.** On the Automation Logs tab, view an associated automation log.

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Option	Action
From Process Job menu	**a.** On the **Lists** tab, under **Monitor**, select **Process Jobs**. **b.** Open a process job record. **c.** On the Automation Logs tab, view an associated automation log.
From Automation Logs menu	**a.** On the **Lists** tab, under **Monitor**, select **Automation Logs**. **b.** Open an automation log to view more details.

Automation Logs form in RPA Hub

Use the Automation Logs form to view a list of the automation logs captured for a bot process.

Automation logs overview

Automation logs help in tracking the execution state of robots ensuring that automation processes run smoothly. The detailed logs show each step completed by the robot and any errors encountered. Reports are generated in real-time.

Automation Log form

Field	Description
Log Level	Type of log level: • Error • Exception • Info • Warning
Sequence Number	Auto generated number as per the order of the automation log record, created during the current process job execution across all process jobs. For example, an automation log created for process job PJ1 is 1 and the automation log created for process job PJ2 is 2.
Message	Message from the automation logs.
Created	Date and time at which the automation log record is created in RPA Hub.
Process Job	Associated Process Job number.

RPA Hub reference

Reference topics provide additional information about the lists and forms that you use to configure and administer RPA Hub.

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Components installed with RPA Hub

Several types of components are installed with the activation of the RPA Hub plugin, including tables, user roles, and scheduled jobs.

Note: The Application Files table lists the components that are installed with this application. For instructions on how to access this table, see Find components installed with an application.

Demo data is available for this plugin.

Roles installed

Note: RPA role requires access to the cmdb_rel_ci table. If there are any customizations to the cmdb_rel_ci ACLs, provide the relevant read access role to the following RPA roles.

Role title [name]	Description	Contains roles
RPA admin [sn_rpa_fdn.rpa_admin]	Sets up RPA Hub application configurations and manages RPA Hub system property settings in various environments.	• fd_read • itil • sn_rpa_fdn.rpa_user • cmdb_read
RPA assisted user [sn_rpa_fdn.rpa_assisted_user] **Note:** Assisted user is attended user.	Executes attended automations.	None
RPA business user [sn_rpa_fdn.rpa_business_user]	Manages data like work items, credentials, and so on. Extracts reports.	• sn_rpa_fdn.rpa_user • cmdb_read
RPA developer [sn_rpa_fdn.rpa_developer]	Builds automation packages, tests the automation projects, and handles exceptions in the RPA Desktop Design Studio. Publishes packages to RPA Hub. Creates and deploys automations in a low-code environment.	• fd_read • sn_rpa_fdn.rpa_user • cmdb_read
RPA elevated privileges [sn_rpa_fdn.rpa_elevated_privileges]	Users with this role and along with other roles (RPA developer, RPA support user, or RPA admin) can access sensitive logs that are captured in Process Execution Log table.	None

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Role title [name]	Description	Contains roles
RPA release manager [sn_rpa_fdn.rpa_release_manager]	Manages data, schedules, and other configuration parameters.	• itil • sn_rpa_fdn.rpa_user • cmdb_read
RPA robot [sn_rpa_fdn.rpa_robot]	Role that is assigned to a service account for the unattended robot to successfully execute automations.	cmdb_read
RPA support user [sn_rpa_fdn.rpa_support_user]	Identifies, diagnoses, and resolves the issues that are related to bot processes. Performs first-level troubleshooting.	• sn_rpa_fdn.rpa_user • cmdb_read
RPA user [sn_rpa_fdn.rpa_user]	Qualifier role that is required for users to access to RPA Hub.	• canvas_user • sn_change_read • fd_read • uxframework_user

Scheduled jobs installed

Scheduled job	Description
Machine Lookup value change	Validates the values in the **Machine Name Lookup** field and **Machine Name** field. If the value is different, the schedule job updates the **Machine Name** (String field) with the value of the **Machine Name Lookup** field. Schedule runs every 3 hours and runs only when the *sn_rpa_fdn.enable_unattended_robot_machine_name_lookup* system property is set to **Yes**. When the schedule job updates the **Machine Name** field, the life cycle stage status of the robot is moved to **In Maintenance**.
RPA: Purge Process Jobs	Schedule runs every day to purge process jobs and associated execution logs that are based on the information from a job's purging days and created date.
RPA: Purge Work Items	Schedule runs every day to purge queue items that are based on a queue's purge after days and the purge status. Purge after days is the number of days after which the work items get purged based on the created date.
RPA: Purge Alert Rule Triggers	Schedule runs every day to purge alert rule trigger records.

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Scheduled job	Description
RPA: Purge Alerts	Schedule runs every day to purge alerts.
Re-evaluate License Distribution	Schedule runs on demand to validate the distribution of license records. For more information, see Re-evaluate license distribution by executing RPA scripts.

Tables installed

Table	Description	Extends
Alerts [sn_rpa_fdn_alert]	Contains the alerts that are generated from the alert rules and the information about the alert message, the associated alert rule name, and the trigger type.	
Alert Rule [sn_rpa_fdn_alert_rule]	Contains the rules that are defined for the alerts to be generated and the information about the type and priority of the alert rule, the alert trigger, and the alert message.	Application file
Application Credentials [sn_rpa_fdn_application_credentials]	Contains the user name and password of business application used by the bot process at the time of execution on a robot.	Credentials
Attended Configuration [sn_rpa_fdn_attended_configuration]	Contains the details like the associated bot process name, table, action label, and conditions to trigger the attended bot process (automation) from the corresponding ServiceNow form.	Application file
Attended User Group [sn_rpa_fdn_rda_user_group]	Contains the details like the associated bot process name, the assigned user for the attended bot process, and the assigned group for the selected assigned user.	
Authorized User [sn_rpa_fdn_authorized_user]	Contains details of mapping between process credential mapping and an authorized user who can access the associated credential group.	

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Table	Description	Extends
Automation Log sn_rpa_fdn_automation_log	Contains the live log and give real-time visibility of the status of the running process jobs.	
Assigned Studio User sn_rpa_fdn_assigned_studio_user	Defines if a robot is available for impersonation in RPA Desktop Design Studio for an assigned user. RPA release manager and RPA admin can create this record and add assigned user.	
Bot Process Configuration [sn_rpa_fdn_bot_process_config]	Contains the bot process settings.	Application file
Bot Process [cmdb_ci_rpa_process]	Contains the configuration details of a process that runs on a robot. Details include the package, package version, assigned robots, process credential mappings, process robot credential sets, assigned business applications, process parameters, and attended users or groups.	Base Bot Process
Credential Group [sn_rpa_fdn_credential_group]	Contains details like the credential group name and the associated robot credentials.	
Credential Group Application Credential [sn_rpa_fdn_m2m_credential_group_application]	Contains details like the credential group and the associated application credentials.	
Code Quality Rule [sn_rpa_fdn_code_quality_rule]	Contains the details of compliance rules for code quality check feature.	
External Credential Vault [sn_rpa_fdn_external_credential_vault]	Contains the details that enable you to register your external credential vault for further usage by the unattended robot.	
Field Parameter Mapping [sn_rpa_fdn_field_parameter_mapping]	Contains the details that enable you to map ServiceNow form fields of the associated attended configuration table to the process field parameters	Application file

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Table	Description	Extends
	used in the attended automations.	
Installed RPA Plugin [sn_rpa_fdn_rpa_plugin]	Contains the details of the plugins that are available on the instance which can be used with RPA Desktop Design Studio, Attended Robot, and Unattended Robot.	
Installed RPA Plugin Version [sn_rpa_fdn_rpa_plugin_version]	Contains the details of the different versions that are available for the installed RPA plugins.	
Maintenance Request [sn_rpa_fdn_maintenance_request]	Contains the details that tracks the status of the scheduled maintenance days on the robot calendar.	
MFA Authenticator [sn_rpa_fdn_mfa_authenticator]	Contains the details of the authenticator and token length that acts as an enabler for the Time-based One-time Password (TOTP) authentication.	
Package [sn_rpa_fdn_package]	Contains a set of resource files that include the robot files required for an automation execution.	Application file
Package Version [sn_rpa_fdn_package_version]	Contains the version details of a package.	Application file
Process Credential Mapping [sn_rpa_fdn_process_credential_mapping]	Contains details of a credential group and associated bot process.	
Process Execution Log [sn_rpa_fdn_execution_log]	Contains the execution type and associated process job details.	
Process Job [sn_rpa_fdn_process_job]	Contains the details of the execution of a process on a robot. Details include the process job name, the state of the process job, the associated bot process name, the assigned robot of the bot process, the execution log status, the start and end time, and the date of the process job.	
Process Field Parameter	Contains the details that enable you to create	Application file

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Table	Description	Extends
[sn_rpa_fdn_process_field_parameter]	dynamic parameters that are required in the attended automations.	
Process Parameter [sn_rpa_fdn_process_parameter]	Contains the details of the variables that are used within a bot process and across bot processes.	Application file
Process Robot Credential [sn_rpa_fdn_process_robot_cred]	Contains the details of a credential group that a robot uses to perform the automation for the given bot process.	
Process Schedule [sn_rpa_fdn_schedule]	Contains the details that enable users to execute jobs in a planned manner at regular intervals. Details include the name and interval type of the schedule and the start and end date of the schedule.	Application file
Process Skill Mapping [sn_rpa_fdn_m2m_process_skill_mapping]	Contains details about mapped package version and overridden version of the skill package for a bot process configuration.	
Robot [cmdb_ci_rpa_robot]	Contains the details of a software agent that runs a bot process that is built in the RPA Desktop Design Studio. Details include the name, type, and department of the robot, the machine name that is used to install the Unattended Robot, and the attended user.	Base Robot
Robot Credentials [sn_rpa_fdn_credentials_set]	Contains the login credentials that the robot uses to log in to a Windows machine and perform the automation.	Credentials
Robots License Distribution [sn_rpa_fdn_license_distribution]	Contains the details of consumption and distribution of licenses in your organization.	
Robots Pool [sn_rpa_fdn_robot_pool]	Contains the details of the number of robots selected for robot pool option.	
Skill Mapping	Contains attended and unattended package	

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Table	Description	Extends
[sn_rpa_fdn_m2m_package_version_skill_mapping]	version and associated skill package version details.	
TOTP Authenticator [sn_rpa_fdn_totp_authenticator]	Contains the details of MFA authenticator and seed which is the secret key of the authenticator that is used to generate the TOTP.	
Work Queue [sn_rpa_fdn_work_queue]	Contains the details of a repository that can hold a number of work items. Details include the name, department, and description of the work queue, and purge-work item details.	Application file
Work Item [sn_rpa_fdn_work_queue_item]	Contains the details about the multiple types of data that are stored, such as the transaction information, the customer details, or the information from a document. Details include the name, status, and priority of the work item, and associated work queue name.	

Domain separation and Robotic Process Automation (RPA) Hub

Domain separation is supported for RPA Hub. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Basic

- Business logic: Ensure that data goes into the proper domain for the application's service provider use cases.
- The application supports domain separation at run time. The domain separation includes separation from the user interface, cache keys, reporting, rollups, and aggregations.
- The owner of the instance must set up the application to function across multiple tenants.

Sample use case: When a service provider (SP) uses chat to respond to a tenant-customer's message, the customer must be able to see the SP's response.

For more information on support levels, see Application support for domain separation.

Domain separation overview

The goal of RPA Hub is to enable end-to-end automation for your organization. Domain separation is enabled in all the features.

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You should have either a flat hierarchy or a single-tier hierarchy and at least one primary or top-level domain.

Related topics

Domain separation for service providers

Limitations of ServiceNow Otto for RPA Hub

The limitations of the RPA bot generation skill are as follows.

AI Search and LLM timeout

The RPA bot generation skill relies on AI Search and large language models (LLM) to understand the user instructions and flow creation. The timeout limits and rate-limiting behavior of these APIs collectively apply to the RPA bot generation skill. For more information about AI search system properties, see AI Search system properties. For more information about API rate limits, see Inbound REST API rate limiting. For more information about configuring rate limiting for providers, see Configure rate limiting for providers.

Component scope in Yokohama release

The initial version supports few components. Components outside this scope don't appear in the generated automation workflow. For example, if you provide an instruction, such as `Capture a screen shot and save it in the location at 'C:\Users\Screens'`, the generated automation workflow might not contain the Capture component because it isn't included in the initial version components list. For more information about the list of supported components, see Supported components and connectors for Now Assist for RPA Hub in Yokohama release.

Plugin version compatibility

The feature uses Yokohama version plugins. If the large language model (LLM) returns a method that doesn't exist in the loaded plugin version, then such methods are displayed as unknown components in the generated automation workflow. For example, if you're using Washington DC version plugins within an existing automation project and provide an instruction to set or get values from an application, then the SetValue, GetValue, or Click methods of the Universal App connector are displayed as unknown components in the generated automation workflow.

In the following example, to get the weather information, data reader components are required. Since they are not available in the current scope, they appear as UNKNOWN components in the automation preview.

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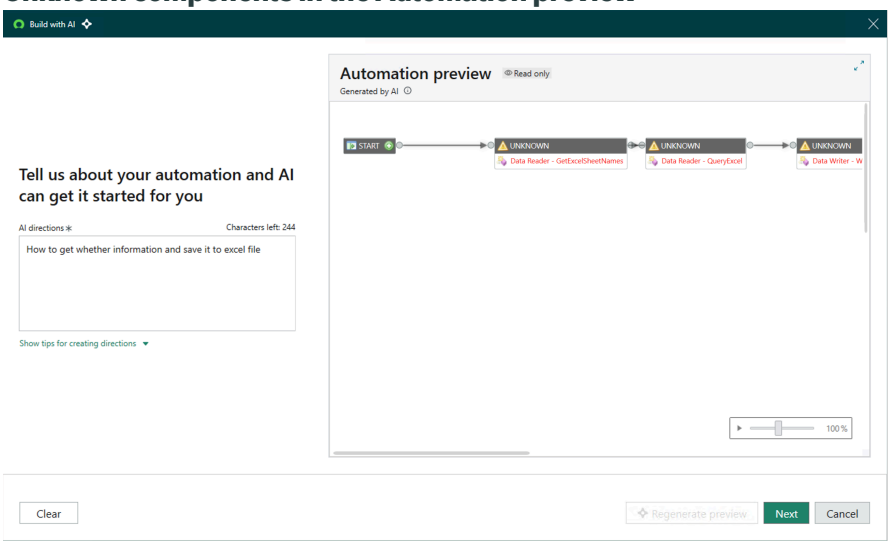
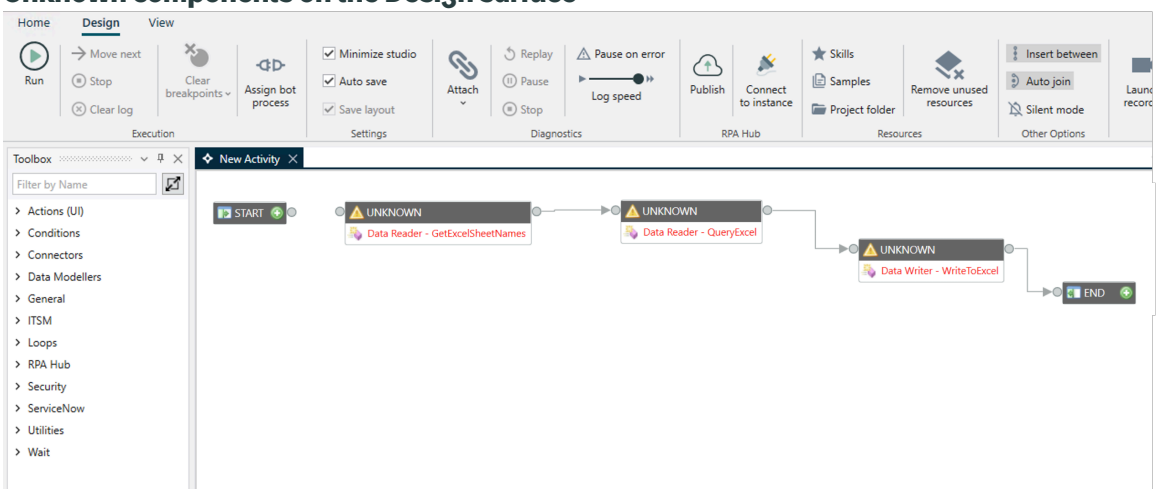
Unknown components in the Automation preview



If you select **Next** in the previous screen, the automation appears as follows on the Design surface.

Unknown components on the Design surface



Usage of existing connectors in new activity using AI or build automation context menu options

During the automation workflow creation, if a method, such as the AddNewWorksheet method of Microsoft Excel connector is created, RPA Desktop Design Studio checks for an existing global object of the same connector type and uses the most recent one. In the following example, the Badging Data Microsoft Excel connector is used.

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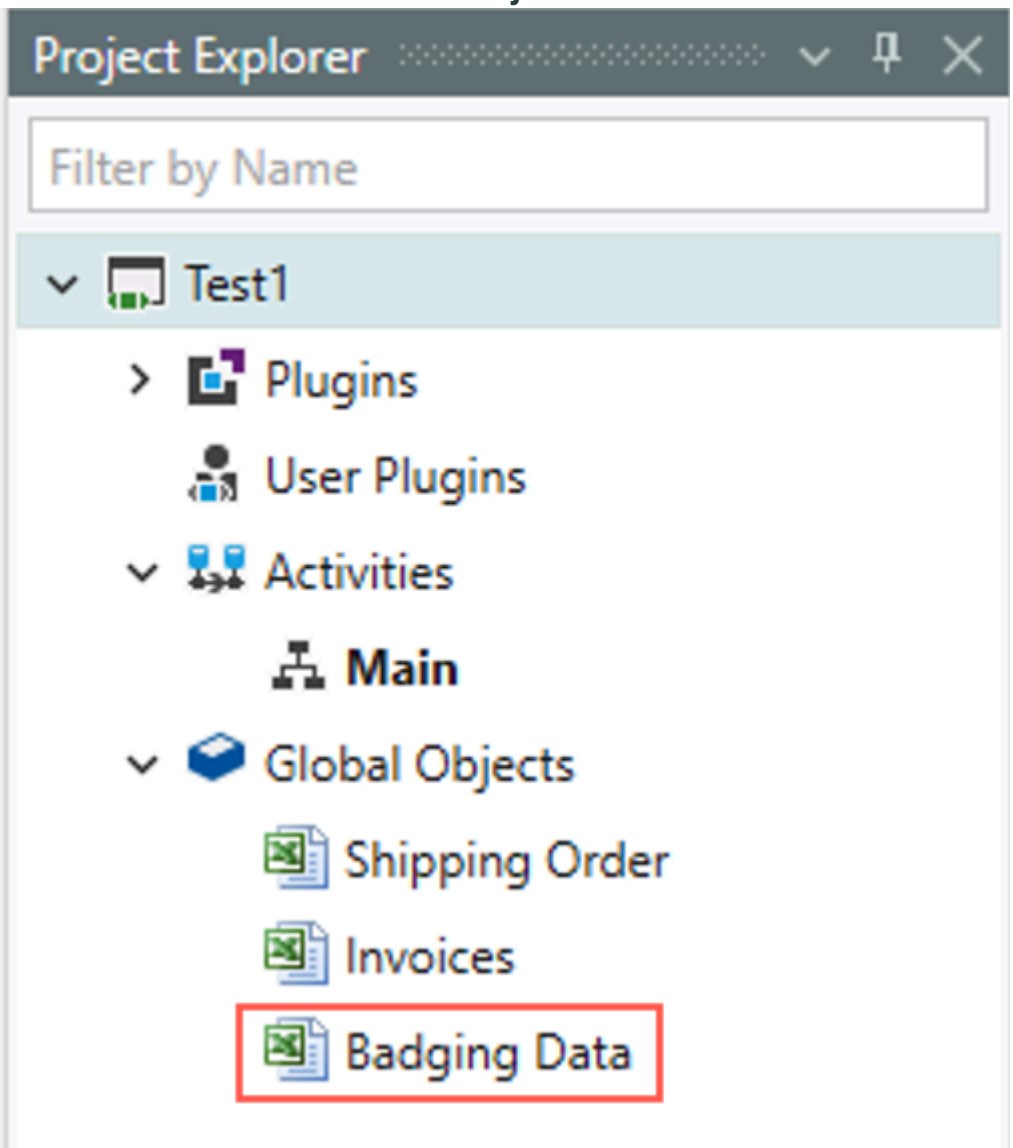
Microsoft Excel connectors in Global Objects



Dynamic configuration

Dynamic configuration for supported components isn't available in the Yokohama release. You can configure components manually. For example, you must give inputs in the configuration window for the Microsoft Excel connector's SetCellValues method. Select the settings icon ( ) to view the configuration window.

Data in the parameter values might not be populated in the large language model (LLM) generated components.

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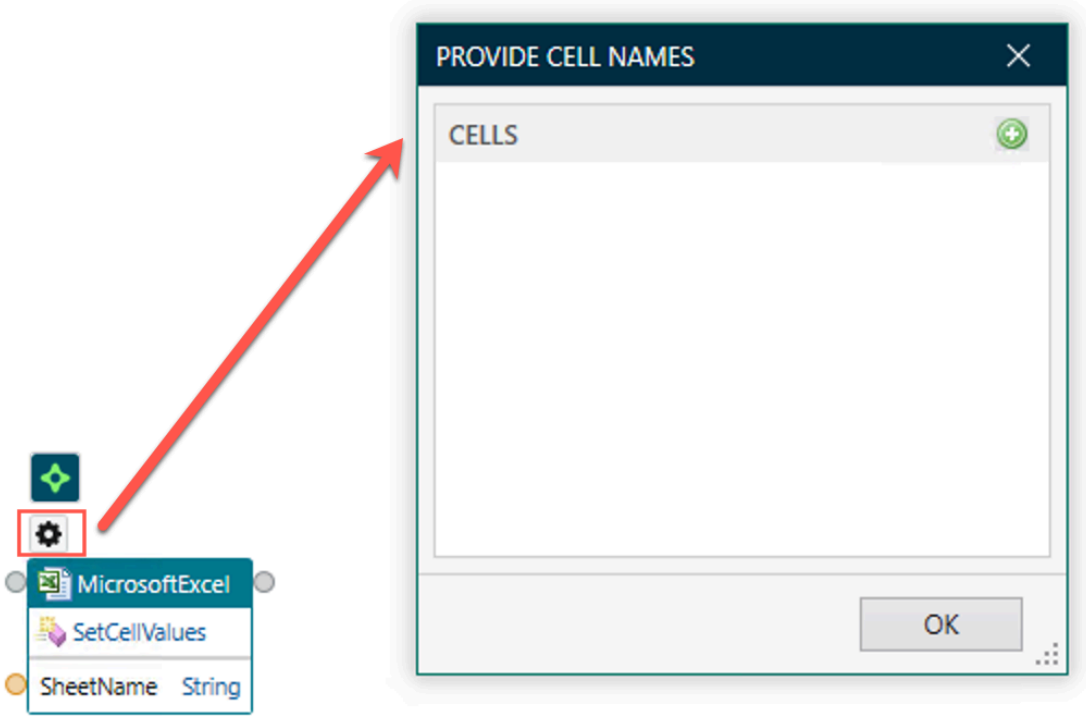
Configuration window for SetCellValues method



Automation for Windows, Java, or browser applications

For automating Windows, Java, or browser-based applications, RPA Desktop Design Studio suggests generic UI actions such as SetValue, GetValue, or Click. These actions are a part of the Universal app connector. You must configure these actions manually, including capturing screens and adding elements via the field window. For more information about these methods, see Universal app connector.

Expression-based components

For components that require expressions, such as Decision or Expression, and so on, expressions in these components aren't automatically populated in the Brazil release.

Hallucinated components

If the large language model (LLM) returns a method that doesn't exist in the RPA Desktop Design Studio, then such methods are displayed as unknown components in the generated automation workflow.

Example instructions for ServiceNow Otto for RPA Hub

Example instructions you can use with Now Assist for RPA Hub to get relevant, accurate responses. Refer to these examples when crafting instructions to guide automation tasks.

The following examples show how you can create automations, activities, and automation logic additions.

Example instruction 1: Retrieve and process meeting emails

You can use this instruction to create an automation for retrieving and processing meeting emails in Microsoft Outlook.

```
Retrieve a list of meeting-related emails from the
'Calendar' folder in Outlook. For each email, store
```

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```
all attachments in a separate folder named 'Meeting
Attachments'. Lastly, mark the email as read.
```

Example instruction 2: Split and convert PDF pages to excel

You can use this instruction to create an automation for splitting and converting PDF pages to Microsoft Excel.

```
Split each page of a PDF into a separate PDF files into
the folder path 'C:\Users\Input', then retrieve all files
from this folder, now iterate over each file then convert
each PDF document into an Excel.
```

Example instruction 3: Add property to JSON object

You can use this instruction to create an automation for adding a property to a JSON object.

```
I have a sample JSON object represented as a string as
follows: { "name": "Jane Doe", "id": 12345" } I want to
add a new property called "Designation" and set its value
to "Engineer".
```

Example instruction 4: Find and replace text in a Word document

You can use this instruction to create an automation for finding and replacing text in a Microsoft Word document.

```
Open a word document, find and replace the value #NAME
with 'ServiceNow' in the word document. Save the word
document at 'C:\Users\Desktop\test.docx'.
```

Example instruction 5: Modify and export data as CSV

You can use this instruction to create an automation for modifying and exporting data as a CSV file.

```
Load a DataTable from the list, set the name of the
first column to 'Name', and update the row data. Finally,
export the table as a CSV file.
```

Example instruction 6: Generate and send excel data as PDF

You can use this instruction to create an automation for generating and sending the Microsoft Excel data as a PDF in an email via Microsoft Outlook.

```
Open Excel from 'C:\Reports\Sales
\Monthly_Sales_Data.xlsx'. Generate a chart based on
sales data in sheet named Saleschart and then save
this excel sheet as a PDF document at 'C:\Reports\Sales
\Reports\Monthly_Sales_Data.pdf'. Now send an email to
team@xyz.com using Outlook.
```

Example instruction 7: Extract and summarize work emails with attachments

You can use this instruction to create an automation for extracting and summarizing work emails with attachments.

```
Extract a list of work related emails from outlook
with attachments from the 'Projects' folder. Save
all the attachments to a designated folder on your
system. Generate a summary email listing all the saved
attachments and their respective emails. Send this email
to the project manager.
```

Example instruction 8: Split and read PDF pages

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You can use this instruction to create an automation for splitting and reading PDF pages.

```
Load a PDF file from the 'C:\input\test.pdf', split the PDF file, save them to 'C:\output folder', generate one PDF for each page, and then read the text from the first page.
```

Example instruction 9: Fetch and save unread emails

You can use this instruction to create an automation for fetching and saving unread emails.

```
Fetch all the unread mails from the 'AI-inbox' folder of the email account. Iterate through each email and save the mail to the folder 'C:\Mails'.
```

Example instruction 10: Retrieve and set application credentials

You can use this instruction to create an automation for retrieving and setting application credentials.

```
From the ServiceNow instance, get the application credentials for the app named 'SAP' application. Now, set the value into the Username field and password field. Then, click on the login element.
```

General guidelines

Follow these general guidelines when writing AI instructions:

Be clear and specific

State exactly what you want. Use direct and clear sentences for the expected actions.

Avoid vague language

Don't use jargon or abbreviations. Avoid ServiceNow jargon, such as FD - Flow Designer. For example, avoid instructions such as `Trigger a FD action named 'Action1', retrieve its output, and insert it into an existing Word`. Instead, use the phrase `Trigger a flow designer action named 'Action1', retrieve its output, and insert it into an existing Word file located at 'C:\Users\Worddocs\wordoc1.doc'`.

Avoid ambiguity

Be specific for the context related to methods. For example, avoid instructions such as `Open file from file path 'C:\Users\Analysis\DataAnalysis.xlsx'`. Instead, use the phrase `Open an excel file from file path 'C:\Users\Analysis\DataAnalysis.xlsx'`.

Set expectations and constraints

Specify component parameters wherever possible. For example, avoid instructions such as `Read the content of the file located in C drive and copy that content as the body of an email and then send it to 'email@ss.ss'`. Instead, use the phrase `Read the content of the file 'c:/d/f1/txt', and use the content as body to compose an outlook email with subject "my email text", and send this email to 'email@ss.ss'`.

Use step-by-step instructions

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Break down complex tasks into smaller, manageable steps. For example, use the phrase, `Open a Microsoft Word document located at 'C:\Marketing\Templates\Promo_Letter_Template.docx.', delete a specific page based on its index, add a new column to a table at a particular position, and close the document with changes saved` to make it clear and simple.

Robotic Process Automation (RPA) Hub glossary

Learn about the terms and concepts that are unique to Robotic Process Automation (RPA) Hub.

A

Glossary terms are grouped alphabetically.

activities

Reusable set of instructions that are designed for an automation on the Design surface of RPA Desktop Design Studio.

alert

Custom notifications that are sent to a user or a group. These notifications are generated for robots, schedules, process jobs, and other RPA Hub related tables.

AMB channel

The Asynchronous Message Bus (AMB) channel is utilized to notify unattended robots, when a change is made to bot processes in RPA Hub. Consequently, all the robots subscribed to the designated channel receive a notification. For example, when Start Process is initiated from RPA Hub, a message is sent to the selected robot via an AMB channel, then the robot receives the message to start the automation process.

Attachment Framework

A set of REST APIs that enable uploading or downloading attachments to or from a ServiceNow instance. This helps in publishing and downloading automation packages that are built in RPA Desktop Design Studio to the ServiceNow instance (RPA Hub) that run on attended or unattended robots.

Attended Robot

Software agent that is installed on a Windows machine and executes attended automations.

automation

Robotic Process Automation (RPA) is a software technology that makes it easy to build, deploy, and manage robots that emulate human actions interacting with digital systems and software.

B

Glossary terms are grouped alphabetically.

bot process

A predefined sequence of actions that a robot follows to accomplish a specific task or achieve a particular goal in RPA Hub. You can assign and schedule a package that will be executed by the software agent. You can add other details that pertain to the bot process, such as business applications, credential groups, process robot credentials, process parameters, attended users, or groups.

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bot process configuration

A record that contains the bot process settings. The bot process configuration record is mapped to a bot process record in RPA Hub. It is a one to one mapping.

breakpoint

Option in RPA Desktop Design Studio that you set to stop or pause the automation execution for debugging purposes.

C

Glossary terms are grouped alphabetically.

component

Reusable blocks that are used for designing automations and to abstract functionality in RPA Desktop Design Studio.

connector

Connector that connects to various data sources and tools to create automation in RPA Desktop Design Studio.

D

Glossary terms are grouped alphabetically.

Desktop In Desktop

Option in Attended Robot where you can work simultaneously while the robot runs an automation in the background. You can create multiple sessions on your machine.

E

Glossary terms are grouped alphabetically.

execution logs

Logs that are captured when an automation is executed by either an attended or an unattended robot. These logs help in understanding the errors and the end-to-end logging of automation execution. For more information, see Bot Process form in RPA Hub.

G

Glossary terms are grouped alphabetically.

GraphQL services

A web query language optimized for client-side development to request the exact data they need. It provides a flexible and efficient way to interact with an API. Graph QL services refer to the APIs that utilize the GraphQL query language to retrieve and manipulate data for bot processes. RPA Desktop Design Studio, Unattended Robot, and Attended Robot applications use GraphQL services from RPA Hub.

H

Glossary terms are grouped alphabetically.

HashCode

Unique, auto-generated alphanumeric value of a published package version.

Heartbeat

Every 30 seconds, the ServiceNow unattended robot that runs on a robot machine posts a collection of heartbeat messages.

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High density robot

High density robots leverage the Remote Desktop Services to execute multiple automations simultaneously in separate user sessions on the same Windows Server machine.

P

Glossary terms are grouped alphabetically.

package

A package refers to a set of workflows, scripts, configurations, and dependencies that are designed to automate specific tasks or processes. These packages can be published or imported onto the RPA platforms to quickly deploy automation solutions.

Packages are used to encapsulate functionalities, libraries, or applications, making it simpler for developers or RPA administrators to deploy software components.

package version

Package version that is a number that identifies the set of components uploaded in a package.

After a package is created, the RPA developer publishes an automation from RPA Desktop Design Studio. This process results in a new package version.

port

Part of the component, categorized into Data ports and Control ports in RPA Desktop Design Studio.

process job

Execution of a bot process by a robot in RPA Hub.

process parameter

Variable that is used within a bot process in RPA Hub.

Q

Glossary terms are grouped alphabetically.

queue

Repository that can hold a number of work items in RPA Hub. Work items can store multiple types of data, such as transaction information, customer details, or information from a document.

Queues are used in automations to distribute transactional data or the workload among different robots.

R

Glossary terms are grouped alphabetically.

robot

A software agent that runs a bot process (automation). Robots are designed to interact with software applications, data sources, and user interfaces like a human operator would, but in a more efficient, accurate, and consistent manner.

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robot file

The automation file that is created when you use RPA Desktop Design Studio for designing an automation workflow. This robot file contains the automation logic for the robot to execute.

RPA bot generation skill

Now Assist for RPA Hub skill that uses generative AI for creating automations, activities, and extending automation logic.

RPA Desktop Design Studio

Windows native application that is used by RPA developers to design or configure automation workflows.

RPA plugin

Software component that adds a specific feature for an interaction with third-party applications such as Microsoft Office 365, Google Chrome, Windows, and so on.

RPA plugins app (RPA plugin bundle)

The Robotic Process Automation (RPA) Plugin Bundle is the application responsible for building automations. The RPA Plugin Bundle contains metadata of Windows library files that are consumed by RPA Desktop Design Studio, Unattended Robot, and Attended Robot applications. These plugins extend the capability of the RPA product. For instance, RPA Chrome Plugin enables RPA application to automate tasks on the Google Chrome browser. Similarly, the RPA Excel plugin enables the RPA applications to interact with Excel files and many more. Along with Integration Hub, RPA Plugins Bundle is part of Workflow Data Fabric for a complete integration and automation solution for ServiceNow.

S

Glossary terms are grouped alphabetically.

schedule

A schedule that is associated to an unattended bot process to enable users to execute jobs in a planned manner at regular intervals. More than one schedule can be associated with one bot process.

shared parameter

A global variable or configurable item that is stored in one place. These variables are used across bot processes.

skill

A pre-built automation and plug-and-play integration for your complex business processes.

U

Glossary terms are grouped alphabetically.

Unattended Robot

A software agent that is installed on a Windows machine and executes unattended automations.

W

Glossary terms are grouped alphabetically.

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work item

Store multiple types of data, such as transaction information, customer details, or information from a document.

Unattended Robot

Use the ServiceNow® Unattended Robot application to execute unattended automations. Unattended Robot, which is a software agent that you install on a Windows machine, doesn't require human intervention to execute automations.

Get started

Configure  Install and set up Unattended Robot.	**Use**  Run an Unattended Robot.
Reference  Get details about the requirements for Unattended Robot installation.	

Helpful resources

- Troubleshooting issues for the Robotic Process Automation (RPA) Hub application
- Ask or answer questions in the community forum
- Developer documentation
- Contact Customer Service and Support
- Robotic Process Automation (RPA) Hub glossary
- RPA General Guidelines

Exploring Unattended Robot

Learn about the Unattended Robot features that enable you to run unattended automations.

Unattended Robot overview

The ServiceNow® Unattended Robot is a software agent that you install on a Windows machine. Unattended Robot can execute unattended automations without requiring any human intervention.

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The ServiceNow® Unattended Robot Login Agent is a software agent that you install on a Windows machine with Unattended Robot. You can use this application to unlock or to perform a self-login to the robot machine when an unattended bot process is triggered.

Unattended Robot benefits

- Executes defined automation in a bot process independently without human intervention.
- Gets triggered either by a schedule, API, or manually.

What to explore next

To learn more about configuring and using Unattended Robot, see:

- Configuring Unattended Robot
- Using Unattended Robot

High density robots in Unattended Robot

Execute multiple automations simultaneously and independently on a single Windows Server machine using high density robots.

Familiarize yourself with high density robots concepts in RPA Hub. For more information, see High density robots in RPA Hub.

How a high density robot works

- The robot can start one automation for each Windows user session at any given time. You can run the same automation on all robots simultaneously. You can also run different automations on all robots at the same time.
- In a scenario, where, a user A is connected to a server via Remote Desktop Protocol (RDP) where a high density robot is connected. If an execution is triggered for the same user A, the manually connected session is disconnected and transferred to the robot. However, the user can reconnect to view the execution after the robot starts its automation.
- When changing the robot type from High Density Robot to standard or vice-versa, you must reconnect the unattended robot to ensure seamless execution of automations. For more information about creating an unattended robot, see Create an unattended robot in RPA Hub.

List of steps for configuring high density robots

Perform the following tasks to configure high density robots:

1. Set up the environment for high density robots on a Windows Server machine by installing a Remote Desktop Session Host. Then, add users who can establish RDP connection to the Windows Server machine. For more information, see Set up Windows Server machine for high density robots.
2. Restart the Windows Server machine after the installation is complete.
3. Enable the high density robot option in RPA Hub. For more information, see Create an unattended robot in RPA Hub.
4. Install Unattended Robot.
5. Add user profiles in the Unattended Robot application, so that multiple robots can execute jobs concurrently. For more information, see Set up Unattended Robot.

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Troubleshooting

- RDP logon errors are recorded in the service logs. Although some logs may lack detailed explanations, utilize the code to search for relevant information in Disconnect reason code and Extended disconnect reason code.
- The underlying application process names used in automations may vary between the server environment and the development environment. To avoid discrepancies, ensure they are correctly specified in the automations based on the target machine.

Limitations

- The Unattended Robot user interface is accessible by only one user at a time.
- The latest version of the Unattended Robot must be installed after upgrading the RPA Hub to the newest version.
- High density robots are not a part of robot pool.

Configuring Unattended Robot

You can plan and configure an Unattended Robot and Unattended Robot Login Agent implementation in your organization.

Configuration overview

Perform the following tasks to download the installation package of Unattended Robot and Unattended Robot Login Agent and configure the Unattended Robot after installation.

1. Download Unattended Robot from RPA Hub.

   Select and download the Unattended Robot application in your Windows machine from RPA Hub as a prerequisite for installing the application.

2. Install Unattended Robot

   You can install the Unattended Robot application in your Windows machine if you have the admin role.

3. Install Unattended Robot Login Agent

   You can install the Unattended Robot Login Agent application in your Windows machine if you have the admin role.

4. Set up Unattended Robot

   Set up the Unattended Robot application to establish a connection between a robot and the ServiceNow® RPA Hub instance.

5. Set up Windows Server machine for high density robots

   Set up the environment for high density robots on a Windows Server machine by installing a Remote Desktop Session Host.

Using Guided Setup to implement Unattended Robot and Unattended Robot Login Agent

Guided Setup provides a sequence of tasks that help you configure Unattended Robot and Unattended Robot Login Agent. With Guided Setup, keep track of what you have completed, so

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you can stop and start again where you left off. To open Guided Setup for RPA Hub, navigate to **All** > **Robotic Process Automation** > **Administration** > **Guided Setup**.

For more information about using the guided setup interface, see Using guided setup.

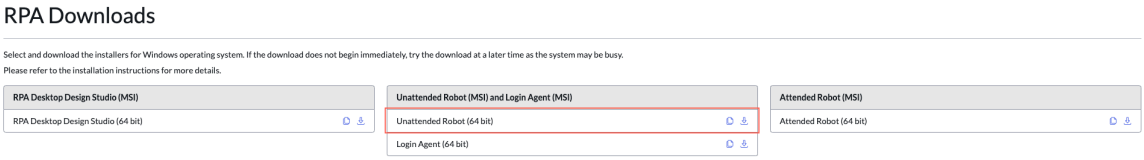
Install Unattended Robot

You can install the Unattended Robot application in your Windows machine if you have the admin role.

Before you begin

Download and unzip the installation file for the Unattended Robot application. For more information, see Download the RPA applications from RPA Hub.

Download Unattended Robot application



Ensure that you follow the hardware and software requirements. For more information, see Requirements for Unattended Robot.

Ensure that you meet the following set up requirements:

- An unattended robot is mapped to only one machine. This is applicable for standard robot.
- The Windows machine or the Virtual Machine (VM) is persistent and constantly on to run unattended robots.
- If connected via Citrix, the Windows machine or the VM must not go to sleep mode.
- The idle timeout setting is turned off for the VDI pool.
- Communication with the ServiceNow instance host is enabled.
- Verify that the *glide.cometd.websocket.enabled* system property is set to true in the ServiceNow instance, to ensure that the robot is connected to the instance via websocket.
- Verify that the websockets are also enabled on the client machine where the unattended robot runs.

Role required: admin

Procedure

1. Locate and open the `Unattended Robot.msi` file.
2. In the Welcome to the Unattended Robot Setup Wizard dialog box, select **Next**.
3. In the Select Installation Folder dialog box, do one of the following actions to choose a folder:
   - To install the application in the default folder, select **Next**.
   - To install the application in a different folder, select the folder location in the **Folder** field or select **Browse** to select the folder, and then select **Next**.
4. In the Confirm Installation dialog box, select **Next** to start the installation.
5. After the installation is complete, in the Installation Complete dialog box, select **Close** to exit.

Result

You can see the Unattended Robot icon on your desktop.

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The installation of the Unattended Robot application is configured to function on a per-machine basis, with the default directory as `%ProgramFiles%\ServiceNow\Unattended Robot`.

What to do next

Set up the Unattended Robot application. For more information, see Set up Unattended Robot.

Install Unattended Robot Login Agent

You can install the Unattended Robot Login Agent application in your Windows machine if you have the admin role.

Before you begin

Ensure that you meet the following set up requirements:

- An unattended robot is mapped to only one machine.
- The Windows machine or the Virtual Machine (VM) is persistent and constantly on to run unattended robots.
- If connected via Citrix, the Windows machine or the VM must not go to sleep mode.
- Login agent clears the legal notice message if the *sn_rpa_fdn.bypass_legal_notice* system property is selected.

  For more information about this property, see Configure RPA Hub properties.

  If you don't want the unattended robot to clear the legal notice, turn off the legal notice by turning off through the Active Directory Organizational (AD OU) policy. This ensures that the Unattended Robot Login Agent can log in seamlessly.
- Unattended Robot Login Agent can handle only login-related screens, such as #the Ctrl+Alt +Del screen and the User Name and Password screen.
- The idle timeout setting is turned off for the VDI pool.
- Communication with the ServiceNow instance host is enabled.

Download and unzip the installation file for the Unattended Robot application. For more information, see Download the RPA applications from RPA Hub.

Role required: admin

About this task

The Unattended Robot Login Agent is a software agent that you install on a Windows machine with Unattended Robot.

This login agent application is used to unlock or self-log in to the robot machine when an unattended bot process is triggered.

Unattended Robot Login Agent does not support Multi-Factor Authentication (MFA) login.

Procedure

1. Locate and open the `Unattended Robot Login Agent.msi` file.
2. In the Welcome to the Unattended Robot Login Agent Setup Wizard dialog box, select **Next**.
3. After the installation is complete, in the Installation Complete dialog box, select **Close** to exit.

Result

You can see the following image on your Windows lock screen after installation.

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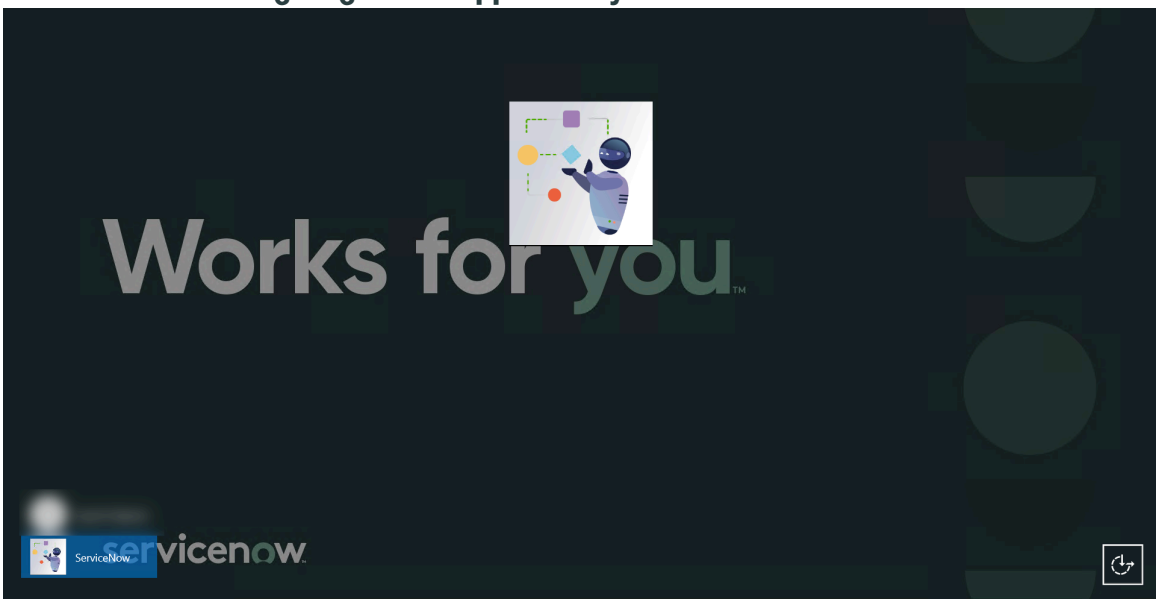
Unattended Robot Login Agent that appears on your Windows lock screen



What to do next

Set up the Unattended Robot application. For more information, see Set up Unattended Robot.

Set up Unattended Robot

Set up the Unattended Robot application to establish a connection between a robot and the ServiceNow RPA Hub instance.

Before you begin

Install the Unattended Robot. For more information, see Install Unattended Robot.

Install the Unattended Robot Login Agent. For more information, see Install Unattended Robot Login Agent.

If you are selecting **mTLS** as the type of the authentication in the following task, install a user certificate, if you have the admin role. For more information, see Install the user-generated certificates.

For high density robots, ensure that the following requirements are met:

- Set up the environment for high density robots on a Windows Server machine. For more information, see Set up Windows Server machine for high density robots.
- Familiarize yourself with high density robots concepts. For more information, see High density robots in Unattended Robot and High density robots in RPA Hub.

Role required: sn_rpa_fdn.rpa_robot (for connection); sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin (for setup)

About this task

Do this task when you're setting up the Unattended Robot application for the first time, unless you're changing the RPA Hub instance.

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Procedure

1. From your desktop, to open the Unattended Robot, do either of the following tasks:
   - Double-click the Unattended Robot icon ().
   - In the notification area (system tray) in the taskbar, select and hold (or right-click) the Unattended Robot icon () and select **Settings**.

   The Unattended Robot dialog is displayed.
2. In the ServiceNow Unattended Robot dialog box, under the RPA Hub section, fill in the fields.

Unattended Robot dialog box

Field	Action
Instance URL	Enter the ServiceNow RPA Hub instance URL. For example, `https://<instance name>.service-now.com/`.
Authentication	Select the type of authentication that you want to use: ○ **mTLS**: Mutual Transport Layer Security. As a prerequisite, install the user certificate. ○ **Basic**: Authentication happens based on the user name and password. If the robot is connected using the **Basic** authentication type, a warning icon is displayed in the taskbar.
High density robots	Select this option to add multiple high density robots user profiles. High density robots leverage the Remote Desktop Services to execute multiple automations simultaneously in separate user sessions on the same Windows server machine. For more information on high density robots, see High density robots in RPA Hub and High density robots in Unattended Robot. You must set up Windows server for high density robots. For more information, see Set up Windows Server machine for high density robots.
Add profile	Select **Add profile** to connect the robots by adding the users associated to them. After a profile is added successfully, it fetches the associated robot for that user. Depending on your selection for the **Authentication** field, the respective fields appear.

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Field	Action
	When a new robot is created for a user who is already connected to the Unattended Robot, a connection is automatically established within a few minutes. However, if the user is not already connected, you must disconnect the Unattended Robot, add the new user, and then try connecting. This field appears only when the **High density robots** option is selected.
Certificate	Perform the following actions to select a certificate: **a.** Select the three-dot menu (...) next to the **Certificate** field. **b.** Select the installed client authentication certificate. **Note:** You can only select a certificate that has the intended purpose as client authentication. If you select a certificate with any other intended purpose, an error is displayed. **c.** Select **OK**. This field appears only when **mTLS** is selected from the **Authentication** field.
Username	Enter your user name. This user must have a robot role for establishing connection. This field appears only when **Basic** is selected from the **Authentication** field.
Password	Enter the password. This field appears only when **Basic** is selected from the **Authentication** field.

3. **Optional:** To add the settings for an internet connection as per your company policies, do the following steps:

   a. In the ServiceNow Unattended Robot dialog box, under the Proxy Settings section, fill in the fields.

Unattended Robot dialog box

Field	Action
Server Address	Enter the proxy server URL.

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Field	Action
Name	Enter your user name.
Password	Enter the password.

b. Select **Save**.

4. Select **Connect**.

What to do next

Run an unattended robot to execute the unattended bot process. For more information, see Run an automation using Unattended Robot.

Related topics

Install the user-generated certificates

Set up Windows Server machine for high density robots

Set up the environment for high density robots on a Windows Server machine by installing a Remote Desktop Session Host. Then, add robot user names who can connect to the machine. It enables them to establish Remote Desktop Protocol (RDP) connection to the Windows Server machine.

Before you begin

Familiarize yourself with high density robots concepts. For more information, see High density robots in Unattended Robot and High density robots in RPA Hub.

The Remote Desktop Session Host service requires a valid license.

Ensure that you follow the hardware and software requirements. For more information, see Requirements for Unattended Robot.

Role required: admin

Procedure

1. Perform the following steps in your Windows Server machine to install the Remote Desktop Session Host.

a. Open Server Manager.

b. In the Dashboard panel, select **Manage** and then select **Add Roles and Features**.

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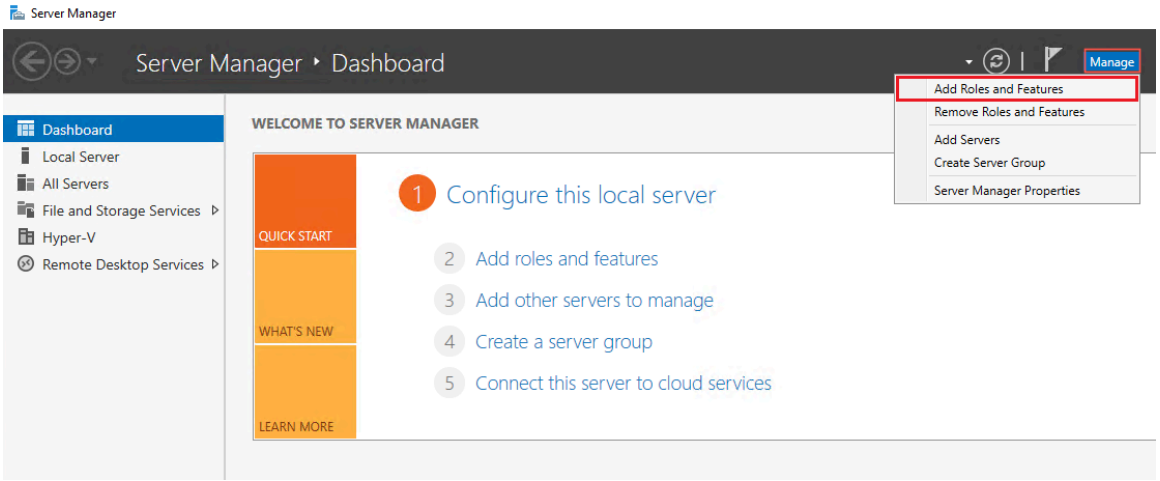
Server Manager Dashboard panel

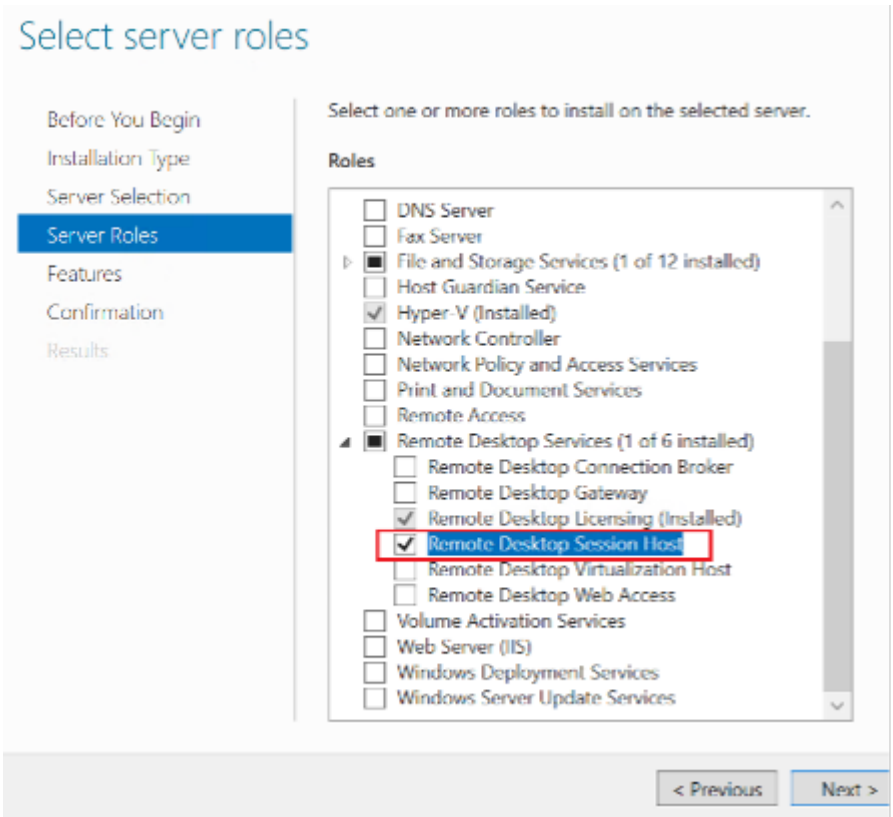


The **Add Roles and Features Wizard** opens.

c. Follow the steps in the wizard until you reach the **Select server roles** window.

d. In the Roles section, from the Remote Desktop Services list, select the **Remote Desktop Session Host** option.

Select server roles



e. In the Add Roles and Features Wizard dialog box, select **Add Features**.

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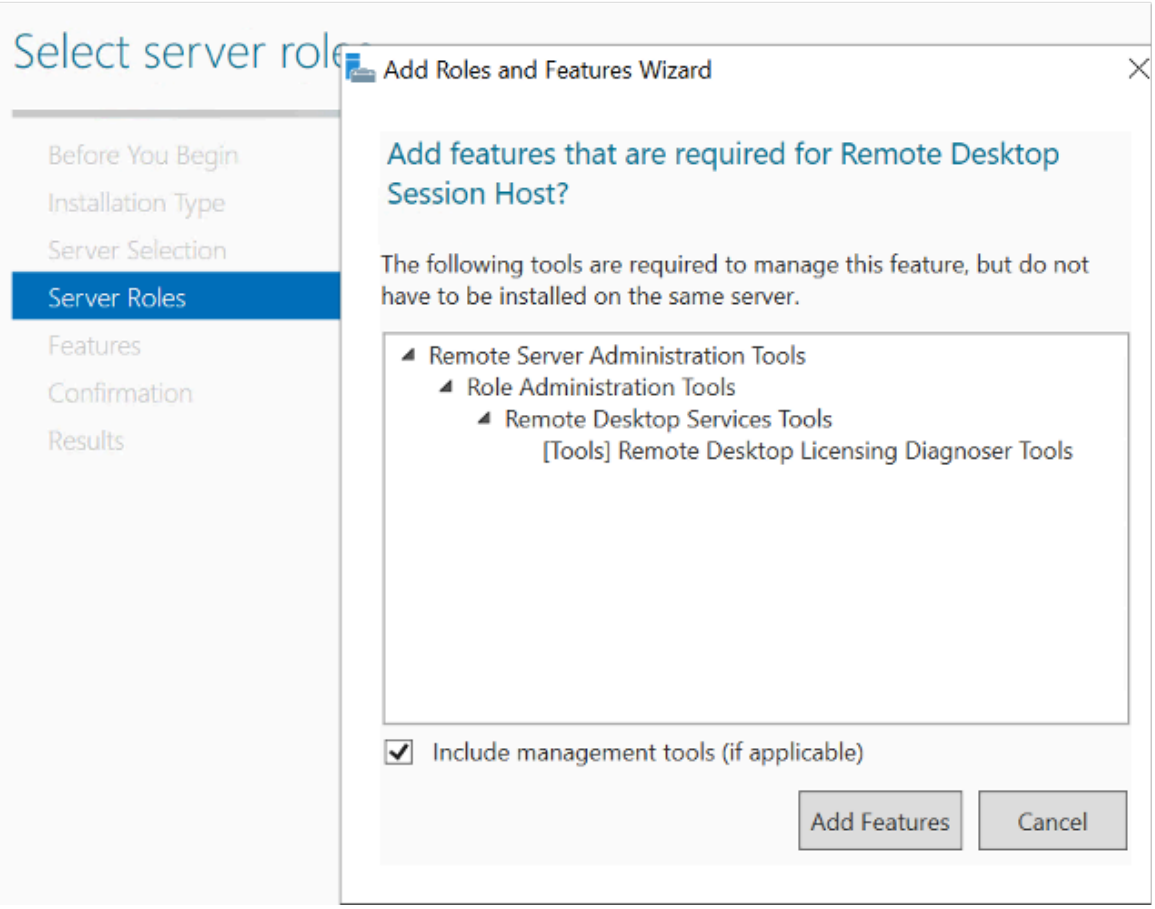
Add Roles and Features Wizard dialog box



It returns to the wizard.

f. Follow the steps in the wizard until you reach the **Confirm installation selections** window.

g. Select **Install**.

2. Configure the following settings to add users and edit policies:

a. Navigate to the **Local Group Policy Editor** and then, navigate to **Computer Configuration** > **Administrative Templates** > **Windows Components** > **Remote Desktop Services** > **Remote Desktop Session Host** > **Security**.

b. Disable the **Always prompt for password upon connection** policy.

c. Enable the **Require user authentication for remote connections by using Network Level Authentication** policy for enhanced security and always authenticate prior establishing session to RDP.

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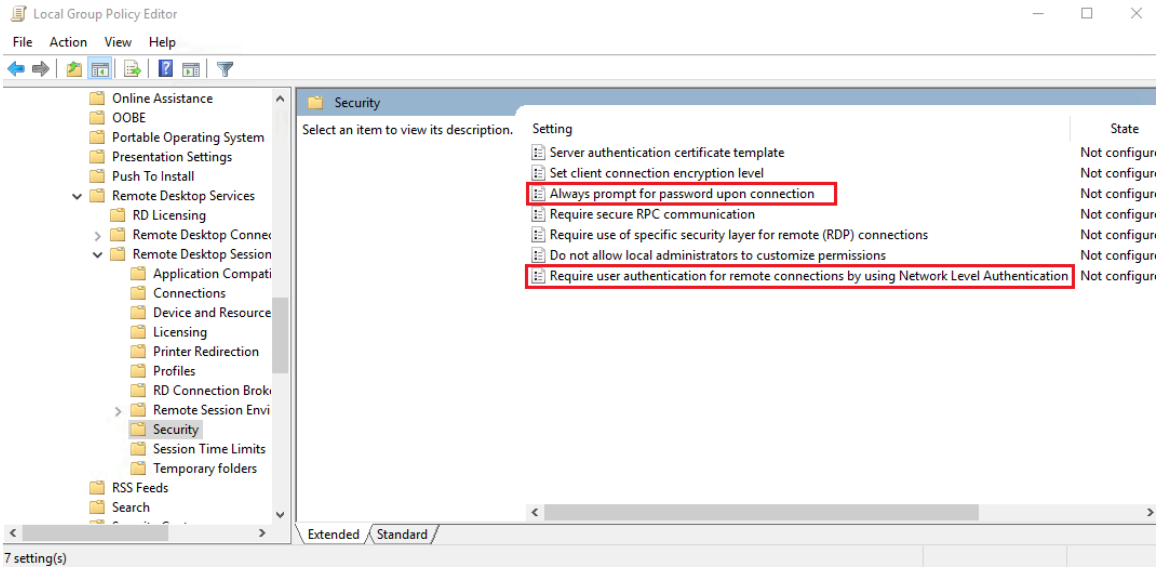
Configure policies in the Local Group Policy Editor



d. Ensure that the Windows user mapped to the robots in the Process Robot Credentials tab of the bot process must be in the **Remote Desktop Users** group.

What to do next

Restart the Windows Server machine after the installation is complete.

Enable the high density robot option in RPA Hub. For more information, see Create an unattended robot in RPA Hub.

Install Unattended Robot.

Add user profiles in the Unattended Robot application, so that multiple robots can execute jobs concurrently. For more information, see Set up Unattended Robot

Using Unattended Robot

You can use the Unattended Robot application to execute unattended automations that are triggered either by a schedule, API, or manually.

Triggered By field on the Process Job form determines if a bot process is triggered via Schedule, Manual or API. For more information, see Process job form in RPA Hub.

Run an automation using Unattended Robot

Run an unattended robot to execute the unattended automations that are triggered either by a schedule, API, or manually.

Before you begin

Create a package. For more information, see Create a package to assign to a bot process.

Create a robot. For more information, see Robots in RPA Hub.

Create a bot process. Select the **Process Type** field as **Unattended** on the Bot process form, while you're creating a bot process. For more information, see Configuring a bot process record in RPA Hub and Bot Process form in RPA Hub.

Ensure that the following conditions are met to execute a robot:

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- The life cycle stage status of the associated bot process must be **Published**.
- The life cycle stage status of the executing robot must be **In-Use**.

(Optional) To run your bot process on regular intervals, create a schedule within a bot process. For more information, see Create a schedule within a bot process in RPA Hub.

Create a credential group and assign it to a bot process. For more information, see Create a credential group in RPA Hub and Associate a credential group to a bot process in RPA Hub.

Assign a robot to a bot process. For more information, see Assign a robot to a bot process in RPA Hub.

Assign a process robot credential within a bot process. For more information, see Assign a process robot credential within a bot process in RPA Hub.

Ensure that the licenses are available. For more information, see Robot license distribution in RPA Hub.

Establish a connection between a robot and ServiceNow RPA Hub instance. For more information, see Set up Unattended Robot.

(Optional) Create a process parameter within a bot process. For more information, see Create a process parameter within a bot process in RPA Hub.

Role required: sn_rpa_fdn.rpa_robot and snc_internal

Note: If the Attended Robot tries to connect to an Federal Information Processing Standards (FIPS)-enabled instance, the robot user must have the `snc_internal` role.

About this task

You can also start an unattended bot process manually from the RPA Hub. For more information, see Start an unattended bot process in RPA Hub.

In this task, you can run an unattended robot in two ways.

Procedure

To run an unattended robot, do any one of the following actions.

Option	Action
Based on the schedule you define in the bot process	**a.** Connect with a robot to execute the bot process. For more in formation, see Set up Unattended Robot. **b.** Review the schedule within a bot process. For more informa tion, see Create a schedule within a bot process in RPA Hub. The Unattended Robot runs the execution based on the schedule defined. For more information about the scheduled and manual triggers, see Execution priority of bot processes in RPA Hub.
Based on the API via Start Process subflow	Review the Start Process subflow in Workflow Studio. For more information, see Workflow Studio actions and subflow in RPA Hub.

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Option	Action
	The Unattended Robot runs the execution based on the subflow that triggers the Start Process in Workflow Studio.

Important: A process job record gets created as soon as the unattended robot starts initiating the bot process in the robot machine. The **Message** field is updated during the different stages of the process that provides insight and visibility regarding the status of your bot process. For more information on the different fields of a process job record, see Process job form in RPA Hub.

Related topics

Open Service and Runtime logs

Unattended Robot reference

Reference topics provide additional information about the requirements for Unattended Robot installation.

Requirements for Unattended Robot

Ensure that you meet the following hardware and software requirements before you install the Unattended Robot application.

Hardware requirements

Hardware requirements for standard robots

Resource	Minimum	Recommended
CPU	2 cores of Intel 1.8 GHz 64-bit processor	4 cores of Intel 2.4 GHz 64-bit processor
RAM	4-GB RAM	8-GB RAM
Disk space	Minimum 50-GB free disk space after installing the OS, patches, and base software	Minimum 100-GB free disk space after installing the OS, patches, and base software

Hardware requirements for high density robots

For a high density robot, where multiple robots execute jobs concurrently on the same Windows Server machine, you must multiply the minimum and recommended hardware requirements by the number of runtimes.

For example, with three users concurrently executing jobs, the minimum requirements are:

- 6 cores of Intel 1.8GHz 64-bit (6 cores of 1.8GHz 64-bit per runtime)
- 12 GB of RAM (4 cores per runtime)

Software requirements

Software requirements for standard robots

For a standard robot, the software requirements are:

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- Operating system: Microsoft Windows 10 or Windows 11, Windows Server 2016, Windows Server 2019, Windows Server 2022
- NET framework: Windows 4.7.1 or greater.
- DPI scaling setting must be deactivated.

Software requirements for high density robots

For a high density robot, the software requirements are:

- Operating system: Windows Server 2022
- NET framework: Windows 4.7.1 or greater.
- DPI scaling setting must be deactivated.

Attended Robot

Use the ServiceNow® Attended Robot application to execute attended automations. Attended Robot, which is a software agent that you install on a Windows machine, requires human intervention to execute automations.

Get started

Configure	Use
	
Install and set up Attended Robot.	Run an automation using Attended Robot.

Helpful resources

- Troubleshooting issues for the Robotic Process Automation (RPA) Hub application
- Ask or answer questions in the community forum
- Developer documentation
- Contact Customer Service and Support
- Robotic Process Automation (RPA) Hub glossary
- RPA General Guidelines

Exploring Attended Robot

Learn about the Attended Robot features that enable you to run attended automations.

Attended Robot overview

The ServiceNow® Attended Robot is a software agent that you install on a Windows machine. Attended Robot can execute attended automations that require human intervention.

Attended automations are typically triggered manually.

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Attended Robot benefits

- User can start the automation by clicking a button that triggers a bot process on the same Window's machine.
- Executes tasks in real time with a human in the loop for complex or subjective decisions as required.

What to explore next

To learn more about configuring and using Attended Robot, see:

- Configuring Attended Robot
- Using Attended Robot

Attended Robot authentication journey and automation execution in Embedded Task Automation

Learn about the authentication process in the Attended Robot application and the automation execution, when the automation is triggered from ServiceNow® forms.

Embedded Task Automation feature

With the embedded task automation feature, you can trigger attended bot processes (attended automations) from the ServiceNow forms, apart from initiating them from the Attended Robot application. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Attended Robot authentication journey in Embedded Task Automation

After you install the Attended Robot application in a Windows machine, it registers a URL schema 'snrdaforms' with Attended Robot, starting from the Washington DC release. This URL schema is used whenever a redirect occurs from OAuth. For more information about OAuth, see OAuth Inbound and Outbound authentication.

RPA assisted user selects the form action and this action redirects the user to the OAuth authentication.

After successful authentication, it generates the Callback URL that includes the information required for the bot process to launch. For example, for a bot process that is associated with an attended configuration, this information is passed to the Callback URL.

The Callback URL initiates the Attended Robot. The Attended Robot receives all the information sent by the Callback URL. In the Connection Manager, a profile (instance details like host name, instance URL) is created locally, if it doesn't exist. It’s required for synchronizing the plugins and it establishes the user context for further authentication purposes.

There are three scenarios for the user context.

- If the Attended Robot application is already launched with embedded task automation and the same user, for example, User A, is used to retrigger the automation. Then, the next automation runs without restarting the Attended Robot application. The Attended Robot application doesn’t close.
- If the Attended Robot application is already launched with embedded task automation by User A. Then, the different user, User B, and same instance are used to retrigger the automation.

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Then, it continues to use the Attended Robot application, logs out User A and reconnects with the User B, without closing and relaunching the Attended Robot application.

- If the Attended Robot application is already launched with embedded task automation from Instance1 and user tries to launch embedded task automation from Instance2. Then, the Attended Robot application is relaunched.

If a default profile saved in the Connection Manager window of Attended Robot application, the robot still uses the URL profile from where the automation is triggered.

If a new version exists to the existing automation, to reflect those changes the Attended Robot application must be closed. Until then, it continues to use the existing version, as the Attended Robot application is already launched.

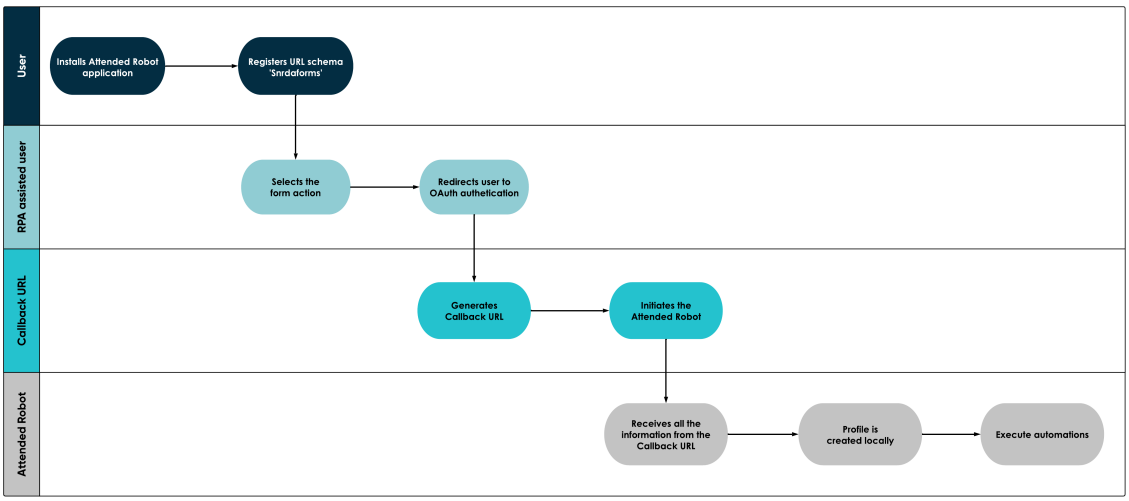
If a new version of RPA Hub is installed on the instance, to reflect those changes the Attended Robot application must be closed. Until then, it continues to use the existing set of plugins, as the Attended Robot application has already launched.

Attended Robot is then ready to launch automations and doesn't prompt with the Connection Manager of Attended Robot when automation invoked from the ServiceNow® form.

If the RPA assisted user directly launches Attended Robot, the Connection Manager is displayed to verify instance and login details.

In the Connection Manager, when the user tries to connect to an instance for the first time, then an alert is displayed, that the user hasn't used that instance before.

Attended Robot authentication journey



Automation execution in a local session and a bot session

After the authentication, the process configuration is retrieved from RPA Hub.

If the **Enable Desktop In Desktop** check box isn't selected on the bot process form, the automation execution starts in a local session. After the execution is complete, the Attended Robot application remains active on the machine and waits for the upcoming automation triggers. For more information, see the **Launch an attended automation from ServiceNow forms** section in the following sections. For more information about the **Enable Desktop In Desktop** and **End Desktop In Desktop On Complete** check boxes, see Bot Process form in RPA Hub.

If the **Enable Desktop in Desktop** check box is selected on the bot process form, the automation execution starts in a bot session. After the execution is complete, depending on the **End Desktop In Desktop On Complete** setting, either of the following occurs:

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- If the **End Desktop In Desktop On Complete** check box is selected, the Attended Robot application closes the bot session, and the Attended Robot application remains with all the UI buttons disabled.

  The Attended Robot application won't be closed after the execution is complete or when user selects the **Stop** button, or any error occurs during automation initiation.

  After the execution is completed, the robot moves from **Busy** to **Available** state.

- If the **End Desktop In Desktop On Complete** check box isn’t selected, the user must close the session. Until the user closes the session, the Attended Robot application runs and the associated robot state shows as **Busy**. After the user closes the bot session, the Attended Robot application remains open.

  If the Attended Robot login user session expires, the Attended Robot instance is closed along with the bot session.

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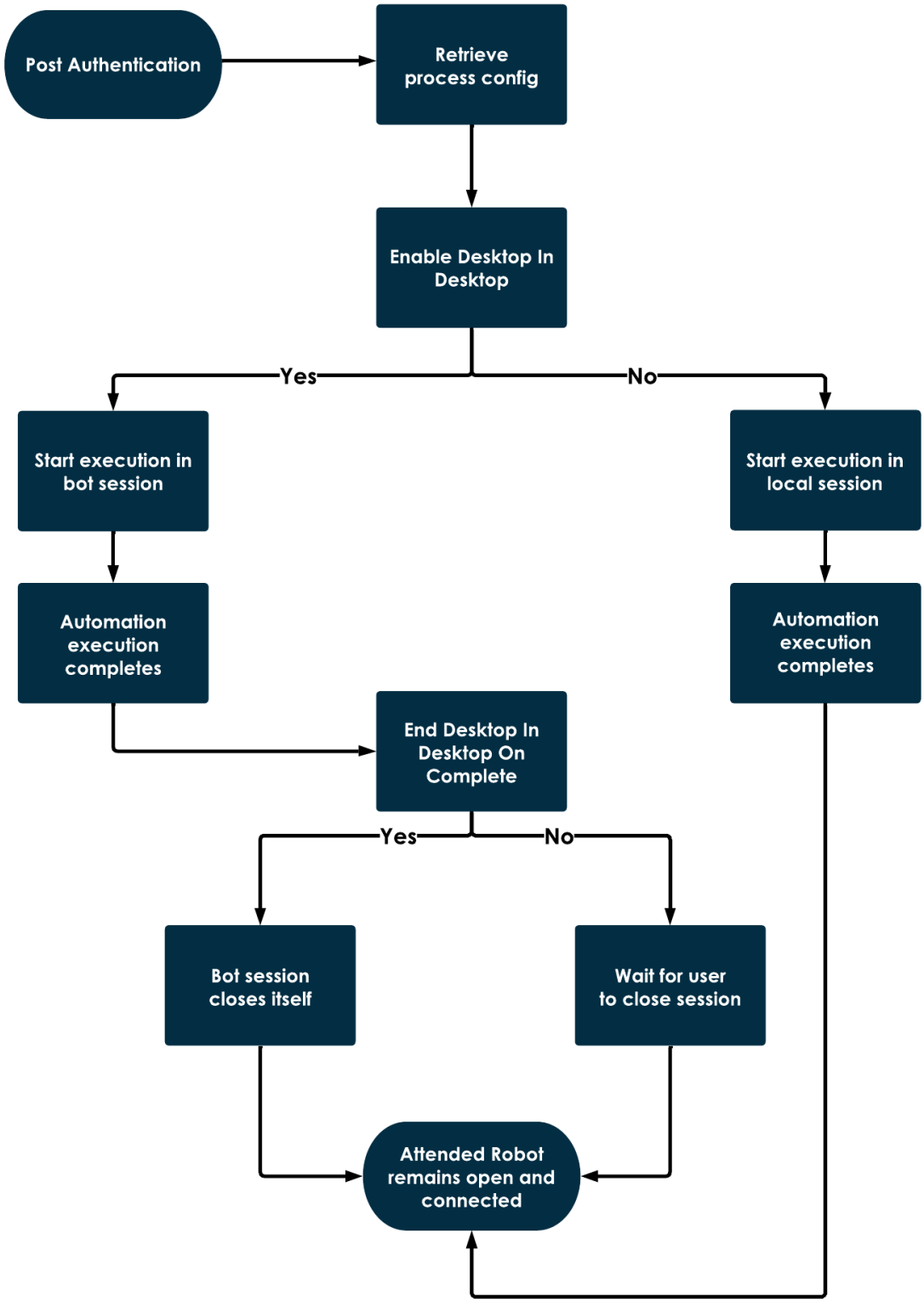
Automation execution in a local session and a bot session



Launch an attended automation from ServiceNow forms

Attended Robot executes attended automation when triggered from ServiceNow forms. For more information, see Runtime Phase of the Embedded Task Automation (ETA). For more information about invoking an attended automation across other types of forms, see Invoke Embedded Task Automation via API in RPA Hub.

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If your organization is configured with proxy settings, the prerequisite for this task is to configure the proxy. In the Proxy Settings section of the Connection Manager, configure the proxy, when you launch Attended Robot from ServiceNow forms, for the first time. For more information about connection manager, see Connect to an RPA Hub instance from Attended Robot. For more information about setting a proxy, see Set up Attended Robot.

On successful authentication, the following scenarios occur:

1. Moves the associated robot state to **Available**, if it is not in Available state already.
2. Creates a **Running** state process job record.

   In the process job record, the **Triggered By** field is updated by **Embedded Task Automation** value.
3. Moves the associated robot state to **Busy**, starts synchronizing, and downloads the package, if not available locally.
4. Initiates the automation in a local session or bot session, based on the option selected in the **Enable Desktop in Desktop** check box.
5. After the automation execution is complete, the robot status is then updated as **Available**.
6. After the automation execution is initiated, if the user selects the **Stop** button on the Attended Robot, it terminates the automation, and the robot state is set to **Available**. The process job record is marked as **Canceled** state.
7. After the automation execution is initiated, if the user selects the **Close** button on the Attended Robot, after performing few pre-validations, it halts the bot process, logs out the user session, and closes the Attended Robot. For more information about stop and close actions, see Run an automation using Attended Robot.

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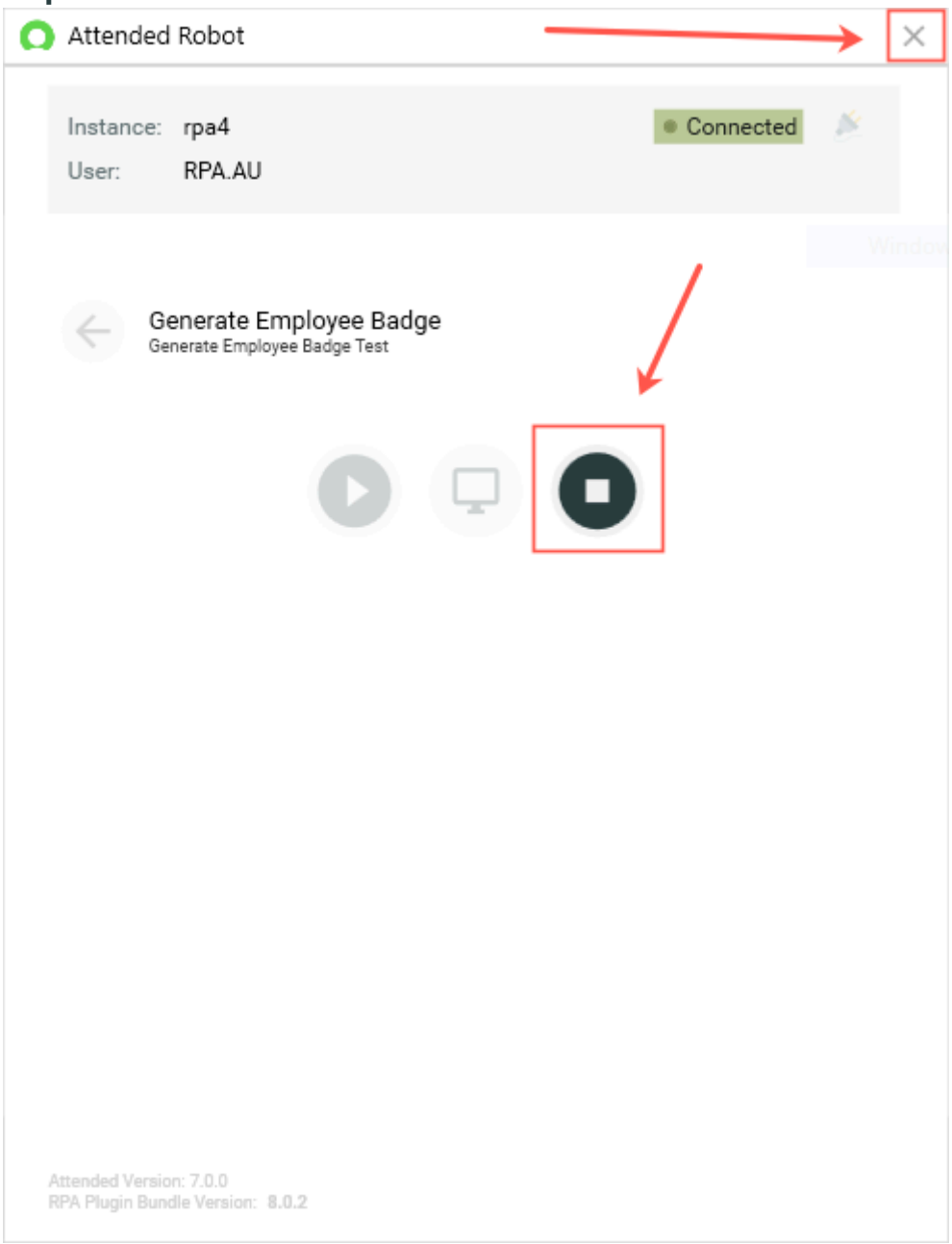
Stop and Close actions in the Attended Robot



8. After the automation is executed, the process job record is marked as success or failure after the automation flow ends.

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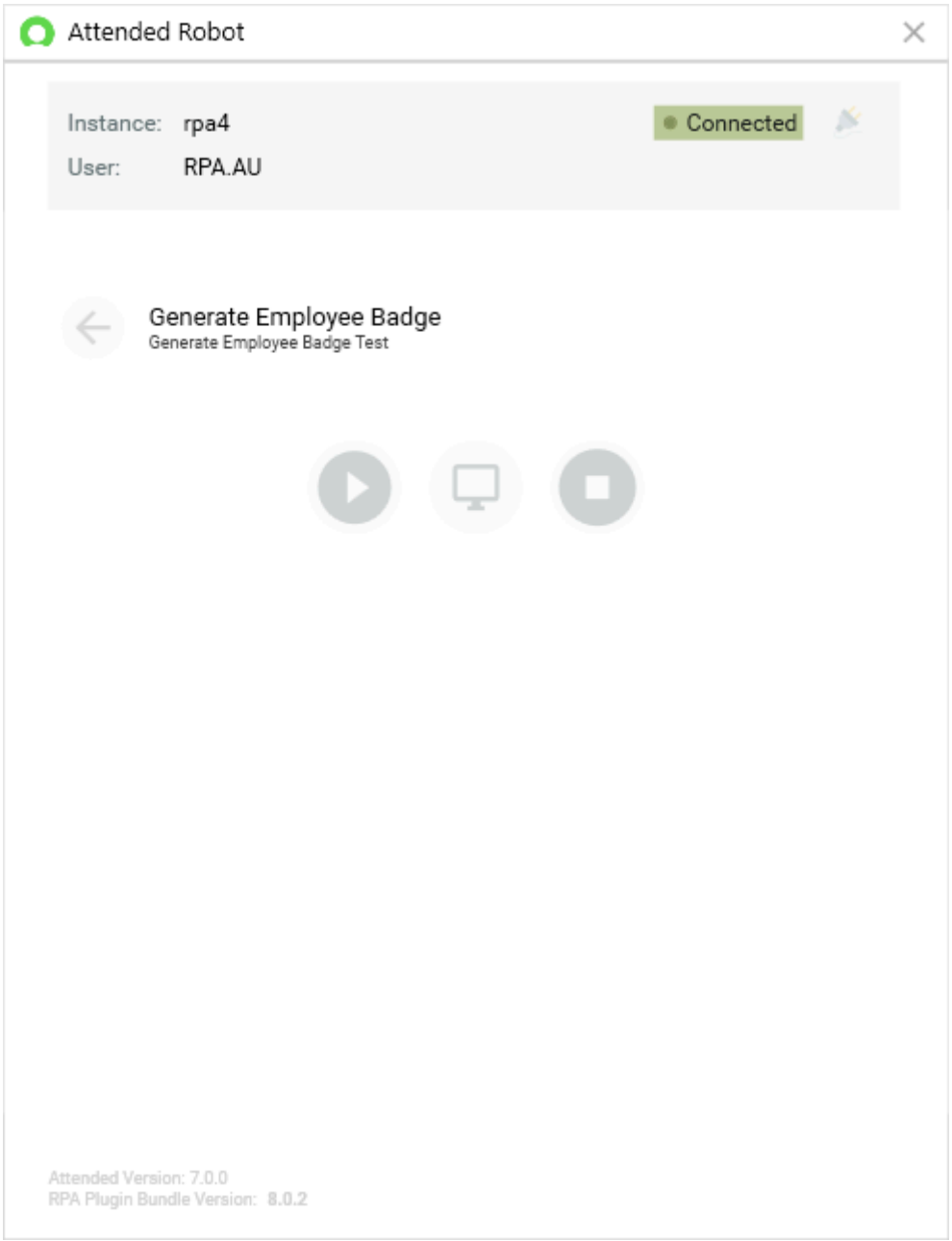
Post automation execution screen in Attended Robot



9. Shuts down the Attended Robot, if the session is timed out.

If the authentication fails, an error is displayed: `Unable to execute the automation as authentication has failed. Contact your system administrator.`

Use the **Terminate** component in attended automations to complete the automation execution. For more information about the component, Use the Terminate component.

To view detailed product logs, refer to the product logs.

Restrictions to launch an attended automation from ServiceNow forms

In the following scenarios, the execution of attended automations via ServiceNow forms are restricted when you select the UI action from the ServiceNow form:

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- When an automation is executing
- When an active child session (Desktop In Desktop) exists.
- If the automation is triggered by the same user and same bot process, local cache is used. If a change is made, close the Attended Robot application and relaunch it, so that the new change is reflected.

Configuring Attended Robot

You can plan and configure an Attended Robot implementation in your organization.

Configuration overview

Perform the following tasks to download the installation package and configure the Attended Robot after installation.

1. Download Attended Robot from RPA Hub.

   Select and download the Attended Robot application in your Windows machine from RPA Hub as a prerequisite for installing the application.

2. Install Attended Robot

   You can install the Attended Robot application in your Windows machine if you have the admin role.

3. Set up Attended Robot

   Establish a connection between the Attended Robot and the ServiceNow RPA Hub instance.

4. Connect to an RPA Hub instance from Attended Robot

   Establish a connection between the Attended Robot and ServiceNow RPA Hub instance to connect to an RPA Hub instance in three ways by using Connection Manager.

Using Guided Setup to implement Attended Robot

Guided Setup provides a sequence of tasks that help you configure Attended Robot. With Guided Setup, keep track of what you have completed, so you can stop and start again where you left off. To open Guided Setup for RPA Hub, navigate to **All** > **Robotic Process Automation** > **Administration** > **Guided Setup**.

For more information about using the guided setup interface, see Using guided setup.

Install Attended Robot

You can install the Attended Robot application in your Windows machine if you have the admin role.

Before you begin

Download and unzip the installation file for the Attended Robot application. For more information, see Download the RPA applications from RPA Hub.

Ensure that you meet the hardware and software requirements.

The following hardware specifications list the minimum and recommended resources.

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Hardware requirements

Resource	Minimum	Recommended
CPU	Intel Processor (1vCPU)	Intel Processor (4vCPU)
RAM	4-GB RAM	8-GB RAM
Disk space	Minimum 20-GB free disk space after installing the OS, patches, and base software	Minimum 50-GB free disk space after installing the OS, patches, and base software

Software requirements

The software requirements are:

- Operating system: Microsoft Windows 10 or Windows 11 or Windows Server 2016 or Windows Server 2019
- NET framework: Windows 4.7.1 or greater.
- DPI scaling setting must be deactivated.

Microsoft Edge WebView2 Runtime is a prerequisite for the ServiceNow login screen to work with RPA users. The Microsoft Edge WebView2 Runtime is installed by default with only specific releases of Windows 10 OS. If it is not available, ensure to install the Microsoft Edge WebView2 Runtime.

For more information about the Microsoft Edge WebView2 Runtime, see Delivering Microsoft Edge WebView2 Runtime to managed Windows 10 devices. For more information about downloading the Microsoft Edge WebView2 Runtime MSI, see Microsoft Edge WebView2.

Role required: admin

About this task

An attended robot is mapped to only one user.

Procedure

1. Locate and open the `Attended Robot.msi` file.
2. In the Welcome to the Attended Robot Setup Wizard dialog box, select **Next**.
3. In the Select Installation Folder dialog box, do one of the following actions to choose a folder:
   - To install the application in the default folder, select **Next**.
   - To install the application in a different folder, select the folder location in the **Folder** field or select **Browse** to select the folder, and then select **Next**.
4. In the Confirm Installation dialog box, select **Next** to start the installation.
5. After the installation is complete, in the Installation Complete dialog box, select **Close** to exit.

Result

You can see the Attended Robot icon on your desktop.

What to do next

Set up the Attended Robot application. For more information, see Set up Attended Robot.

Set up Attended Robot

Establish a connection between the Attended Robot and the ServiceNow RPA Hub instance.

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Watch this video to learn about the configuration of Attended Robot.

https://player.vimeo.com/video/1031638416?h=fef777a493&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

Install the Attended Robot. For more information, see Install Attended Robot.

Role required: none

About this task

Do this task when you're setting up the Attended Robot for the first time unless you're changing the RPA Hub instance.

If the Attended Robot is launched when the RPA Desktop Design Studio is open in your Windows machine and a new profile is added to the Attended Robot Connection Manager, it does not reflect in the RPA Desktop Design Studio Connection Manager. If a new profile is added to the RPA Desktop Design Studio Connection Manager, the entry that you added in the Attended Robot Connection Manager is overwritten. In such scenarios, restart RPA Desktop Design Studio when a profile is added in the Attended Robot Connection Manager.

Procedure

1. From your desktop, double-click the Attended Robot icon ().
2. In the Connection Manager dialog box, to add a new RPA Hub, select **Add New**.
   Do this step when you're setting up the Attended Robot for the first time unless you're changing the RPA Hub instance.
3. In the Add ServiceNow Instance Details dialog box, fill in the fields.

ServiceNow Instance Details dialog box

Field	Action
Name	Name of your ServiceNow RPA Hub instance. For example, `New Instance`
URL	ServiceNow RPA Hub instance URL. For example, `https://<instance name>.service-now.com/`.
Mark as default	Option to enable this instance as the default instance. Clearing this option opens the Connection Manager dialog box each time you double-click the Attended Robot icon.
Launch in default browser	Option to launch the login screen in the default browser. The Attended Robot is successfully connected to the instance after you have authenticated using the username and password.

4. Select **Save**.

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5. **Optional:** To add the settings for an internet connection as per your company policies, do the following steps:

   a. In the Connection Manager dialog box, in the Proxy Settings section, fill in the fields.

   Connection Manager dialog box

Field	Action
Server Address	Enter the proxy server URL.
Name	Enter your user name.
Password	Enter the password.
Save Password	Option to save the password.

   b. Select **Save**.

6. In the Connection Manager dialog box, in the RPA Hub section, select an RPA Hub instance.
7. In the ServiceNow dialog box, do any of the following actions:
   - To set up the Attended Robot for the first time, select **Proceed**.
   - To change the RPA Hub instance, select **Connect**.
8. Enter your user name and password.
   If you have selected the **Launch in default browser** option, the login screen appears in the default browser.
9. **Optional:** From the Domain list, select a domain.
10. Select **Log in**.
11. In the Connection Manager dialog box, set the permission for the Attended Robot application to connect to your ServiceNow instance and access data.
    - To allow Attended Robot to connect to your ServiceNow instance and access data, select **Allow**.
    - To prevent Attended Robot from connecting to your ServiceNow instance and accessing data, select **Deny**. You won't be able to proceed further.

What to do next

Run an Attended Robot to execute the attended bot process. For more information, see Run an automation using Attended Robot.

Connect to an RPA Hub instance from Attended Robot

Connect to an RPA Hub instance in three ways by using the Connection Manager so that you can establish a connection between the Attended Robot and ServiceNow RPA Hub instance.

Before you begin

Establish a connection between the Attended Robot and ServiceNow RPA Hub instance. For more information, see Set up Attended Robot.

Role required: none

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Procedure

1. To connect to an RPA Hub instance, do any of the following actions in the Connection Manager dialog box.

Option	Action
If there is a single instance	**a.** In the RPA Hub section, select the RPA Hub instance. **b.** Select **Connect**.
If there are multiple in stances and none of them are marked as default	**a.** In the RPA Hub section, select an RPA Hub instance. **b.** Select **Proceed**. **c.** In the RPA Hub section, select the RPA Hub instance. **d.** Select **Connect**. **e.** Enter a user name and password. **f.** From the Domain list, select a domain. **g.** Select **Log in**.
If an instance is marked as default	**a.** Enter a user name and password. **b.** From the Domain list, select a domain. **c.** Select **Log in**.

2. In the Connection Manager dialog box, set the permission for the Attended Robot application to connect to your ServiceNow instance and access data.
   - To allow Attended Robot to connect to your ServiceNow instance and access data, select **Allow**.
   - To prevent Attended Robot from connecting to your ServiceNow instance and accessing data, select **Deny**. You won't be able to proceed further.

Disconnect from an RPA Hub instance in Attended Robot

Disconnect anytime from an RPA Hub instance while using the Attended Robot.

Before you begin

Connect to an RPA Hub instance. For more information, see Connect to an RPA Hub instance from Attended Robot.

Role required: none

Procedure

In the Attended Robot dialog box, select **Disconnect**.

Using Attended Robot

You can use the Attended Robot to execute the attended automations.

Run an automation using Attended Robot

Run an attended robot to execute the attended bot process (attended automations).

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Before you begin

Create a package. For more information, see Create a package to assign to a bot process.

Ensure that the licenses are available. For more information, see Robot license distribution in RPA Hub.

If the auto assignment system property *sn_rpa_fdn.allow_rda_robot_auto_assignment* is false, the attended robot record must be available for the assigned RPA Assisted User. If the auto assignment system property is true, attended robots license must be available to auto create attended robot record at the time of automation execution. For more information about this system property, see Configure RPA Hub properties.

Create a bot process. Select the **Process Type** field as **Attended** on the Bot process form, while you are creating a bot process. For more information, see Configuring a bot process record in RPA Hub and Bot Process form in RPA Hub.

Ensure that the following conditions are met to execute a robot:

- The life cycle stage status of the associated bot process must be **Published**.
- The life cycle stage status of the executing robot must be **In-Use**.

Assign an attended user or a group to an attended bot process. For more information, see Assign an attended user or group to an attended bot process.

Establish a connection between the Attended Robot and ServiceNow RPA Hub instance. For more information, see Set up Attended Robot.

Ensure that you meet the infrastructure requirements for running the Desktop In Desktop:

The minimum requirements are as follows:

- Intel Processor (1vCPU)
- 8-GB RAM
- Minimum 20-GB free disk space (after installing OS, patches, and base software).
- Microsoft Windows 10 or Windows Server 2016 or Windows Server 2019
- .NET Framework 4.7.1 or higher
- DPI scaling setting must be deactivated.

The recommended requirements are as follows:

- Intel Processor (4vCPU)
- 16-GB RAM
- Minimum 50-GB free disk space (after installing OS, patches, and base software).
- Microsoft Windows 10 or Windows Server 2016 or Windows Server 2019
- .NET Framework 4.7.1 or higher
- DPI scaling setting must be deactivated.

Role required: sn_rpa_fdn.rpa_assisted_user and snc_internal

Note: If the Attended Robot tries to connect to an Federal Information Processing Standards (FIPS)-enabled instance, the robot user must have the `snc_internal` role.

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About this task

You can run an automation using an attended robot in two ways. Do these tasks after you establish a connection between the Attended Robot and ServiceNow RPA Hub instance. For more information, see Set up Attended Robot.

Procedure

1. In the Attended Robot dialog box, select the attended bot process that you want to run.
   Bot processes with Embedded Task Automation enabled are not displayed in this list. For more information, see Embedded Task Automation (ETA) in RPA Hub.
2. To run an attended robot, do any one of the following actions.

Option	Action
From the Run option	Select the Run icon ( ). The Attended Robot runs the automation.
From the Desktop In Desktop option	Select the Desktop In Desktop icon ( ). The Attended Robot runs the automation in a desktop session. This option is useful when you want to work simultaneously while running an automation. This option appears only when you select the **Enable Desktop In Desktop** check box on the Bot process form, while you are creating a bot process. For more information, see Configuring a bot process record in RPA Hub and Bot Process form in RPA Hub. **Important:** If an automation is executed in Desktop In Desktop, the Zscaler connection is lost in the main session and the connection is established in a bot session. This can lead to unresponsive state of the robot. For more information about the Zscaler limitation, see https://help.zscaler.com/zpa/understanding-client-con If the Desktop In Desktop feature prompts you to enter credentials unexpectedly on Windows 10 or Windows 11, it may be due to the system's security mechanisms such as Credential Guard. For more information on how to suppress the native credential prompt, see KB2030392. **Tip:** If your computer uses the Windows 11 operating system, you might need to enter the login credentials because the Credential Guard is enabled in Windows 11 by default. To avoid entering login credentials every time, you can disable the Credential Guard. To learn the steps to disable, see the Disable Credential Guard section in https://learn.microsoft.com/en-us/windows/security/identity-protection/credential-guard/configure?tab

3. **Optional:** To stop an attended robot, do the following actions:

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a. Select the stop icon ( ).

b. In the Confirmation dialog box, select **Yes**.

ServiceNow Otto for RPA Hub

Use ServiceNow Otto for RPA Hub to accelerate automation development with AI. Instead of writing code or configuring workflows manually, you can describe what you need in natural language and Now Assist generates automations, activities, and logic rules. You can preview generated code before deploying, ensuring it meets your requirements.

For more information, see AI in RPA Hub.

RPA Desktop Design Studio

Use the ServiceNow® Robotic Process Automation (RPA) Desktop Design Studio, which is a low-code Integrated Development Environment (IDE) where you can design or configure automation workflows by dragging and dropping components to the Design surface. RPA Desktop Design Studio is a Windows native application.

Get started

Explore Learn about RPA Desktop Design Studio concepts and features.	**Configure** Install and configure RPA Desktop Design Studio	**Build** Create automation projects. Understand how to use components and ports.
Use Preview, transform, and validate data. Run, publish, and review automations.	**Automation components** Build automations using various components.	**Reference** Get details about RPA Desktop Design Studio components like ports, methods, events, and properties.

Helpful resources

- Troubleshooting issues for the Robotic Process Automation (RPA) Hub application
- Ask or answer questions in the community forum

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- Developer documentation
- Contact Customer Service and Support
- Robotic Process Automation (RPA) Hub glossary
- RPA General Guidelines

Exploring RPA Desktop Design Studio

Learn about the RPA Desktop Design Studio features that enable you to design and create your business process automations.

Overview of RPA Desktop Design Studio

Use the RPA Desktop Design Studio application to build and update automation workflows. You can drag components and connect them in a logical sequence for execution on the Design surface. RPA Desktop Design Studio is a Windows native application.

RPA Desktop Design Studio benefits

- Provides a wide assortment of pre-designed components that you can use to create and design automations.
- Provides ease-of-use, scalability, and efficiency.
- Enables you to design automations in a code-free environment.
- Provides explanations about the errors and displays in simple-to-understand notifications.

What to explore next

To learn more about configuring and using RPA Desktop Design Studio, see:

- Configuring RPA Desktop Design Studio
- Building automations
- Using automations
- Automation components
- RPA Desktop Design Studio reference

RPA Desktop Design Studio user interface

Learn about the RPA Desktop Design Studio user interface.

RPA Desktop Design Studio home

With the RPA Desktop Design Studio home page, you can create and open your automation projects, review your work on these projects, and access resources that help you design automations. The default home page of the RPA Desktop Design Studio is shown in the following example.

Create automations, activities, and automation logic additions from text instructions and preview options using the Now Assist for RPA Hub. For more information, see ServiceNow Otto for RPA Hub.

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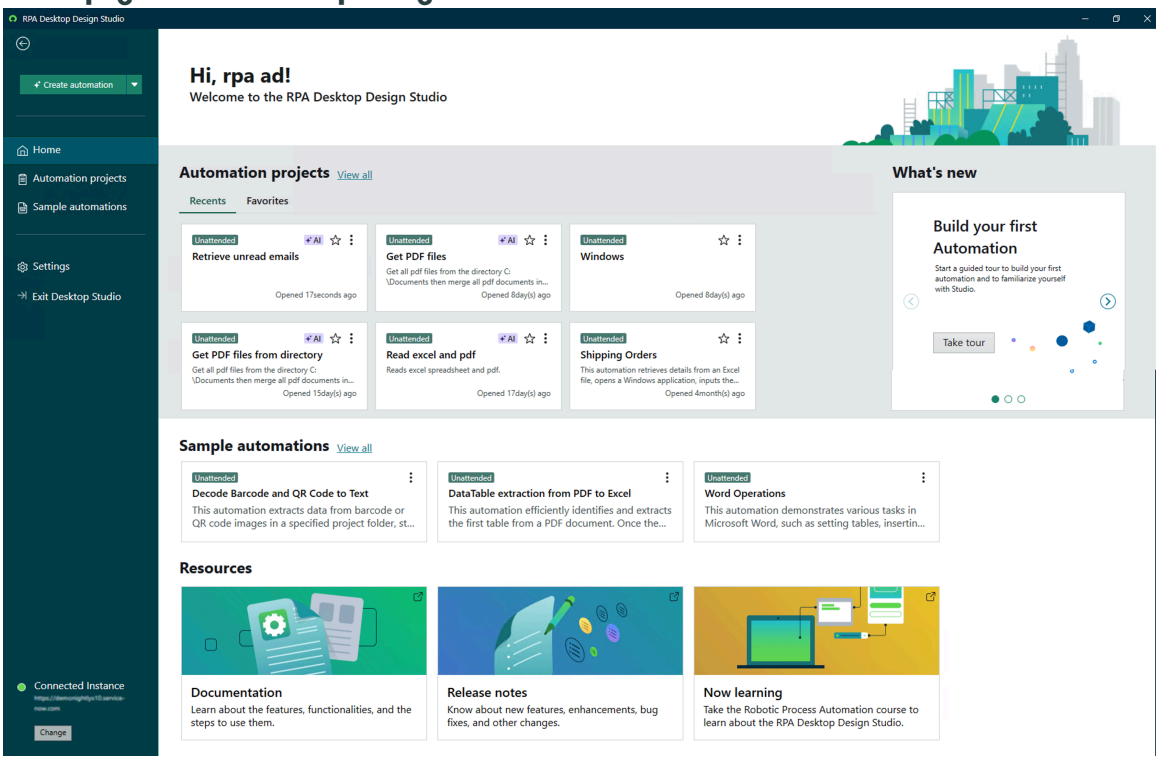
Home page of RPA Desktop Design Studio



When you launch the RPA Desktop Design Studio for the first time, you view a welcome screen to take a quick tour of the desktop studio and learn more about its features. To take a tour, select **Next** on the welcome screen. The guided tour helps you build your first automation. You can pick your preferred journey to create an automation. You can build an automation with a use case or without a use case. Select **Start** to begin the guided tour.

From the left navigation bar, which is shown in the following example, of the RPA Desktop Design Studio home page, you can do the following actions.

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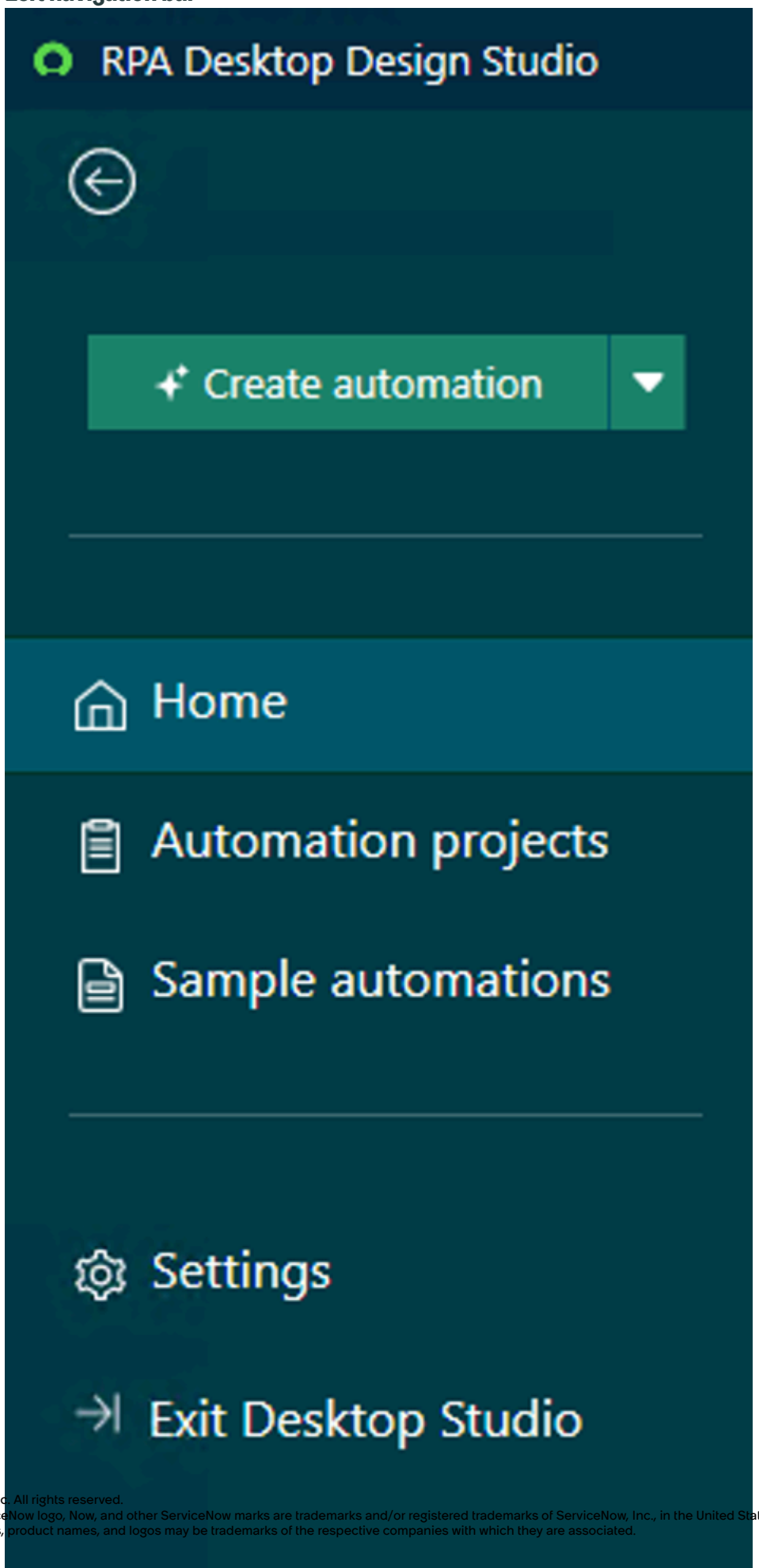
Left navigation bar



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Left navigation bar of the RPA Desktop Design Studio home page

Field	Description
Create Automation	Create an unattended and attended automation project. For more information, see Create an automation project manually and Create an automation with AI.
Create Skill	Create a skill automation project. For more information, see Create a skill project in RPA Desktop Design Studio. A skill automation is a reusable component. You can build a skill so that you can provide prebuilt capabilities for other automation processes. For example, if a login functionality is used in four different automations, that login functionality can be created as a skill that you can reuse across automations.
Home	Home page of the RPA Desktop Design Studio application.
Automation projects	View the list of automation projects that you recently created. You can open a local project or a cloud project. For more information, see Open a local automation project in RPA Desktop Design Studio and Open a cloud automation project in RPA Desktop Design Studio. You can mark the required projects as favorites. Select the three-dot icon next to an automation project and access the following options: • **Open** - Opens the automation project in the Design surface. • **Mark as favorite** - Marks the selected automation project as a favorite. • **Remove from favorite** - Removes the selected automation project from the favorites. This option appears only if the automation is marked as favorite. • **View details** - View the details of the automation projects such as name, description, and location of the project. • **Remove** - Removes the selected automation project from the automation projects list.
Sample automations	A sample automation is a prebuilt automation that shows how different components are configured for a specific use case. The RPA

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Left navigation bar of the RPA Desktop Design Studio home page (continued)

Field	Description
	Desktop Design Studio provides multiple sample automations that cater to different use cases. For example, extracting data from a PDF and insert into an Excel file. Select the three-dot icon next to a sample automation and access the following options: • **Open**- Opens a selected sample automation. • **Open in new window**- Opens a selected sample automation in a new window. • **Create copy**- Creates a copy of the selected sample automation. • **View details**- View the details of the selected sample automation such as name, description, and location of the project. For more information, see Use sample automations in RPA Desktop Design Studio and Sample automations.
Settings	Specify the location for the automation projects to be downloaded in the **Location** field. Select the **Ask everytime before downloading** check box to change the location of the automation projects while downloading. View the RPA Desktop Design Studio version and the Plugin bundle version.
Exit Desktop Studio	Exits the RPA Desktop Design Studio application.
Change	Launches connection manager window. For more details, see Connect to an RPA Hub instance from RPA Desktop Design Studio. You cannot connect to a different instance after the RPA Desktop Design Studio is launched. To connect to a different instance, you must close and reopen the RPA Desktop Design Studio application.

You can do the following actions from the area marked in red in the following example of the home page of RPA Desktop Design Studio.

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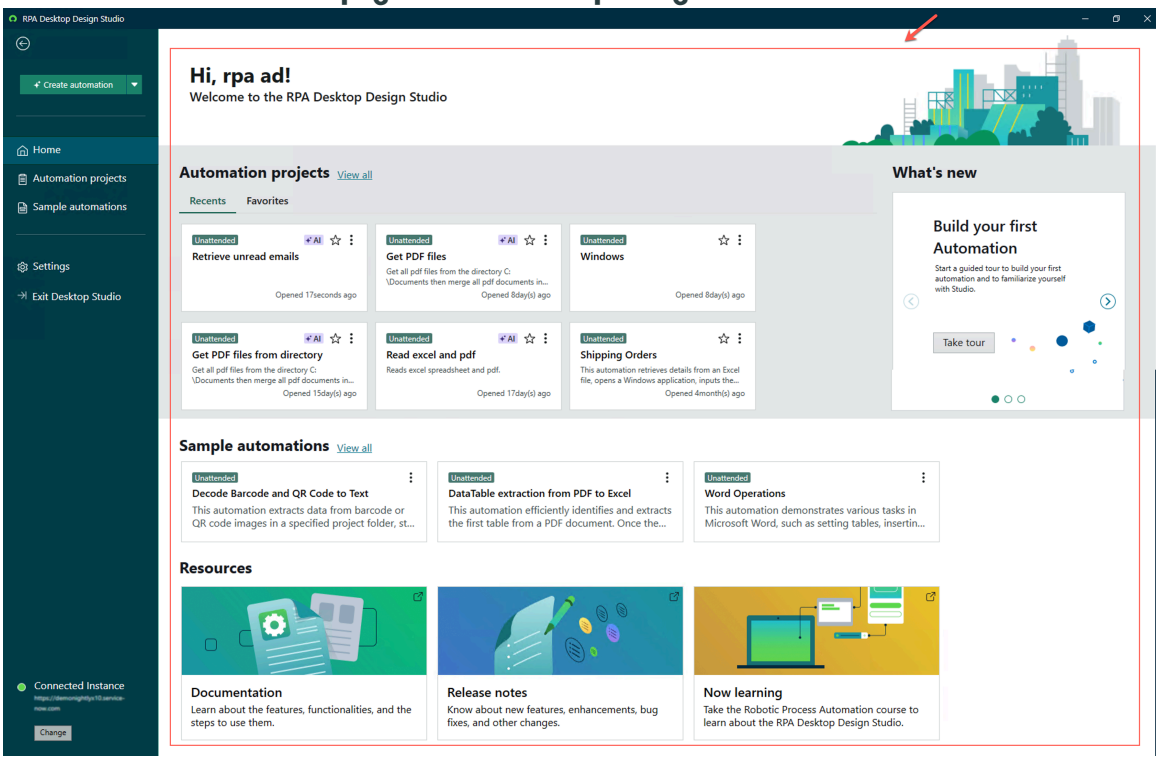
Selected area of the home page of RPA Desktop Design Studio



- **Automation projects**- View the list of automation projects that you recently created by selecting the **View all**. View the recent automation projects in the **Recents** tab. Mark the required projects as favorites. View the favorite automation projects in the **Favorites** tab for quick access.

  In the automation card, view the type, name, and description of the automation along with the timestamp of when it was last opened. The automations created using Now Assist for RPA Hub have an AI icon ( ).

- **Sample automations**- View the list of all sample automations by selecting **View all**.

  In the sample automation card, view the type, name, and description of the automation.

  For more information, see Use sample automations in RPA Desktop Design Studio.

- **Resources**- Learn more about RPA Desktop Design Studio documentation, release notes, and ServiceNow University courses. Select a card to navigate to the respective web page.
- **What's New**- View the new features RPA Desktop Design Studio. For example, you can build your first automation by starting a guided tour. Select **Take tour** to begin the guided tour.

Design surface

The area marked in red in the following example is the Design surface. You create automations by dragging the components from the Toolbox pane to the Design surface.

You can also create automations by dragging the activities and variables from the Project Explorer pane or by dragging methods and events from the Object Explorer pane.

Create automations, activities, and automation logic additions from text instructions and preview options using the Now Assist for RPA Hub. For more information, see Building automations.

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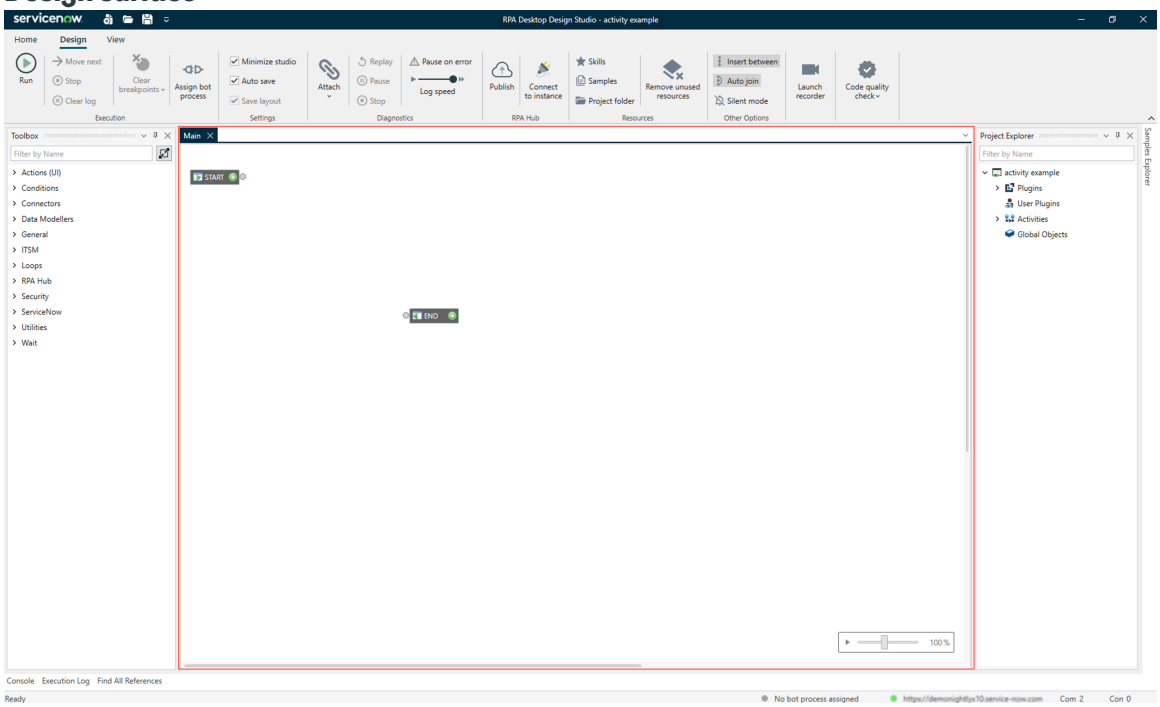
Design surface



The Start and End components are the default components in every activity. They're the starting and ending point of an activity. You can't delete these components.

Enhance the automation logic with text instructions, either on the design surface or by selecting a component or by using the Now Assist for RPA Hub application. For more information, see Build an automation with AI.

When you close this application, you're logged out of the RPA Desktop Design Studio and the ServiceNow instance.

Here's a list of actions that you can do on the Design surface:

Select multiple components

To select multiple components, you can select one or more components by pressing and holding the **Ctrl** key and then selecting the title bar of the component.

Alternatively, you can select the mouse device and drag it across the set of components that you want to select.

Copy, paste, and cut components or methods

You can copy or cut, and paste components or methods by using the keyboard shortcuts or the context menu.

To use the keyboard shortcuts, do the following actions.

- Select the components that you want to copy and press the Ctrl +C keys followed by the Ctrl + V keys.
- Select the components that you want to cut and press the Ctrl +X keys followed by the Ctrl + V keys.

To use the context menu, do the following actions.

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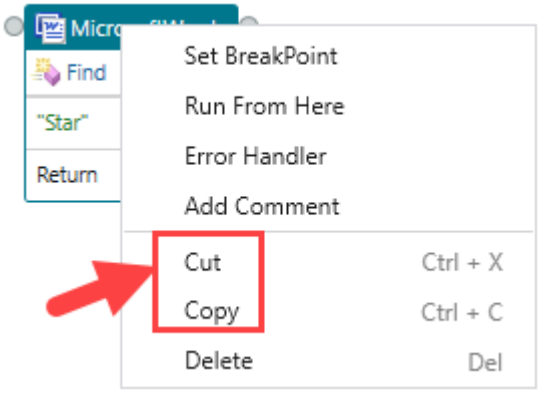
1. Select the components that you want to copy or cut.
2. Right-click on the component bar of any of the components.



3. Select **Cut** or **Copy**.

To paste the components at the same position on the Design surface from where they're copied, use the Ctrl + V shortcut.

You can also copy and paste components between different activities and instances of the RPA Desktop Design Studio.

Alternatively, after copying the components, you can right-click and select **Paste** to paste the components at the position that you choose.

Delete components

To delete components, select the components that you want to delete, right-click any of the selected components, and select **Delete**.

Alternatively, after selecting the components, press the **Delete** key to delete the components. In the Confirmation dialog box, click **Yes**.

Use the zoom settings

On the Design surface, you can zoom in and zoom out to increase or decrease your view of a specific activity.

The zoom settings are in the bottom-right corner of the Design surface as shown in the following example.

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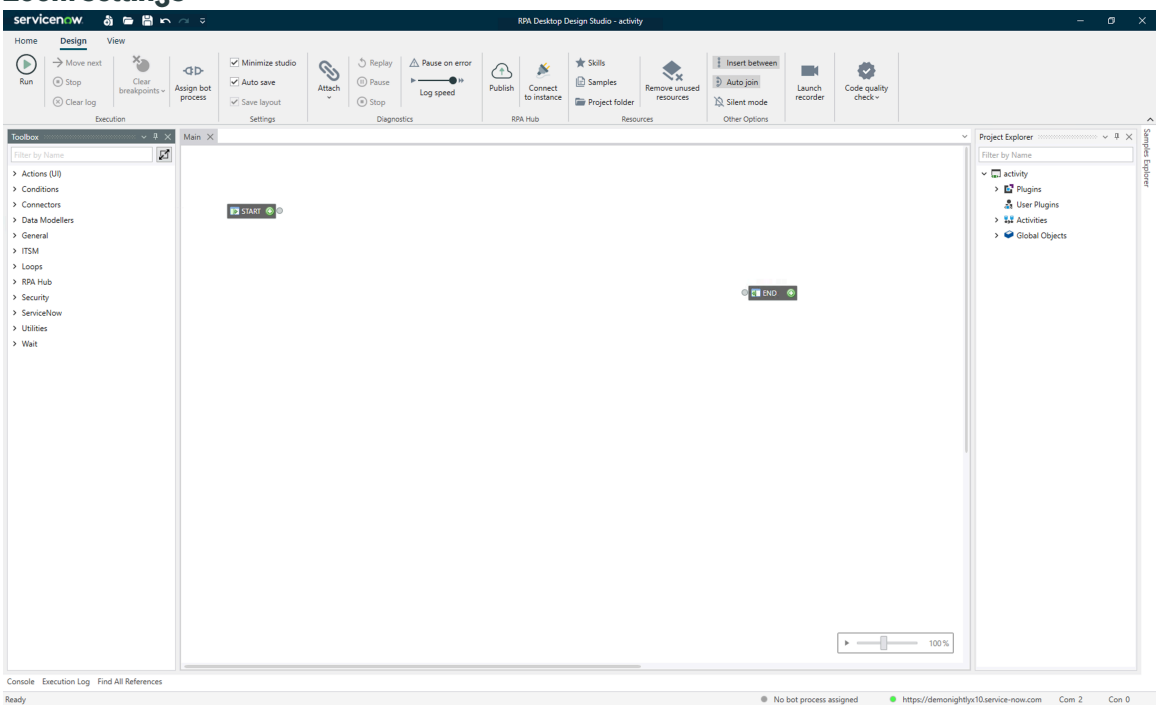
Zoom settings



To zoom out, drag the bar to the left. To zoom in, drag the bar to the right.

Alternatively, you can also use the scroll up and down key with your mouse wheel or track pad while holding the **Ctrl** key to adjust the zoom settings.

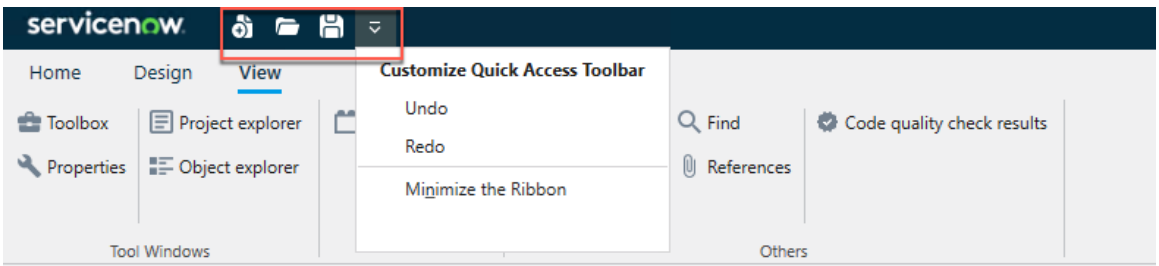
Scroll shortcut

To scroll horizontally on the Design surface, press the **Shift** key and scroll using the mouse.

Quick Access Toolbar

The Quick Access Toolbar, which is shown in the following example, enables you to create, open, save, undo, and redo your automation projects. You can also minimize the ribbon or change the position of the ribbon by using the options that are provided in the toolbar.

Quick access toolbar



Design tab

The **Design** tab provides you with options that enable you to execute an automation, configure the settings of the RPA Desktop Design Studio, help you with diagnostics, publish options, connect to a ServiceNow instance, and access some other resources such as launching recorder. The following example shows you the options that are displayed with the **Design** tab.

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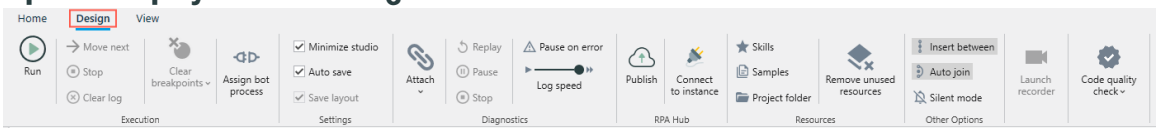
Options displayed on the Design tab



You can access the following sections by using the **Design** tab in RPA Desktop Design Studio:

Sections on the Design tab

Field	Description
Execution section	
Run	Use the **Run** button to start the workflow execution of an automation project.
Move next	Use the **Move next** button to move to the next component where a breakpoint is hit. This option is enabled only when the execution flow hits a breakpoint.
Stop	Use the **Stop** button to stop the workflow execution of an automation project.
Clear log	Use the **Clear log** button to clear the runtime log.
Clear breakpoints	Use the **Clear breakpoints** button to remove all the breakpoints from the automation. This option is enabled when at least one breakpoint is set. Click the down arrow button next to the **Clear Breakpoints** button and select **Find all** to locate the specific breakpoints in the Find All References section.
Assign bot process	Assign the automation package to a bot process and utilize the resources of the automation. For more information on how to assign a bot process, see Assign bot process to an automation project.
Settings section	
Minimize studio	Select the **Minimize studio** check box to minimize the RPA Desktop Design Studio during an automation execution. You can minimize the RPA Desktop Design Studio when you select the **Run** button to run the automation.
Auto save	Select the **Auto save** check box to save your automation project file automatically as you work.
Save layout	Select the **Save layout** check box to save the pane layout of the RPA Desktop Design Studio.
Diagnostics section	
Attach	You can review the execution logs of a process that is already executed. To review, use the **Attach** button to attach either a local execution log file or a remote execution log file that is saved in the ServiceNow instance.

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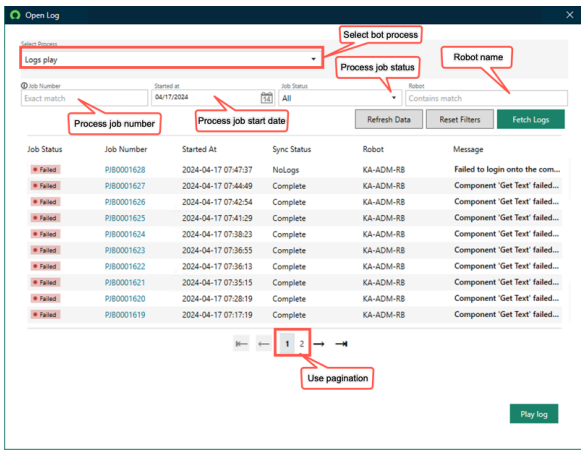
Sections on the Design tab (continued)

Field	Description
	To find a remote execution log, specify your criteria or use the pagination to navigate to the required page on the **Open Log** window.  After specifying the criteria, do the steps. 1. Select **Fetch Logs** to fetch and display the remote execution logs. 2. To play the log, select the required log and then select **Play log**. The following process job records are not displayed in the Attach log window: • Process job records with no logs. • Process job records that are stored in the robot machine.
Replay	Use the **Replay** button to replay the attached log execution.
Pause	Use the **Pause** button to pause the attached log execution.
Stop	Use the **Stop** button to stop the attached log execution.
Pause on error	Use the **Pause on error** button to pause the attached log execution if an error occurs during the execution.
Log speed	Adjust the **Log speed** slider to control the speed when you replay the automation using logs. By default, the slider is adjusted to the center where it takes one second to execute each component. If you decrease the log speed, each component takes the same amount of time it took during the execution. If you increase the log speed, all the components get executed instantly on replay.
RPA Hub	
Publish	Use the **Publish** button to publish the automation project to RPA Hub.

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Sections on the Design tab (continued)

Field	Description
Connect to instance	Use the **Connect to instance** button either to connect to an existing ServiceNow instance or to add ServiceNow instance details.
Resources section	
Skills	Use the **Skills** button to view the skill automation projects in the Skill Explorer pane. You can reuse these skill automation projects by dragging the skill automation project from the Skill Explorer pane to the Design surface. It's displayed as a Remote Activity.
Samples	Select the **Samples** button to refer to the sample automations in the Samples Explorer pane. A sample automation demonstrates how the RPA Desktop Design Studio executes an automation project. The sample automations are classified into **Beginner**, **Intermediate**, **Advanced**, **References**, and **Attended** categories based on the complexity and use cases of the automations. For more information, see Use sample automations in RPA Desktop Design Studio.
Project folder	Use the **Project folder** button to open the current automation project folder.
Remove Unused resources	Use the **Remove unused resources** button to remove unused variables, references, and user plugins.
Other Options section	
Insert between	Use the **Insert between** button to connect to the nearest component with a free Control port to the left of the newly dropped component.
Auto join	Use the **Auto join** button to remap the connections between the two components when a component is deleted.
Silent mode	Use the **Silent mode** button to execute the automation project without opening further activity tabs.
Launch recorder	Capture your actions from your desktop or web applications and convert them into an automation flow by using the recorder option. For more information on recording automations, see Recording automations.
Code quality check	Inspect an activity or completion automation project for any automation issues that prevents the automation from progressing by using the Code quality check feature. For more information on how to perform Code quality check in RPA Desktop Design Studio, see Code quality check in RPA Desktop Design Studio.

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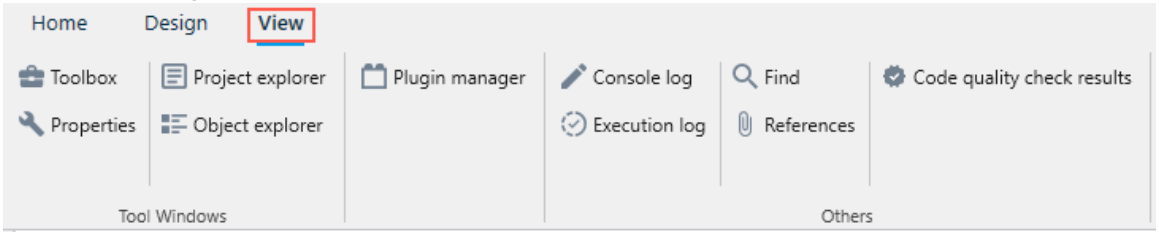
View tab

The **View** tab, which is shown in the following example, enables you to view the Tool Windows when they're closed, install extra plugins by using the plugin manager option, view the console log and execution log, find components, and find all references.

Options displayed on the View tab



You can access the following sections when you use the **View** tab in RPA Desktop Design Studio:

Sections on the View tab

Section or field	Description
Tool Windows section	Click each pane of the tool window (Toolbox, Project explorer, Properties, and Object explorer) to reopen these panes when they're closed.
Plugin manager	Use the **Plugin manager** button to install extra plugins to design automations that are required for creating automation projects. For more information, see Manage plugins in RPA Desktop Design Studio.
Others section	
Console log	Use the **Console** button to open the console section, if closed. This section has the information that is related to the Console Log component.
Execution log	Use the **Execution log** button to open the Execution Log section, if closed. You can view the error logs of the automation execution in this section, when you attach the logs.
Find	Use the **Find** button to find components within the automation project.
References	Use the **References** button to show the navigation pane, if it's closed.
Code quality check results	Displays the details of the code quality check execution.

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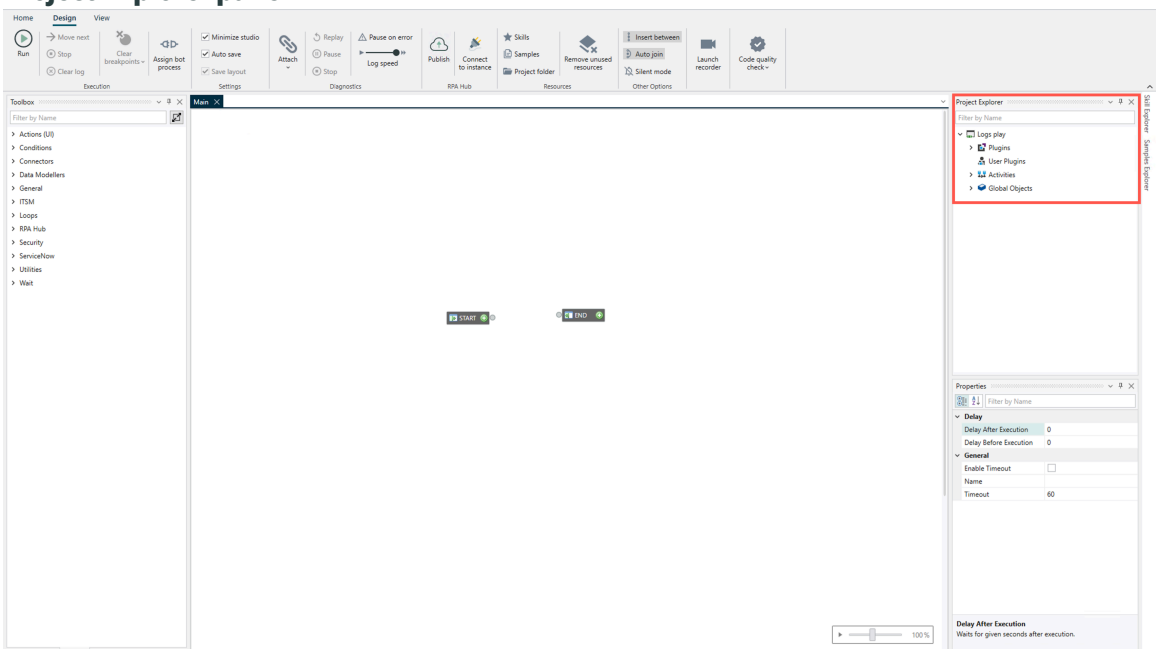
Project Explorer pane

The area marked in red in the following example is the Project Explorer pane. You can see all the artifacts that are used in the current automation project in this pane. Artifacts include activities, plugins, user plugins, global objects, and forms (if you're creating an attended automation project).

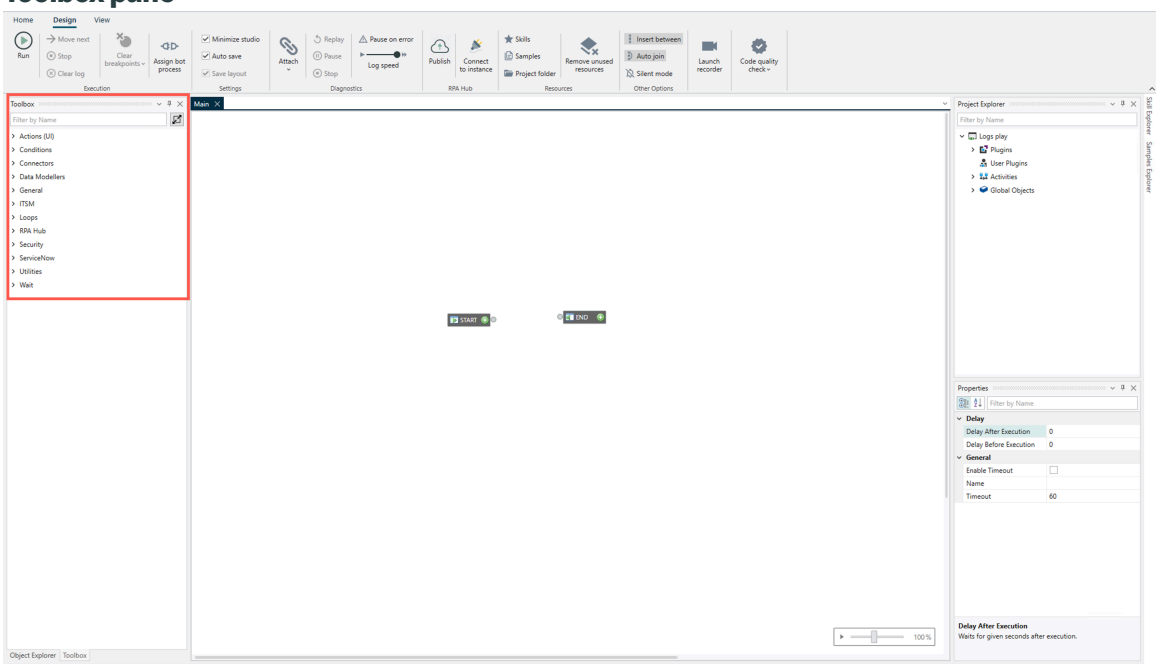
Project Explorer pane



Toolbox pane

The area marked in red in the following example is the Toolbox pane. You can use this pane to see all the available components and connectors in the RPA Desktop Design Studio.

Toolbox pane



Components are listed under multiple categories. You can expand each component group to reveal individual components that can be used on the Design surface.

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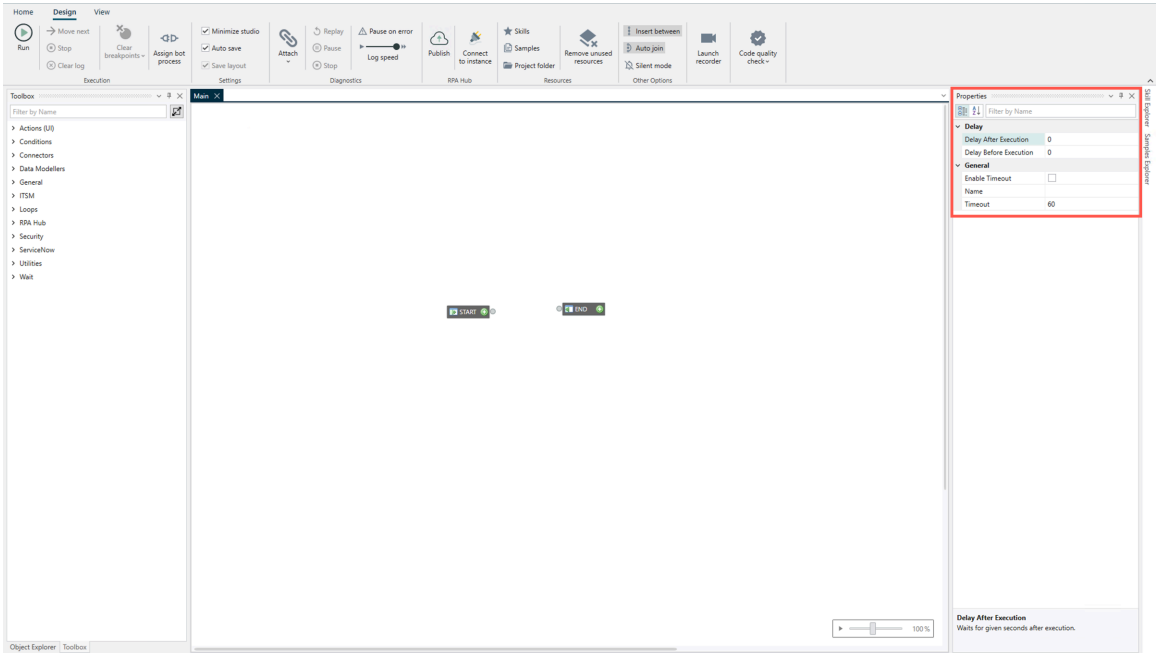
Search for the components that are available within the Toolbox by entering the text in the **Filter by Name** field.

Properties pane

The area marked in red in the following example is the Properties pane. Each component, connector, activity, or global object has multiple properties that appear in the Properties pane.

Properties pane

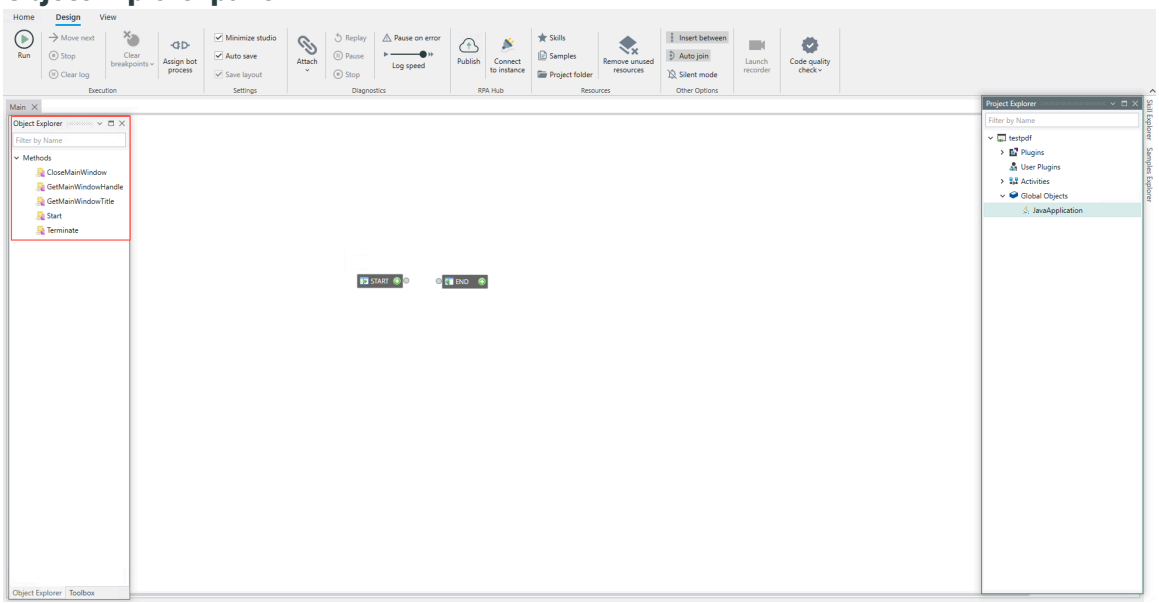


Properties help you fine-tune the functionality of the objects.

Object Explorer pane

The area marked in red in the following example is the Object Explorer pane. The methods and events that are associated with the objects in the Project Explorer pane appear in this pane.

Object Explorer pane



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Double-click the specific object in the Project Explorer pane to view its associated methods and events.

For example, you can click a List connector that you added in the Global Objects node to view the associated methods in the Object Explorer pane.

Global Objects is a section in the Project Explorer pane that is a placeholder for objects that are accessible across all activities like connectors and global variables. You can further organize the objects by creating folders within global objects.

RPA Desktop Design Studio keyboard shortcuts

You can use keyboard shortcuts to perform the following actions quickly in the RPA Desktop Design Studio.

RPA Desktop Design Studio keyboard shortcuts

Action	Windows keyboard shortcut
Create a project	Ctrl+N
Open a project	Ctrl+O
Save a project	Ctrl+S
Build an automation	Ctrl+Enter This option is available only when the Now Assist for RPA Hub is enabled. For more information, see Build an automation with AI.
Undo	Ctrl+Z
Redo	Ctrl+Y
Run	F5
Global Run	Ctrl+F5
Global Stop	Ctrl+Shift+F5
Clear logs	Ctrl+F8
Step over	Ctrl+F10
Copy	Ctrl+C
Cut	Ctrl+X
Paste	Ctrl+V
Select All	Ctrl+A
Project Explorer	Ctrl+R
Object Explorer	Ctrl+Alt+J
Toolbox	Ctrl+Alt+X
Properties	F4
Find window	Ctrl+F
Delete	Del

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Configuring RPA Desktop Design Studio

You can plan and configure an RPA Desktop Design Studio implementation in your organization.

The ServiceNow® RPA Desktop Design Studio is a Windows native application that is used by RPA developers to design or configure automation workflows.

Important information

Refer to the List of components compatible with latest version topic, for a list of components that are executed in their latest versions in the RPA Desktop Design Studio and robots, irrespective of the version they were used during the automation design.

Configuration overview

Perform the following tasks to download the installation package and configure the RPA Desktop Design Studio after installation.

1. Install RPA Desktop Design Studio

   You can install the RPA Desktop Design Studio application in your Windows machine if you have the admin role.

2. Set up RPA Desktop Design Studio

   Set up RPA Desktop Design Studio to add your ServiceNow® RPA Hub instance details in Connection Manager and to start using the application.

3. Connect to an RPA Hub instance from RPA Desktop Design Studio

   Establish a connection between the RPA Desktop Design Studio and ServiceNow® RPA Hub instance to connect to an RPA Hub instance in three ways using Connection Manager.

4. For the upgrade scenario, if your instance is installed with a hot fix and later upgraded to a newer release, verify to install the required hotfix for the respective plugins on the new plugin bundle. The system overrides it by default. Failing to do so, the hotfix will not be applied and you might encounter the same issue again. For more information, see Post requisites after installing a hot fix.

Using Guided Setup to implement RPA Desktop Design Studio

Guided Setup provides a sequence of tasks that help you configure RPA Desktop Design Studio. With Guided Setup, keep track of what you have completed, so you can stop and start again where you left off. To open Guided Setup for RPA Hub, navigate to **All** > **Robotic Process Automation** > **Administration** > **Guided Setup**.

For more information about using the guided setup interface, see Using guided setup.

Install RPA Desktop Design Studio

Install the RPA Desktop Design Studio application in your Windows machine if you have the admin role.

Before you begin

Download and unzip the installation file for the RPA Desktop Design Studio application. For more information, see Download the RPA applications from RPA Hub.

Ensure that you meet the hardware and software requirements.

The following hardware specifications list the minimum and recommended resources.

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Hardware requirements

Resource	Minimum	Recommended
CPU	Intel Processor (At least, Core i5)	Intel Processor (Core i7).
RAM	4-GB RAM	8-GB RAM
Disk space	Minimum 20-GB free disk space after installing the OS, patches, and base software	Minimum 50-GB free disk space after installing the OS, patches, and base software

Software requirements

The software requirements are:

- Operating system: Microsoft Windows 10 or Windows 11 or Windows Server 2016 or Windows Server 2019.
- NET framework: Windows 4.7.1 or greater.
- Monitor with 1920x1080p resolution.
- DPI scaling setting must be deactivated.

Microsoft Edge WebView2 Runtime is a prerequisite for the ServiceNow login screen to work with RPA users. The Microsoft Edge WebView2 Runtime is installed by default with only specific releases of Windows 10 OS. If it is not available, ensure to install the Microsoft Edge WebView2 Runtime.

For more information about the Microsoft Edge WebView2 Runtime, see Delivering Microsoft Edge WebView2 Runtime to managed Windows 10 devices. For more information about downloading the Microsoft Edge WebView2 Runtime MSI, see Microsoft Edge WebView2.

Role required: admin

Procedure

1. Locate and open the `Robotic Process Automation Desktop Design Studio.msi` file.
2. In the Welcome to the RPA Desktop Design Studio Setup Wizard dialog box, click **Next**.
3. In the Select Installation Folder dialog box, do one of the following actions to choose a folder:
   - To install the application in the default folder, click **Next**.
   - To install the application in a different folder, select the folder location in the **Folder** field or click **Browse** to select the folder. Then, click **Next**.
4. In the Confirm Installation dialog box, click **Next** to start the installation.
5. After the installation is complete, in the Installation Complete dialog box, click **Close**.

Result

You can see the RPA Desktop Design Studio icon on your desktop.

What to do next

Set up the RPA Desktop Design Studio application. For more information, see Set up RPA Desktop Design Studio.

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Set up RPA Desktop Design Studio

Set up RPA Desktop Design Studio to add your ServiceNow RPA Hub instance details in Connection Manager and to start using the application.

Watch this video to learn about the configuration of RPA Desktop Design Studio.

https://player.vimeo.com/video/1031641086?h=06a646eaf2&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

Install RPA Desktop Design Studio. For more information on how to install it, see Install RPA Desktop Design Studio.

Role required: none

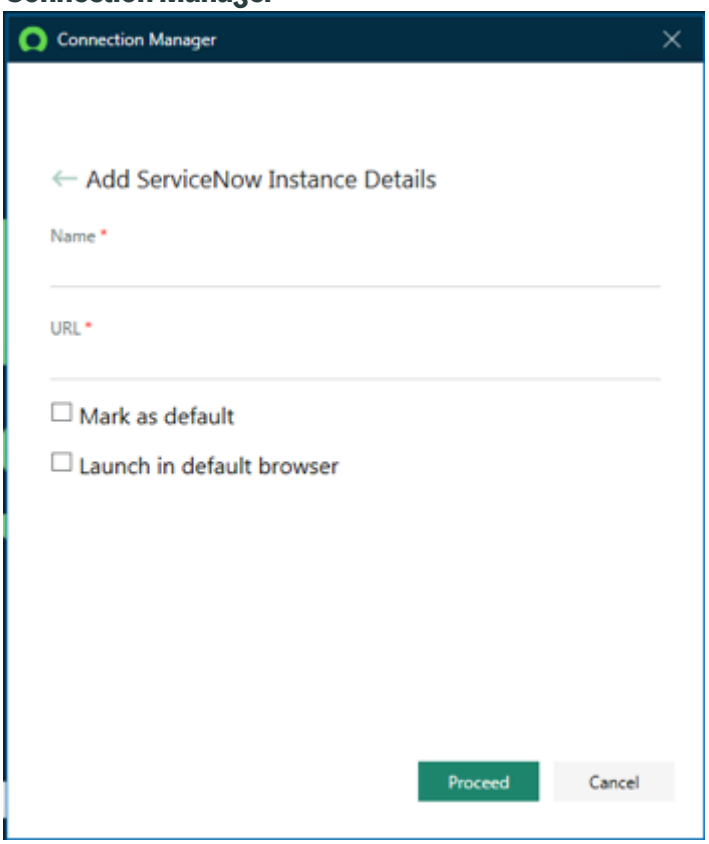
About this task

You can do this task when you're setting up RPA Desktop Design Studio for the first time or when you're adding an RPA Hub instance.

Procedure

1. From your desktop, double-click the RPA Desktop Design Studio icon ( ).
   If you're using RPA Desktop Design Studio for the first time, you can add the instance details in the Connection Manager dialog box.

Connection Manager



2. **Optional:** When you start using RPA Desktop Design Studio and want to add an instance from Connection Manager, select **Add New**.

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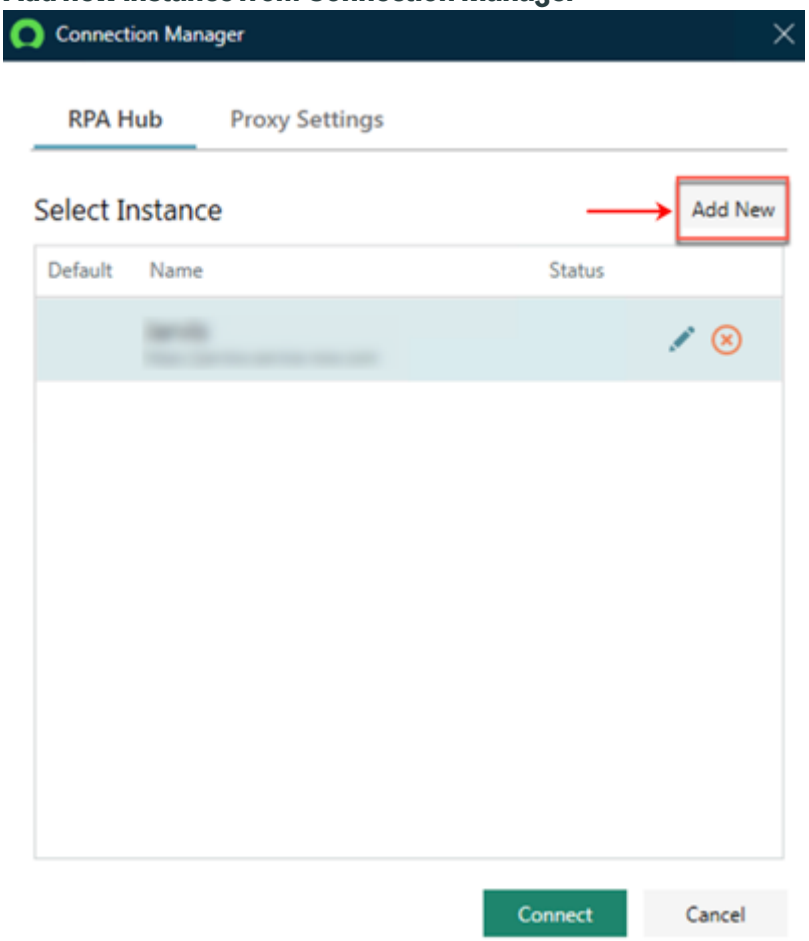
Add new instance from Connection Manager



3. On the form, fill in the fields.

Add ServiceNow Instance Details form

Field	Description
Name	Name of your ServiceNow RPA Hub instance for easy identification of the instance. For example, `Dev instance`.
URL	ServiceNow RPA Hub instance URL. For example, `https://<instance name>.service-now.com/`.
Mark as default	Option for enabling this instance as the default. RPA Desktop Design Studio launches each time by using this default instance. Clearing this option opens the Connection Manager dialog box each time you double-click the RPA Desktop Design Studio icon ( ).
Launch in default browser	Option for launching the instance in the default browser of your machine.

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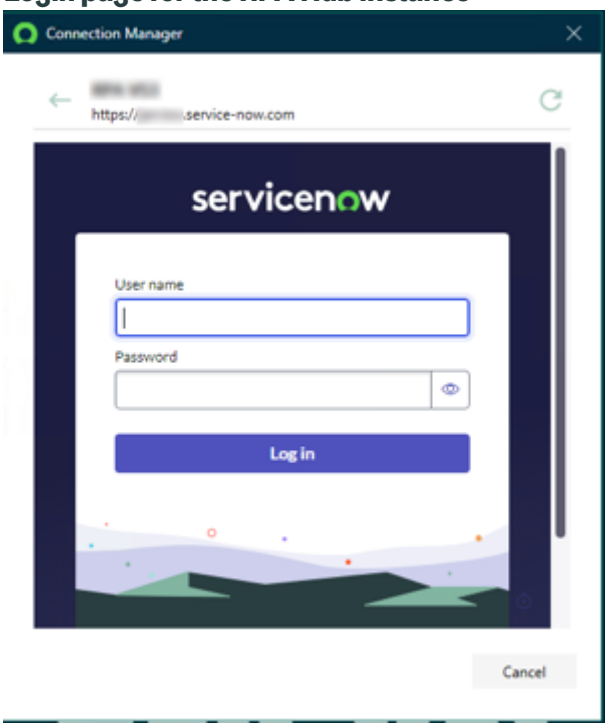
4. **Optional:** If you want to add proxy settings for your internet connection according to the company policies, do the following actions:
   a. In the **Proxy Settings** tab of the Connection Manager dialog box, fill in the fields for the server address, user name, password, and select the **Save Password** check box to save the password.
   b. Select **Save**.
5. Select **Proceed** and the plugins from the RPA Hub instance download to your machine.

Downloading plugins from the RPA Hub instance



When the plugins download, the login page of your RPA Hub instance is displayed.

Login page for the RPA Hub instance



Note: If the error `Connection failed. Verify if the RPA Plugins are available in the ServiceNow instance.` is displayed when you start RPA Desktop Design Studio, select **OK** and configure a ServiceNow instance URL that has the RPA plugins installed. Restart RPA Desktop Design Studio and try again.

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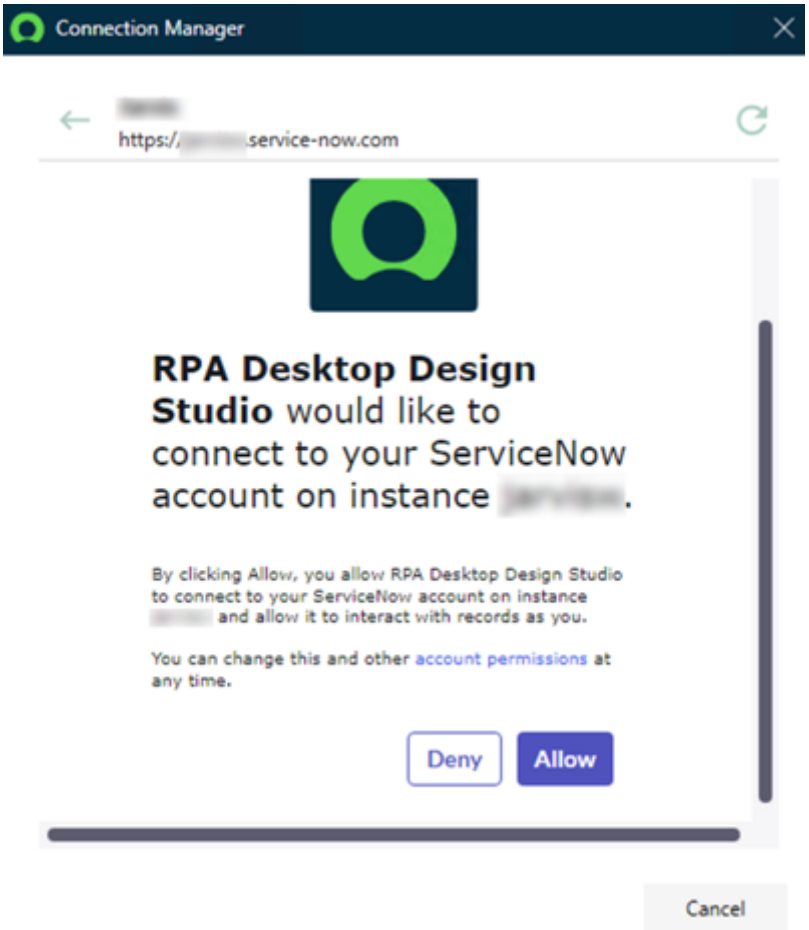
6. Authenticate your connection by entering the user name and password of your RPA Hub instance and then select **Log in**.
   The RPA Hub instance authentication page is displayed.

RPA Hub instance authentication



Important:

- When you enter credentials in the Connection Manager dialog box but don't select the **Allow** button in the next screen, the session times out.
- You must authenticate your RPA Hub instance each time that you launch RPA Desktop Design Studio. If you don't authenticate and cancel the login operation, RPA Desktop Design Studio doesn't launch.

7. Select **Allow**.
   The authentication is complete and the home page of RPA Desktop Design Studio is displayed.

What to do next

You can start creating automations from the RPA Desktop Design Studio home page. For more information on how to create automations, see Create an automation project manually or Create an automation with AI.

Connect to an RPA Hub instance from RPA Desktop Design Studio

Connect to an RPA Hub instance in three ways using the Connection Manager so that you can establish a connection between the RPA Desktop Design Studio and ServiceNow RPA Hub instance.

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Before you begin

Set up the RPA Desktop Design Studio application to add ServiceNow instance details. For more information, see Set up RPA Desktop Design Studio.

Open an automation project. For more information, see Open a local automation project in RPA Desktop Design Studio and Open a cloud automation project in RPA Desktop Design Studio.

Role required: none

About this task

After you launch the RPA Desktop Design Studio, you can connect to the same instance using different credentials.

You cannot connect to a different instance after the RPA Desktop Design Studio is launched.

To connect to a different instance, you must close and reopen the RPA Desktop Design Studio application.

Procedure

1. To connect to an RPA Hub instance, do any of the following actions in the Connection Manager dialog box.

Option	Action
If there is a single instance	**a.** In the RPA Hub section, select the RPA Hub instance. **b.** Select **Connect**.
If there are multiple instances and none of them are marked as default	**a.** In the RPA Hub section, select an RPA Hub instance. **b.** Select **Proceed**. **c.** In the RPA Hub section, select the RPA Hub instance. **d.** Select **Connect**. **e.** Enter a user name and password. **f.** From the Domain list, select a domain. **g.** Select **Log in**.
If an instance is marked as default	**a.** Enter a user name and password. **b.** From the Domain list, select a domain. **c.** Select **Log in**.

2. In the Connection Manager dialog box, set the permission for the RPA Desktop Design Studio application to connect to your ServiceNow instance and to access the data:
   - To enable RPA Desktop Design Studio to connect to your ServiceNow instance and access the data, select **Allow**.

     Note: When you enter credentials in the Connection Manager dialog box but do not select the **Allow** button, an error occurs after 30 minutes. Close the Connection Manager dialog box and reopen.

   - To prevent RPA Desktop Design Studio from connecting to your ServiceNow instance and accessing the data, select **Deny**. You won't be able to proceed further.

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Disconnect from an RPA Hub instance in RPA Desktop Design Studio

Disconnect a connected RPA Hub instance while you're using the RPA Desktop Design Studio. You can then log in to the same instance with different credentials. For example, you might want to switch credentials when you use the Assign Bot Process feature.

Before you begin

Connect to an RPA Hub instance. For more information, see Connect to an RPA Hub instance from RPA Desktop Design Studio.

Role required: none

About this task

You can't disconnect from an RPA Hub connected instance and then connect to a different RPA Hub instance when you're using Connection Manager in RPA Desktop Design Studio. If you want to connect to the same RPA Hub instance with another user role, you can select the **Disconnect** option in Connection Manager to disconnect from the instance. For example, let's consider a scenario where you were connected to the RPA Hub instance as a developer user. If you want to connect to the instance as an admin user, you can select the **Disconnect** option in Connection Manager and then log in to the same instance by using the admin user credentials.

Procedure

1. On the **Design** tab, select **Connect to instance**.
   The Connection Manager dialog box is displayed.
2. Disconnect from the connected instance by selecting **Disconnect**.

What to do next

Log in with new credentials. For more information about connecting to an instance, see Connect to an RPA Hub instance from RPA Desktop Design Studio.

Related topics

Assign bot process to an automation project

Building automations

Create automation projects, use components, and create the activities and variables that are required to design automations in RPA Desktop Design Studio.

Create an automation with AI

Create an automation from text instructions and preview options by using the ServiceNow Otto for RPA Hub application.

Before you begin

Set up the RPA Desktop Design Studio application and add the ServiceNow instance details. For more information, see Set up RPA Desktop Design Studio.

To access the AI features in RPA Desktop Design Studio, perform the following steps:

- Install the ServiceNow Otto for RPA Hub application to add the generative AI capability. For more information, see Install ServiceNow Otto for RPA Hub.
- Turn on the RPA bot generation skill to use the generative AI capability. For more information, see Turn on the RPA bot generation skill.
- After activating the RPA bot generation skill, relaunch the RPA Desktop Design Studio application to apply the modified settings.

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If you skip these steps, the ServiceNow Otto for RPA Hub feature doesn't appear in RPA Desktop Design Studio.

Familiarize yourself with the RPA bot generation skill concepts. For more information, see Robotic Process Automation (RPA) bot generation skill, Limitations of ServiceNow Otto for RPA Hub, and Example instructions for ServiceNow Otto for RPA Hub.

Role required: sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin

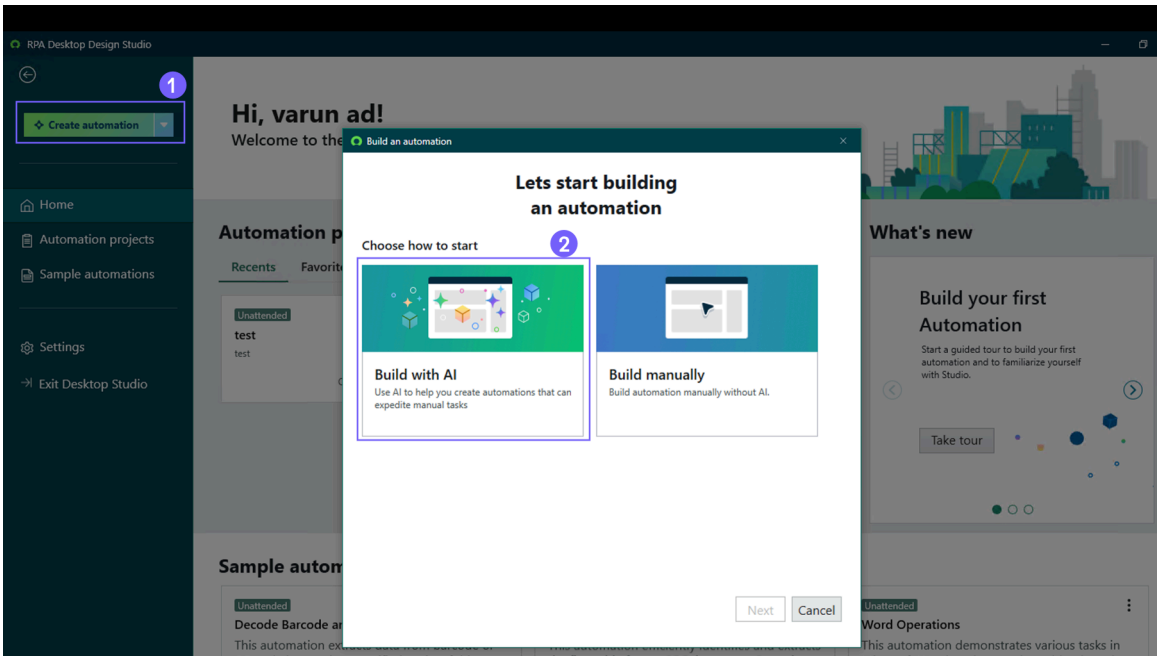
About this task

To create an automation project manually, see Create an automation project manually.

Procedure

1. On the RPA Desktop Design Studio home page, select **Create Automation**.
2. In the Build an automation window, select the **Build with AI** option.

Build with AI



3. Select **Next**.
4. In the Build with AI window, enter instructions for AI.

   The instruction text is used by the RPA bot generation skill to create your automation. Use short, direct, and clear sentences to describe the expected actions. Be specific and provide detailed descriptions of the automation logic. Avoid jargon and abbreviations.

   The following example shows that the AI instructions are provided so that you can build an automation to get PDF files from a location and then merge all PDF documents into a single PDF document.

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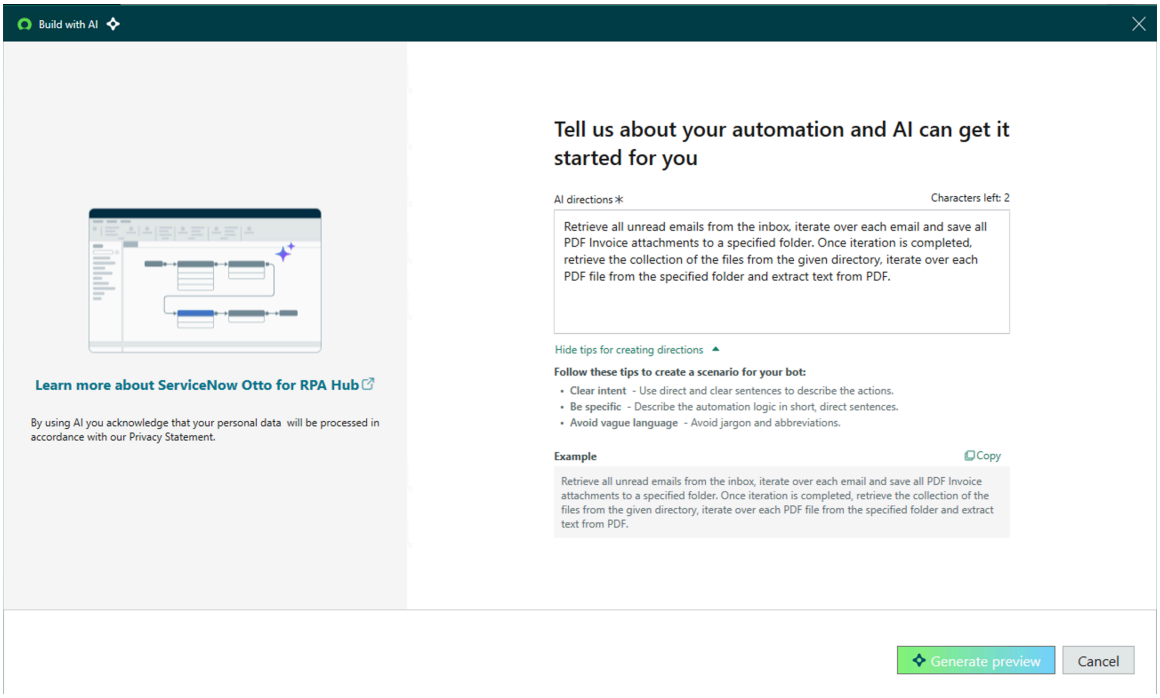
Build with AI window



An example instruction is displayed for your reference.

Note:

For more information on example AI instructions and general guidelines, see Robotic Process Automation (RPA) bot generation skill. For more information about the limitations of the RPA bot generation skill, see Limitations of ServiceNow Otto for RPA Hub.

5. Select **Generate preview**.
6. **Optional:** In the Build with AI window, regenerate a preview, clear the workflow, stop creating an automation, or select next if you like the automation preview.

Note: You can't make any changes In the Automation preview screen because it's read-only. You can maximize it and use the scroll options to view the entire generated automation workflow.

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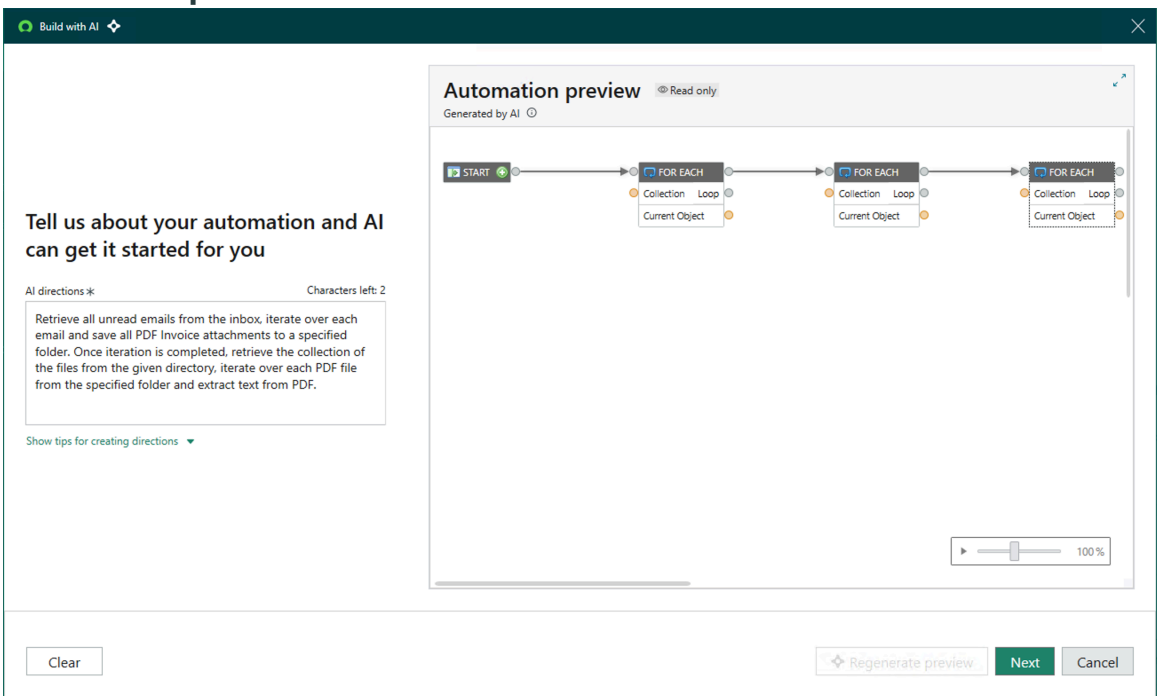
Build with AI options



Option	Procedure
Regenerate preview	If the generated automation preview doesn't meet your needs, you can update the AI instructions, and select **Regenerate preview**. Each time you build or rebuild an automation, the operation counts as an assist tracked by your AI subscription. To track your AI usage, see Monitoring Now Assist usage in Subscrip
Clear	If you want to clear the workflow that was created by AI and the AI instruction, select **Clear** and then select **Yes** in the Confirm clear automation window.
Cancel	If you want to stop creating an automation and return to the RPA Desktop Design Studio home page, select **Cancel**. In the Confirm cancel window, select **Yes** to return to the previous screen. The generated automation workflows, if any, aren't saved.
Next	If the automation preview looks good, select **Next**.

7. In the Create new automation window, fill in the fields.

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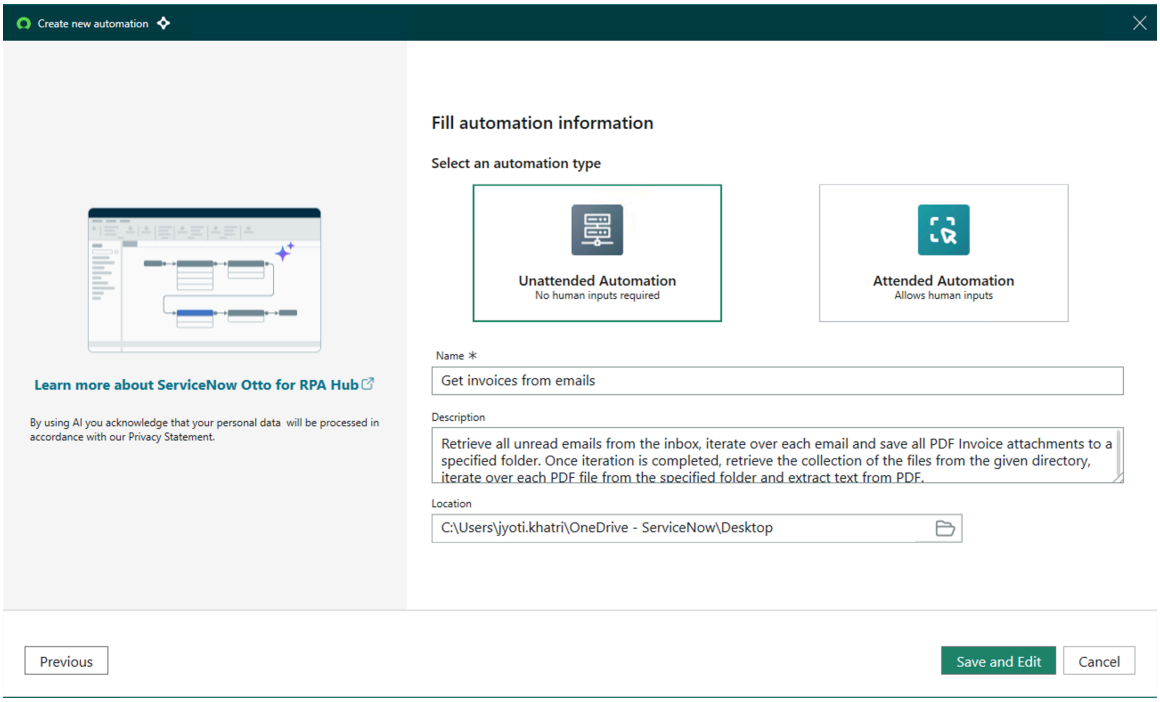
Create new automation window



Note:

If your instruction generates a workflow with components that aren't compatible with the selected automation type, those components show up as unknown in the generated workflow. For example, if your workflow includes a GracefulStop component and you select **Attended Automation**, the GracefulStop component appears as unknown because it's not supported in the attended automations.

Create an automation form

Field	Description
Select an automation type	Type of automation. Select either **Unattended Automation** or **Attended Automation**. An unattended automation doesn't require human supervision and can be used for highly repetitive tasks. For example, an unattended robot can seamlessly perform copy and paste operations into a Microsoft Excel file, streamlining data entry in a Customer Relationship Management (CRM) system without any human input. An attended automation requires human supervision. For example, in a contact center, robots are used as user assistants. They're installed on an operator's workstation and are triggered by human operators on demand.
Name	Name of the unattended or attended automation project.

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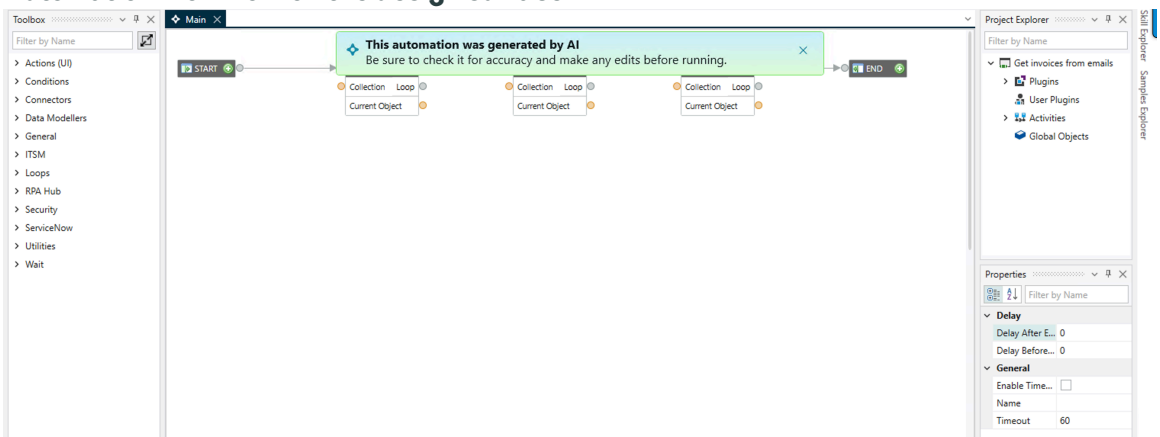
Field	Description
Description	Description of the unattended or attended automation project.
Location	Location of the automation project or the default location.

8. Select **Save and Edit**.

> **Important:** The automation is generated by AI. Be sure to check it for accuracy and make any edits before running.
>
> Close the displayed message for a clearer view.

Automation workflow on the design surface



Result

The automation flow is launched on the design surface and it's added as a Main activity in Activities.

Create an automation project manually

Create an attended or unattended automation project manually in RPA Desktop Design Studio that enables you to automate tasks. You can create an automation project that is based on a prebuilt template and targeted at a use case, or you can create an automation project without using a template.

Before you begin

Set up the RPA Desktop Design Studio application and add the ServiceNow instance details. For more information, see Set up RPA Desktop Design Studio.

Role required: none

About this task

An unattended automation doesn't require human supervision and can be used for highly repetitive tasks. For example, in a Customer Relationship Management (CRM) system, an unattended robot can perform the copy and paste tasks to a Microsoft Excel file without any human inputs.

An attended automation requires human supervision. For example, in a contact center, robots are used as user assistants. They're installed on an operator's workstation and are triggered by human operators on demand.

To create automation projects, you can use the default templates that RPA Desktop Design Studio provides or the custom automation templates that you have created and published to the

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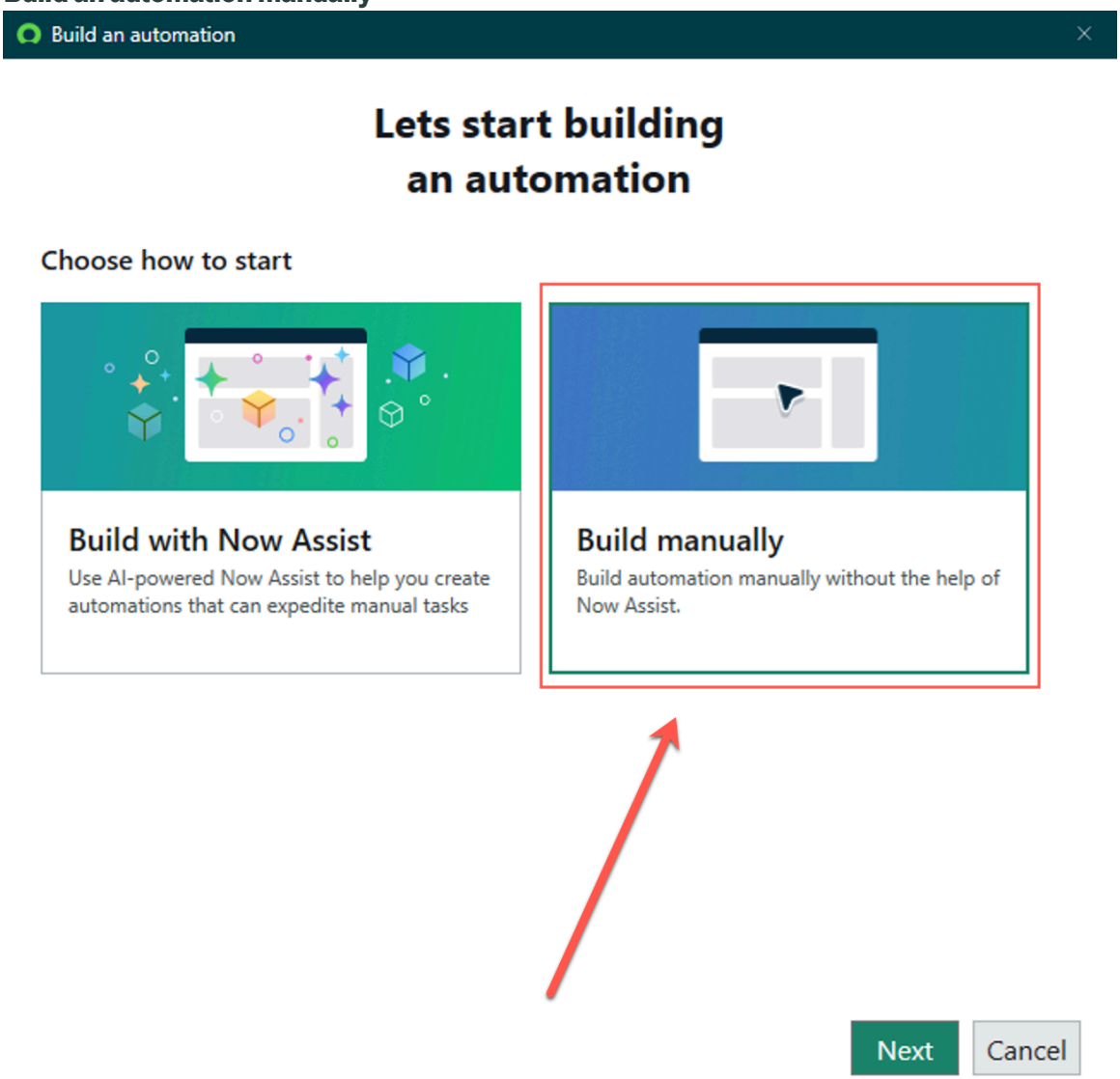
RPA Hub. An automation template caters to a use case and provides a framework of automation. For example, automate a manual employee onboarding process. The default templates that the RPA Desktop Design Studio provides are `Unattended Non-Transactional Workflow`, `Unattended Transactional Workflow`, and `Attended Workflow`. You can also create automations with no template.

To create an automation project using Now Assist, see Create an automation with AI.

Procedure

1. On the RPA Desktop Design Studio home page, select **Create Automation**.
2. In the Build an automation window, select **Build manually**.

Build an automation manually



3. Select **Next**.
4. In the Create new automation window, select either **Unattended Automation** or **Attended Automation**.
5. In the **Name** field, enter the name of the unattended or attended automation project.

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6. **Optional:** In the **Description** field, enter the description of the unattended or attended automation project.
7. In the **Location** field, enter the location of the automation project or retain the default location.
8. Select **Next**.
9. In the Do you want to select a template dialog box, you can perform either of the tasks.
   - To create an automation without a template, select **Use a blank canvas**.
   - To create an automation based on a template, select **Select a template** and choose from the default templates.

   Note:

   By default, the RPA Desktop Design Studio provides the latest versions of certain plugins with the automation project that you create. You can add more plugins after you create the project. In the Create new automation window, view the default plugins by selecting **View**.

   You can choose from the default templates that the RPA Desktop Design Studio provides or the custom templates that you have created and published to the RPA Hub. This template is built on the loaded plugin versions.
10. Select **Create**.

Related topics

Create a skill project in RPA Desktop Design Studio

Create an automation project from a template

Create an automation project from the default automation templates that RPA Desktop Design Studio provides or the templates that you have designed on the RPA Desktop Design Studio and published to the RPA Hub. An automation template caters to a use case and provides a framework of automation.

Before you begin

Role required: none

About this task

The default templates that the RPA Desktop Design Studio provides are RPA Desktop Design Studio provides are `Unattended Non-Transactional Workflow`, `Unattended Transactional Workflow`, and `Attended Workflow`. Use these templates as a framework for your automation projects. You can also create an automation project and publish it to the RPA Hub as a template so that it's available as an automation framework.

Procedure

1. On the RPA Desktop Design Studio home page, select **Create Automation**.
2. In the Build an automation window, select **Build manually**.
3. Select **Unattended Automation** or **Attended Automation**.
4. In the **Name** field, enter the name of the unattended or attended automation project.
5. **Optional:** In the **Description** field, enter the description of the unattended or attended automation project.
6. In the **Location** field, enter the location of the automation project or retain the default location.

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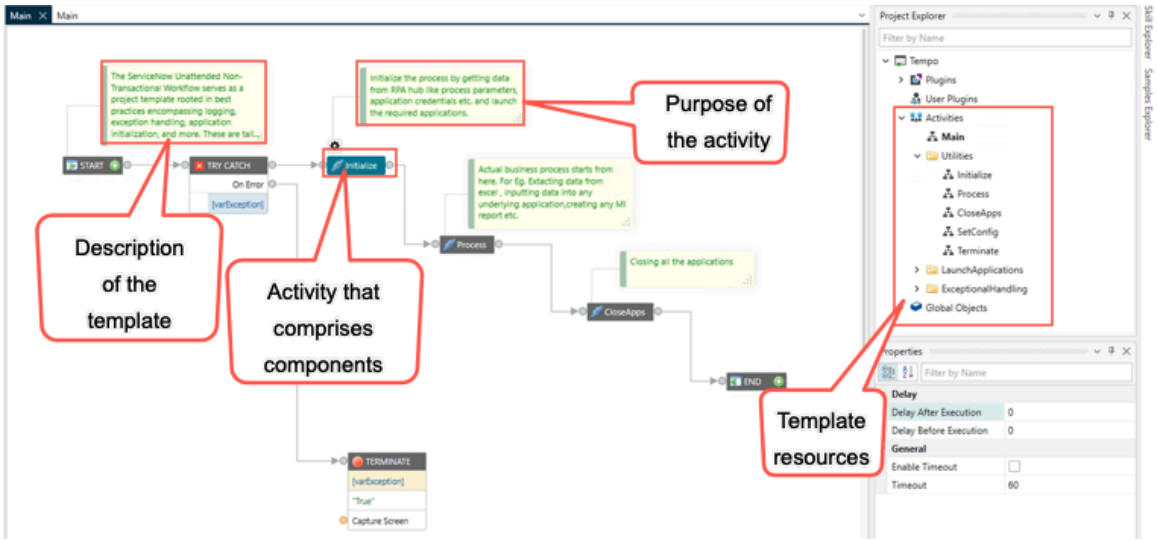
Ensure that the automation project file is in a separate folder. All the files and folders in the current project file location are published to the RPA Hub.

7. Select **Next**.
8. In the Do you want to select a template dialog box, select **Select a template**.
   The screen shows both the default templates that the RPA Desktop Design Studio provides and custom templates, if any. This template is built on the loaded plugin versions.
9. Choose a template from the default templates.
10. Select **Create**.
    The automation project is created.



Build an automation with AI

Enhance the automation logic with AI text instructions, either in an empty activity or by selecting a component in an existing one by using the ServiceNow Otto for RPA Hub application.

Before you begin

Set up the RPA Desktop Design Studio application and add the ServiceNow instance details. For more information, see Set up RPA Desktop Design Studio.

To access the AI features in RPA Desktop Design Studio, perform the following steps:

- Install the ServiceNow Otto for RPA Hub application to add the generative AI capability. For more information, see Install ServiceNow Otto for RPA Hub.
- Turn on the RPA bot generation skill to use the generative AI capability. For more information, see Turn on the RPA bot generation skill.
- After activating the RPA bot generation skill, relaunch the RPA Desktop Design Studio application to apply the modified settings.

If you skip these steps, the ServiceNow Otto for RPA Hub feature doesn't appear in RPA Desktop Design Studio.

Familiarize yourself with the RPA bot generation skill concepts. For more information, see Robotic Process Automation (RPA) bot generation skill, Limitations of ServiceNow Otto for RPA Hub, and Example instructions for ServiceNow Otto for RPA Hub.

Role required: sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin

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About this task

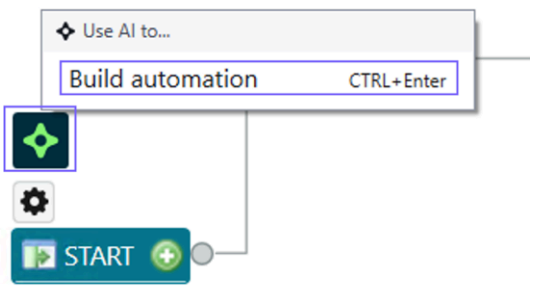
The **Build automation** option (or the in-line prompting feature) with the AI icon, appears only for those components that contain control output ports. For example, the AI icon doesn't appear for components such as END or Break.

On the design surface, if you select multiple components and the AI icon, the in-line prompting trigger appears for the first component that you select.

If there are multiple control output ports for a component, the generated automation workflow is attached to the default or first control output port.

Procedure

1. In the RPA Desktop Design Studio, extend the automation logic with in-line prompting from the component level or from the design surface.

Option	Procedure
From component level	**a.** On the design surface, select the required component and hover over the AI icon. **b.** Open the in-line prompting window by selecting the AI icon and selecting **Build automation**. You can also use the keyboard shortcut Ctrl +Enter to open the in-line prompting window. **Build an automation logic by selecting a component**  If you access in-line prompting from the component level, the automation workflow is generated to the default control output port of the component.
From design surface	On the design surface, open the in-line prompting window by selecting and holding (or right-clicking) and selecting **Build automation**. You can also use the keyboard shortcut Ctrl +Enter to open the in-line prompting window.

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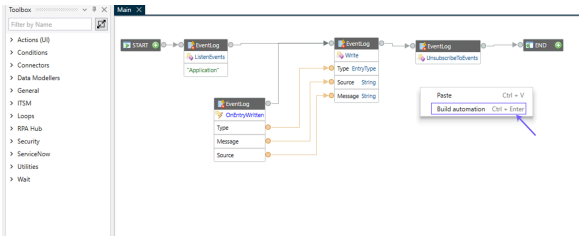
Option	Procedure
	Build an automation logic from an empty activity on the design surface  If you access in-line prompting from the de sign surface, the generated automation work flow is an orphan flow. You must connect the control output ports.

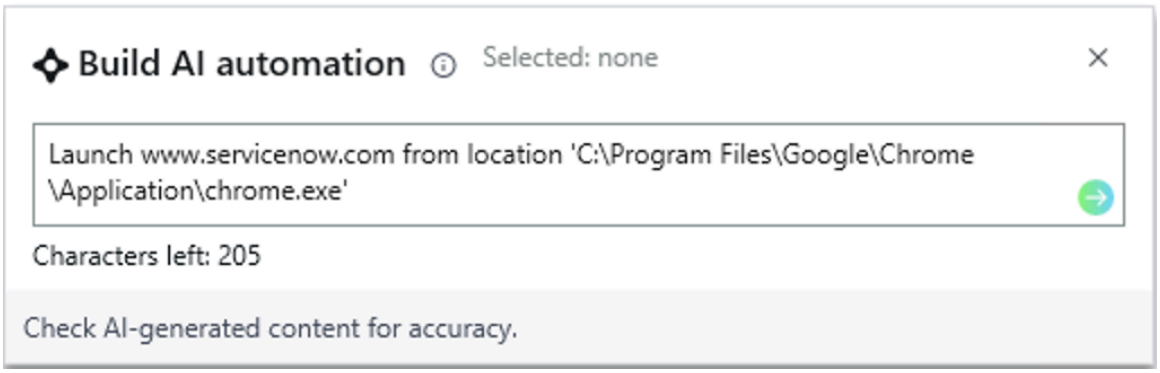
2. In the Build automation with AI window, enter the AI instructions and select the enter icon .

   For example, `Launch www.servicenow.com from location 'C:\Program Files\Google\Chrome\Application\chrome.exe'`.

   The instruction text is used by the RPA bot generation skill to create your automation. Use short, direct, and clear sentences to describe the expected actions. Be specific and provide detailed descriptions of the automation logic. Avoid jargon and abbreviations.

   The following example shows that the AI instructions are provided to build an automation to launch the ServiceNow website with Google Chrome.

   Build with AI window

   Note:

   For more information on example AI instructions and general guidelines, see Robotic Process Automation (RPA) bot generation skill. For more information about the limitations of the RPA bot generation skill, see Limitations of ServiceNow Otto for RPA Hub.

3. In the Build with AI window, close the window, cancel the workflow generation, reject an automation, or accept the automation preview.

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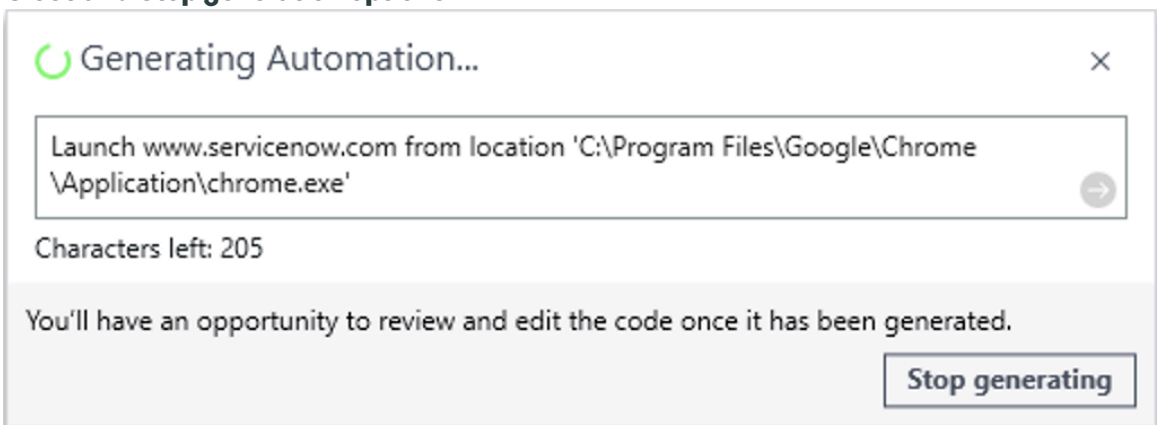
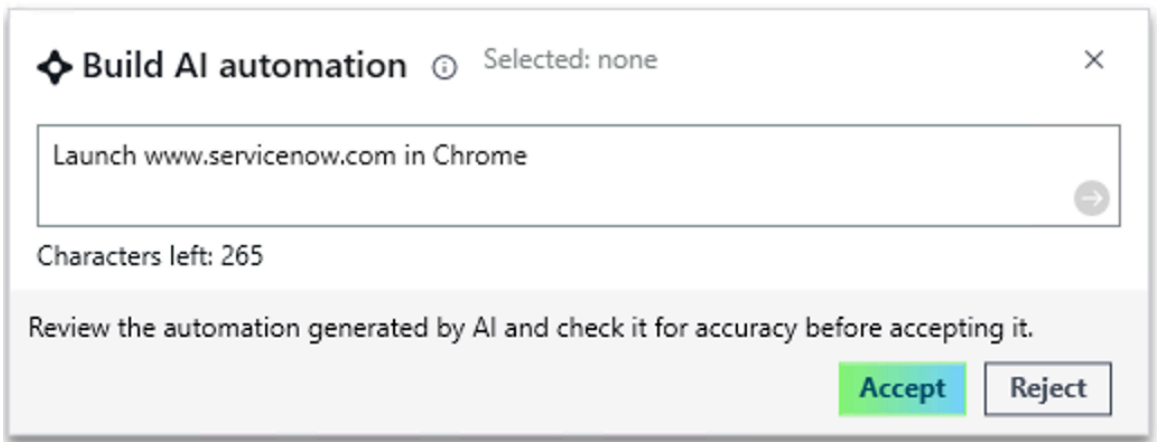
Option	Procedure
Close	If you want to close the Build with AI window, select the close icon ×, and then select **Close AI** in the confirmation window. The generated automation workflow is discarded.
Stop generating	If you want to cancel the workflow generation or update the instruc tion, select **Stop generating**. You can update the AI instructions and select the enter icon .
Reject	If you aren't satisfied with the automation preview, select **Reject**. Each time you build or rebuild an automation, the operation counts as an assist tracked by your AI subscription. To track your AI usage, see
Accept	If the automation preview looks good, select **Accept**.

Close and Stop generation options



Accept and Reject options



Result

The automation workflow that is generated by AI is displayed on the design surface.

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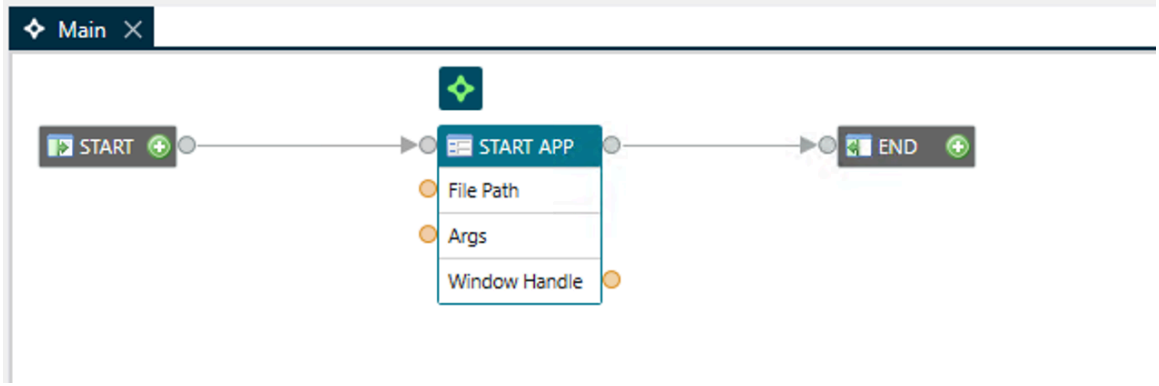
Generated automation workflow on the design surface



Open a local automation project in RPA Desktop Design Studio

Open an automation project from the local file system in RPA Desktop Design Studio, so that you can debug, build, or modify the automation.

Before you begin

Create an automation project. For more information, see Create an automation project manually or Create an automation with AI.

Download the automation package file by accessing the associated package file in RPA Hub. For more information, see Download a package version in RPA Hub.

Role required: none

Procedure

1. In the RPA Desktop Design Studio, navigate to **Home** > **Automation projects**.
2. Select **Open local project**.
3. In the Open ServiceNow Automation Project dialog box, select a project.
4. Select **Open**.
5. **Optional:** If the plugin versions that are used in the project aren't found in the local framework, go to the Choose Plugin Version dialog box, select the plugin versions to be used, and select **OK**.

> **Important:** When you open an older automation project in the latest version of Set up RPA Desktop Design Studio, the Upgrade Plugin Version dialog box is displayed. If you proceed to upgrade the plugin version and any automation components are unavailable after the upgrade, then these components are marked as **Unknown** in the automation project.

Open a cloud automation project in RPA Desktop Design Studio

Open an automation project remotely from RPA Hub in RPA Desktop Design Studio, so that you can debug, build, or modify the automation.

Before you begin

Make sure that the package (automation project) that you're trying to open is published on RPA Hub. For more information, see Publish an automation project in RPA Desktop Design Studio.

Role required: sn_rpa_fdn.rpa_developer, sn_rpa_fdn.rpa_support_user, or sn_rpa_fdn.rpa_admin

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Procedure

1. In the RPA Desktop Design Studio, navigate to **Home** > **Automation projects**.
2. Select **Open cloud project**.
   If the selected ServiceNow instance session has expired, add the ServiceNow instance details. For more information, see Set up RPA Desktop Design Studio.
3. In the Open Project dialog box, select a package name and a version.
4. Select **Open**.
5. Save the ServiceNow project in the default location by selecting **Save**.
6. **Optional:** If the plugin versions that are used in the project aren't found in the local framework, go to the Choose Plugin Version dialog box, select the plugin versions to be used, and select **OK**.

> **Important:** When you open an older automation project in the latest version of Set up RPA Desktop Design Studio, the Upgrade Plugin Version dialog box is displayed. If you proceed to upgrade the plugin version and any automation components are unavailable after the upgrade, then these components are marked as Unknown in the automation project.

Create a skill project in RPA Desktop Design Studio

Create a skill automation project in RPA Desktop Design Studio that can be reused in other automations.

Before you begin

Set up the RPA Desktop Design Studio application and add the ServiceNow instance details. For more information, see Set up RPA Desktop Design Studio.

Role required: none

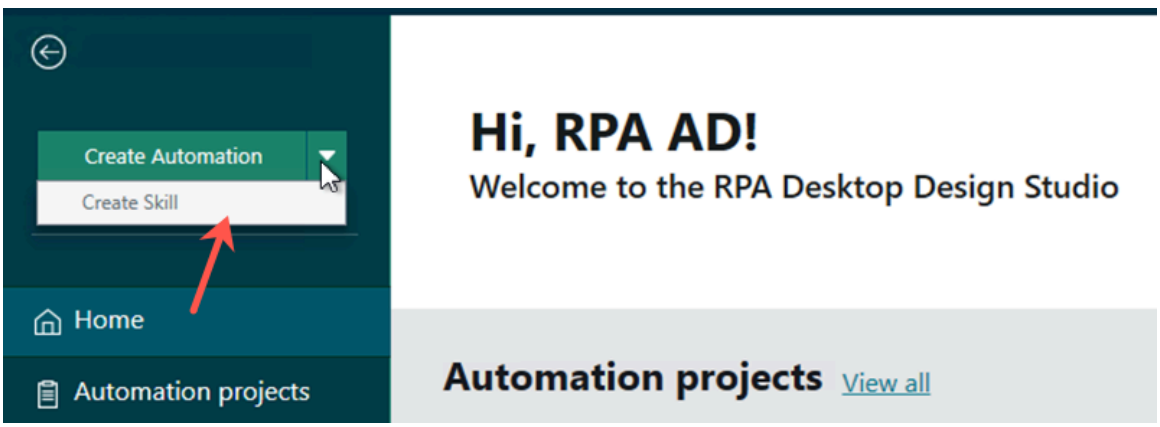
About this task

A skill automation is a reusable component. You can build a skill so that you can provide prebuilt capabilities for other automation processes. For example, if a login functionality is used in four different automations, that login functionality can be created as a skill that you can reuse across automations.

Procedure

1. On the RPA Desktop Design Studio home page, select the down arrow in the **Create Automation** button.
2. Select **Create Skill**.

Create Skill automation button



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3. In the **Name** field, enter the name of the skill automation project.
4. **Optional:** In the **Description** field, enter the description of the skill automation project.
5. In the **Location** field, enter the location of the skill automation project or retain the default location.

   Note: By default, the RPA Desktop Design Studio provides the latest versions of certain plugins with the automation project that you create. You can add more plugins after you create the project. In the Create new skill window, view the default plugins by selecting **View**, next to **Using latest plugins**.

6. Select **Create**.

Related topics

Create an automation project manually

Create an automation project from a template

Create an automation with AI

Manage plugins in RPA Desktop Design Studio

Install, update, or remove plugins to design automations while you're creating unattended and attended automation projects in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

An RPA plugin is a bundle of Windows library files that are consumed by the RPA Desktop Design Studio application. These plugins extend the capability of the Robotic Process Automation (RPA) product. For instance, the Universal App Connector plugin enables the RPA application to automate tasks on a Google Chrome browser.

Internet Explorer, Essential Connectors, Essential Toolkit, and Universal App Connector plugins are available in the RPA Desktop Design Studio project by default.

Install, update, or remove all plugins from a RPA Desktop Design Studio project from the **Plugin manager** under the **View** tab or the **Plugins** node under **Project Explorer** in the RPA Desktop Design Studio.

The following table lists the RPA plugins and their descriptions.

RPA plugins

Plugin Name	Description
Internet Explorer	A connector that enables automating web applications inside Microsoft Internet Explorer. For more information about the IE connector, see IE connector.
SSH	Connector for interacting with server via Secure Shell (SSH). For more information about the SSH connector, see Secure Shell (SSH) connector.

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RPA plugins (continued)

Plugin Name	Description
Essential Toolkit	An essential toolkit for developing unattended and attended projects.
FTP	Connector to transfer files between a client and server on a network. For more information about the FTP connector, see FTP.
Windows	Enables automation of Windows desktop applications. For more information about the Windows connector, see Windows connector.
Barcode Reader	Provides barcode or QR code reading components. For more information about the Barcode connector, see Use the ReadBarcode component.
Universal App Connector	Connector for interacting with Google Chrome, Edge, Java, and Windows based applications. For more information about the Universal App connector, see Universal app connector.
Java	Connector for interacting with Java based applications. For more information about the Java connector, see Configure the Java connector.
Essential Connectors	An essential set of connectors for developing unattended and attended projects.
Scripting	A connector that enables developers to code in Python, VB.NET, C#, and Javascript languages. For more information about the C#, VB.NET, and Javascript connectors, see , Configure the C#.Net connector, Configure the JavaScript connector, and Configure the VB.Net connector.
Terminal (Mainframe)	Connector that interacts with Mainframe applications through IBM Personal Communications (PCOMM) and Rocket BlueZone emulators.

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RPA plugins (continued)

Plugin Name	Description
	For more information about the Terminal connector, see Configure the Terminal connector.
Chromium	A connector that enables automating web applications inside Google Chrome or Microsoft Edge. For more information about the Chromium connector, see Chromium connector.
SAP	Connector for interacting with SAP applications. For more information about the SAP connector, see Configure the SAP connector.

Procedure

1. To navigate to the Plugins Manager window to the RPA Desktop Design Studio project, do either of the steps.
   - Navigate to **View** > **Plugin manager**.
   - Right-click **Plugins** in the **Project Explorer** pane and select **Add Plugin**.

   The **Available** tab shows the plugins that you can install and the **Installed** tab shows the plugins that are available to the current RPA Desktop Design Studio project.
2. To add a plugin, on the Plugins Manager window, select the **Available** tab.
3. Select the plugin you want to add.

   Tip: To find the plugin, enter the name of the plugin in the Filter field.

4. Select **ADD**.
   By default, the RPA Desktop Design Studio displays the latest version of the plugin. To view the previous versions, select the drop-down.
   The plugin is added to the current RPA Desktop Design Studio project and appears under the **INSTALLED** tab of the Plugins Manager window.
5. Select **OK**.
6. **Optional:** To add more plugins, repeat the procedure.
7. Perform the following steps for more plugin options.

Action	Steps
Update a plugin version	**a.** Open the Plugins Manager window. **b.** Select the **AVAILABLE** or **INSTALLED** tab. **c.** Select the plugin. **d.** Select **UPDATE**.

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Action	Steps
	e. Select **OK**. **f.** Save, close and reopen the project to load the updated plugins to the current project.
Remove a plugin	**a.** Open the Plugins Manager window. **b.** Select the **AVAILABLE** or **INSTALLED** tab. **c.** Select the plugin and select **REMOVE**. **d.** Select **Yes**. **e.** Select **OK**. The plugin is no longer available to the cur rent RPA Desktop Design Studio project and removed from the **INSTALLED** tab.

Create user plugins for RPA Desktop Design Studio

Create user plugins by using Microsoft Visual Studio to enable RPA developers to use complex .NET components or libraries in RPA Desktop Design Studio in a seamless way.

Before you begin

Use either Microsoft Visual Studio Pro, Community, or Enterprise version to perform this task.

Role required: none

About this task

The following procedure describes how to create a user plugin using C#.NET.

Procedure

1. Open Microsoft Visual Studio and click **Create a new project**.
2. In the Create a new project dialog box, select the Class Library (.NET Framework) template.

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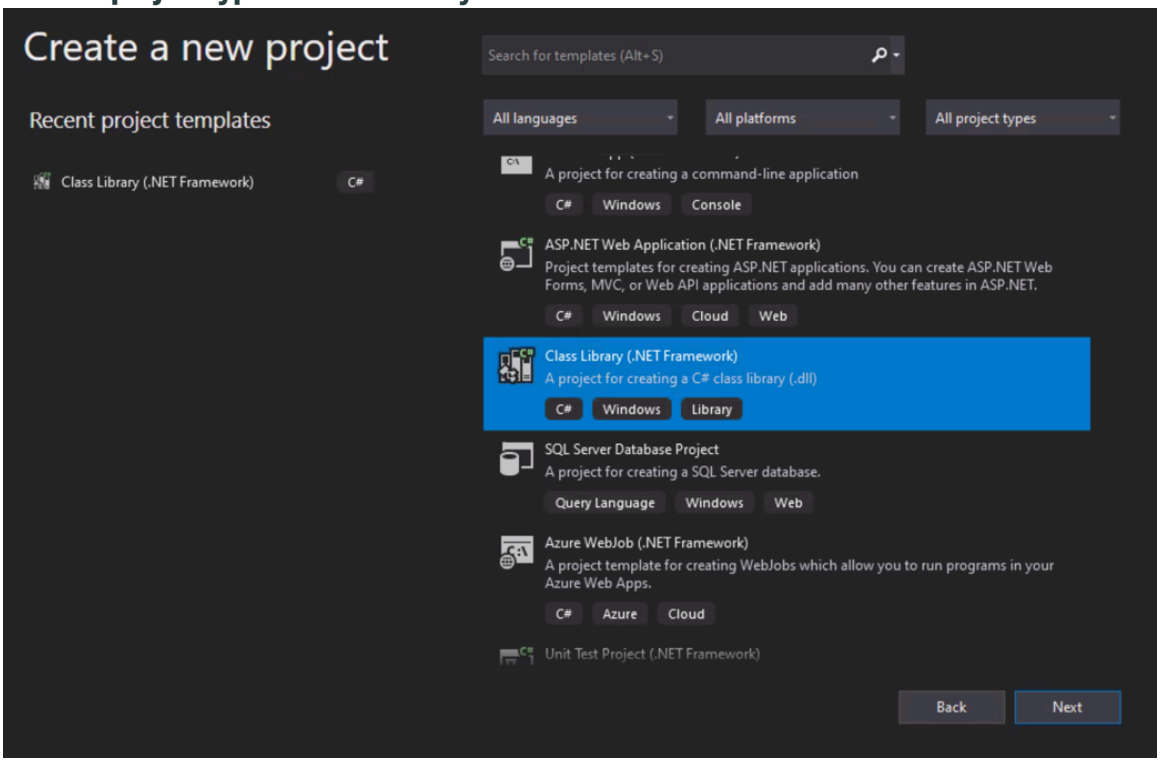
Select a project type of Class Library DOT NET Framework



3. Click **Next**.
4. In the Configure your new project dialog box, fill in the following fields:

Field	Description and action
Project name	Name of your project. For example, `MyFirstPlugin`.
Location	Location of your project. Select a disk location.
Solution name	Name of your project's solution.
Framework	Select a framework version. Select **.NET Framework 4.7** version.

5. Click **Create**.
   The Class1.cs file opens.
6. In the Solution Explorer pane, right-click **References** and select **Add Reference**.
7. In the Reference Manager dialog box, navigate to **Assemblies** > **Framework**.
8. Select the **System.AddIn** assembly to add an annotation of this addin.

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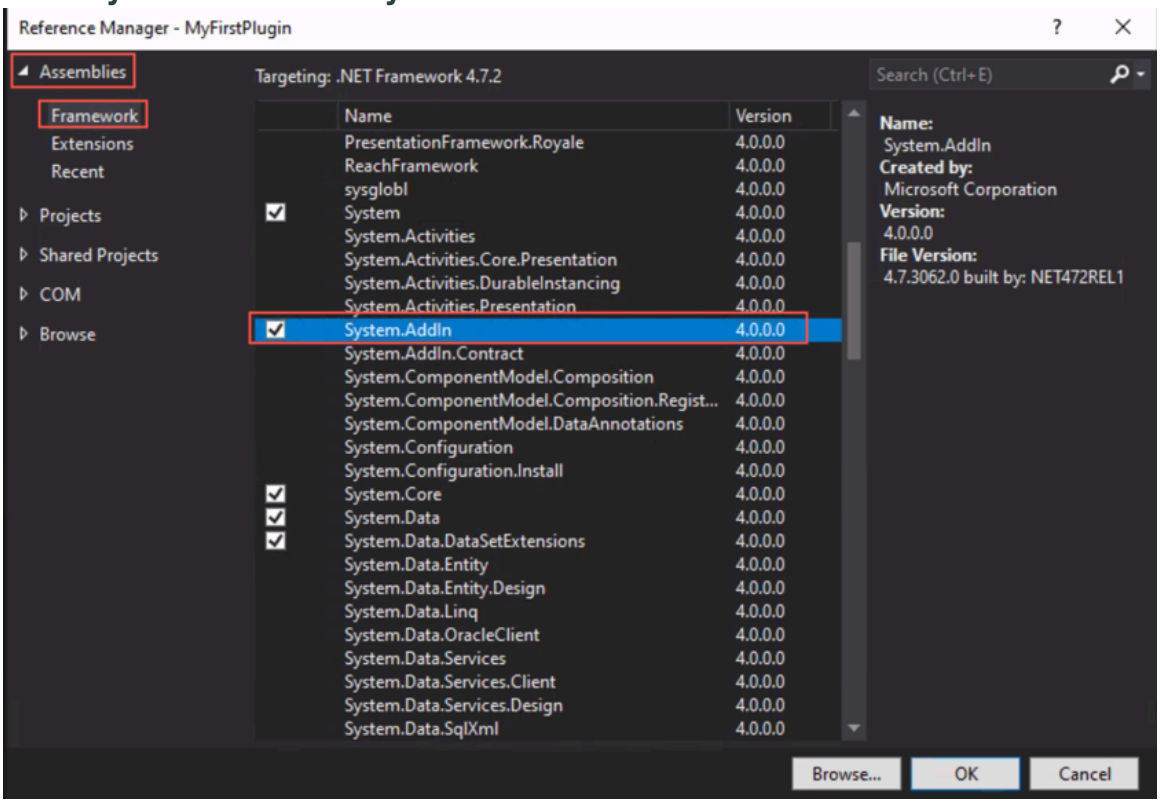
Select System.AddIn assembly



9. Click **OK**.
10. In the Class1.cs file, add the `System.AddIn.AddIn("MyFirstPlugin", Description = "Learning to create custom components", Version = "1.0")` code snippet above the class.
11. In the Class1.cs file, create one or more public static methods to your code.

    In this example, two methods are added to the code:

    - **SayHello** method: The name is taken as the input and returns "Hello" with a name and followed by an exclamation mark. For example, if the input is `User`, it returns "Hello User!".
    - **Sum** method: Two numbers are taken as the input and returns the sum of these two numbers. For example, if the inputs are `5` and `12`, it returns "17".

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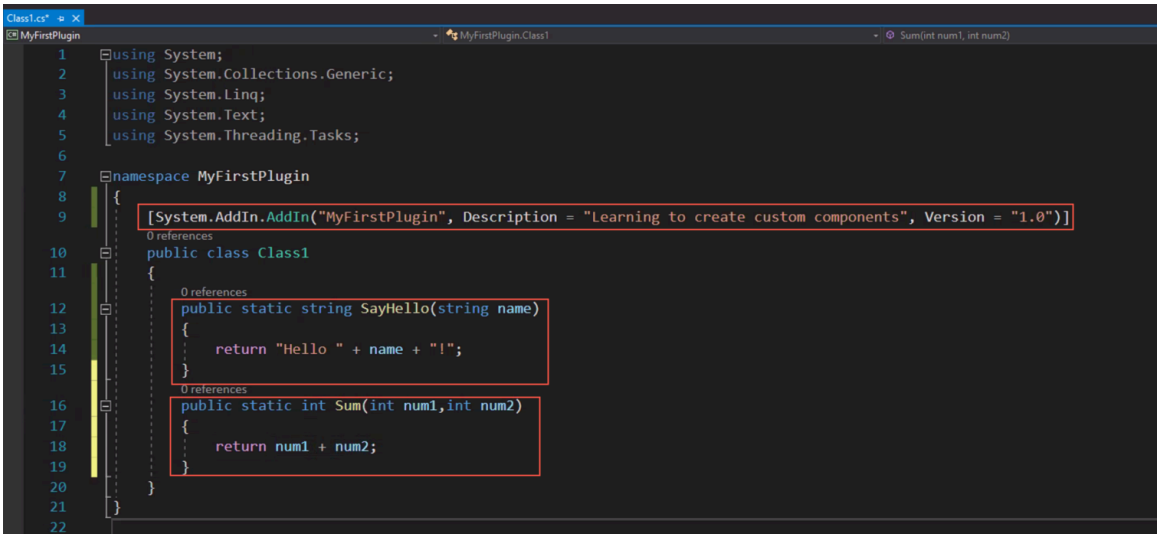
Public static methods



12. Click **Save**.
13. In the Solution Explorer pane, right-click your project and select **Build**.
14. After the build is successful, do the following actions to copy and paste the .dll files:

    a. In the Solution Explorer pane, right-click your project and select **Open Folder in File Explorer**.

    b. Navigate to **bin** > **Debug** and copy the .dll files.

    c. Go to your RPA Desktop Design Studio automation project folder and create a new folder as **UserPlugins**.

    > **Important:** Ensure that the spelling of this folder is entered correctly.

    d. In the UserPlugins folder, create a folder and enter a name for the folder.

    Example
    For example, `My First Plugin`.

    e. Paste the .dll files in this folder.

15. In the RPA Desktop Design Studio, do the following actions to add the plugin to your automation project:

    a. In the Project Explorer pane, right-click **User Plugins** and select **Add User Plugin**.

    b. In the Available User Plugins dialog box, select the plugin.

    c. Click **OK**.
    In the Toolbox pane, the user plugin you created appears.

16. Do the following actions to use the user plugin:

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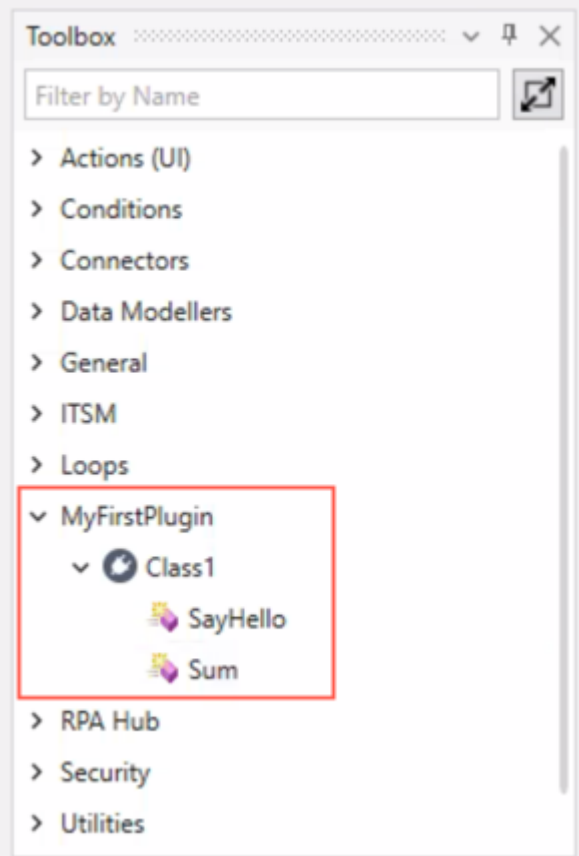
a. In the Toolbox pane, navigate to the user plugin component category to select a method.

Two methods that appear in the user plugin component category



b. Drag a method to the Design surface.

c. To provide the input parameter value manually, double-click the input parameter field under the method, and enter the value.

d. To provide the input parameter value from another method or component, connect the Data In port of the method to the Data Out port of another method or component.

e. Connect the control ports of the method to the corresponding ports of another method or component.

f. On the Design surface, right-click the title bar of the component from where you want to start the execution and select **Run From Here**.

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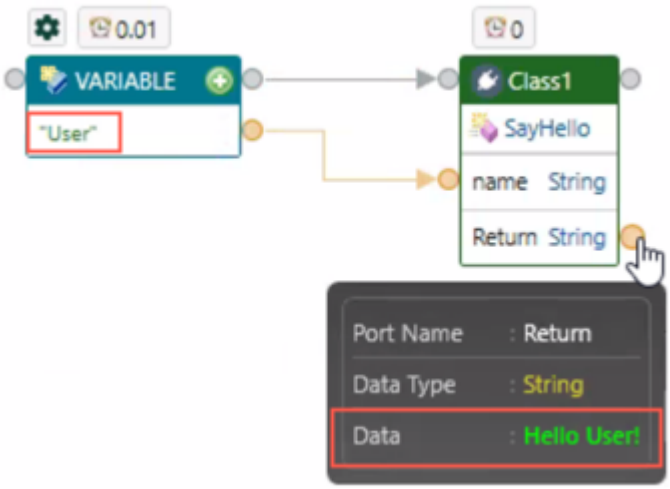
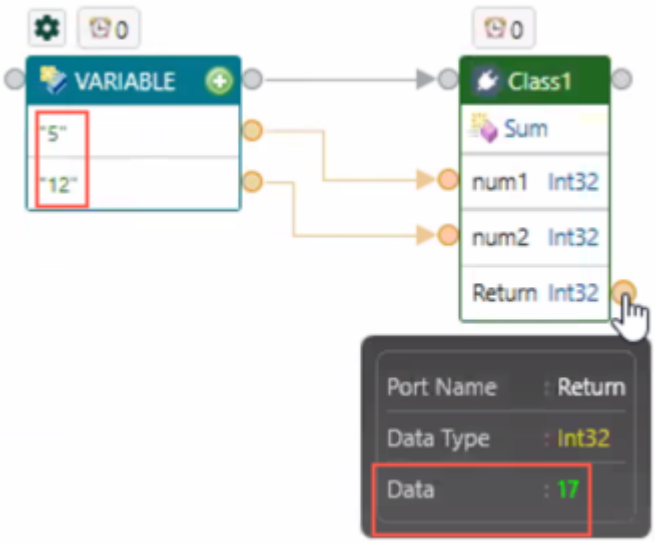
Output of the SayHello method



Output of the Sum method



RPA Desktop Design Studio ports

Components in the RPA Desktop Design Studio have ports that are used while creating an automation workflow.

The ports are categorized as Control ports and Data ports.

The gray ports are called the Control ports and the orange ports are called the Data ports.

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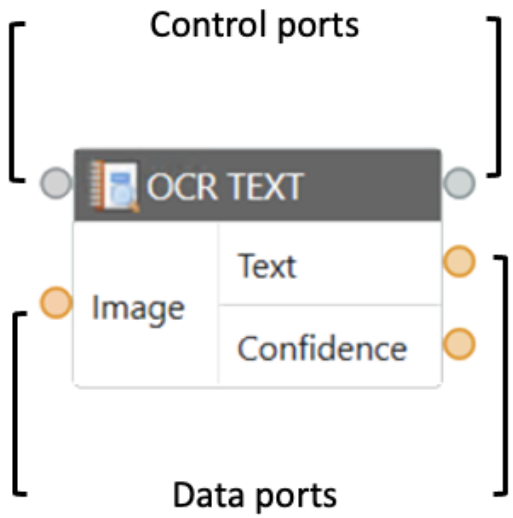


The ports are subcategorized into input ports and output ports.

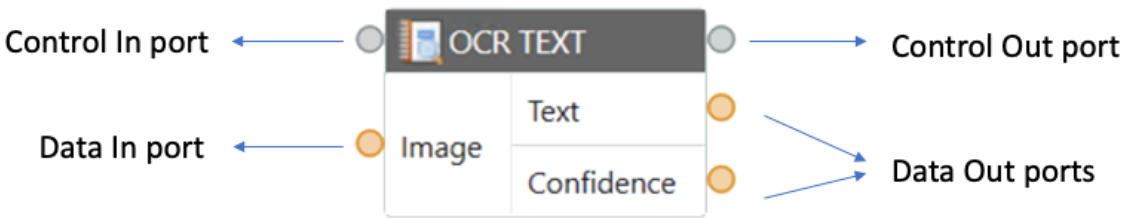
Control ports are subcategorized into Control In and Control Out ports. Control ports decide the flow of the automation execution (which component to execute next).

Data ports are subcategorized into Data In and Data Out ports. Data ports transfer data between components.

Arrow heads on the connection lines indicate the flow of the direction.

Input ports always appear on the left of the component and output ports appear on the right of the component.

Hover over the port to see the function of the port.



A Data port turns red when you turn off the logging on that port. For example, select this option if you don't want to log sensitive information such as password or banking

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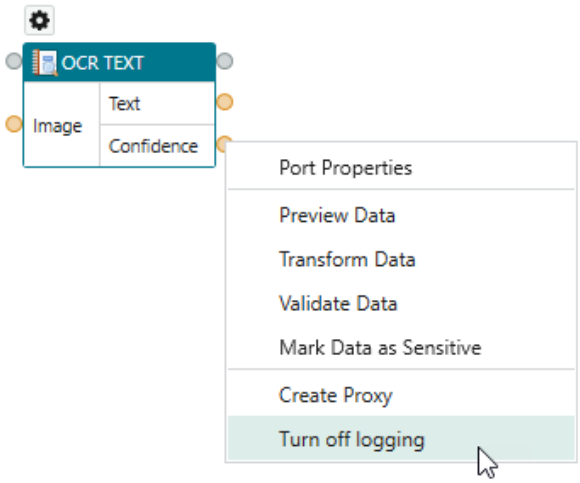
details. To do that, right-click the Data In or Data Out port and select **Turn off logging**.



To turn on the logging, right-click the inactive Data port and select **Turn on logging**.

A Data port turns green when the data is transformed. For example, it turns green when it converts any information existing within a Data port from one format to another. To do that, right-click the Data In or Data Out port and select **Transform Data**. For more information, see Transform the data in RPA Desktop Design Studio.

Create an activity with AI

Create activities from text instructions and preview options by using AI. Activities provide modularity to an automation project in RPA Desktop Design Studio.

Before you begin

Set up the RPA Desktop Design Studio application and add the ServiceNow instance details. For more information, see Set up RPA Desktop Design Studio.

To access the AI features in RPA Desktop Design Studio, perform the following steps:

- Install the ServiceNow Otto for RPA Hub application to add the generative AI capability. For more information, see Install ServiceNow Otto for RPA Hub.
- Turn on the RPA bot generation skill to use the generative AI capability. For more information, see Turn on the RPA bot generation skill.
- After activating the RPA bot generation skill, relaunch the RPA Desktop Design Studio application to apply the modified settings.

If you skip these steps, the ServiceNow Otto for RPA Hub feature doesn't appear in RPA Desktop Design Studio.

Familiarize yourself with the RPA bot generation skill concepts. For more information, see Robotic Process Automation (RPA) bot generation skill, Limitations of ServiceNow Otto for RPA Hub, and Example instructions for ServiceNow Otto for RPA Hub.

Role required: sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin

About this task

Activities are a reusable set of instructions that are designed for an automation on the Design surface of RPA Desktop Design Studio. Activities are used to segregate the entire automation into smaller chunks for easier comprehension of the automation logic.

You can design automation workflows in an activity on the Design surface by using various components.

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Each activity contains two components by default: Start and End. These components can't be deleted because they're the starting and ending points of the activity.

You can reuse each activity multiple times within the same automation project by dragging the activity to the Design surface. You can also import activities in different automation projects.

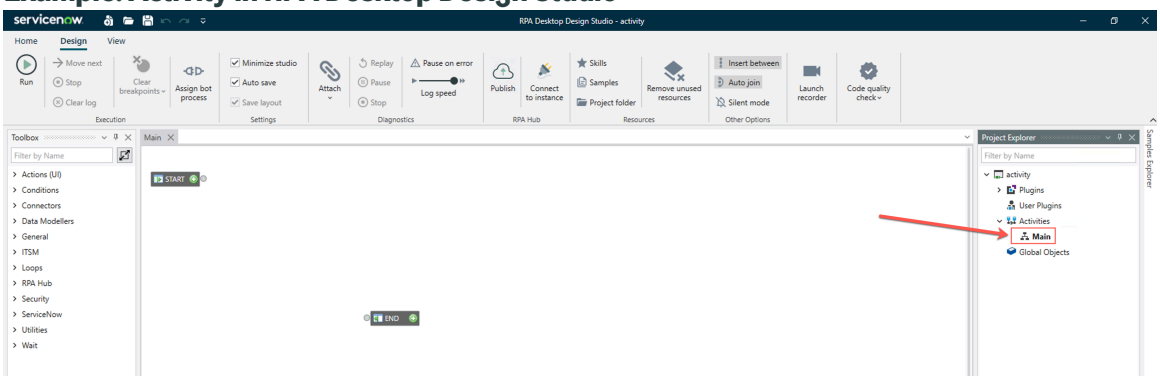
To create an activity manually, see Create an activity manually in RPA Desktop Design Studio.

Procedure

1. In the Project Explorer pane of RPA Desktop Design Studio, navigate to **Activities**.

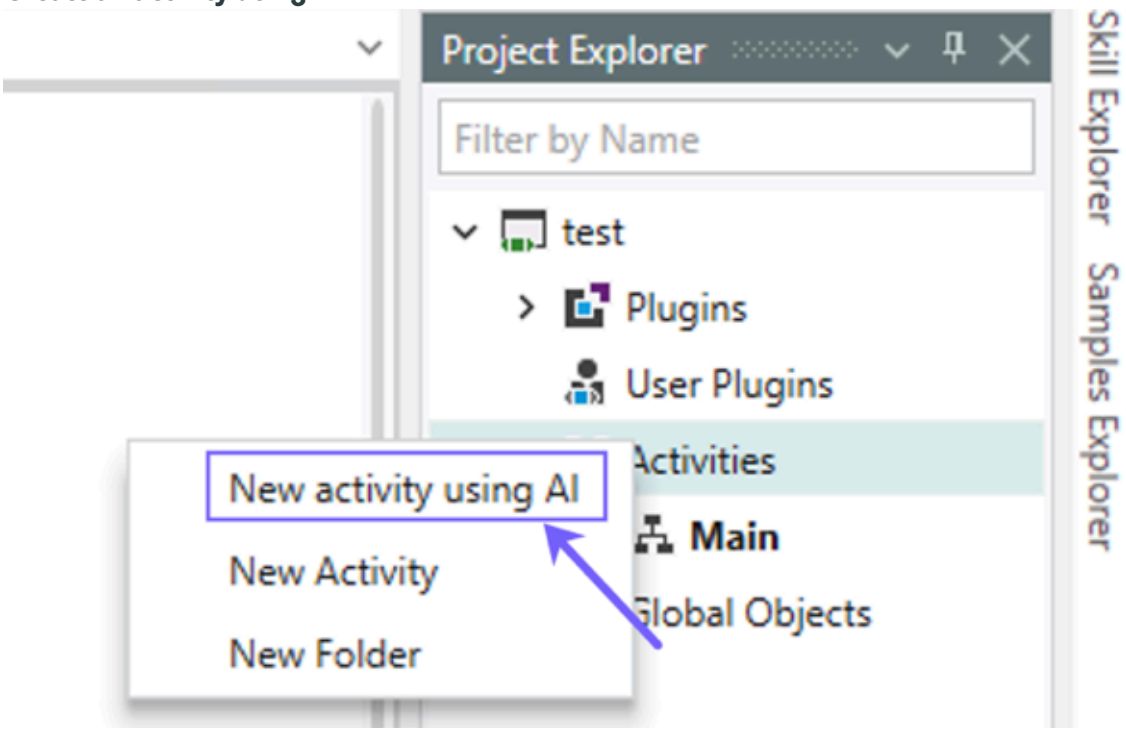
   The Activities section lists all the activities that are created in each project. By default, a Main activity is created when a new project is initiated. The automation execution starts from the startup activity, in this case, Main activity, as shown in the following example.

   Example: Activity in RPA Desktop Design Studio

2. In the Project Explorer pane, right-click **Activities** and select **New activity using AI**.

   Create an activity using AI

3. In the New activity window, enter the AI instructions.

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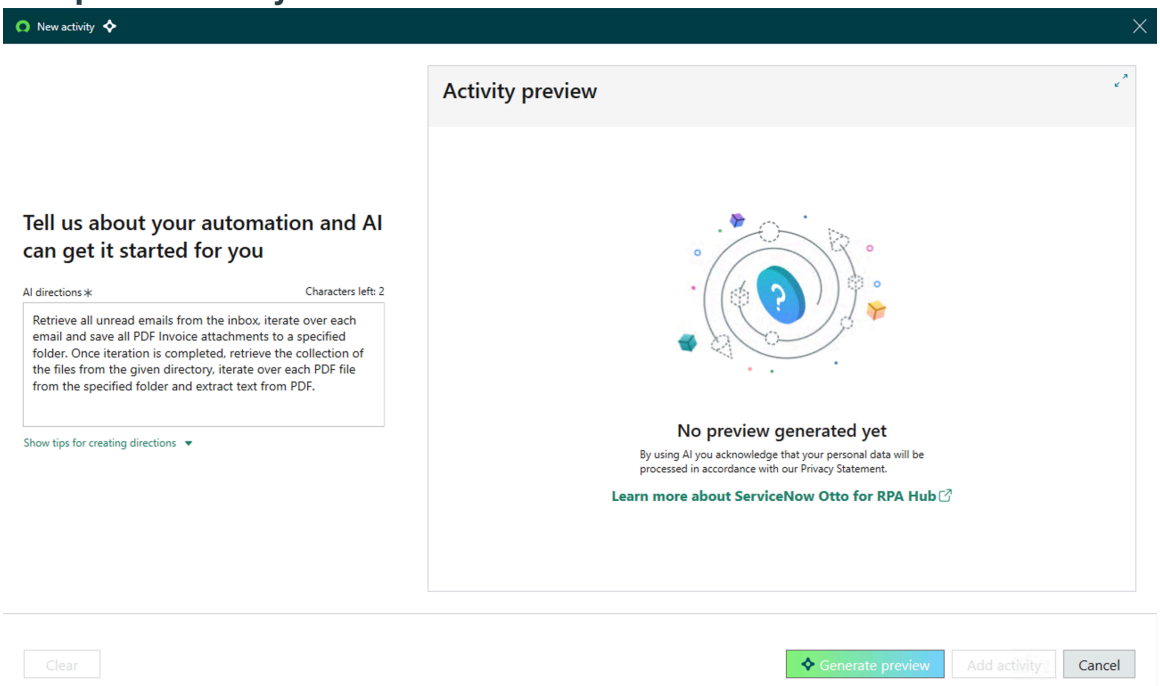
The instruction text is used by the RPA bot generation skill to create your automation. Use short, direct, and clear sentences to describe the expected actions. Be specific and provide detailed descriptions of the automation logic. Avoid jargon and abbreviations.

Example: New activity window



Note:

For more information on example AI instructions and general guidelines, see Robotic Process Automation (RPA) bot generation skill. For more information about the limitations of the RPA bot generation skill, see Limitations of ServiceNow Otto for RPA Hub.

4. Select **Generate preview**.
5. **Optional:** In the New Activity window, regenerate a preview, clear a workflow, cancel an automation, or add an activity.

Note:

You can't make any changes In the Activity preview screen because it's read-only. You can maximize it and use scroll options to view the entire generated automation workflow.

If your instruction generates a workflow with components that aren't compatible with the current project type, those components show up as unknown in the generated workflow. For example, if your workflow includes a GracefulStop component and if the current project is attended automation, the GracefulStop component appears as unknown because it's not supported in the attended automations.

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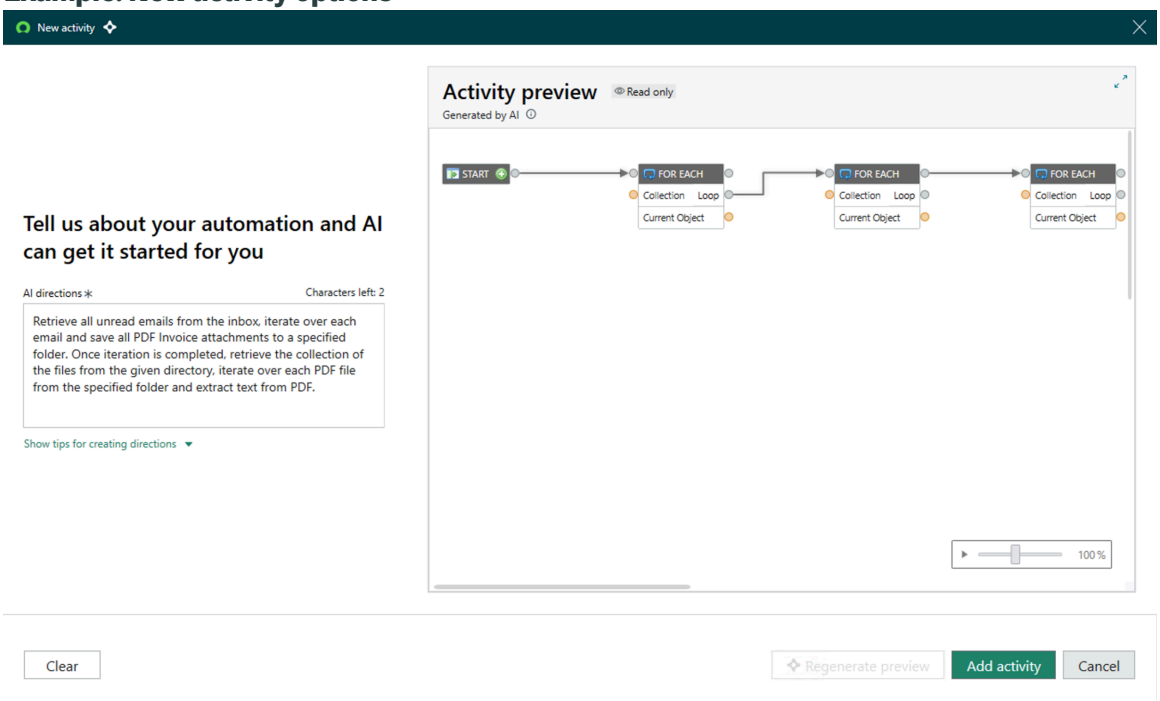
Example: New activity options



Option	Procedure
Regenerate preview	If the generated automation preview doesn't meet your needs, you can update the AI instructions, and select **Regenerate preview**. Each time you build or rebuild an automation, the operation counts as an assist tracked by your AI subscription. To track your AI usage, see Monitoring Now As
Clear	If you want to clear the workflow that was created by the AI instructions, select **Clear** and then select **Yes** in the Confirm clear automation window.
Cancel	If you want to stop creating an automation and return to the design surface, select **Cancel**. In the Confirm cancel window, select **Yes** to return to the previous screen. The added content isn't saved.
Add activity	If the automation preview looks good, select **Add activity**. **Important:** The automation is generated by AI. Be sure to check it for accuracy and make any edits before running. Close the displayed message for a clearer view. **Example: Automation workflow on the design surface** 

Result

The automation flow is added as a New Activity in Activities.

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What to do next

For more actions on the activity, see Create an activity manually in RPA Desktop Design Studio.

Create an activity manually in RPA Desktop Design Studio

Create and use an activity to provide modularity to an automation project in RPA Desktop Design Studio.

Before you begin

Set up the RPA Desktop Design Studio application and add the ServiceNow instance details. For more information, see Set up RPA Desktop Design Studio.

Role required: none

About this task

Activities are a reusable set of instructions that are designed for an automation on the Design surface of RPA Desktop Design Studio.

You can design automation workflows in an activity on the Design surface by using various components.

Each activity contains two components by default: Start and End. These components can't be deleted because they are the starting and ending points of the activity.

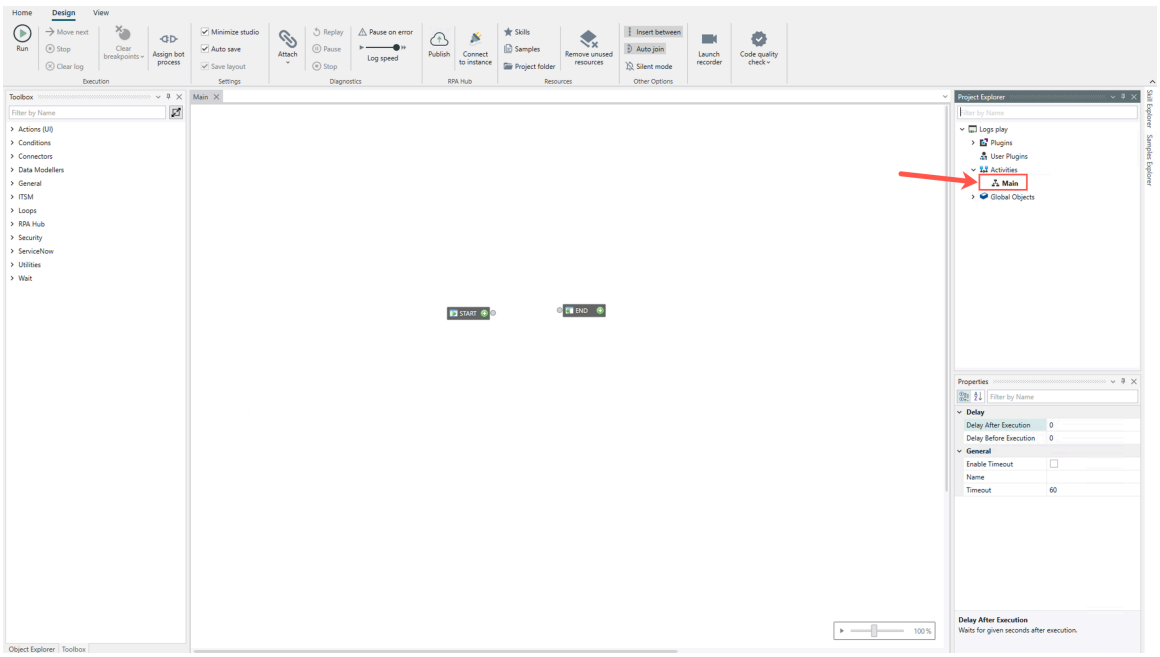
You can reuse each activity multiple times within the same automation project by dragging the activity to the Design surface. You can also import activities in different automation projects.

To create an activity using Now Assist, see Create an activity with AI.

Procedure

1. In the Project Explorer pane, navigate to **Activities**.

   The Activities section lists all the activities that are created under each project. By default, a Main activity is created when a new project is initiated. The automation execution starts from the startup activity, in this case, Main activity as shown in the following example.



2. Do any of the following options for a desired action.

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Option	Action
To create a new activity	Right-click **Activities** in the Project Explorer pane and select **New Activity**.
To create a new activity with Now Assist	Right-click **Activities** in the Project Explorer pane and select **New activity using Now Assist**. For more information, see Create an activity with AI. To access the AI features in RPA Desktop Design Studio, perform the following steps: ○ Install the ServiceNow Otto for RPA Hub application to add the generative AI capability. For more information, see Install ServiceNow Otto for RPA Hub. ○ Turn on the RPA bot generation skill to use the generative AI capability. For more information, see Turn on the RPA bot generation skill. ○ After activating the RPA bot generation skill, relaunch the RPA Desktop Design Studio application to apply the modified settings. If you skip these steps, the ServiceNow Otto for RPA Hub feature doesn't appear in RPA Desktop Design Studio.
To rename an activity	Do one of the following actions: ○ In the Project Explorer pane, right-click the activity and select **Rename** to enter a new name. ○ Double-click the activity and in the Properties pane, change the name in the **Name** field. For example, Test 1 and Test 2.
To add the input parameters to an activity	Click the plus icon () on the Start component. When you drag this activity into another activity, the input parameters appear as Data Input ports.
To add the output parameters to an activity	Click the plus icon () on the End component. When you drag this activity in another activity, the output parameters appear as Data Output ports.
To open an activity on the Design surface	Double-click the activity.
To set a particular activity as the starting point for the automation project	Right-click the activity and select **Mark As Startup**.

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Option	Action
	By default, the Main Activity is marked as start up. When you click **Run** under the **Design** tab to run this project, the automation begins from the activity that is marked as startup.
To reuse an activity within the same automation project	Drag the activity to the desired Design surface of the activity.
To reuse an activity in a different automation project	Perform the steps in the Import project in RPA Desktop Design Studio.
To handle the errors at an activity level	Right-click the desired activity and select **Error Handler**.
To create a local variable	Right-click the desired activity and select **Create a Variable**.
To create a copy of an activity	Right-click the desired activity and select **Create a Copy**. For example, if you are creating a copy of the Test 1 activity, a new activity is created as Test1_Copy under the Activities section.
To find all the references of an activity that are used in other activities	Right-click the desired activity in the Project Explorer pane and select **Find All References**. Results are displayed in the Find All References dialog box.
To delete an activity	Do the following: **a.** Delete all the references that are used in other activities, if any. Use the **Find All References** option to do this step. **b.** In the Project Explorer pane, right-click the activity and select **Delete**. **c.** In the Confirmation dialog box, select **Yes**.
To resolve conflicts when merging changes from multiple sources of an activity	Right-click the desired activity in the Project Explorer pane and select **Source Control**. The COMPARE PROCESSES dialog box appears and the changes are highlighted as shown in the following example.

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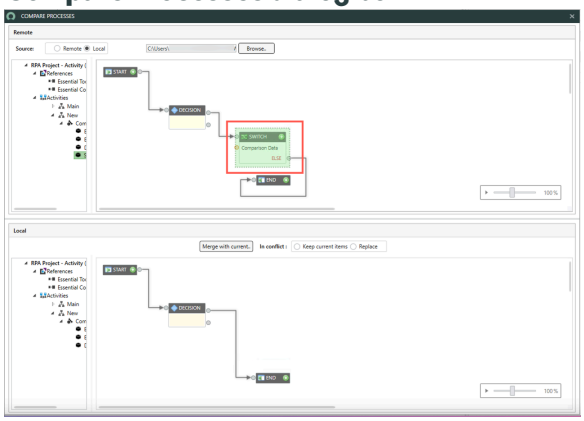
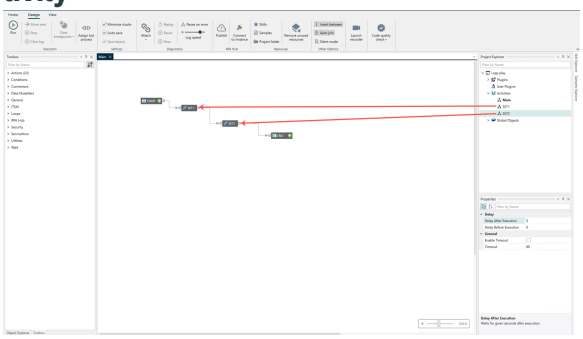
Option	Action
	Compare Processes dialog box  For more information, see Resolve conflicts when merging changes from multiple sources of the same activity.
To execute and test the automation of the project that includes all activities	Do the following: **a.** Consolidate all the activities in a single Main activity and arrange them in the execution order to execute the entire automation, as shown in the following example. **Consolidate Test 1 and Test 2 activities in a single Main activity** 

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Option	Action
	b. Click **Run** under the **Design** tab to execute the entire automation designed in these two activities. In this example, the Main activity is marked as startup, which executes the Test 1 activi ty followed by the Test 2 activity.

Important: You might come across the following behaviours when you drag and drop an automation component from the Toolbox, Object explorer, Project explorer, and Skills explorer to the Design surface:

- If you drag and drop a component to the same component in the Design surface, then the new component replaces the existing component. For example, if you already have the **ActionSet** component on the Design surface and you drag and drop another **ActionSet** component to the existing **ActionSet**, then the new version replaces the existing component.

  All the connections (control and data connections), variables, or static data associated to the existing component gets associated to the newly dropped component if the port name and the port data type are the same.

- If you drag and drop a new component to a different component or method in the Design surface then the new component replaces the existing component.

  All the connections, variables, or static data associated to the existing component gets associated to the newly dropped component if the port names and the port data types are the same.

- If you drag and drop a component between two components that are already connected in the Design surface, then the component is placed between the existing components. You may come across the following behaviours when you drag and drop a component between two components:
  - If port names and the port data types of the newly dropped component match with the connected components, then the data connections are created.
  - If the port names are the same and the port data types are different, then the data connections are created only if the port data type is can be converted (the source port data must be converted to target data type. This is known as typecasting or type conversion. For more information on type casting, see Java Type Casting). For example, integer to object but not object to integer.
  - If the port names are the same and the port data type can be converted, but there is already an existing data connection between the two components, then no new data connection is created.

Related topics

Handle errors in RPA Desktop Design Studio

Create and use a variable in RPA Desktop Design Studio

Create and use a variable in RPA Desktop Design Studio

Create a variable in RPA Desktop Design Studio.

Before you begin
Role required: none

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About this task

There are two types of variables:

- Local: This variable is declared within an activity and can be used only within the declared activity.
- Global: This variable is declared at a project level and can be used in any activity within the automation workflow.

  Variables have four attributes and they're assigned during an automation execution at different times:

  - Identifier
  - Data Location
  - Type
  - Value

Procedure

1. To create a local variable, perform either of the following actions:
   - In the Toolbox pane, navigate to **General** and drag the Variable component to the Design surface.
   - In the Toolbox pane, navigate to **General** and drag the Variable component onto the activity under the Project Explorer pane.
   - In the Project Explorer pane, right-click the desired activity and select **Create a Variable**.
2. To create a global variable, perform either of the following actions:
   - In the Project Explorer pane, right-click **Global Objects** and select **Create a Variable**.
   - In the Toolbox pane, navigate to **General** and drag the Variable component to **Global Objects** onto the Project Explorer pane.
3. **Optional:** If you want to convert a local variable to global, right-click the local variable from Project Explorer and select **Convert to global**.
   You can use this option if you have created a variable as local.
4. After the variable is created, drag the variable to the Design surface as shown in the following example.

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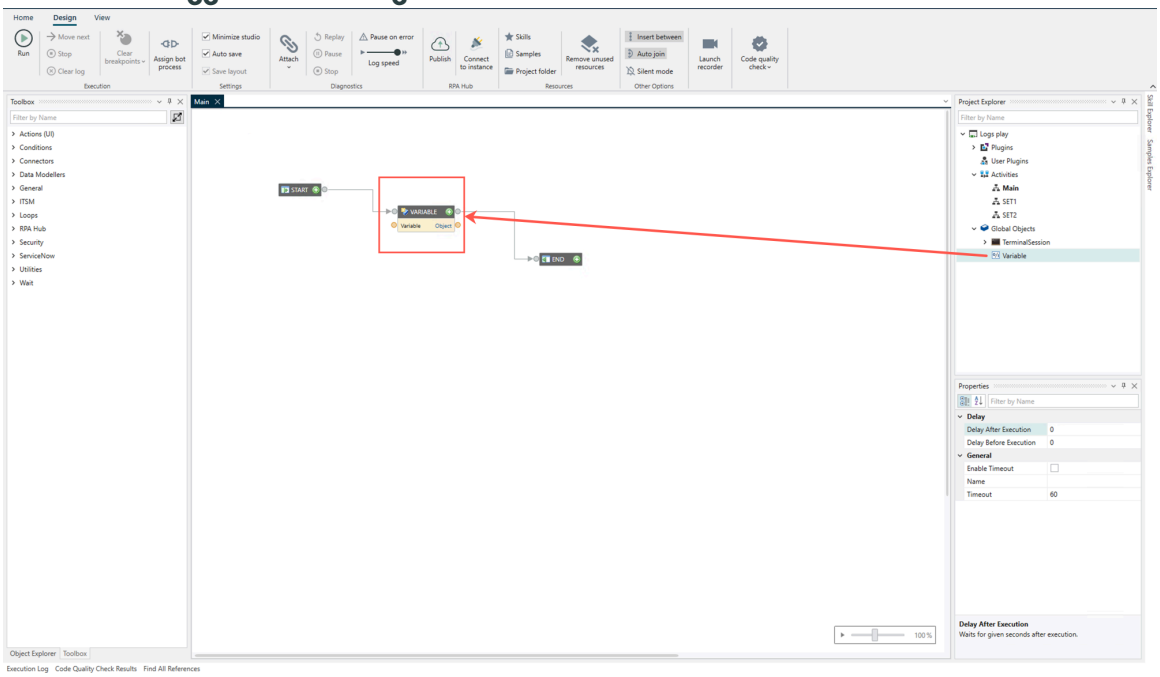
Variable is dragged to the Design surface



5. Connect the data and control ports of the variable to the corresponding ports of the other components.
6. **Optional:** To assign a variable to either the Data In or the Data Out port, perform the following actions:

   a. On the Design surface, right-click the Data In or Data Out port of the variable and select **Override**.

   b. In the PORT PROPERTIES dialog box, click **Select** next to the **Mapped Variable** field to choose a required variable.

   > **Note:** If you select this option, the Data In port on the component disappears and the variable name appears on the port.

   c. In the CHOOSE VARIABLE dialog box, choose a mapped global or a local variable to read or store data depending on whether you want to override the Data In or the Data Out port.

   d. Click **OK**.

7. **Optional:** To use variables in either a Data In or a Data Out port, drag the variable onto the Data In or Data Out port on the Design surface as shown in the following example.

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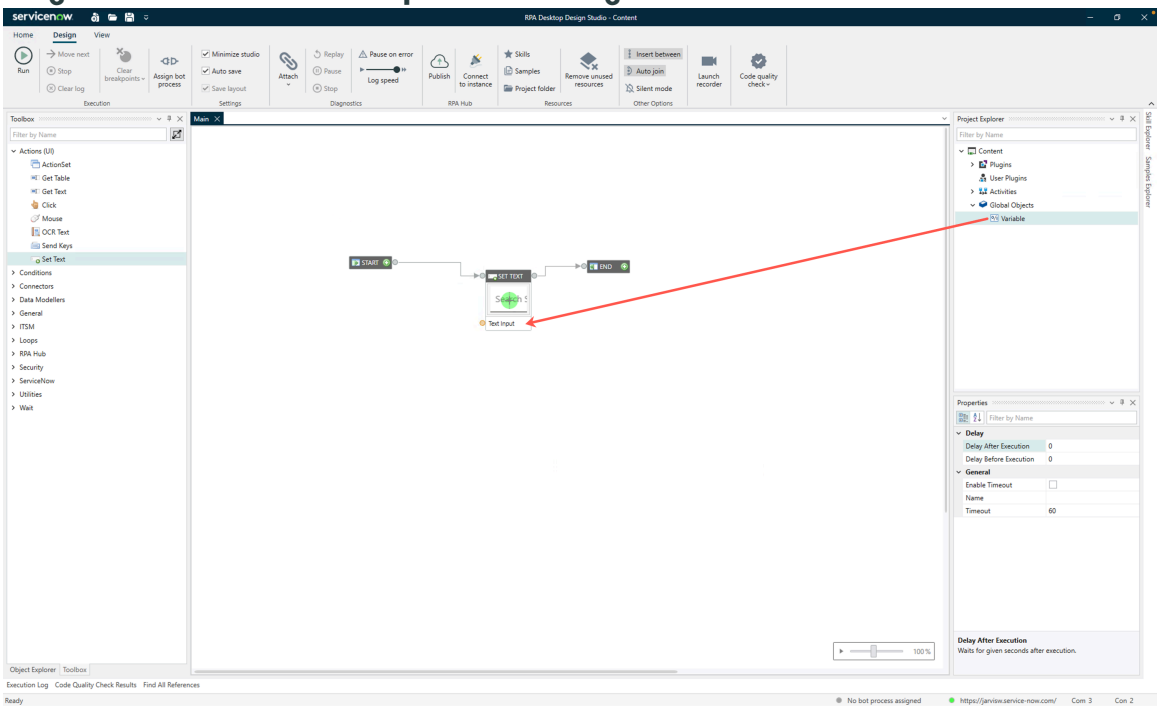
Drag the variable to the Data In port on the Design surface



The following example shows the output when the variable is dragged to the Data In port.

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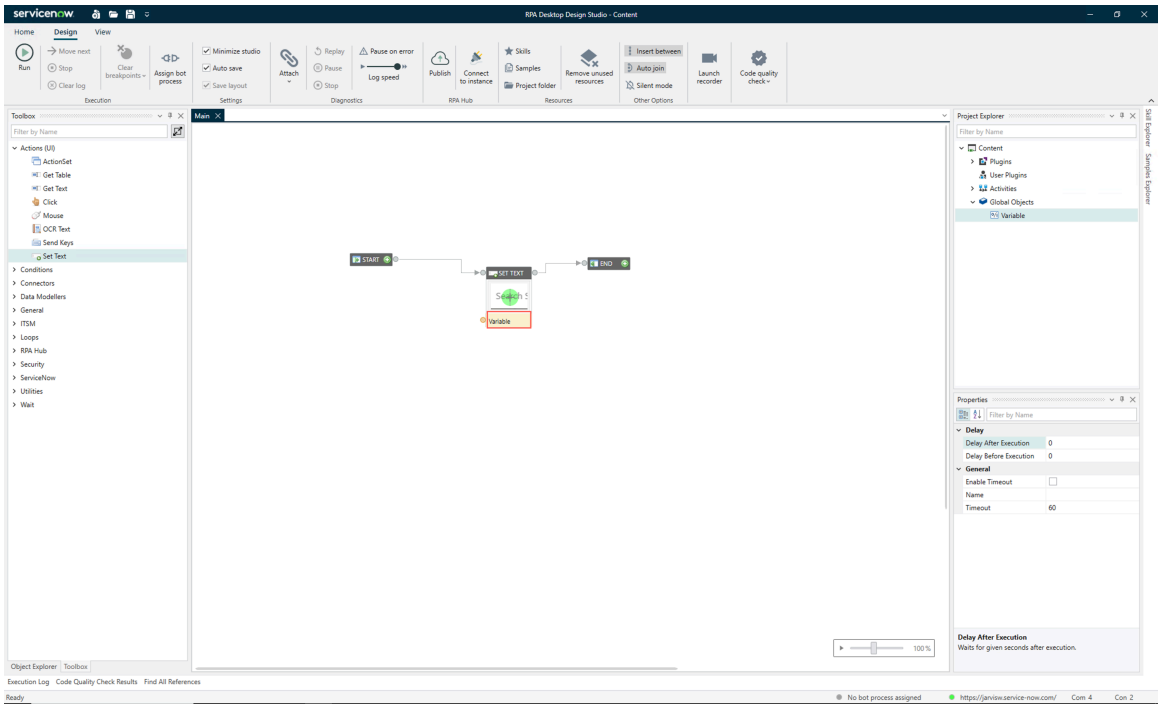
Output when the variable is dragged to the Data In port



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Important: You might come across the following behaviours when you drag and drop an automation component from the Toolbox, Object explorer, Project explorer, and Skills explorer to the Design surface:

- If you drag and drop a component to the same component in the Design surface, then the new component replaces the existing component. For example, if you already have the **ActionSet** component on the Design surface and you drag and drop another **ActionSet** component to the existing **ActionSet**, then the new version replaces the existing component.

  All the connections (control and data connections), variables, or static data associated to the existing component gets associated to the newly dropped component if the port name and the port data type are the same.

- If you drag and drop a new component to a different component or method in the Design surface then the new component replaces the existing component.

  (Optional) All the connections, variables, or static data associated to the existing component gets associated to the newly dropped component if the port names and the port data types are the same.

- If you drag and drop a component between two components that are already connected in the Design surface, then the component is placed between the existing components. You may come across the following behaviours when you drag and drop a component between two components:
  - If port names and the port data types of the newly dropped component match with the connected components, then the data connections are created.
  - If the port names are the same and the port data types are different, then the data connections are created only if the port data type is can be converted (the source port data must be converted to target data type. This is known as typecasting or type conversion. For more information on type casting, see Java Type Casting). For example, integer to object but not object to integer.
  - If the port names are the same and the port data type can be converted, but there is already an existing data connection between the two components, then no new data connection is created.

Create an attended automation form in RPA Desktop Design Studio

Design attended automations by creating an attended user interface (UI) form in RPA Desktop Design Studio.

Before you begin

Ensure that the project type is **Attended Automation**. For more information, see Create an automation project manually.

Role required: none

About this task

An attended automation form is a container for all the elements that make up the UI. A form is a custom interface that you can use to interact with multiple applications within the RPA Desktop Design Studio. You can use forms to insert various elements and arrange them in layouts.

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Procedure

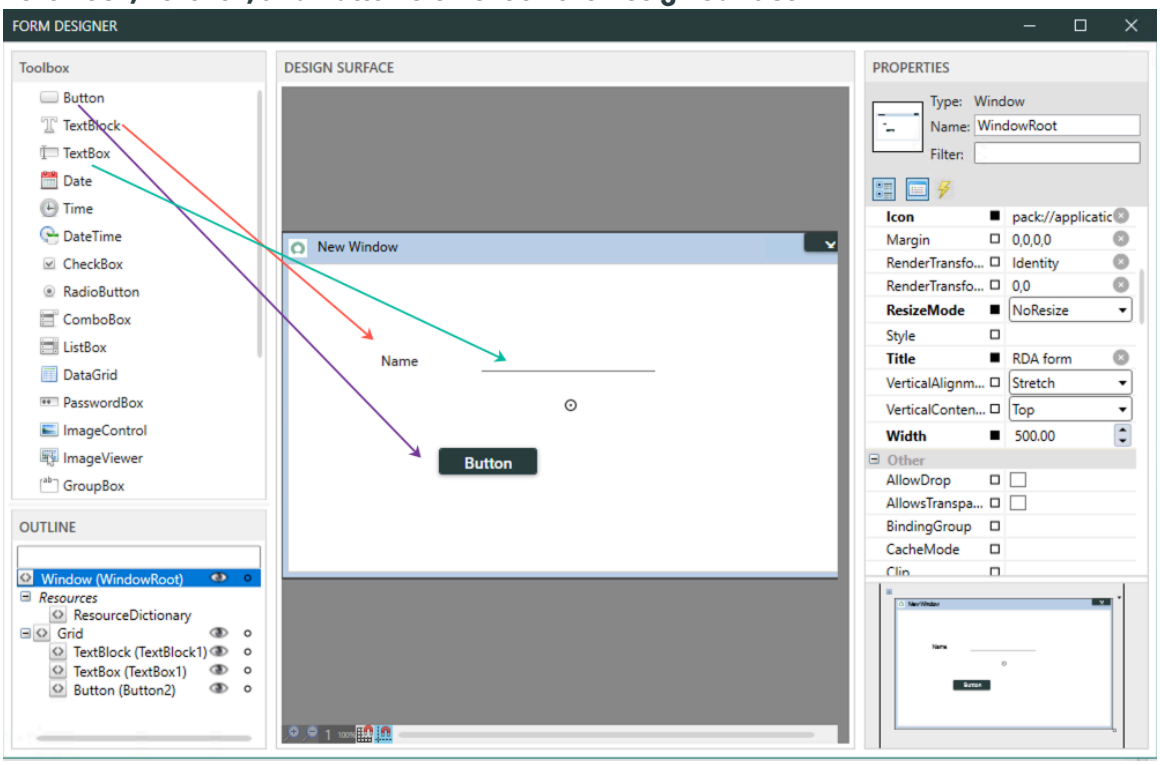
1. In the RPA Desktop Design Studio, from the Project Explorer pane, navigate to **Forms** and expand it.
2. Choose an option and complete the action.

Option	Action
To create a new form	Right-click **Forms** in the Project Explorer pane and select **New Form**.
To access the Form Designer	Right-click a form in the Project Explorer pane and select **Design**. For more information on the Form Designer, see Form designer for building attended automation forms.

3. In the Form Designer, from the Toolbox pane, select an element that you want to add to your form and draw it on the Design surface.

   Example
   For example, to draw a text block on the form, select the TextBlock element from the Toolbox pane and draw it on the Design surface. Similarly, select the TextBox and Button element and draw them on the Design surface, as shown in the following example.

   TextBlock, TextBox, and Button element on the Design Surface



4. In the Form Designer, from the Properties pane, update the name of an element in the **Name** field, as shown in the following example.

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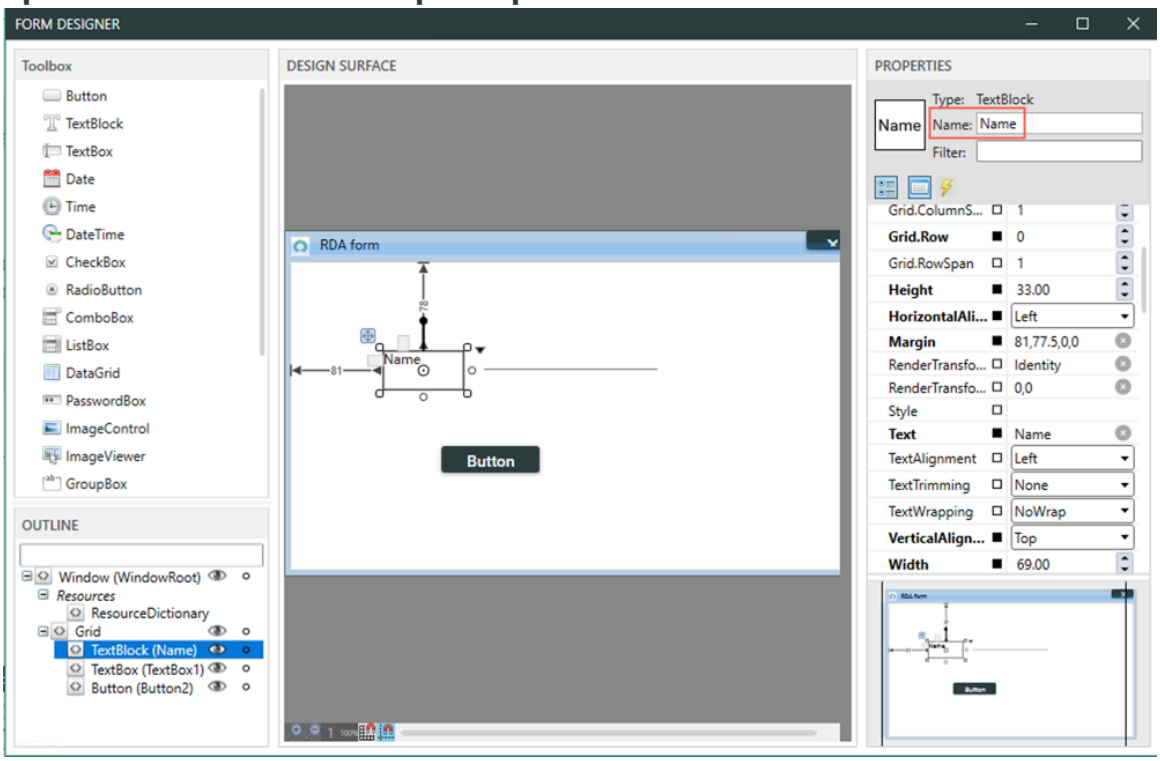
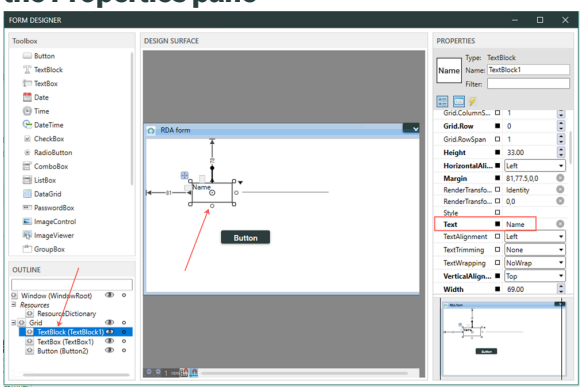
Update the Name field in the Properties pane



5. Choose an option and complete the action.

Option	Action
To edit the properties of an element	Select the desired element in the Outline pane or on the Design surface and edit the re quired properties in the Properties pane. For example, to edit the display label of the TextBlock element, enter a label in the **Text** field in the Properties pane, as shown in the following example. **Enter a name in the Text field in the Properties pane** 
To edit the properties of a window	Select the window in the Outline pane and edit the required properties in the Properties pane.

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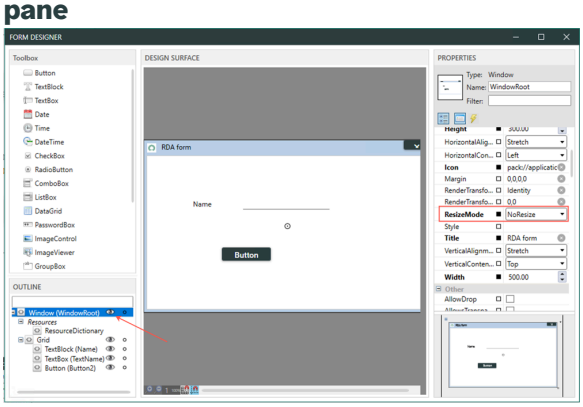
Option	Action
	For example, to resize the window, select an option from the **ResizeMode** field in the Properties pane, as shown in the following example. **Resize the window in the ResizeMode field in the Properties pane** 
To arrange the elements	Move them as required in the Outline pane.
To view the added elements under the desired form	Perform the following actions:

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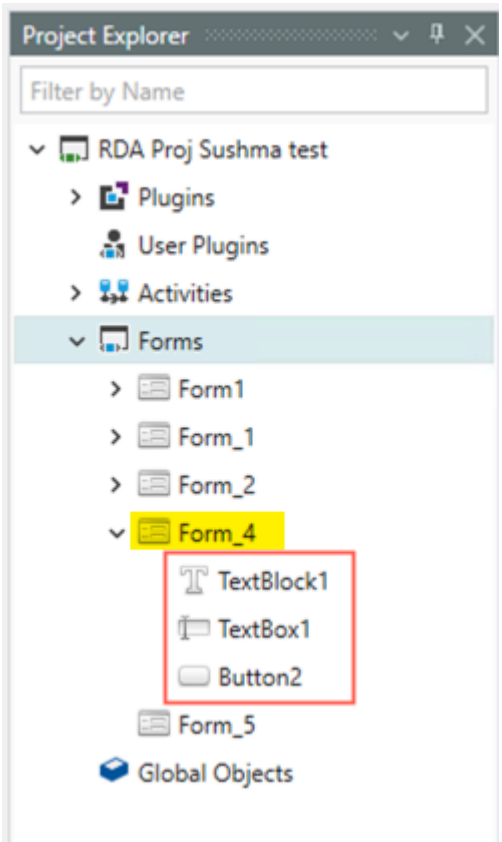
Option	Action
	a. In the Project Explorer pane, close the form in which you added the elements. **b.** Expand the form and view the elements that are added under the form as shown in the following example. **Elements appear under the form** 
To delete an element on the Design surface	In the Outline pane, right-click the element to be deleted and select **Delete**.
To view the methods and events for a form	Double-click the created form in the Project Explorer pane. The methods and events are displayed in the Object Explorer pane. For more information, see Methods and events of an attended automation form.
To view the methods and events for an element	Double-click the element in the Toolbox pane of the Form Designer. The methods and events are displayed in the Object Explorer pane. For more information, see Methods and events of elements.
To delete a form	Do the following actions:

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Option	Action
	a. Delete all the references of the elements that are used in other activities, if any. Use the **Find All References** option to do this step. **b.** In the Project Explorer pane, right-click the form and select **Delete**. **c.** In the Confirmation dialog box, select **Yes**.
To find all the references of an element that are used in other activities	Right-click the desired form in the Project Explorer pane and select **Find All References**. Results are displayed in the Find All References dialog box.
To rename a form	Do any of the following actions: ○ In the Project Explorer pane, right-click the form and select **Rename** to enter a new name. ○ Double-click the form and in the Properties pane, change the name in the **Name** field.

Related topics

Methods and events of an attended automation form

Methods and events of elements

Form designer for building attended automation forms

Form designer is an Integrated Development Environment (IDE) for building attended automation forms in RPA Desktop Design Studio.

Form designer overview

A form is a custom interface to interact with multiple applications by using the Forms functionality within the RPA Desktop Design Studio. Forms can be used to insert various elements and arrange them as per the desired layout.

Access the Form Designer

To access the Form Designer, right-click the desired form in the Project Explorer pane and select **Design**.

Sections of the Form Designer

Form Designer has four parts as shown in the following example:

- Toolbox pane: The elements used for designing the form are displayed in the example.
- Outline pane: Lists the elements and resources in the form. You can view and focus on a specific element of the form, as you are designing the form.

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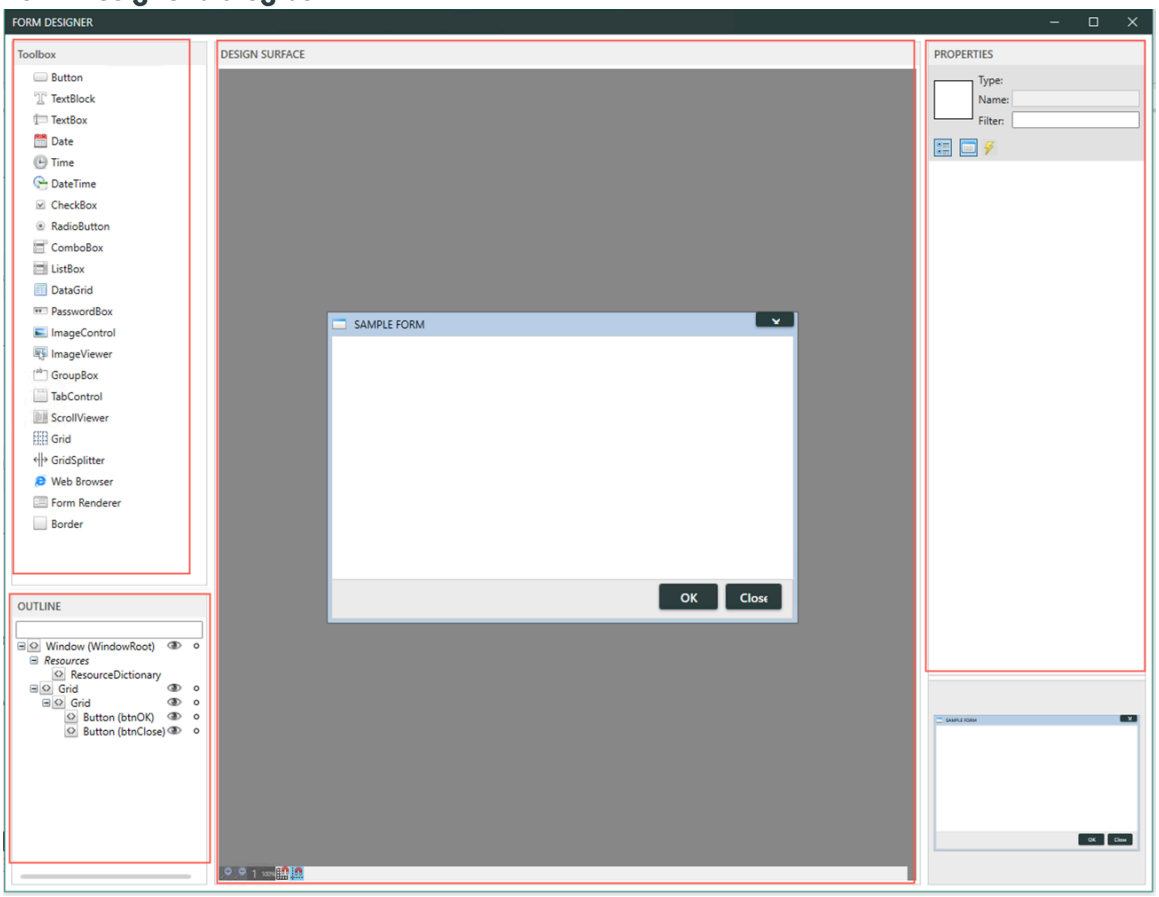
- Design surface: Create designs by selecting elements from the Toolbox pane and drawing on the form within the Design surface.
- Properties pane: View and edit the properties of an element or a window in the form that help to fine-tune its functionality. The important properties are highlighted in bold.

Form Designer dialog box



Details of the Toolbox pane elements

The following elements from the Toolbox pane can be used to design the form.

Toolbox pane elements

Element	Description
Button	Helps you to add one or more buttons on the form. Enables the user to click it to perform an action.
TextBlock	Helps you to add a label on the form. Enables the user to view a text block as read-only information.
TextBox	Helps you to add a text box to the form.

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Toolbox pane elements (continued)

Element	Description
	Enables the user to provide information to the form within a text box.
Date	Helps you to provide a date picker on the form. Enables the user to select a specific date on the form.
Time	Helps you to provide a time picker on the form. Enables the user to select a specific time on the form.
DateTime	Helps you to provide a date and time picker on the form. Enables the user to select a specific date and time on the form.
CheckBox	Helps you to present yes, no, true, or false selections. You can also use the check box element in groups to display multiple choices in a form.
RadioButton	Enables you to select a choice from the group of choices.
ComboBox	Displays the data in a drop-down combination box. By default, the ComboBox element appears in two parts. The top part is a text box that enables you to type a list item. The second part is a list box that displays a list of items that you can select from.
ListBox	Displays a list of items that you can select one or more Items from.
DataGrid	Enables you to display and manipulate the tabular data.
PasswordBox	Displays placeholder characters while you type a string.
ImageControl	Displays images in the form.
ImageViewer	Enables you to open and view image files including JPEG, GIF, WMF, and other image formats.

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Toolbox pane elements (continued)

Element	Description
	It also provides options to stretch the images, shrink the images, and rotate the images at different angles through all axis.
GroupBox	Provides an identifiable grouping for other elements. Typically, you use group boxes to subdivide a form by function.
TabControl	Helps you add one or more tabs in your form.
ScrollViewer	Enables you to add a scrolling functionality to the form.
Grid	Defines a flexible grid area that consists of columns and rows.
GridSpiltter	Helps you to split a grid element into multiple parts.
Web Browser	Hosts web pages and provides web browsing capabilities to your application.
Form Renderer	Helps you build forms quickly with the following controls: • TextBox • ComboBox • CheckBox • RadioButton • ToggleButton • Date • Time • PasswordBox
Border	Enables you to draw a border, background, or both with the form.

Related topics

Methods and events of an attended automation form

Methods and events of elements

Configure the form fields for the Form Renderer element

Configure the form fields in the Form Renderer element while you are building an attended automation form in RPA Desktop Design Studio.

Before you begin

Create an attended automation form in RPA Desktop Design Studio. For more information, see Create an attended automation form in RPA Desktop Design Studio.

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Ensure that your attended automation form contains a Form Renderer element. For more information, see Form designer for building attended automation forms.

Role required: none

About this task

The Form Renderer element helps you to build forms quickly with the available controls.

Procedure

1. In the RPA Desktop Design Studio, from the Project Explorer pane, navigate to **Forms** and expand it.
2. Right-click the Form Renderer element and select **Configure** to configure the form fields.
3. In the CONFIGURE FORM FIELDS dialog box, click the add icon (+) to add a new **Field** tab.
4. In the Fields section, expand a Field option and fill in the following details:

Field form

Field	Description
Name	Name of the field that appears as a label name on the form.
Type	Type of the field: ○ TextBox ○ ComboBox ○ CheckBox ○ RadioButton ○ ToggleButton ○ Date ○ Time ○ PasswordBox
Required	Option for enabling this field as a required field on the form.
Read Only	Option for enabling this field as a read-only field on the form.
Field Help	Help information for the field: ○ None ○ Text ○ Link
Help Text	Help text information for the field. This field appears only when **Text** is selected from the **Field Help** field.
Help Link	Help link URL for the field. This field appears only when **Link** is selected from the **Field Help** field.

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5. Click **OK**.
6. Repeat steps 3 to 5 to add a new field.
7. **Optional:** To delete a field, do the following actions:
   a. Expand the field option that you want to delete and click the delete icon ( ).
   b. In the Confirmation dialog box, click **Yes**.
8. In the Form Settings section, fill in the fields.

Form Settings form

Field	Description
Name	Title of the form.
Field Help	Help information for the form: ○ None ○ Text ○ Link
Help Text	Help text information for the form. This field appears only when **Text** is selected from the **Field Help** field.
Help Link	Help link URL for the form. This field appears only when **Link** is selected from the **Field Help** field.
Show Popups Inside	Option for enabling pop-up windows inside the form.

9. Click **OK**.

Related topics

Form designer for building attended automation forms

Methods and events of the Form Renderer element

Open Service and Runtime logs

Logs record events that occur during the execution of an automation process. These logs are crucial for debugging and monitoring the performance of the robots.

Before you begin

Close the existing Unattended Robot or Attended Robot window.

Role required: none

About this task

Logs provide detailed information about the actions performed by the robot, including any errors or exceptions that occur. These logs help developers understand the robot's behavior and identify areas for improvement.

There are types of logs - service logs and runtime logs. Service Logs has the windows service-related operation logs. Runtime Logs has the automation-related logs.

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Unattended Robot has a windows service for the core operations such as invoking an automation, updating the robot status, creating process jobs. This windows service runs in a system context. All the logs that are captured in that context are saved in a program data location. Verify to unhide the Program Data folder in your Windows machine.

Each log has a naming convention. If it's a runtime-related log, the log name starts with Runtime. If it's a RPA Desktop Design Studio related log, the log name starts with Studio.

Procedure

1. In the notification area (system tray) in the taskbar, select and hold (or right-click) the Unattended Robot icon ().
2. Select **View Logs** and select either **Service Logs** or **Runtime Logs**, to view the related logs.

Post requisites after installing a hot fix

Perform these tasks after installing a hot fix for either Universal App Connector (UAC) or Chromium connector on your instance to verify the hot fix is accurately downloaded.

Before you begin

Install the hot fix in your RPA Hub instance. An admin access might be required, to do this task.

Take a backup of the iBot project file that you're trying to open.

Close RPA Desktop Design Studio and any open browser tabs on your machine.

Role required: sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin

About this task

For example, if you created a project using the UAC plugin version 6.1, and a hot fix is installed on your instance for the same version. In this scenario, the following steps are required only for the first time when you either launch the RPA Desktop Design Studio, Unattended Robot, or Attended Robot after installing a hot fix.

This procedure is applicable if you are using Google Chrome, or Edge applications.

Procedure

1. In your Windows machine, navigate to the Task Manager.
2. Perform any of the following tasks to close the *`chrome.exe`*, *`msedge.exe`*, and *`msedgewebview2.exe`* processes (dependent tasks).
   - Locate the running *`chrome.exe`*, *`msedge.exe`*, *`msedgewebview2.exe`*, *`UTL.RPA.ChromeNativeMessaging.exe`*, and *`UTL.RPA.EdgeNativeMessaging.exe`* processes and select and hold (or right-click) **End task**.

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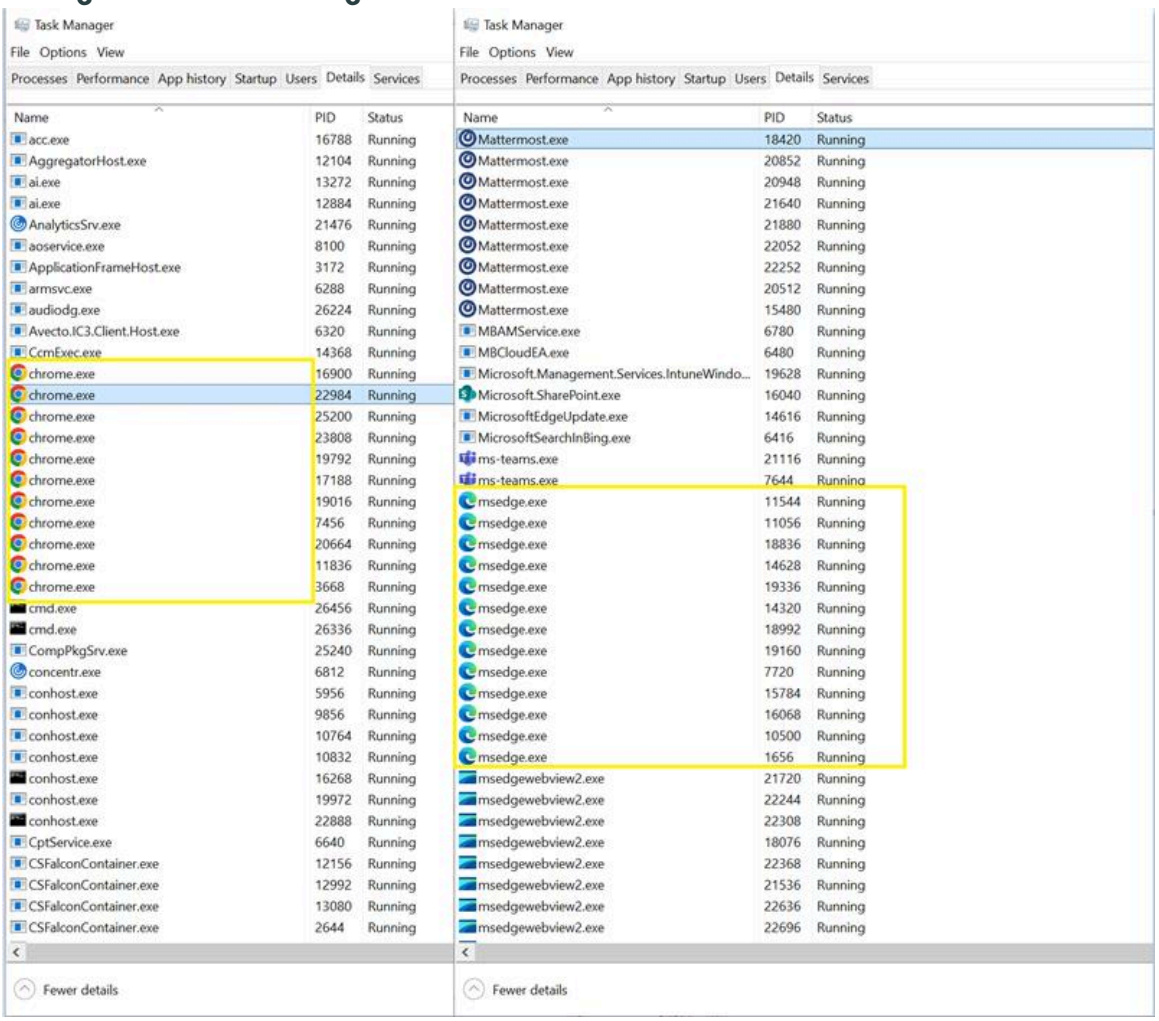
Ending Chrome and MS Edge exe files



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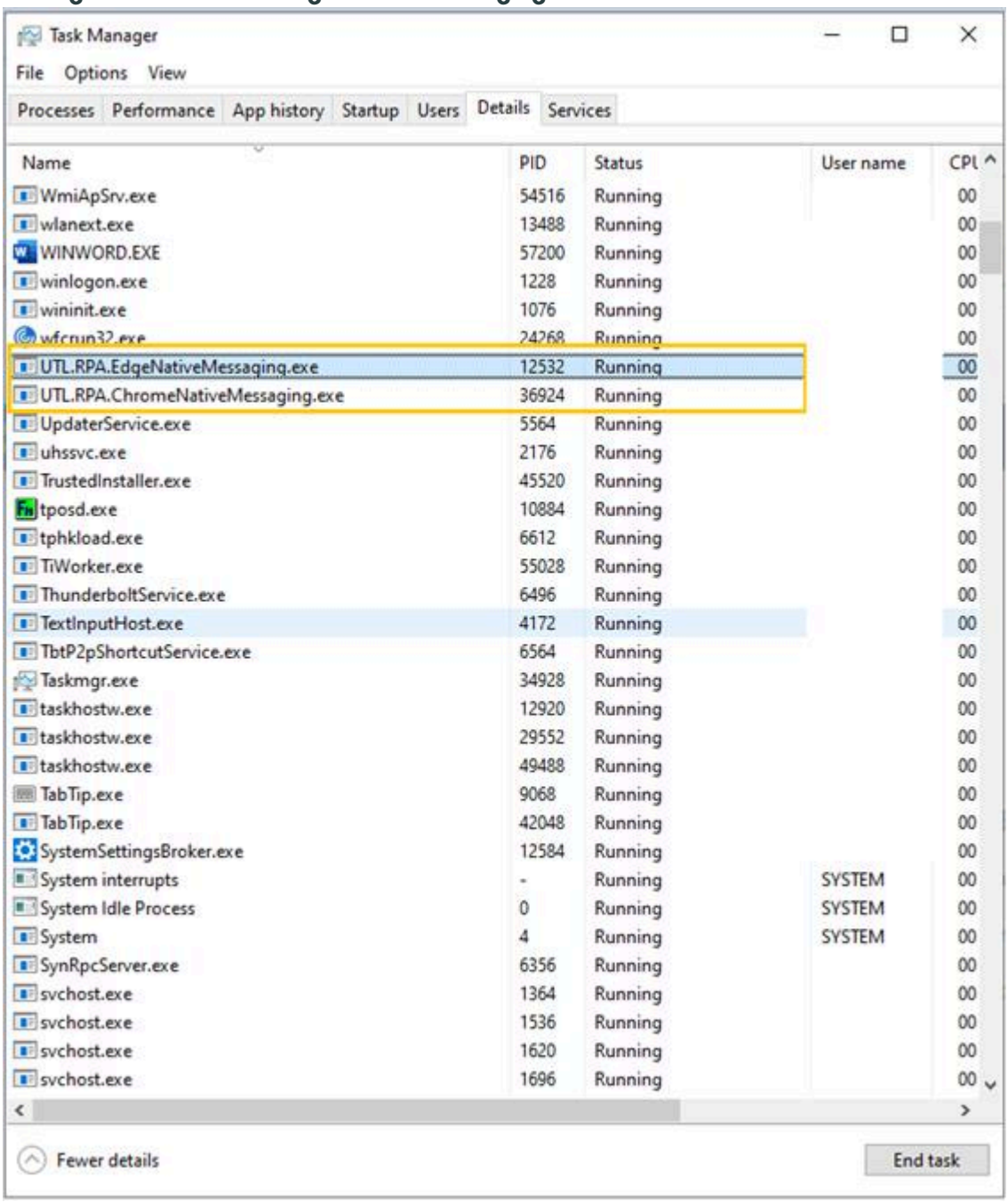
Ending Chrome and MS Edge Native Messaging exe files



- Use the following commands with elevated access to terminate all dependent tasks.
  - taskkill /f /im msedge.exe
  - taskkill /f /im msedgewebview2.exe
  - taskkill /f /im UTL.RPA.EdgeNativeMessaging.exe
  - taskkill /f /im chrome.exe
  - taskkill /f /im UTL.RPA.ChromeNativeMessaging.exe

3. Verify that the browser tabs or the mentioned executable files aren't running.

4. Launch either RPA Desktop Design Studio, Unattended Robot, or Attended Robot and proceed.

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Related topics

- Universal app connector
- Chromium connector
- Configuring RPA Desktop Design Studio

Using automations

You can preview, transform, and validate data on the automations. You can also run, publish, and review automations in RPA Desktop Design Studio.

Use a component in RPA Desktop Design Studio

Design automation projects by using components in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

Components are reusable blocks that are used for designing automations and to abstract functionality.

RPA Desktop Design Studio hosts a wide range of components that you can use while you're creating automation projects.

Each component has ports that are used while creating an automation workflow. For more information, see RPA Desktop Design Studio ports.

Enhance the automation logic with text instructions, either in an empty activity or by selecting a component in an existing one by using the Now Assist for RPA Hub application. For more information, see Build an automation with AI.

Procedure

1. In the RPA Desktop Design Studio, from the Toolbox pane, navigate to a parent component category to select a component.
2. To use a component, drag a component to the Design surface as shown in the following example.

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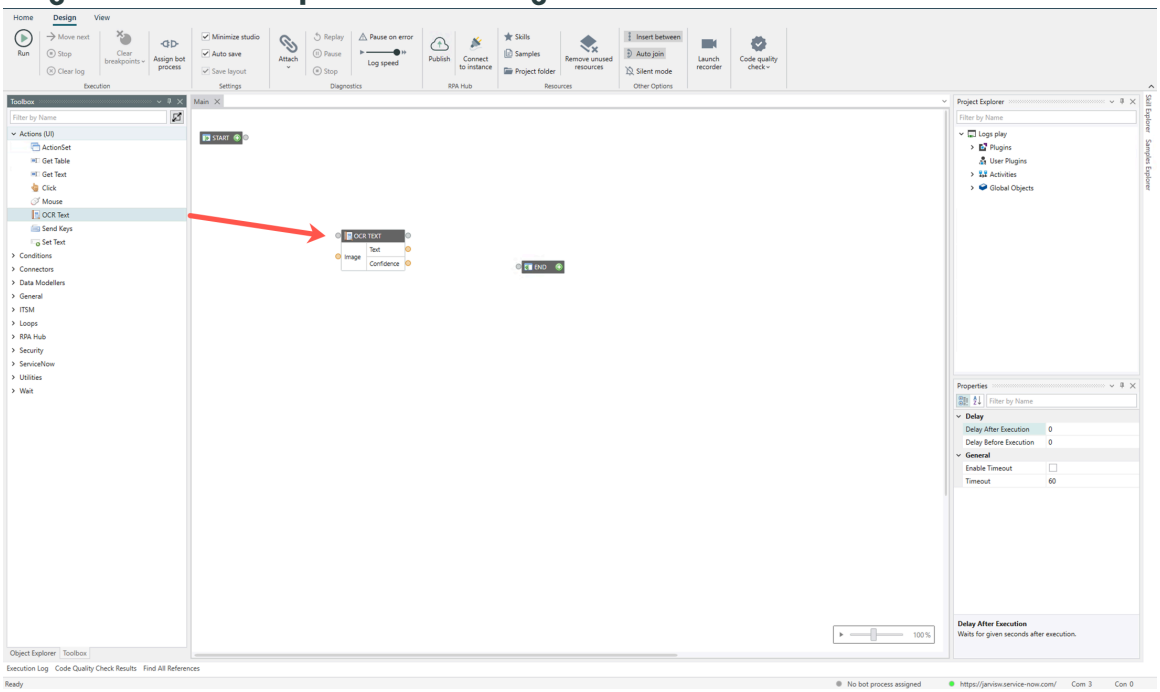
Drag the OCR Text component to the Design surface



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Important: You might come across the following behaviours when you drag and drop an automation component from the Toolbox, Object explorer, Project explorer, and Skills explorer to the Design surface:

- If you drag and drop a component to the same component in the Design surface, then the new component replaces the existing component. For example, if you already have the **ActionSet** component on the Design surface and you drag and drop another **ActionSet** component to the existing **ActionSet**, then the new version replaces the existing component.

  All the connections (control and data connections), variables, or static data associated to the existing component gets associated to the newly dropped component if the port name and the port data type are the same.

- If you drag and drop a new component to a different component or method in the Design surface then the new component replaces the existing component.

  All the connections, variables, or static data associated to the existing component gets associated to the newly dropped component if the port names and the port data types are the same.

- If you drag and drop a component between two components that are already connected in the Design surface, then the component is placed between the existing components. You may come across the following behaviours when you drag and drop a component between two components:
  - If the port names and the port data types of the newly dropped component match with the connected components, then the data connections are created.
  - If the port names are the same and the port data types are different, then the data connections are created only if the port data type is can be converted (the source port data must be converted to target data type. This is known as typecasting or type conversion. For more information on type casting, see Java Type Casting). For example, integer to object but not object to integer.
  - If the port names are the same and the port data type can be converted, but there is already an existing data connection between the two components, then no new data connection is created.

3. Connect the following ports:
   a. Connect the Control In port of the OCR Text component with the Control Out port of another component.
   b. Connect the Control Out port of the OCR Text component with the Control In port of the next component.
   c. Connect the Data In (Bitmap) port of the OCR Text component with the Data Out port of another component.
   d. Connect the Data Out (String) with the Data In port of another component.
4. Do any of the following options for a desired action.

Option	Action
Search for a component that is available within the Toolbox	Enter the text in the **Filter by Name** field.
Edit the configuration or settings of a com ponent	Either double-click the component title bar or click the settings icon ( ).

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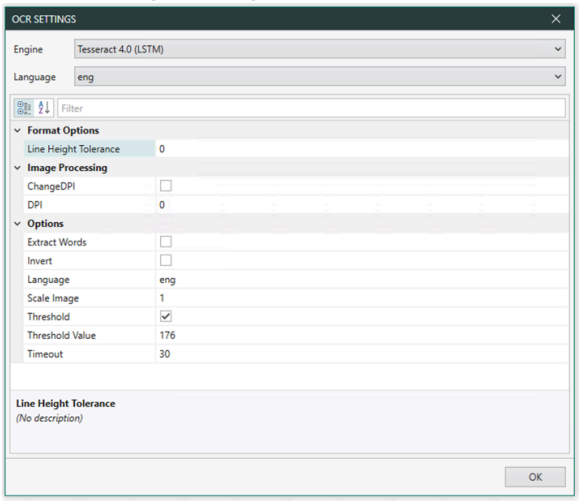
Option	Action
	For example, to edit the settings of the OCR Text component, click the settings icon ( ) over the OCR Text component. The OCR SET TINGS dialog box appears. You can define the properties in the dialog box that is shown in the following example. **OCR Settings dialog box**  The settings icon ( ) doesn't appear for all components.
Edit the properties of a component	Change the required property in the Proper ties pane.
Set a breakpoint	Right-click the component title bar and select **Breakpoint** For more information on Break points, see Set a breakpoint to pause a com ponent in RPA Desktop Design Studio.
Start the workflow execution from a select ed component	Right-click the component title bar and select **Run From Here**.
Handle the errors at a component level	Right-click the component title bar and select **Error Handler** To learn more about handling errors, see Handle errors in RPA Desktop De sign Studio.
Delete a component	Right-click the component title bar and select **Delete**.
Skip a component in an automation	To enable the automation to skip a compo nent, right-click the component title bar and select **Skip This**.

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Option	Action
	Note: ○ If you set a breakpoint and the **Skip This** option on the same component, the automation still skips the com ponent and moves to the next exe cutable component. ○ If you use the **Skip This** option on the **For Each** and **For Loop** components under the **Loop** section in the Tool box, the automation doesn't execute the Loop part of those components. ○ If you use the **Skip This** option on the **Try Catch** component, the automation skips the component and exceptions, if any, appear in the respective compo nent in the automation. ○ If you use the **Skip This** option on a component where you have set a de lay using the **Delay After Execution** or **Delay Before Execution** options, the automation still skips the component. ○ The **Skip This** option ignores the De cision component and dependencies on the component, if any. ○ You can't use the **Skip This** option on the **Start**, **End**, or any event-related component.
Execute a single component	To test and debug any issue in an automation by isolating a single component, right-click the component title bar and select **Run This**.

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Option	Action
	Note: ○ If you apply a breakpoint on a compo nent before or after applying the **Run This** option, the breakpoint pauses the execution of the component. ○ In the For Loop component, the **Run This** option completes the loop that you specify but the execution doesn't proceed to the Control Out port. ○ If you set a delay in the execution of a component using the **Delay After Execution** or **Delay Before Execution** options and then use the **Run This** op tion, the component will execute after the delay that you have set. ○ You can't use the **Run This** option on any event-related component.

5. **Optional:** To search for a component that is available within the Toolbox, enter the text in the **Filter by Name** field.

Related topics

Set a breakpoint to pause a component in RPA Desktop Design Studio

Start a workflow execution from a selected component in RPA Desktop Design Studio

Handle errors in RPA Desktop Design Studio

Build an automation with AI

Use a connector in RPA Desktop Design Studio

Connect to the various data sources and tools to create automation by using a connector in RPA Desktop Design Studio.

Before you begin

Ensure that the connector plug-in is installed and added to the RPA Desktop Design Studio application. For more information, see Manage plugins in RPA Desktop Design Studio.

Role required: none

About this task

For a list of connectors and their methods, see Connectors in RPA Desktop Design Studio.

For details on the issues related to connectors, see KB article KB1123555.

Procedure

1. Right-click **Global Objects** in the Project Explorer pane and select **Add Connectors**.
   The Add Connector dialog box is displayed.
2. Select the required connectors and click **Add Connectors**.
   The connectors are added to Global Objects. You can also drag and drop the required connector from the Toolbox pane to Global Objects.

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Note: If you add multiple instances of the same connector to Global Objects, each duplicate instance is appended with the numerical value of the duplication. For example, if you add 3 instances of the Email connector to Global Objects, they appear as Email, Email_2, and Email_3.

3. To provide the connector a custom name, perform the following steps.
   a. Double-click the connector under Global Objects.
   b. Enter a custom name of the connector in the Name field under the Properties pane.
4. In the Project Explorer pane, double-click the connector under Global Objects.
   Some connectors provide additional levels and methods for each level. To know more about the levels, see Understand levels of connector methods.
   The Object Explorer lists all methods of the connector.
5. Drag a method to the Design surface.
6. Configure the input fields.
   For more information, see Configure port properties.
7. Connect the control ports of the method to the corresponding ports of another method or component.

Use connector method

Expose and then use the methods within a connector to perform all the actions that the connector can do.

Before you begin

You must install the connector plugin. To install, see Manage plugins in RPA Desktop Design Studio.

To navigate to connectors, open an activity.

Role required: None

Procedure

1. In the Toolbox pane, navigate to **Connectors**.
2. Drag a connector under Global Objects in the Project Explorer pane.
3. Expose the methods, as given.
   Some connectors expose the methods at the connector level while the others expose the methods at multiple levels. For the latter, you must first configure the connector. To find a connector that needs configuration first, right-click the connector and see if the context-menu displays the **Configure** option.

Number of levels	Step
Connector	Double-click the connector.
Multiple	**a.** Configure the connector to expose all lev els. **b.** Double-click the level.

The methods are exposed under the Object Explorer pane.

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4. Drag the method to the Design surface.

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- If you drag and drop a component to the same component in the Design surface, then the new component replaces the existing component. For example, if you already have the **ActionSet** component on the Design surface and you drag and drop another **ActionSet** component to the existing **ActionSet**, then the new version replaces the existing component.

  All the connections (control and data connections), variables, or static data associated to the existing component gets associated to the newly dropped component if the port name and the port data type are the same.

- If you drag and drop a new component to a different component or method in the Design surface then the new component replaces the existing component.

  All the connections, variables, or static data associated to the existing component gets associated to the newly dropped component if the port names and the port data types are the same.

- If you drag and drop a component between two components that are already connected in the Design surface, then the component is placed between the existing components. You may come across the following behaviours when you drag and drop a component between two components:
  - If port names and the port data types of the newly dropped component match with the connected components, then the data connections are created.
  - If the port names are the same and the port data types are different, then the data connections are created only if the port data type is can be converted (the source port data must be converted to target data type. This is known as typecasting or type conversion. For more information on type casting, see Java Type Casting). For example, integer to object but not object to integer.
  - If the port names are the same and the port data type can be converted, but there is already an existing data connection between the two components, then no new data connection is created.

Connectors in RPA Desktop Design Studio

Learn about the connectors that you can use in RPA Desktop Design Studio to create an automation.

Connectors

Important:

For more information about connectors, see Connectors.

The following table lists the connectors that are available in the RPA Desktop Design Studio.

Connectors

Connector	Methods
Chromium Connector	Chromium connector methods

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Connectors (continued)

Connector	Methods
Counter	Counter connector methods
C#.Net	C# connector methods
Email	Email connector methods
EventLog	EventLog connector event and methods
FTP	FTP connector methods
IdleTimer	IdleTimer connector methods and events
IE Connector	IE Connector methods
Java Connector	Java connector methods
JavaScript	JavaScript connector methods
KeyValuePair	KeyValuePair connector methods
List	List connector methods
Microsoft Excel	Microsoft Excel connector methods
Microsoft Outlook	Microsoft Outlook connector methods
Microsoft Word	Microsoft Word connector methods
PDF	PDF connector methods
Python	
SAP Connector	SAP Connector methods
Secure Shell (SSH) Connector	Secure Shell (SSH) connector methods
StringBuilder	StringBuilder connector methods
Table	Table connector methods
Terminal (Mainframe) Connector	Terminal connector methods
Timer	Timer connector methods
Universal App Connector	Universal app connector
VB.Net	VB connector methods
Windows Connector	Windows Connector methods

Understand levels of connector methods

Some connectors in the RPA Desktop Design Studio provide methods that interact with various applications at different levels. For example, the Chrome connector provides methods that interact with applications and their elements open in a Google Chrome browser to perform specific Robotic Process Automation tasks.

Connectors with different levels of methods

The RPA Desktop Design Studio provides connectors that interact with various applications at different levels.

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Connectors with different levels of methods

Connector name	What does it do?
Chrome	Provides methods that interact with applications open in the Google Chrome browser.
Internet Explorer (IE)	Provides methods that interact with applications open in the IE browser.
Java	Provides methods that interact with Java-based applications.
Windows	Provides methods that interact with Windows applications.
Terminal (Mainframe)	Provides methods that interact with Mainframe applications.

Know the different levels of methods

The methods in the connectors interact at different levels in the applications.

Understand the method levels

Method level	What does it do?	Example
Connector	Interacts with the connector.	The Chrome connector interacts with the connector under the Global Objects in the Project Explorer and exposes the methods.
Screen	Interacts with the application.	The ServiceNow website opened in the Google Chrome browser.
Element	Interacts with elements in the application.	A text box in the ServiceNow website open in the Google Chrome browser.

Configure the connectors

To access the various methods, you must first configure the connectors.

- Configure the Chromium connector
- Configure the Internet Explorer connector
- Configure the Java connector
- Configure the Terminal connector
- Configure Windows connector

Expose the methods at different levels

After configuration, you can expose the methods at different levels. The methods appear in the Object Explorer pane.

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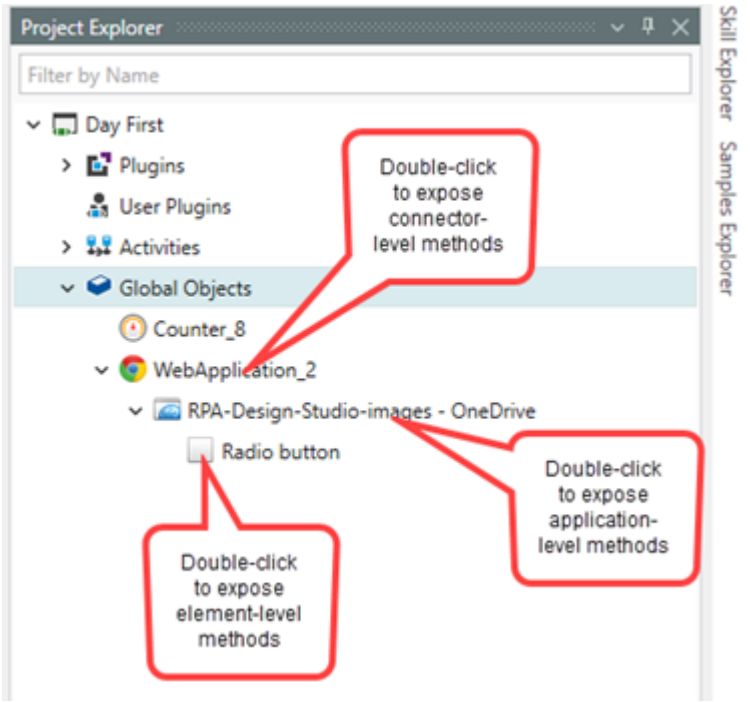

Use sample automations in RPA Desktop Design Studio

Use a sample automation, which is a prebuilt automation, that shows how different components are configured for a specific use case.

Before you begin

Set up the RPA Desktop Design Studio application and add the ServiceNow instance details. For more information, see Set up RPA Desktop Design Studio.

Role required: none

About this task

The RPA Desktop Design Studio provides multiple sample automations that cater to different use cases. For example, extracting data from a PDF and insert into an Excel file.

The sample automations are classified into **Beginner**, **Intermediate**, **Advanced**, **References**, and **Attended** categories based on the complexity and use cases of the automations.

Procedure

1. In the RPA Desktop Design Studio, from the Resources section, select **Samples**.
2. To access the sample automations in the **Beginner**, **Intermediate**, **Advanced**, **Reference**, or **Attended** categories, perform the following tasks:
   a. In the Samples Explorer, expand any of those folders.
   b. Double-click the sample automation.
   c. Under the Design tab, select **Run**.
3. To view the project files for the respective sample automation in the **Advanced**, **Reference**, or **Attended** categories, perform the following tasks:
   a. In the Samples Explorer, expand any of those folders.
   b. Double-click the sample automation.

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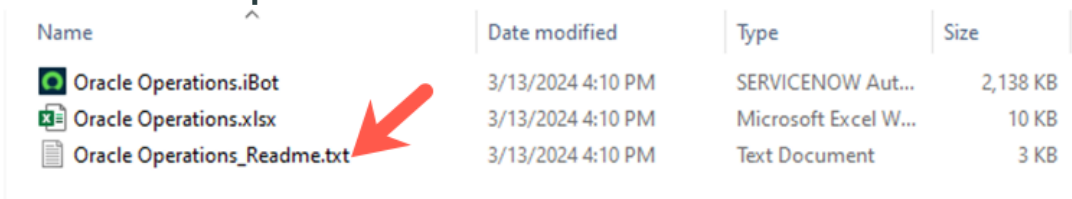
c. In the Resources section, select **Project folder**.

d. Open the Readme file to view the detailed information of the sample automation and follow the instructions.
For example, the following image shows the ReadMe file for the sample automation on Oracle operations.

ReadMe file for sample automation



Sample automations

The RPA Desktop Design Studio provides multiple sample automations that cater to different use cases.

Sample automations descriptions

A sample automation is a prebuilt automation that shows how different components are configured for a specific use case.

Use the following unattended and attended sample automations that were added to the Sample Automations page of RPA Desktop Design Studio. You can also view them in the Sample Explorer section.

Unattended sample automations

Sample automation	Description
Add Word Footer	This automation downloads Word files from a specified URL. The robot further adds a footer to each page, using dynamically retrieved information from an Excel file.
Automate Offer Letters	This automation streamlines the process of generating offer letters for selected candidates. It extracts data from an Excel file, populates a predefined offer letter template, and distributes the letters via email, ensuring accurate and efficient candidate communication.
City Weather Reports	This automation retrieves weather information (temperature, wind, cloudiness, humidity) for various cities and countries listed in an Excel file. The automation loops through each city-country pair, fetches the corresponding weather details from Weather.com, and updates the relevant data fields in the Excel file. This data is collated into a comprehensive weather report, with all the information organized and populated in the same Excel sheet for easy reference.

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Unattended sample automations (continued)

Sample automation	Description
Clear Browser Cache	This automation clears the all-time cookies, other site data, cached images, and files from the browsers like Microsoft Edge and Google Chrome.
Consolidated Invoices	This automation extracts information from each Excel file within the Invoice Data folder and consolidates all the data into a single Excel file.
Convert Excel to Json	This automation reads data from an Excel file (including password-protected ones) and converts the Excel file into a JSON file.
DataTable extraction from PDF to Excel	This automation efficiently identifies and extracts the first table from a PDF document. Once the table is extracted, the script seamlessly converts the data into a structured format and writes it to an Excel file.
Date Delta Across Apps	This automation calculates the delta between two dates and updates the relevant systems or documents accordingly.
Decision Component	This automation takes the provided input as a number, checks whether the number is greater than 100 using the Decision component, and displays the corresponding text in a message box in the provided format.
Decode Barcode and QR Code to Text	This automation extracts data from barcode or QR code images in a specified project folder, stores the information in an organized Excel file, and ensures accurate and efficient capture for easy access and analysis.
Download attachments from outlook	This automation monitors email accounts for messages with specific subjects, ensuring that only relevant emails are processed. On identifying an email that matches the criteria, it downloads the attachments and saves them to a designated local project folder.
Download File from URL	This automation simplifies the file download process from a web application. It provides a consistent and reliable method for downloading files from any URL, saving them to a specified local folder, and sending an email with the downloaded file as an attachment, ensuring you have a seamless and efficient experience.
Email Archiving or Deletion	This automation archives or deletes emails based on provided parameters: MailID, Sender, Subject, and FolderName on Outlook.

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Unattended sample automations (continued)

Sample automation	Description
	The solution streamlines the process, reduces errors, and saves time.
Excel Conversion	This automation reads data from an Excel file and converts it into an XML file. It facilitates the transfer of data from the Excel table into a SQL database table.
Excel Operations	This automation demonstrates various tasks in Microsoft Excel, including searching for text, creating pivot tables, and exporting charts. It showcases a sequential flow to help users understand seamless integration within an automation workflow.
Expression Component	This automation performs addition using the Expression component and displays the result in a message box.
Extract Data from a Table and Saving to Excel	This automation is customized for a specific website because the elements that must be captured on different websites vary. When creating comparable automations for different websites, this automation can be used as a guide.
Extract Data from JSON to Excel	This automation streamlines data handling by efficiently extracting and logging JSON data into structured formats, reducing manual intervention. The bot creates work items in a designated queue, retrieves those items, and extracts JSON values based on specific property names. The extracted values are then organized and updated into an Excel sheet, ensuring accurate and easy access to the data.
Extract Excel Table to Embed in Email Body	This automation extracts the data from the specified sheet in the Excel file and sends an Microsoft Outlook email to the recipient with the Excel data included in the body of the email.
ExtractDataFromPDF	This automation extracts table data from a PDF and generates an Excel file with the extracted information.
Fetch contact info from email	This automation identifies relevant emails based on specific subjects and updates the extracted information (FirstName, LastName, and EmailAddress) into an Excel spreadsheet. This automation enhances data management efficiency and reduces manual data entry errors.
File Operations	This automation checks whether the provided file exists or not. If file exists, automation

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Unattended sample automations (continued)

Sample automation	Description
	provides a new incremental filename which doesn't exist already. Ex: If a file "C:\Users \Public\XYZ.txt" already exists, automation returns the filename as C:\Users\Public \XYZ_1.txt and so on.
File Ops Copy, Delete, Move	This automation copies, moves, and deletes files according to user-defined rules. It enhances file management by minimizing manual effort and errors and can be customized to handle specific conditions such as file type, timestamps, or folder locations, ensuring improved organization and efficiency.
For Each Component	This automation sets a list of values, retrieves each item's value using the For Each component, displays the item value in a message box, and checks whether the item value is equal to the provided value. If it's equal, the automation breaks out of the For Each loop.
For Loop	This automation obtains each index value using the For Loop component with provided inputs for "From" and "To," and then displays the index values in a message box.
Format Text	This automation accepts the provided input and displays the text in a message box using the specified format.
Health Check Bot	This automation verifies system prerequisites on Remote Desktop Protocol (RDP) machines before executing specific tasks. It ensures all necessary system conditions are met, reducing the risk of process failures due to configuration issues.
Highlight Excel Rows	This automation highlights rows in an Excel sheet based on information extracted from a Word document. It's useful for tasks such as data validation, report generation, and automating document processing involving both Excel and Word.
HTML to CSV	This automation converts multiple HTML table data files into a single CSV file, storing the converted files in the specified output folder path.
Invoice Data Extraction to Excel	This automation extracts the necessary data from invoices, populates the extracted information into an Excel sheet, and sends the Excel file as an email attachment to designated recipients. By streamlining the process, it reduces errors and enhances

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Unattended sample automations (continued)

Sample automation	Description
	efficiency, ensuring accurate and timely data management.
Merge CSV files	This automation merges two or more same CSV files into 1 main CSV with all the required details.
Merge Excel Sheets	This automation merges two or more Excel files into one main Excel file, with all the required details. To use the automation, you need to provide the folder path containing the Excel files as input and then execute the automation. It automatically merges all the .xlsx files into the main Excel file.
OneDrive Operations	This automation includes various activities that perform actions like 'Upload,' 'Download,' and 'Share'. The Upload activity uploads a local file specified in the process parameter to the ServiceNow® table or uploads a file to OneDrive using the OneDrive action. The Download activity downloads file from OneDrive to the local folder. The Share activity generates a link of a OneDrive file and shares it via email.
Oracle EBS Password Reset	This automation resets passwords for third-party applications or systems. The RPA Oracle Password Reset subflow queues the password reset request, which is automatically created from the Password Reset Request to the queue. The Update Password Reset subflow updates the status as Completed with Success.
Oracle Operations	This automation enables you to define employees in the Oracle EBS ERP system. Employment of a candidate is confirmed when the recruitment process is completed. If the recruitment of a candidate is performed through a manual system such as email, spreadsheets, and so on, you can use this automation to define employees from the manual system to the Oracle EBS ERP system. You can also use this automation if the recruitment process is performed through a different ERP system and then define the employees in the Oracle EBS ERP system.
PDF Text to Images	This automation searches for a specific text within a PDF file and saves the corresponding pages as images in a designated folder. Supported image formats include JPEG, JPG, and PNG. Provide the text to be searched, the

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Unattended sample automations (continued)

Sample automation	Description
	path to the PDF file, and the destination folder path where the images must be saved.
PDF to Word	This automation converts multiple PDF files into separate Word files. Provide the path to the folder containing the PDF files, and the automation converts them to the Word file format.
Resume Skill Matcher	This automation automates the resume screening process, saving recruiters valuable time and effort.
Shipping Orders	This automation retrieves details from an Excel file, opens a Windows application, inputs the details into the application, submits the information, and finally, once all details are processed, closes the Windows application.
Start App	This automation launches a webpage in the Chrome application with the provided URL.
Streamlining Report Data Analysis	This automation extracts tables from the Word document and creates sheets in Excel.
Summarize Sales Data	This automation summarizes sales data using Excel Macros and sends the results to the recipient via email as an unattended automation.
Tiff to PDF	This automation converts multiple TIFF images into a single PDF file. It processes TIFF files from a specified input location and generates a consolidated PDF document. After completing the conversion, the resulting PDF file is automatically saved in the designated output folder, for easy access. This process streamlines document handling by combining multiple image files into a single, organized PDF output.
Universal Timezone Converter	This automation converts time from one-time zone to another using the VB.Net Connector, ensuring accurate adjustment to the specified target time zone.
User Creation in Badging App	This automation streamlines the interaction with BadgeTool application by using the Universal App Connector to automate user management tasks based on data from an Excel file.
V_LookUp	This automation reads data from the Department Excel file, retrieves values from column A, and adds them to a list. It then reads Employee Excel file, takes column A values one by one, and compares them with the

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Unattended sample automations (continued)

Sample automation	Description
	department list values. If a match is found, it retrieves the corresponding row details from the Employee Excel file and sets the values into the Department Excel file.
While Loop	This automation reads values from a variable, checks a condition using the While Component and Decision Component, and displays formatted text in a message box. If the decision matches, the automation breaks out of the while loop.
Word Operations	This automation demonstrates various tasks in Microsoft Word, such as setting tables, inserting tables and pictures, and exporting Word to PDF. It showcases a sequential flow to help you understand seamless integration within an automation workflow.
Word to PDF Converter	This automation converts multiple Word files (.docx) from the Source folder path (default Project folder) to separate PDF files and stores them in the same location.
XML to Excel Conversion	This automation converts multiple XML files to separate XLSX files. Converted XLSX files are stored in the processed folder path.
Zip and UnZip files	This automation streamlines file management by providing compress and decompress functionalities.

Attended sample automations

Sample automation	Description
Copying a Range from One Excel File to Another	This automation copies a range of data from one Excel file to another. The automation is designed to identify the specific range of cells in the source Excel file, extract the data, and then paste it into the designated range in the destination Excel file. This use case is useful for tasks such as data consolidation, report generation, and data migration, where manual copying and pasting can be time-consuming and prone to errors.

Recording automations

Capture your actions from your desktop or web applications and convert them into an automation flow by using the recorder option in the RPA Desktop Design Studio application. You can record attended and unattended automations by using this capability. When you record an automation, you don't have to create it manually by using connectors or components.

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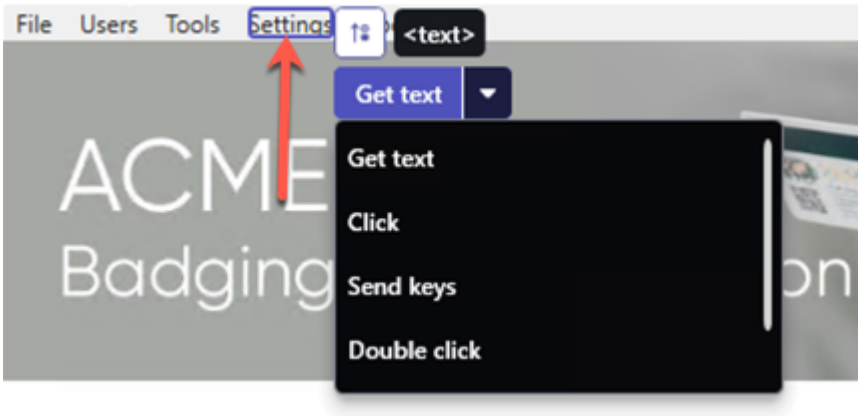
Important: The recorder feature supports the applications which can be interrogated using the Universal App Connector.

Highlighting an element

When you use the recorder, you can highlight the different elements in an application. These highlights enable you to differentiate the different type of elements. You can then perform the required action for each element. Each element has a default action and a list of sub-actions.

Highlighting an element by using the recorder



Recorded actions pane

The action that you perform on each element is captured in the Recorded actions pane. The recorded action in the Recorded actions pane displays the type of action and the element on which the action is performed. The recorded actions are also listed according to the application screens.

Automation flow generation

When a recording is saved, the RPA Desktop Design Studio application generates an automation flow as an activity to the automation project. The recording is also automatically configured as an object and listed under the **Global Objects** option in the Project Explorer pane. You can improve the generated automation flow from the Design surface by adding further components.

Configuring the screen match rules

The screens and elements of the recording are also configured as objects to **Global Objects**. You can configure the screen match rules and the element attributes based on your preference, by using the Universal App Connector. For more information on how to use the Universal App Connector, see Universal app connector.

Enhanced element interrogations

Populate element name

When you record an action in the application, the element name is automatically filled in the Recorded actions pane. The element name is captured from the target application. In the following example, while recording the SendKeys action, the element name "Location" is automatically filled, followed by "with text" and the keys or text value that is inputted by the user during the recording phase. If no default element name is available in the target application, the type of element is used as the name.

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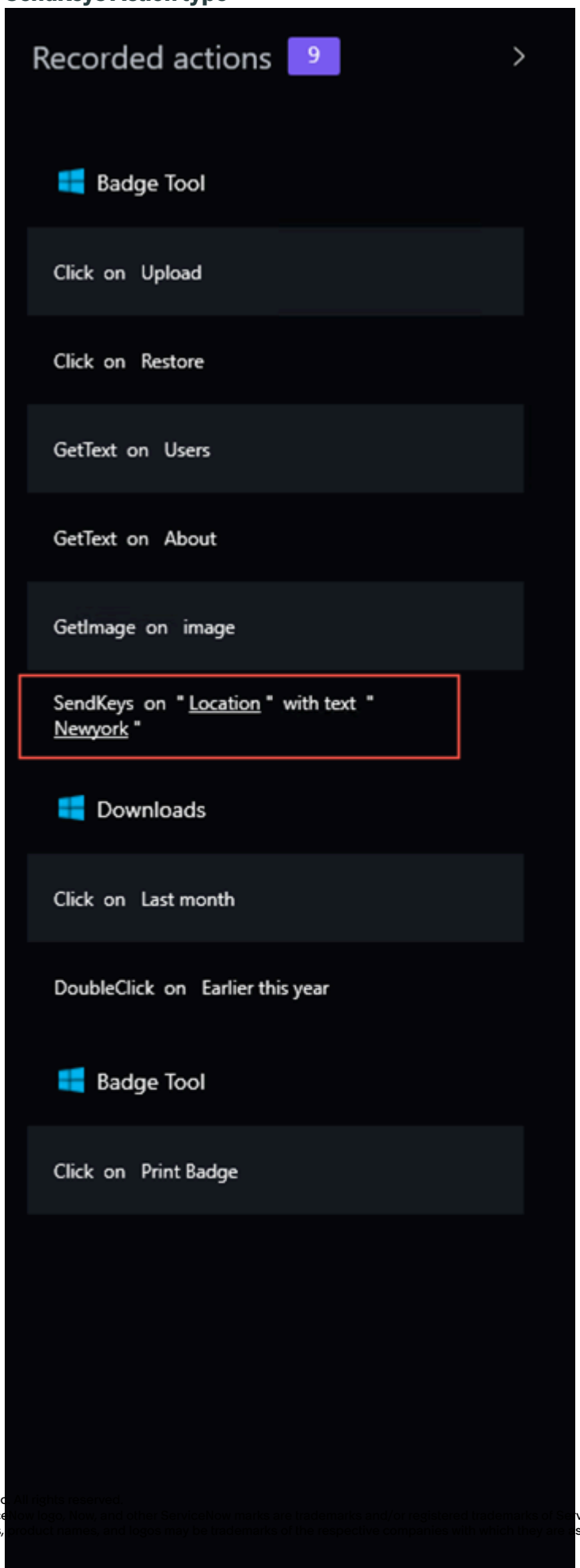
SendKeys Action type



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Rearrange recorded actions

You can move and position your recorded actions and screens in the Recorded actions pane. You can also rearrange recorded elements in the Recorded actions pane. The recorded screen segment is split when a recorded action from a screen segment is dropped on to a different screen segment.

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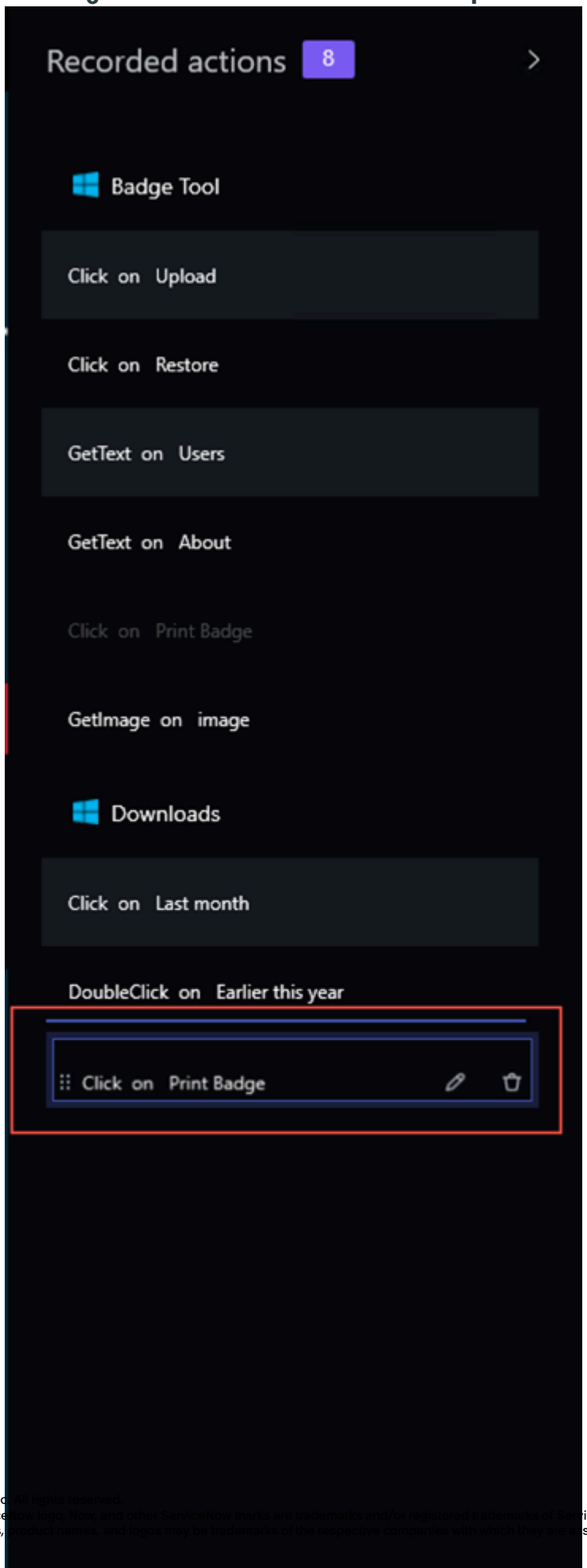
Rearranged elements in the Recorded actions pane



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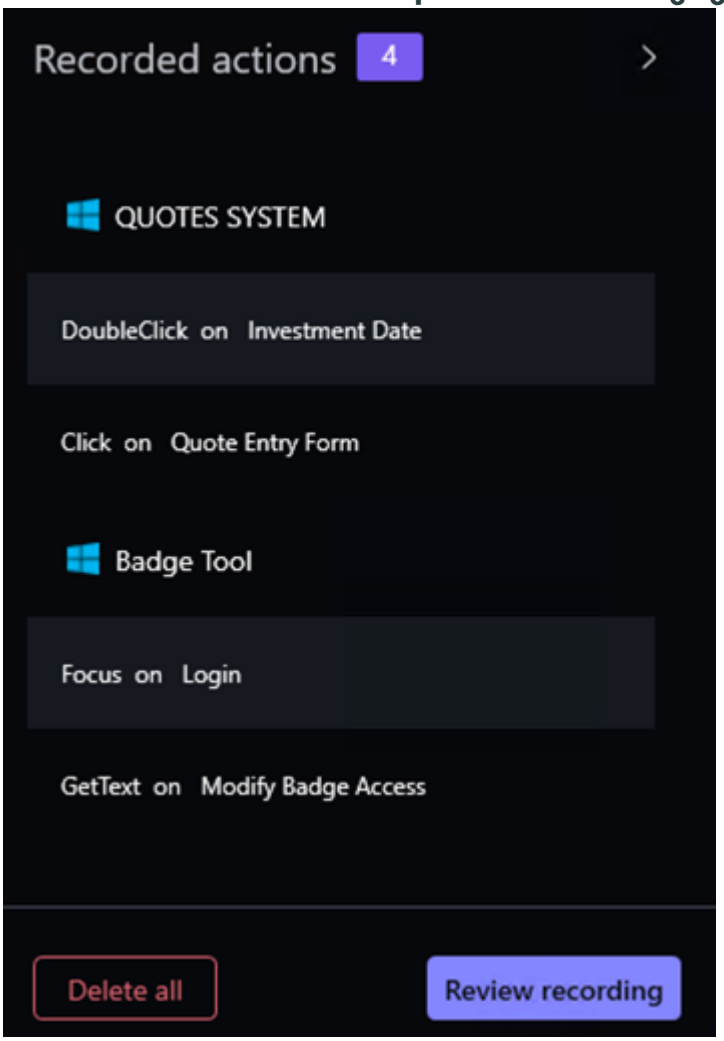
For example, when you record two actions of the QUOTES SYSTEM application, (DoubleClick and Click) and two actions of the Badge Tool application (Focus and GetText). Then, the list of actions are displayed in the Recorded actions pane, in the order in which they are recorded.

Actions in the Recorded actions pane before rearranging



When you move the Focus action from the Badge Tool application to the top of the list and above the QUOTES SYSTEM application. Then, the list of actions are displayed as follows in the Recorded actions pane, after the hierarchy is rearranged. The recordings of the QUOTES SYSTEM application are split.

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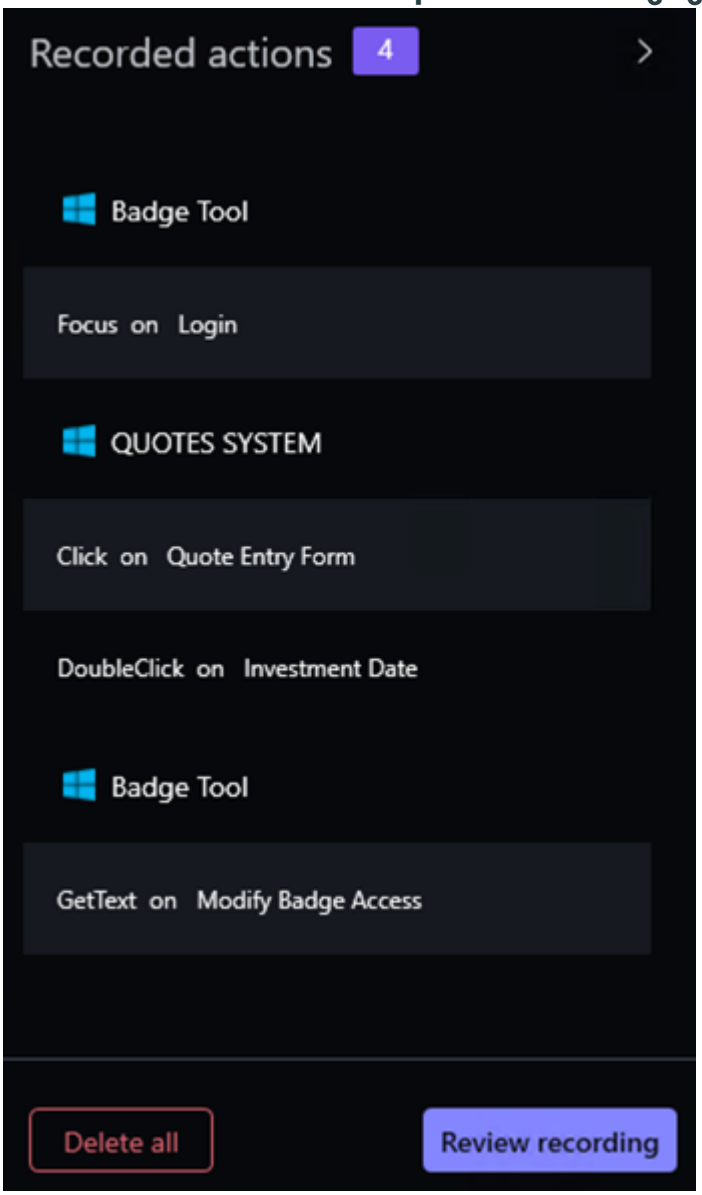
Actions in the Recorded actions pane after rearranging



When you save the recording, the automation is generated accordingly. The automation flow is generated based on the new sequence of actions in the Recorded actions pane.

Editing a recorded action

Instead of deleting and re-recording an action, you can update the action type or element details by editing the recorded action, using the Edit action icon, in the Recorded actions pane. For example, you can edit the "GetText" action type on "About" element name in the following image.

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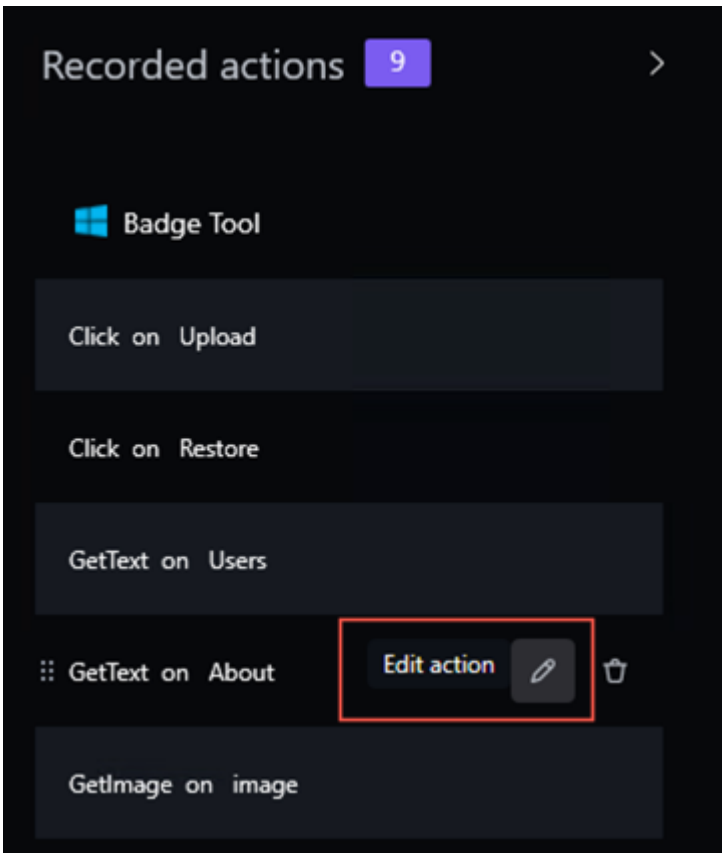
Edit a recorded action



After selecting the edit action, you can change the action type to "SetText" or element name to "Tools" from "About" and select **Update**, as shown in the following example.

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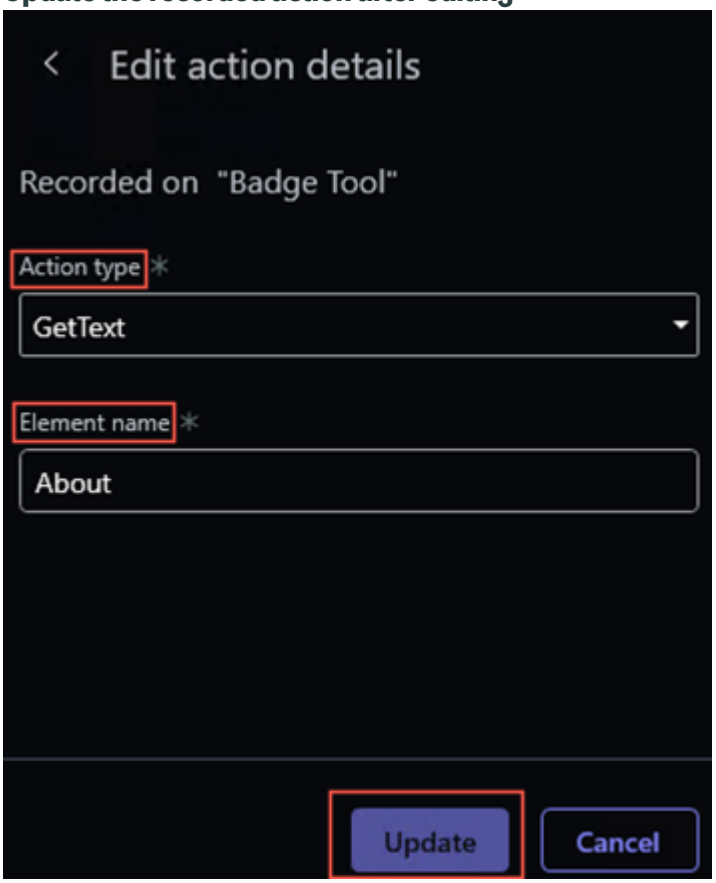
Update the recorded action after editing



Launch application

On the design surface, the component to launch an application is now added automatically to the automation flow that is generated by the recorder.

Benefits of creating automations with the recorder

Using a recorder to create an automation provides the following benefits:

- Low-code users can create automations more easily. Manually creating an automation with a connector or component is complicated.
- There's less time and effort needed to create an automation with the recorder.

Limitations

For information on the known issues and limitations for recording automations, see Known issues and limitations of RPA Desktop Design Studio for recording automations [KB1225708].

Record an automation

Record an automation by using the recorder option in the RPA Desktop Design Studio application. The actions that you perform on the application elements can be saved as an automation flow to the automation project.

Before you begin

You must do the following actions before you start recording an automation with the recorder for the first time:

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- Install and enable the ServiceNow RPA Chrome extension to your Google Chrome browser. For more information on adding the RPA Google Chrome extension, see Add the ServiceNow RPA Chrome extension.
- Install and enable the ServiceNow RPA Edge extension to your Microsoft Edge browser. For more information on adding the RPA Edge extension, see Add the ServiceNow RPA Edge extension.
- Ensure that the option **Allow this extension to read and change all your data on websites that you visit** to **On all sites** is enabled in the Site access pane of the ServiceNow RPA Google Chrome and Microsoft Edge browser extensions.
- Enable Java Access Bridge from your Windows machine. For more information on how to enable Java Access Bridge, see Enabling and Testing Java Access Bridge.

Ensure to configure the following settings and tasks before you record a web application:

- Set the zoom level of the browser to 100%.
- Close the developer tools of the browser.
- Wait for the web page to load completely to the browser.

Role required: None

Procedure

1. Select **Launch recorder** from the toolbar of the **Design** tab.
   The RPA Desktop Design Studio window is minimized and the recorder panel is launched.

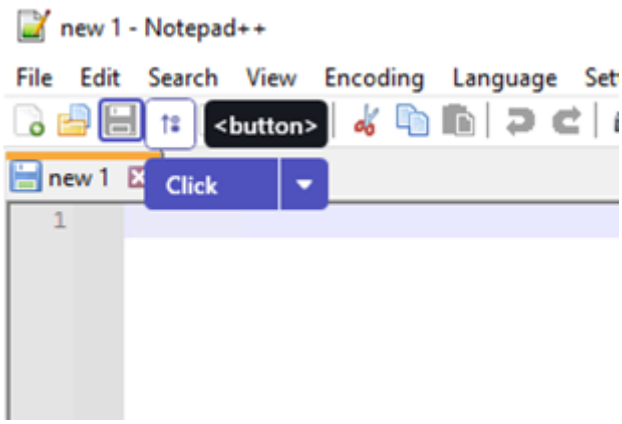
   Important: If the Universal App Connector (UAC) plugin is unavailable or removed from the automation project, the **Launch recorder** button is greyed out in RPA Desktop Design Studio.

2. Open the application that you want to record and select the **Start recording** icon ( ).
3. Point to the element where you want to perform an action.

   The default action that is related to the type of element is displayed.

   For example, if you point to the **Save** button in Notepad++, the element type is displayed as <button> and the default action for this item is **Click**.

   Element type and default action for Save button

4. Select the drop-down button against the default action to view the list of related actions for the element.

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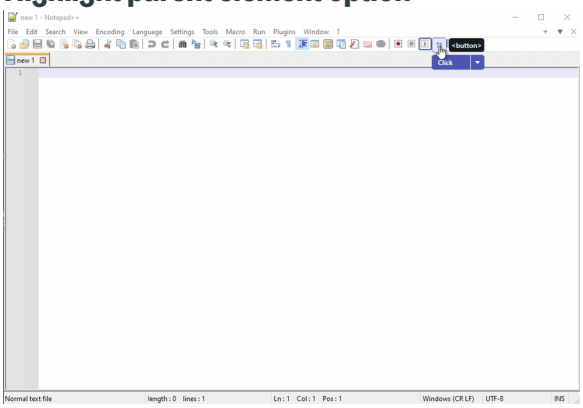
For example, the list of related actions for the button element type are SendKeys, GetText, DoubleClick, and Focus.

For more information on the different types of actions and elements, see Types of elements and actions for the recorder.

5. Select the required action to be performed on the element.
   Each action that you perform is captured sequentially in the Recorded actions pane.
6. Do any of the following options for a desired action.

Option	Action
Highlight the parent of an element	Select the Highlight parent element icon ( ). For example, if you select the **Highlight parent element** option for a button, the toolbar is highlighted. **Highlight parent element option** 
Pause the recording	Select the Pause recording icon ( ).
View the Recorded actions pane	Select the Show recorded steps icon ( ). You can verify the actions that you performed on the application elements from here.
Know more about the recorder feature	Select the Help icon ( ) that navigates to the product documentation web page.
Delete a recorded action	Point to the action and select the Delete action icon ( ).
Delete all the recorded actions from the Recorded actions pane	Select **Delete all**.
Edit the recorded action or element details	**a.** Select the Edit action icon ( ) in the Recorded actions panel. **b.** Update the action type or element name. **c.** Select **Update**.

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7. Select **Review recording**.
8. On the Review app path and URL pane, review the list of applications and their application paths.
9. Select **Continue**.
10. On the Save recording pane, fill in the fields.

Save recording pane

Field	Description
Activity name	Name of the automation activity to which the recorded actions are saved as an automation flow. **Note:** Ensure that you don't give the name of an existing activity.
Save global object to	Option to save the recorded elements to an existing UAC object or a new UAC global object. If you select **New global object**, you must enter the name for the object in the **Global object name** field. If you select the **Existing global** object, you must select an existing UAC global object from the Select from existing global objects list.

11. Select **Save recording**.
    The recorded actions are saved as an automation activity to the automation project. You can modify the recorded automation activity from the design surface.

What to do next

You can view the recorded elements as a UAC object in **Global Objects** in Project Explorer. Expand the UAC objects and view all the screens and elements that are captured by the recorder. Do the following actions if you want to change the screens and element match rules in UAC:

1. Right-click the generated UAC object in **Global Objects** and select **Configure**.

   The Configure screens and elements window is displayed.

2. Configure the screens and the elements of the recording from the Screens and elements pane.

   For more information on how to configure the screen and element match rules, see Use the Universal App Connector.

Types of elements and actions for the recorder

The actions are the activities that you can perform on an application element such as a text box, button, hyperlinks, and so on. By using these actions, you can build an automation flow in the RPA Desktop Design Studio recorder.

Type of elements and their actions

Type of element	Actions
Button	• Click (default) • SendKeys

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Type of elements and their actions (continued)

Type of element	Actions
	• GetText • DoubleClick • Focus
Table	• GetTable (default) • Click • SendKeys • GetText • DoubleClick • Focus
Hyperlink	• Click (default) • SendKeys • GetText • DoubleClick • Focus
Textbox	• SetText (default) • GetText • SendKeys • DoubleClick • Focus
Text area	• SetText (default) • GetText • SendKeys • DoubleClick • Focus
Drop-down list	• SelectItem (default) • Click • SendKeys • GetText

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Type of elements and their actions (continued)

Type of element	Actions
	• DoubleClick • Focus
Check box	• Check (default) • Uncheck • Click • SendKeys • GetText • DoubleClick • Focus
Radio button	• Click (default) • SendKeys • GetText • DoubleClick • Focus
Image	• GetImage (default) • SendKeys • GetText • DoubleClick • Focus

Definition of actions

Action	Description
Click	Performs the left-click mouse device operation on an element.
Check	Performs the select operation on a check box.
DoubleClick	Performs the double-click mouse device operation on an element. If the element has a double-click event that is related to it, then the double-click action is performed.
Focus	Sets the focus to the element.
GetImage	Retrieves the image from an image element. For example, an icon image.
GetTable	Retrieves the table data in a tabular format from a table element.
GetText	Retrieves the text from an element. For example, text from the house address field in a web page.

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Definition of actions (continued)

Action	Description
SendKeys	Simulates the keyboard key or key combinations that are performed on an element.
SelectItem	Selects the item in an element.
SetText	Sets the specified text to the element.
Uncheck	Clears a check box element.

Override a data port

Override a data port of a component in RPA Desktop Design Studio so that you can change the default behavior of the Data In and Data Out ports. By overriding a data port, you can simplify the automation workflow development and testing.

Before you begin

Configure a component. For more information, see Use a component in RPA Desktop Design Studio.

Role required: none

Procedure

1. In the RPA Desktop Design Studio, on the Design surface, right-click the Data In or Data Out port of a component that you want to override and select **Port Properties**.
2. In the PORT PROPERTIES dialog box, edit the details as needed.

PORT PROPERTIES dialog box

Field	Description
Port Name	Name of the port. You can't edit this field.
Data Type	Input or output data type of the component: ○ **Object** ○ **String** ○ **Integer** ○ **Long** ○ **Boolean** ○ **Float** ○ **Double** ○ **DateTime** ○ **Image** ○ **List** ○ **Table** ○ **Secure String**

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Field	Description
Sensitive Data	Option to hide the data from the default view on the Design surface. You can also mark the data as sensitive by doing the following steps: **a.** Right-click the Data In or Data Out Port. **b.** Click **Mark Data as Sensitive**.
Read Data From	Field that appears for the Data In ports only. There are three options: ○ **Connection**: Pass the data from another component. ○ **Static**: Define a static value or select a static option that is associated with the component. If you select this option, the Data In port on the component disappears. ○ **Variable**: Map a global or a local variable from where the data must be read. If you select this option, the Data In port on the component disappears and the variable name appears on the port. For more information, see Create and use a variable in RPA Desktop Design Studio.
Write Data From	Field that appears for Data Out ports only. There are two options: ○ **Connection**: Pass the data to another component. ○ **Variable**: Map a global or a local variable from where the data must be written. If you select this option, the Data Out port on the component disappears and the variable name appears on the port. For more information, see Create and use a variable in RPA Desktop Design Studio.
Static Value	Value of the specific Data port. This field appears when you select **Static** in the **Read Data From** field.

3. Click **OK**.

Preview the data of a data port in RPA Desktop Design Studio

Preview the data of a Data port in RPA Desktop Design Studio to view and verify if the result of a port is correct and is as expected.

Before you begin

Ensure that the component for which you want to view the data for is executed. For more information, see Run an automation in RPA Desktop Design Studio.

Role required: none

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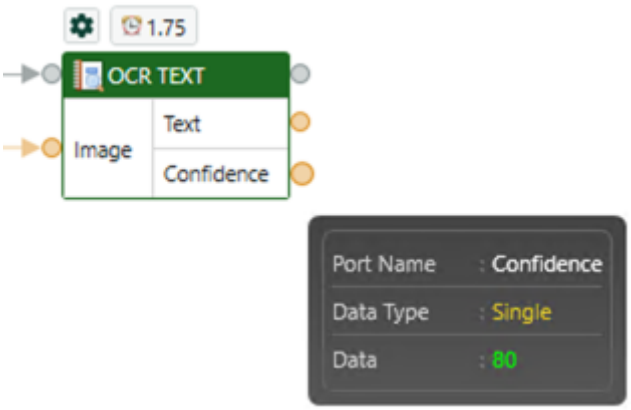
Procedure

In the RPA Desktop Design Studio, on the Design surface, do any of the following actions to preview the data:

- If the data type is simple text, hover over the Data Out port of a component as show in the following example.

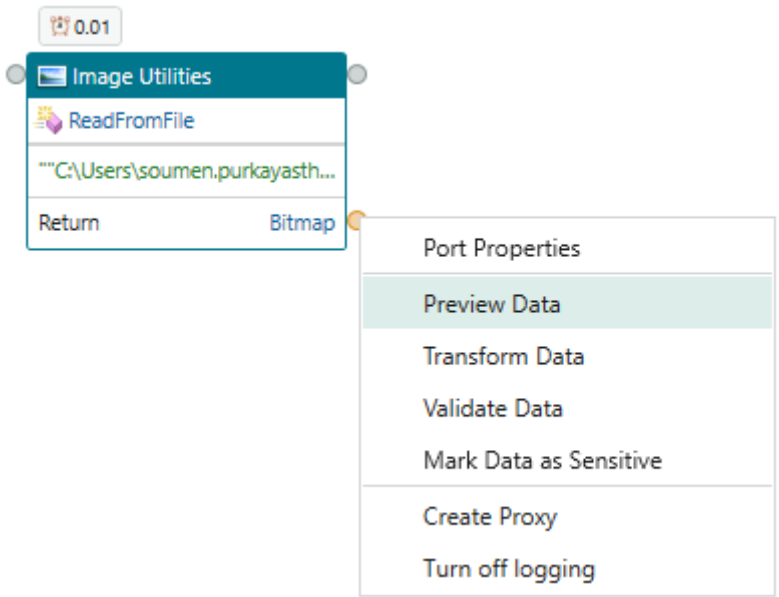
  Partial data is visible in the tooltip.

  Hover over option on the Data Out port



- To view the complete data output, right-click the Data port that you want to view data for and select **Preview Data** as shown in the following example.

  Preview Data option



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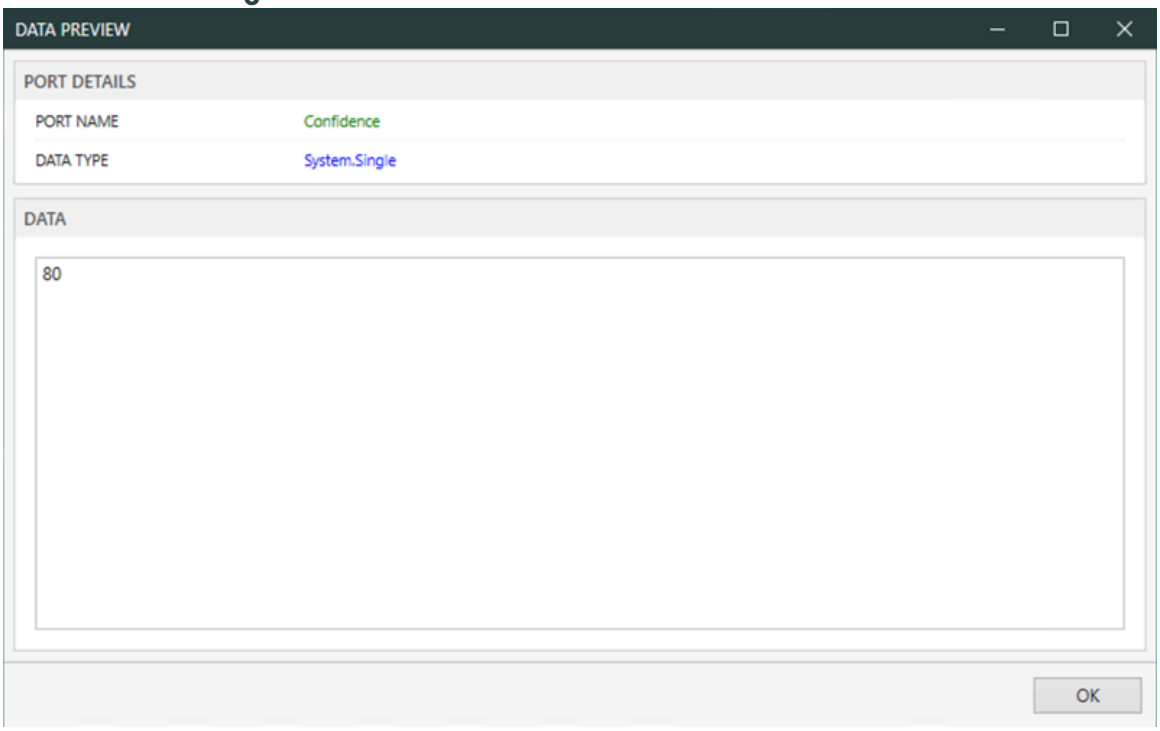
A DATA PREVIEW dialog box is displayed, as shown in the following example.

Data Preview dialog box



You can view the name of the port, the data type, and the data in this dialog box.

Transform the data in RPA Desktop Design Studio

Transform the data in RPA Desktop Design Studio by using the **Transform Data** option at a component level. With this option, you can edit the output value of the Data port by using VB.NET, C#.NET, or JavaScript.

Before you begin

Configure a component. For more information, see Use a component in RPA Desktop Design Studio.

Role required: none

About this task

The **Transform Data** option can be used to modify any data that comes from the Data In port or is returned from the Data Out port.

Procedure

1. In the RPA Desktop Design Studio, on the Design surface, right-click either the Data In or Data Out port that you want to transform and select **Transform Data**.
2. In the DATA TRANSFORMATION EDITOR dialog box, select the **Enabled** check box to enter the code in the Script section.
   The Data port turns green to verify the data transformation in the automation flow.
3. From the following SCRIPT LANGUAGE list, select your preferred scripting language to write the code for the data transformation:

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- **VB.NET**
- **C#**
- **Javascript**

4. In the Script section, enter the code.
   You can use the Value variable to use the incoming data for the Data In port or the outgoing data for the Data Out port in your script.
5. After entering the script, click **OK**.
   The system validates the script.
6. If there are any errors in the Script section, resolve the errors that are displayed in the ERRORS section and then click **OK**.

Validate the data in RPA Desktop Design Studio

Validate your data by using the **Validate Data** option at a component level in RPA Desktop Design Studio.

Before you begin

Configure a component. For more information, see Use a component in RPA Desktop Design Studio.

Role required: none

About this task

You can ensure that the data coming from a Data Out port is not null by using the NotNullValidation validation type. You can also write custom validations by using a script.

Procedure

1. In the RPA Desktop Design Studio, on the Design surface, right-click either the Data In or Data Out port of a component and select **Validate Data**.
2. In the VALIDATIONS dialog box, from the Validator list, select either of the following validation types:

Type	Description and action
NotNullValidation	Checks if the given input is null. A custom message can be inputted for validation and error handling. **a.** Click the plus icon ( ) to add a validation. **b.** In the text box next to **[NOT NULL]**, enter the custom error message as shown in the following example.

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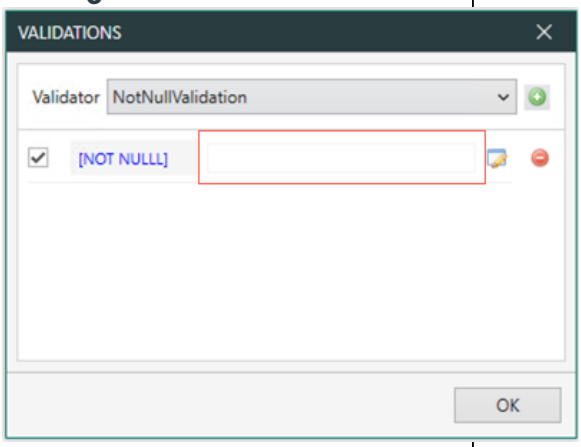
Type	Description and action
	Text box for entering the error message  **c.** Click **OK**.
ScriptValidation	Enables you to choose from a list of programming languages and write a validation script to ensure the data that flows in or out of the Data port is validated against the mentioned conditions. Otherwise, it stops execution and throws an error. **a.** Click the plus icon ( ) to add a validation. **b.** Click the script icon ( ) to open the SCRIPT VALIDATION dialog box. **c.** From the following SCRIPT LANGUAGE list, select your preferred scripting language to write your custom validation: ▪ **VB.NET** ▪ **C#** ▪ **Javascript** **d.** In the Script section, enter the code. For example, `Return Value > 300`. **e.** Click **OK**. **f.** In the text box next to **[SCRIPT]**, enter the custom error message as shown in the following example.

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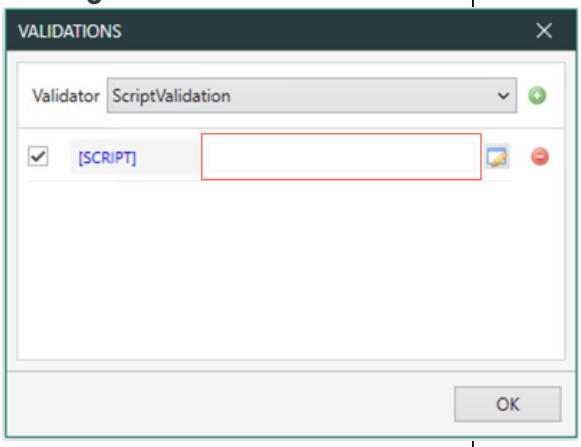
Type	Description and action
	Field for entering the error message  **g.** Click **OK**.

3. **Optional:** To delete a validation rule, click the delete icon ( ) and in the Confirmation dialog box, click **Yes**.

Create a proxy in RPA Desktop Design Studio

Create a proxy at a component level in RPA Desktop Design Studio to extract the additional properties of that component.

Before you begin

Configure a component. For more information, see Use a component in RPA Desktop Design Studio.

Role required: none

About this task

Use the **Create Proxy** option to add or modify some functionalities of an already-existing class.

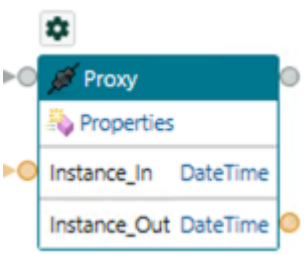
Procedure

1. In the RPA Desktop Design Studio, on the Design surface, right-click either the Data In or Data Out port of a component and select **Create Proxy**.

   Example

   For example, the proxy of the DateTime component appears as shown in the example.

   Proxy component

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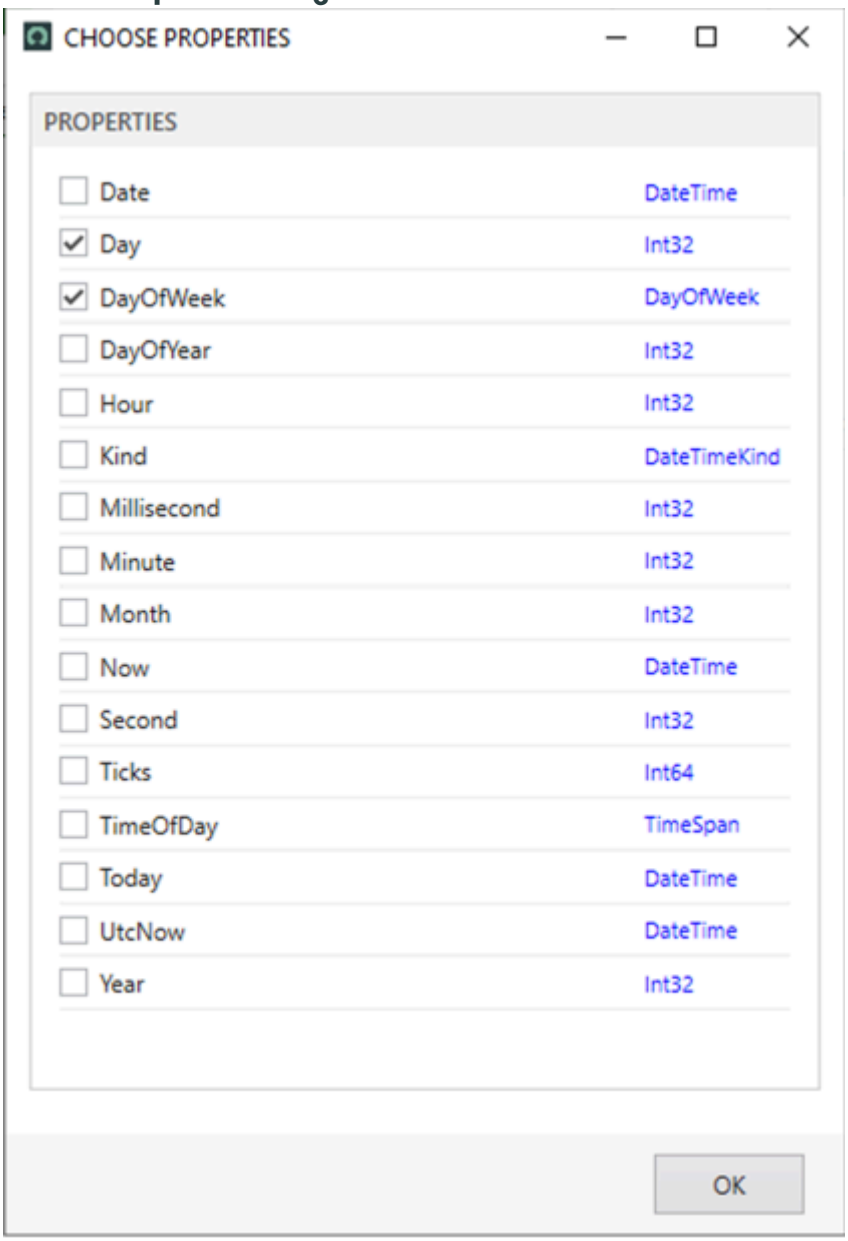
2. Double-click the proxy component title bar to open the CHOOSE PROPERTIES dialog box.
3. In the CHOOSE PROPERTIES dialog box, select the applicable check boxes for the properties to be used.

Example
For example, select the Day and DayOfWeek properties as shown in the example.

Choose Properties dialog box



4. Click **OK**.

Example
If you hover over the Data Out port of the DateTime component after executing the component, you can see the Day as 27 and the DayOfWeek as Saturday in the following examples.

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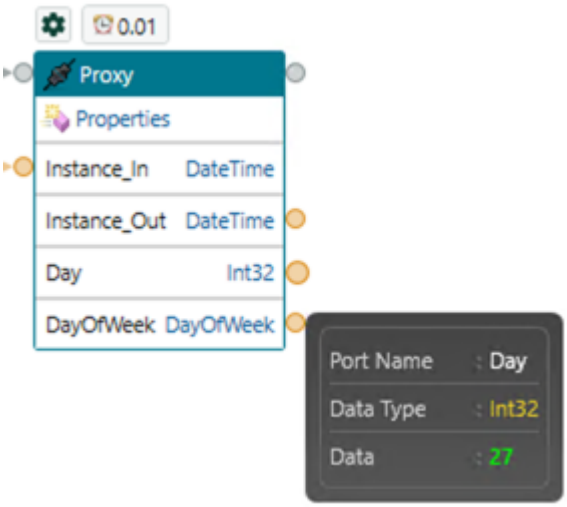
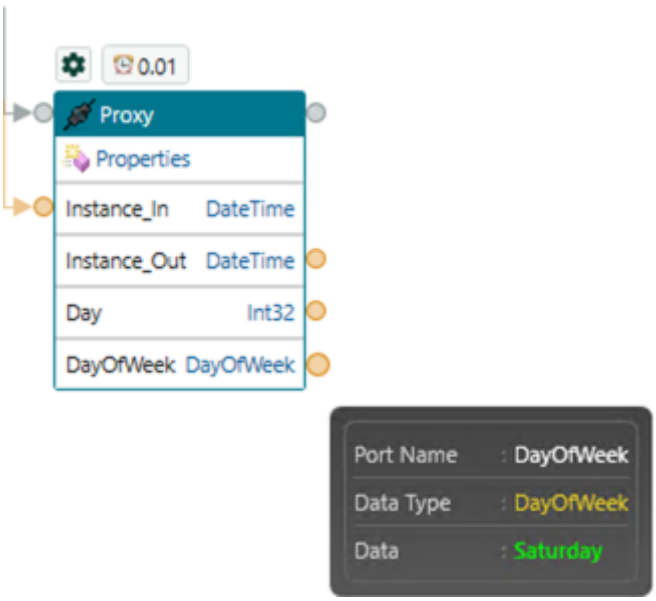
Day as 27 in the DateTime component



DayOfWeek as Saturday in the DateTime component



Set a breakpoint to pause a component in RPA Desktop Design Studio

Set a breakpoint on a component in RPA Desktop Design Studio so that you can pause it for debugging purposes during an automation execution. You can set a breakpoint for any number of components.

Before you begin

Ensure that the component or components where you want to set a breakpoint in are a part of your automation.

Configure a component. For more information, see Use a component in RPA Desktop Design Studio.

Role required: none

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Procedure

1. In the RPA Desktop Design Studio, on the Design surface, right-click the title bar of the component where you want to set the breakpoint and then select **Breakpoint**.

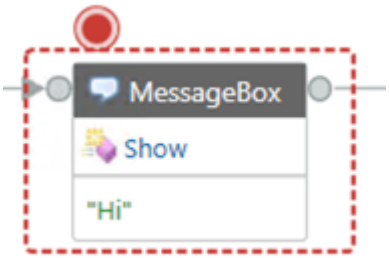
   After a breakpoint is set on a component, you can see a red icon as shown in the following example.

   Red icon that appears after a breakpoint is set on a component

   During the automation execution, when the robot reaches a component that has a breakpoint, the execution pauses and the component is highlighted with a red border, as shown in the following example.

   Red border that appears when the robot reaches a component that has a breakpoint

2. Choose an option and complete the action.

Option	Action
To execute the component where the break point is set	Click **Move next** under the **Design** tab or press the **Ctrl+F8** keys. For a step-by-step execution of the workflow, continue clicking the **Move next** button.
To continue the execution of the remaining components	Click **Run** under the **Design** tab.
To find all the breakpoints in the automation	Click the down arrow button next to the **Clear Breakpoints** button under the **Design** tab and select **Find all**. A list of breakpoints appears in the Find All References section.
To remove a breakpoint	Right-click a desired component and select **Breakpoint**.
To remove all the breakpoints	Click **Clear breakpoints** under the **Design** tab.

Start a workflow execution from a selected component in RPA Desktop Design Studio

Start a workflow execution from a component instead of at the beginning of the workflow by using the **Run From Here** option in RPA Desktop Design Studio. This functionality allows you to rapidly develop and test the automation workflows.

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Before you begin

Configure a component. For more information, see Use a component in RPA Desktop Design Studio.

Role required: none

Procedure

1. In the RPA Desktop Design Studio, on the Design surface, right-click the title bar of the component from where you want to start the execution.
2. Select **Run From Here**.

Run an automation in RPA Desktop Design Studio

Run an automation to execute the workflow in RPA Desktop Design Studio.

Before you begin

Create an automation project. For more information, see Create an automation project manually or Create an automation with AI.

Role required: none

About this task

The **Run** option starts the execution from the Start component of the activity that is marked as startup.

Procedure

1. In the RPA Desktop Design Studio, navigate to the **Design** tab.
2. Click **Run**.
3. **Optional:** To clear the runtime log, click **Clear Log**.

Code quality check in RPA Desktop Design Studio

You can use code quality check in RPA Desktop Design Studio to proactively find the issues in an automation activity or the complete automation project. When you publish an automation project, an in-built code quality check is also performed. Code quality check enables you to reduce the number of errors and prevent potential issues that may hinder your automation.

Code quality check overview

Code quality check in RPA Desktop Design Studio is based on the pre-defined set of rules that are enabled from the RPA Hub instance. You must connect to the instance that has Code quality check to RPA Desktop Design Studio before you start using Code quality check. For more information on how to configure Code quality check from RPA Hub, see Code quality check in RPA Hub RPA Desktop Design Studio. For more information on the pre-defined set of rules, see Code quality rules list in RPA Hub.

When you check an activity or the complete automation project by using Code quality check, the issue results and details are displayed as a list of entries in the Code Quality Check Results window. The following example shows the window.

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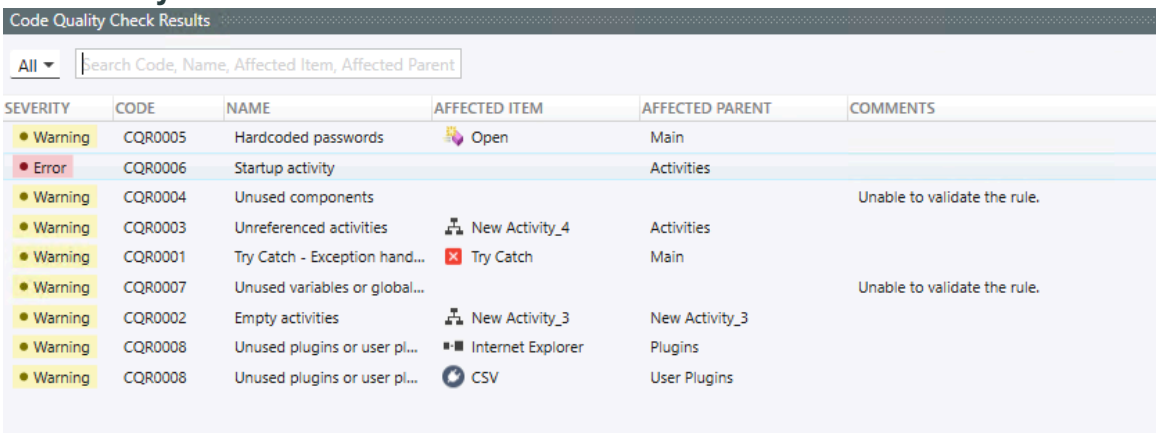
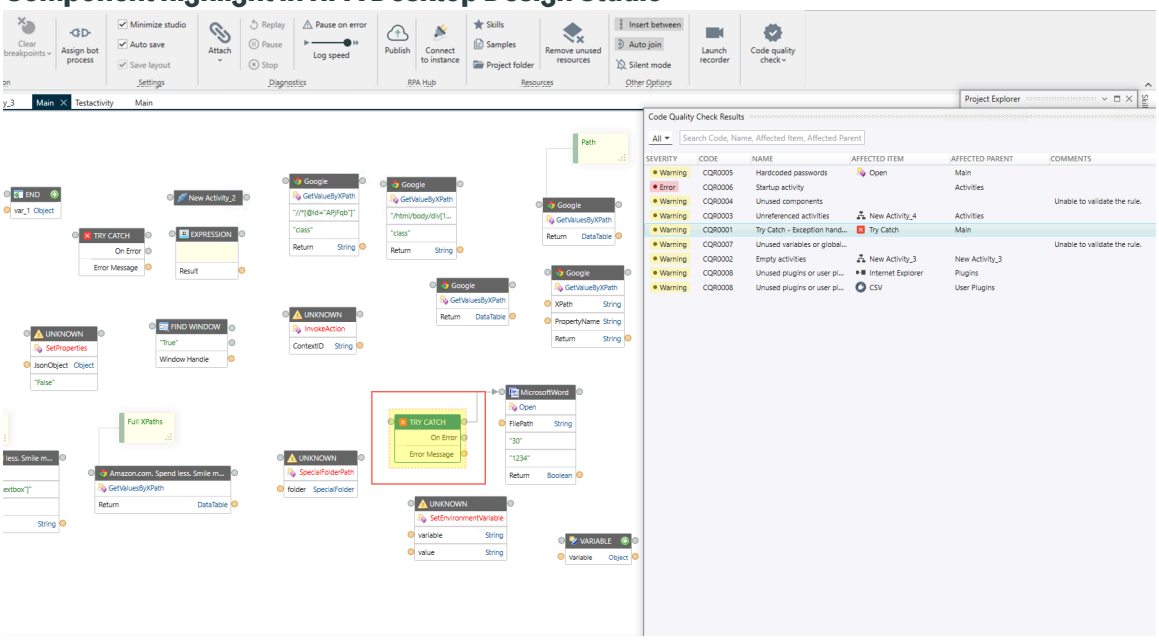
Code Quality Check Results window



You can double-click the result entries for components in the Code Quality Check Results window for the following scenarios:

- If an affected component is in the current activity, it's highlighted in the current activity.
- If the affected component is in a different activity, you can navigate to the activity. The component gets highlighted. See the following example to see the component highlight in RPA Desktop Design Studio.

Component highlight in RPA Desktop Design Studio



Code quality check in publishing an automation project

Code quality check is automatically performed when you publish the automation project. If your project has code quality check issues, the Code Quality Check Results window is displayed with the result entries. For more information on how to publish an automation project, see Publish an automation project in RPA Desktop Design Studio in RPA Desktop Design Studio.

Note: You can publish a package with errors or a combination of errors and warnings only if the property *sn_rpa_fdn.restrict_package_by_severity* is set as **No restriction** in RPA Hub. For more information on this property, see Configure RPA Hub properties. For more information on the compliance rules that the Code Quality Check feature follows if a package is published from RPA Desktop Design Studio, see Code quality check compliance for RPA Desktop Design Studio in RPA Desktop Design Studio.

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You can view the list of active and inactive rules from the View Rules window. You can filter the rules by their severity level from this window.

Fix automation issues with Code quality check in RPA Desktop Design Studio

Fix the automation issues in your automation activity or complete an automation project proactively by using the Code quality check feature in RPA Desktop Design Studio.

Before you begin

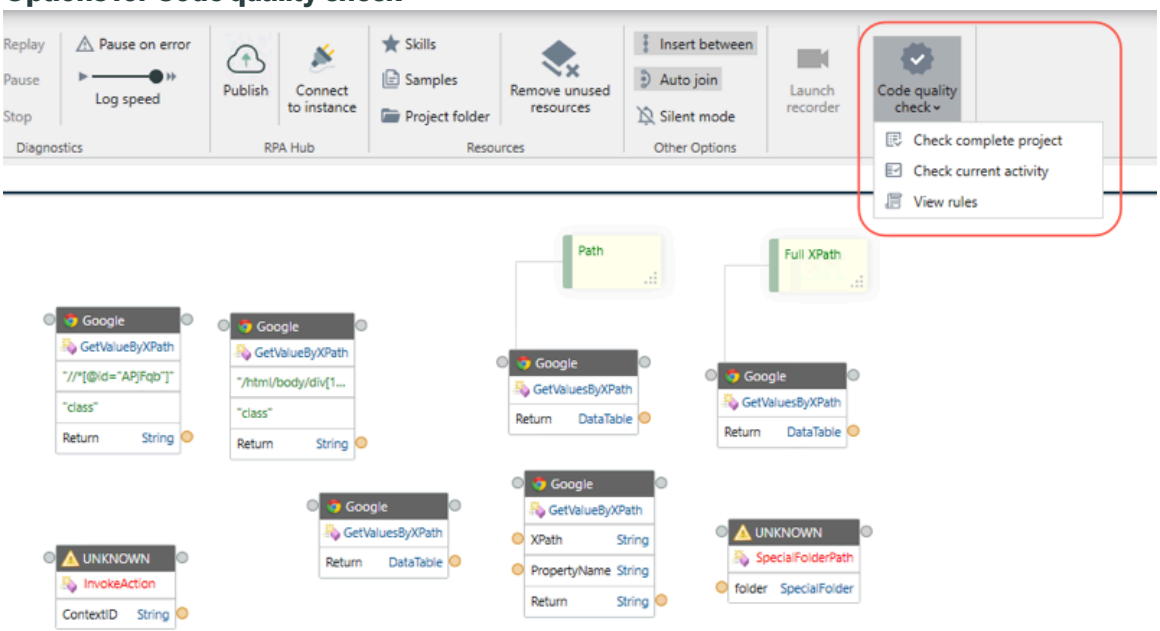
Connect to the RPA Hub instance that has the Code quality check feature enabled. For more information on how to connect to an RPA Hub instance, see Connect to an RPA Hub instance from RPA Desktop Design Studio.

Role required: RPA Developer

Procedure

1. On the toolbar of the **Design** tab in RPA Desktop Design Studio, select **Code quality check**. The **Code quality check** options are displayed.

Options for Code quality check



Note: If you aren't connected to an instance and you select the **Code quality check** option, the Connection Manager window is displayed. For more information on how to connect to an RPA Hub instance, see Connect to an RPA Hub instance from RPA Desktop Design Studio.

2. Do Code quality check for the following options.

Code quality check option	Description
Check complete project	Performs code quality check for the complete automation project. Use this option if your au tomation project has multiple activities and you don’t want to do a Code quality check for each of them. The results are displayed in the Code Quality Check Results window.

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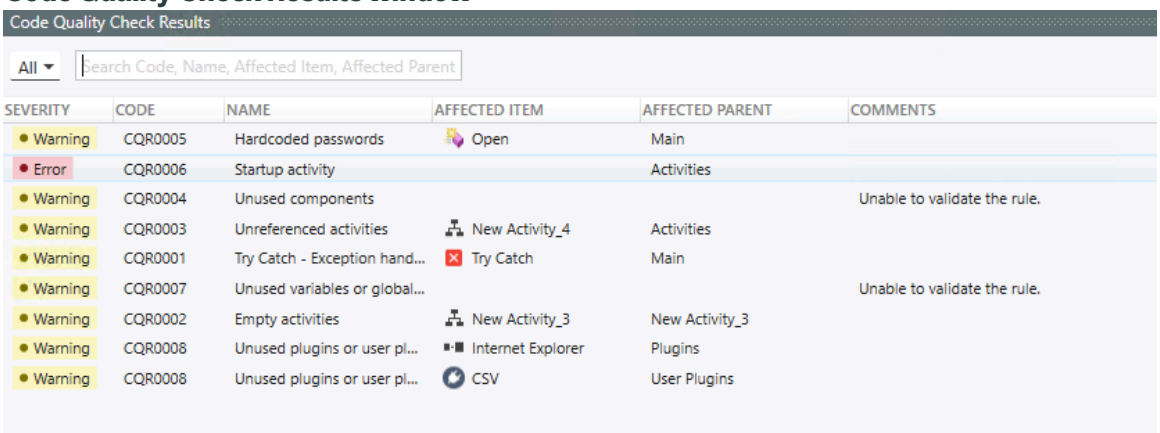
Code quality check option	Description
Check current activity	Performs Code quality check for the current activity.

The results are displayed in the Code Quality Check Results window.

Note: If you select the option **Check complete project** or the option **Check current activity** and there's a connectivity issue, a timeout error is displayed. Contact your RPA administrator for more information.

3. In the Code Quality Check Results window, view the issue results and their details as a list. The results are classified as error, warning, and information based on the severity that is set by the RPA administrator or release manager. You can filter the results by the severity level by selecting the **All** button. The **Name** field indicates the type of issue that is based on the code quality rules configured in RPA Hub. For more information on the list of code quality rules, see Code quality rules list in RPA Hub.

Code Quality Check Results window



You can double-click the result entries for components in the Code Quality Check Results window for the following scenarios:

- If an affected component is in the current activity, it's highlighted in the current activity.
- If the affected component is in a different activity, you can navigate to that activity. The affected component is highlighted.

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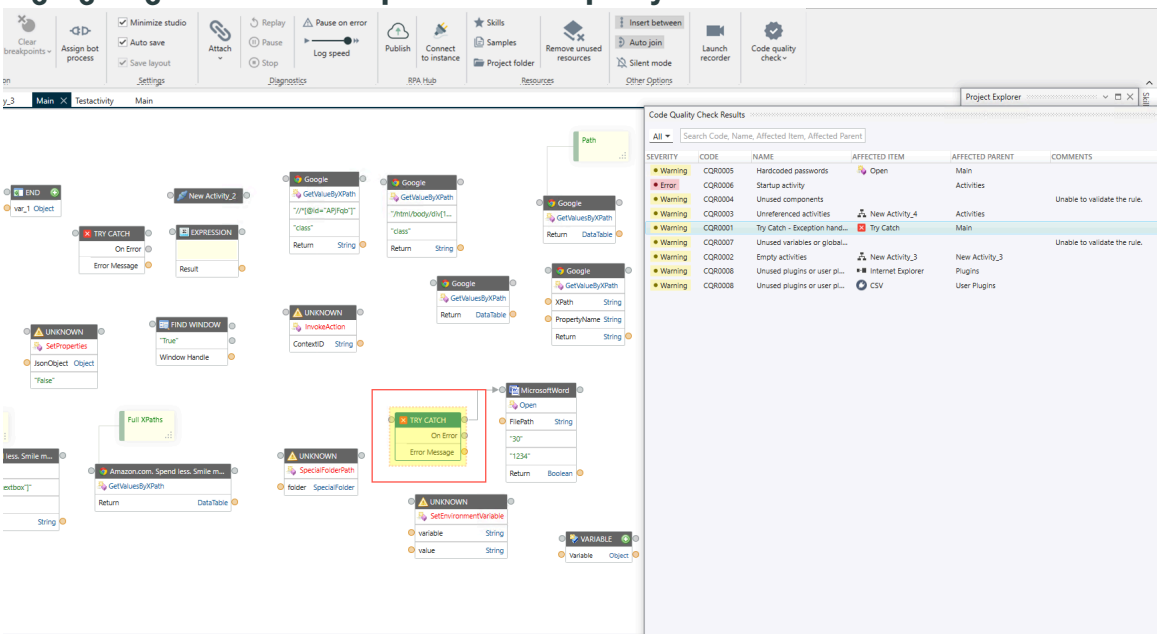
Highlighting the affected component in code quality check



4. View the list of active and inactive rules that are configured from the RPA Hub instance by selecting **View Rules**.

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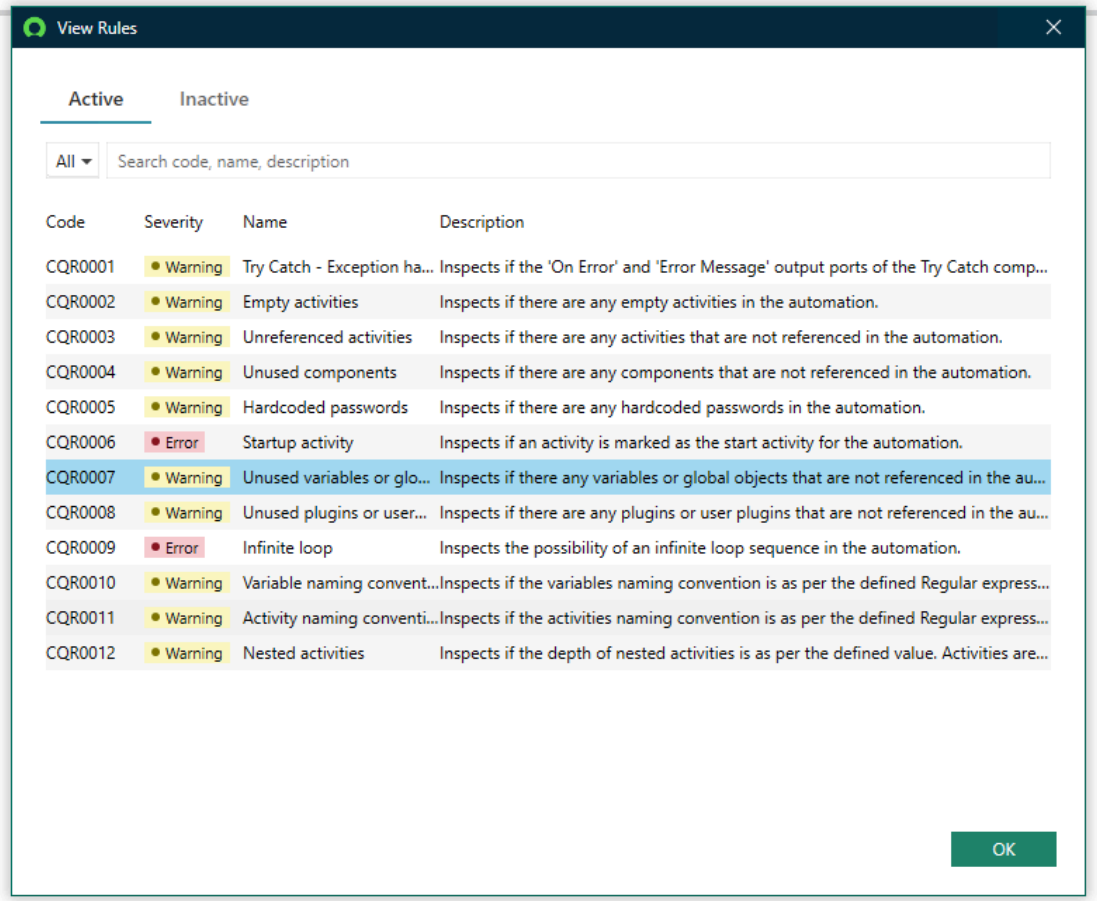
View Rules window for Code Quality Check



5. Fix the issues that pertain to the code quality check and your automation project is ready to be published.

What to do next

The automation project is ready to be published. Code quality check is also performed automatically when you publish a project. For more information on how to publish a project, see Publish an automation project in RPA Desktop Design Studio.

Assign bot process to an automation project

Assign a bot process to an automation project in RPA Desktop Design Studio to start using the bot process resources.

Before you begin

Role required: sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin, if running from RPA Desktop Design Studio

About this task

The Assign Bot Process feature is enabled for all automation projects including skills. It shows both attended and unattended bot processes in the **Bot process** field.

To access resources (Queues, Process Parameters, and so on) limited to a specific bot process within the automation from RPA Desktop Design Studio, the **Assign bot process** option helps in selecting the bot process and there by accessing resources to successfully run the automation in RPA Desktop Design Studio.

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Procedure

1. From the **Design** tab of RPA Desktop Design Studio, select **Assign bot process**.
   The Assign Bot Process dialog box is displayed.
2. Select the required bot process from the **Bot Process** list.

   Note: The users who are a part of the Managed by Group for the respective bot process, those bot processes are also displayed in this list.

3. If the selected bot process is enabled with Embedded Task Automation, fill in the following required fields.

   Assign Bot Process

Attended Config	The attended configurations that are associated with the selected bot process in step 2, are displayed here. Select an attended configuration.
Record Context	Enter the Sys ID or URL of the ServiceNow form record. This helps you to fetch field values using GetProcessFieldParameters component and update field values using SetProcessFieldParameters component of the selected Sys ID. For more about getting the Sys ID or URL, see Unique record identifier (sys_id).

   Note: For more information about Embedded Task feature, see Embedded Task Automation (ETA) in RPA Hub.

4. **Optional:** For unattended bot process, select the required robot from the **Robot** list.

   (Optional) You can select the robots that are assigned to the bot process.

   Note: Starting from the Vancouver release of RPA Desktop Design Studio, for unattended automations, you can view only those robots from the bot process that are mapped to your user role. The robot must also have your machine name where RPA Desktop Design Studio is running. If there are no robots associated to the bot process, then an error is displayed.

5. Select **OK**.
   If one or more skills are overridden in the bot process, the automation uses the updated skill version during current execution. For more information about overridden skill versions, see Override a skill version for a bot process in RPA Hub.

Publish an automation project in RPA Desktop Design Studio

Publish an automation project to RPA Hub from RPA Desktop Design Studio as a package or as a template. After publication, you can quickly deploy automation solutions in the RPA platforms by using the packages or by using a template as a framework to create automations.

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Before you begin

Ensure that the automation project file is open in RPA Desktop Design Studio. For more information, see Open a local automation project in RPA Desktop Design Studio.

Ensure that the automation project file is in a separate folder. All the files and folders in the current project file location are published to the RPA Hub.

Verify the connection manager setup in the RPA Desktop Design Studio. For more information, see Set up RPA Desktop Design Studio.

Role required: sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin

About this task

Publishing an automation project as a package enables the RPA Hub to execute a process job that executes the workflow in the automation project. You can publish an automation project as a new package or as the version of an existing package.

Publishing an automation project as a template makes it the framework for creating automation projects later. You can publish an automation project as a new template or as the version of an existing template.

Procedure

1. In the RPA Desktop Design Studio, open the automation project that you want to publish.
2. On the **Design** tab, select **Publish**.

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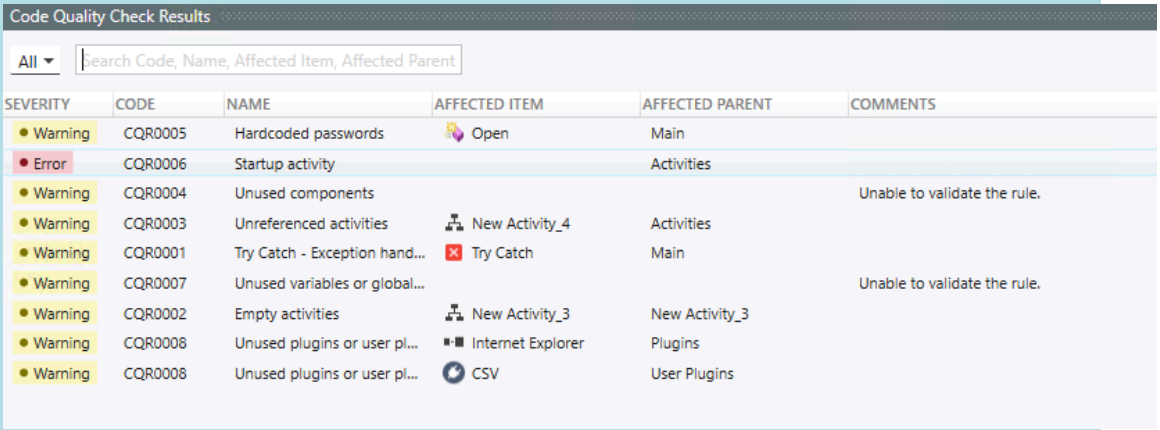
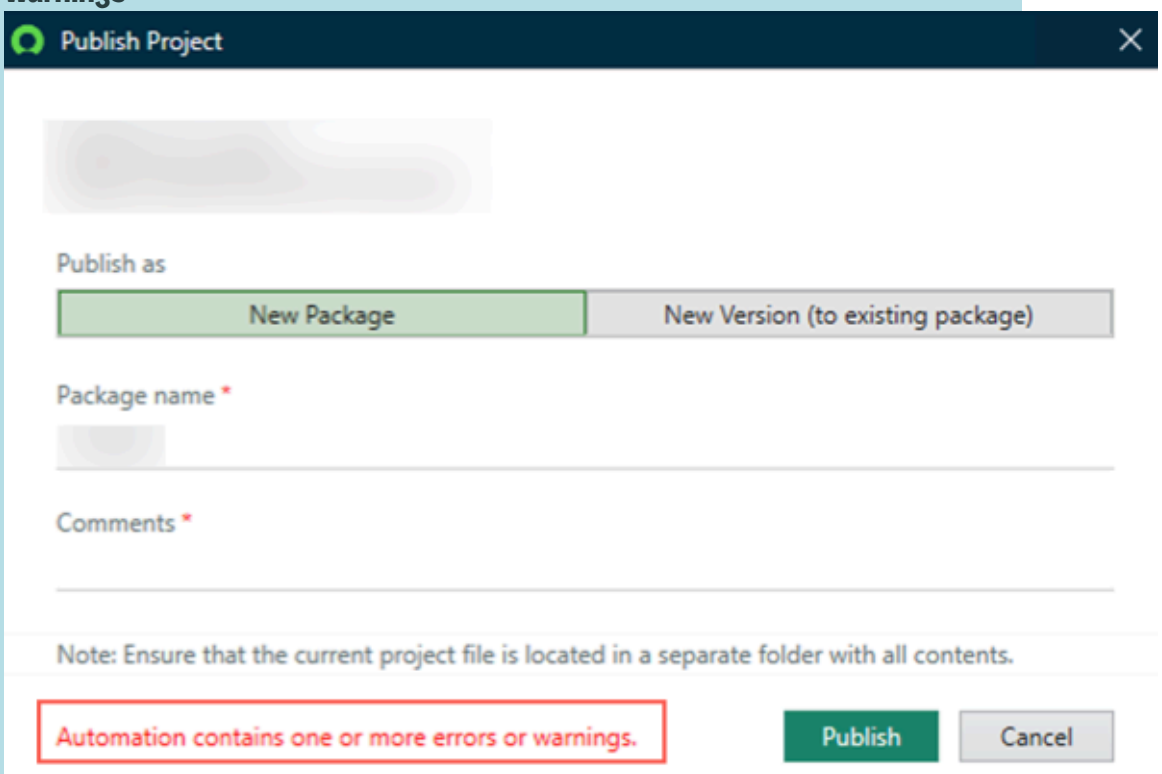
Important:

- If the Code quality check feature is enabled from your RPA Hub instance and your automation project has Code quality check issues, the Code Quality Check Results window displays an error message.



You can publish a package with errors or with both errors and warnings only if the property *sn_rpa_fdn.restrict_package_by_severity* is set as **No restriction** in RPA Hub. For more information, see Configure RPA Hub properties. As shown in the following example, these packages are highlighted with the message `Automation contains one or more errors or warnings` when you begin to publish a project.

Error displayed when you're publishing a project with errors or warnings



For more information on the compliance rules that the Code quality check follows when a package is published from RPA Desktop Design Studio, see Code quality check compliance for RPA Desktop Design Studio.

- When you enable the *sn_rpa_fdn.code_signing_required* system property on the instance, it impacts the existing bot processes that are associated with the packages on the same instance because you didn't enable code signing on them earlier while you were publishing from RPA Desktop Design Studio to RPA Hub. As a

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3. Publish an automation project as a package or template.

Option	Action
Publish the automation project as a package	**a.** In the Publish project window, ensure that **Package** is selected in the **Publish project as** field. **Note:** **Package** is the default option. **b.** In the Publish package as list, select **New Package** or **New version (to existing package)**. ▪ Publish the automation project as a new package by ensuring that **New Package** is selected. **Note:** **New Package** is the default selection. ▪ Publish the automation project as a version to an existing project by selecting **New version (to existing package)**. **c.** Publish the package as a new package by entering the package name in the **Name** field or by retaining the default name. **Note:** By default, the automation project name is the default package name. **d.** Publish the package as a new version to an existing package by selecting the package name from the Select Package list. **e.** In the **Comments** field, enter a comment. **f.** Select **Publish**. **g.** Select **OK**.
Publish the automation project as a template	**a.** In the Publish project window, in the **Publish project as** field, select **Template**. **b.** In the Publish template as list, select **New template** or **New version (to existing template)**. ▪ Publish the automation project as a new template by selecting **New template**. ▪ Publish the automation project as a version to an existing template by selecting **New version (to existing template)**. **c.** Publish the automation project as a new template by entering the template name in

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Option	Action
	the **Name** field or by retaining the default name. **Note:** By default, the automation project name is the default template name. **d.** Publish the automation project as a version to an existing template by selecting **New Version (to existing template)**. **e.** Publish the template as a new version to an existing template by selecting the package name from the **Template** list. **f.** In the **Comments** field, enter a comment. **g.** Select **Publish**. **h.** Select **OK**.

4. **Optional:** If code signing is mandated by your organization and you're publishing the automation project as a package, do the following actions:

   a. In the **Certificate location** field, select either **File** or **Cert Store** as the location of the certificate.

   b. Select the three-dot menu (...) next to the **Certificate** field.

   c. Select the installed code signing certificate.

      Note: You can only select a certificate that has the intended purpose as code signing. If you select a certificate with any other intended purpose, an error is displayed.

   d. Select **OK**.

   Note: This step is applicable only if you're publishing the automation project as a package.

Resolve conflicts when merging changes from multiple sources of the same activity

Resolve conflicts when merging changes from multiple sources of the same activity by using the **Source Control** option in RPA Desktop Design Studio.

Before you begin

If you're not connected to a ServiceNow instance, click the Connection Manager icon under the **Design** tab to connect to an existing instance. For more information, see Set up RPA Desktop Design Studio.

Create an activity. For more information, see Create an activity manually in RPA Desktop Design Studio.

Role required: none

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Procedure

1. Open the project that has the activity that you want to resolve conflicts in.
2. In the Project Explorer pane, navigate to **Activities**.
3. Right-click the activity and select **Source Control**.
4. In the COMPARE PROCESSES dialog box, under the Remote section, select any of the following source types to open the automation project from the **Source** field.

Option	Action
Remote	**a.** Click the Open Project icon ( ). **b.** In the Open Project dialog box, select a package name and a version. **c.** Click **Open**. **d.** Click **Save** to save the Project in the default location. **e.** From the Select a Document version list, se lect a package version.
Local	**a.** Click **Browse**. **b.** In the Open dialog box, select a project. **c.** Click **Open**.

The changes are highlighted in the COMPARE PROCESSES dialog box as shown in the following example. If changes are added, they appear in green. If the changes are removed, they appear in red. If the changes are modified, they appear in yellow.

Changes highlighted in the Compare Processes dialog box

5. Under the Local section, select any of the following options for resolving conflicts from the **In conflict** field:
   - Select **Keep current items** to retain the changes in the Local section.
   - Select **Replace** to replace the highlighted changes in the Local section with the highlighted changes in the Remote section.
6. In the CONFIRM dialog box, click **OK**.
7. Click **Merge with current**.

Import project in RPA Desktop Design Studio

Import a project to reuse resources, such as activities, variables, attended automation forms, and other global objects from a different automation project in RPA Desktop Design Studio.

Before you begin

Create an automation project. For more information, see Create an automation project manually.

Create an activity. For more information, see Create an activity manually in RPA Desktop Design Studio.

Create a variable. For more information, see Create and use a variable in RPA Desktop Design Studio.

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Create an attended automation form. For more information, see Create an attended automation form in RPA Desktop Design Studio.

Install plugins to design automations. For more information, see Manage plugins in RPA Desktop Design Studio.

Role required: none

Procedure

1. Open the project that you want to reuse resources from a different automation for.
2. In the Project Explorer pane, right-click the project and select **Import**.
3. To select a project that contains the resources that need to be imported, go to the Import Project dialog box, and click the three-dot menu next to **Project File (.iBot)**.
4. Click **Open**.
5. Click **Load**.
6. In the Project Items section, select the check boxes next to the options that you want to import so that you can merge or override conflicts.
   If a conflict occurs with any resource that you're importing, select an option to either merge or override it with the conflict in your project.
7. Click **OK**.

Handle errors in RPA Desktop Design Studio

Handle errors at the component level and activity level in RPA Desktop Design Studio. You can use the **Error Handler** option to handle the errors that occur during an automation execution.

Before you begin

Configure a component. For more information, see Use a component in RPA Desktop Design Studio.

Create an activity. For more information, see Create an activity manually in RPA Desktop Design Studio.

Role required: none

Procedure

1. In the RPA Desktop Design Studio, select one of the following options to handle errors either at a component level or at an activity level.

Option	Action and description
To handle errors at a component level	On the Design surface, right-click the com ponent title bar and select **Error Handler** to open the ERROR HANDLER dialog box.
To handle errors at an activity level	In the Project Explorer pane, right-click an ac tivity and select **Error Handler** to open the ER ROR HANDLER dialog box. By default, error handling at the activity level applies to all components within that activity, except for the components where errors han dling is explicitly configured.

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2. In the ERROR HANDLER dialog box, from the On Error list, select any one of the following error handler types:

Type	Description
Inherit	Inherits the error handling settings that are configured at the parent level. Within a component, an activity that the component belongs to, is the parent. Within an activity, the parent is the activity where the activity is being called from. This option is the default for error handling at component level.
Stop	Stops the execution if error occurs. This option is the default for error handling at the activity level.
Continue	Continues the execution if an error occurs.
Retry	Retries the execution of the component where the error occurs. After selecting the **Retry** option, the following fields appear: ○ In the **Max Retries** field, you can define the number of retries. ○ In the **Retry Delay** field, you can define the delay between each retry. The automation stops with an error if the Maximum retires count is exhausted during an execution. In the **On Error After Retry** field, you can select an option such as **Inherit**, **Stop**, and **Continue** to provide further steps if an error persists after a defined retry has failed.

3. Click **OK**.

Configure port properties

Configure how data is passed to the input fields of a component or method in RPA Desktop Design Studio.

Before you begin

Role required: none

Procedure

1. On the Design surface, right-click a port or the associated field of a method or component.
2. Click **Port Properties**.

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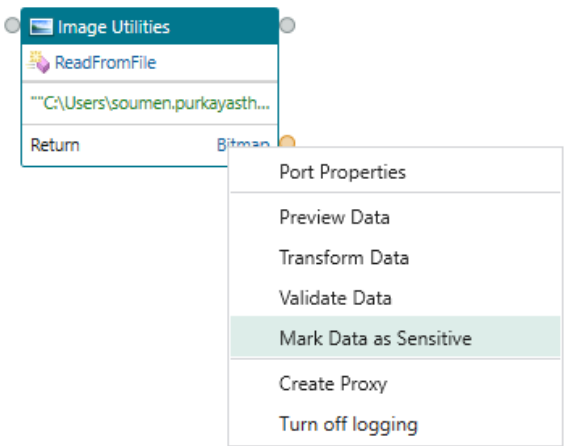
3. In the Port Properties dialog box, configure the port properties.

PORT PROPERTIES dialog

Field	Description
Data Type	Specifies the data type of the input that you are passing to the component or method. This option is enabled when the input field requires that you pass a variable or parameter to the field.
Sensitive Data	Option to hide the data from view on the Design surface. You can also set this option by right-clicking the port and selecting **Mark Data as Sensitive**. 
Read Data From	The **Read Data From** field appears only for Data In ports, and includes the following options: ○ **Connection**: Pass the data from another component. ○ **Static**: An unchanging value that is associated with the component. Use data specified in the Static Value field of this dialog box. When you select this option, the Data in port on the component disappears. **Note:** This option does not appear in some components and methods. ○ **Variable**: A global or a local variable from where the data must be read. When you select this option, the Data in port on the component disappears and the variable name appears on the port. For more information about variables, see Create and use a variable in RPA Desktop Design Studio.
Write Data To	The **Write Data To** field appears only for Data Out ports and includes the following options:

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Field	Description
	○ **Connection**: Send data to another component. ○ **Variable**: Use data from a global or a local variable. When you select this option, the variable name appears on the port, and the Data Out port is not present. For more information about variables, see Create and use a variable in RPA Desktop Design Studio.
Static Value	The value that is attached to the port. This field appears when you select **Static** in the **Read Data From** field.
Mapped Variable	The variable that is mapped to the port. This field appears when you select **Variable** in the **Read Data From** field.

Configure output port properties

Configure the ways the output ports or fields of components or methods return output in the RPA Desktop Design Studio.

Before you begin

Role required: none

Procedure

1. Right-click the output field or Data out port of the component or method.
2. Click **Override**.
3. Configure how the method or component processes the output as given in the table.

PORT PROPERTIES dialog box

Field	Description
Sensitive Data	Option to hide the data from the default view on the Design surface.
Write Data To	Field that appears for Data Out ports only. There are two options: ○ **Connection**: Pass the data to another component. ○ **Variable**: Map a global or a local variable from where the data must be written. If you select this option, the Data Out port on the component disappears and the variable name appears on the port. For more information, see Create and use a variable in RPA Desktop Design Studio.

Automation components

Design automations using various components in RPA Desktop Design Studio.

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Make sure you're familiar with the basics of using a component, connector, activity, variable, and the various actions using automations. For more information, see the topics listed in Building automations and Using automations.

List of components compatible with latest version

Learn about the list of components that are executed in their latest versions in the RPA Desktop Design Studio and robots, irrespective of the version they were used during the automation design.

Backward compatibility of plugins overview

Robotic Process Automation (RPA) solution is built with backward compatibility of plugins.

An automation built using the earlier plugin versions are compatible with a latest version. For example, if an automation is built using an earlier version of a plugin, 1.0, the RPA Desktop Design Studio, Attended Robot, and Unattended Robot applications run the automation by loading the plugin version 1.0.

If any newer version of a component is no longer compatible with its older versions, they're documented in the release notes. For more information, see and RPA Plugin Bundle release notes.

Additionally, any automation component interacting with RPA Hub APIs are only compatible with its own RPA Hub version. For example, if the component is released as part of Utah 4.1, then it's compatible only for that version.

During the infrastructure upgrade for every family or store release (Vancouver, for example), use the MSI packages corresponding to the respective releases.

The following table lists the matrix defining the backward compatibility. In this table, N depicts the latest release version of the software and N-2 depicts two versions prior to it.

Matrix defining the backward compatibility

Plugins	Backward compatibility	Comments
RPA Desktop Design Studio	N	
Unattended Robot	N	
Attended Robot	N	
Essential Toolkit	N-2	Except for RPA Hub components
Essential Connectors	N-2	Except for RPA Hub components
Windows	N-2	
Java	N-2	
Chromium (Google and Edge)	N-2	
Mainframe (PCOMM)	N-2	
FTP	N-2	
Barcode Reader	N-2	
Scripting	N-2	

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Matrix defining the backward compatibility (continued)

Plugins	Backward compatibility	Comments
Universal app connector	N-2	

Few fundamental components that are essential to build the automation logic are excepted as these components are part of the RPA Desktop Design Studio.

List of components

The following list of components are executed in their latest versions in the RPA Desktop Design Studio and robots, irrespective of the version they were used during the automation design.

Category	Component
Conditions	Decision
	Switch
Connectors	IdleTimer
	System Events
	Timer
General	Variable
	Try Catch
	Expression
	Parallel
	Terminate
	MessageBox
Loops	Break
	For Each
	For Loop
	While
RPA Hub	Log
Security	DPAPI
Utilities	Debug
Internal	ExecutionPoint
	Start
	End
	UnknownComponent
	RemoteActivity
	VariableContainer

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Actions (UI)

The Actions (UI) group of components work on and with browsers, browser elements, applications, and the desktop in the RPA Desktop Design Studio.

You can, for example, perform the following actions.

- Execute a JavaScript on a web page
- Extract text using the Optical Character Recognition (OCR) technology
- Simulate the mouse device clicks
- Extract data from a table

Using Actions (UI) components, your automation can interact with browsers, forms, applications, and objects in a way that is similar to how a user might interact with them using a mouse and keyboard.

Use the ActionSet component

The ActionSet component lets an automation interact with Windows applications (such as web browsers) and with Citrix applications. Using this single component in RPA Desktop Design Studio, you can click, drag, read and set text, interact with tables, and more, combining several user actions into a single task.

Before you begin

Role required: none

About this task

Using the ActionSet component, you can simulate a user interaction in an automation by specifying multiple user actions.

You can configure the properties for the ActionSet component settings. For more information about these properties, see Properties of Actions (UI) components.

Using the controls in the window, you capture an area of an application window, set one or more anchors, and define the user interactions that you want to simulate in that window. An anchor helps specify the target area for the interaction by defining a static area from which actions can be defined at a relative distance. For more information about anchors, see Anchor.

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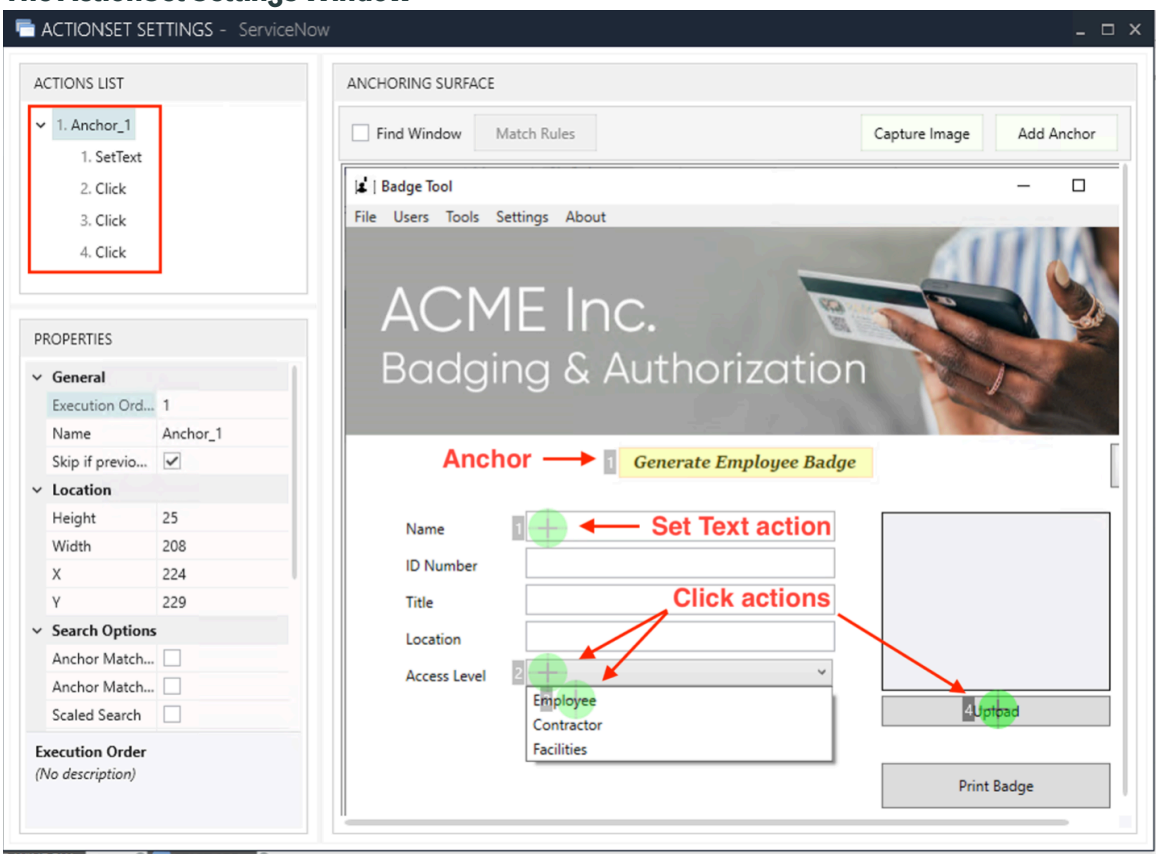
The ActionSet Settings Window



Note: The ActionSet component is compatible with the Internet Explorer browser, Windows, and Citrix applications.

Procedure

1. In the Toolbox pane, navigate to **Actions (UI)** > **ActionSet**.
2. Drag the ActionSet component to the Design surface.
3. Click the component settings icon ( ), or, double-click the header of the component.
   The ACTIONSET SETTINGS window appears.
4. Do the following actions:
   Capture the area of the external application's window that you want the automation to interact with. For example, capture the area surrounding a button or a text field in a web browser.

   a. Click **Capture Image**.
      The `Press "CTRL+SHIFT" for selection` message appears.

   b. Switch to the external application.

   c. Press the **Ctrl + Shift** keys at the same time, then release them.
      The mouse device turns into a crossover icon ( ).

   d. Drag the mouse device over the element on which you want the ActionSet component to perform an action and its surrounding area and release.
      For example, if you want the component to click a button, drag the mouse device to capture the button and its surrounding areas.

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The selected area is captured as an image in the ACTIONSET SETTINGS window.

All ActionSet actions take place in the selected window. To run actions in more than one window, use more than one ActionSet component in your workflow.

5. To add one or more anchors, follow these steps:

   a. Return to RPA Desktop Design Studio and in the ACTIONSET SETTINGS window, click **ADD ANCHOR**.
   The anchor appears as a yellow rectangle with red borders.

   b. If necessary, move the anchor to a part of the captured image that will not change.
   For example, move the anchor to a title or field label.

   If the area under the anchor does not exactly match the corresponding area of the captured image, the anchor will not be recognized, and the ActionSet component will not work as intended. Choose a static area of the image to set your anchor.

   You can define more than one anchor. Multiple anchors let you define the geographical relationship between anchor and target with greater accuracy when targeting different locations in the image.

6. Right-click the anchor and select an action to perform in the contextual menu.
7. To do the actions that the ActionSet component can perform, see the following steps in the appropriate topic to configure the action:

ActionSet component actions

Action	Reference
Simulate a mouse click	Use the ActionSet Click action.
Enter text in a field	Use the ActionSet SetText action.
Capture text from a window or web page	Use the ActionSet GetText action.
Capture a table	Use the ActionSet Get Table action.
Select, copy, or delete text	Use the ActionSet Text Selection action.
Read text in an image	Use the ActionSet OCR Read Text action.
Read a table in an image	Use the ActionSet OCR Read Table action.
Read text in an image and click it when found	Use the ActionSet OCR Read Text action.
Simulate a key press or a key function	Use the ActionSet SendKeys action.
Simulate an alternative mouse action (for example, right-click, drag, scroll, or paste)	Use the ActionSet Mouse action.

8. **Optional:** To add more actions, repeat step 6 and 7.
9. **Optional:** To delete the anchor, right-click the anchor and click **Delete**.
10. **Optional:** Connect the data and control ports of the ActionSet component to the corresponding ports of the other components as described in the following table.

    (Optional) The ActionSet component has one optional parameter, which you can use to specify the handle of the window where the action takes place. A window handle may identify a specific window more quickly than is possible using image matching. You can also specify

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match rules to help the automation find the target window by testing available windows against the rules you specify.

To specify the window handle, connect the Window Handle Data Out port of another component (such as the Start App component) to the Window Handle Data In port of the ActionSet component. For more information about the Window Handle parameter, see the following table.

Port type	Port name	Data type	Purpose of connection	Notes
Data In	Window Handle	Integer	The numeric handle of the window where the action will be performed. This must be the window from which the image in the ACTIONSET SETTINGS window was captured.	You must provide the handle of the window from which you have captured the image of the screen.

Use the ActionSet Click action

Simulate a simple left-click on the target area as part of a series of actions in the ActionSet component.

Before you begin

Capture an image of the target application window and create an anchor. For information about how to do this, see Use the ActionSet component.

Role required: none

About this task

The ActionSet Click action simulates a manual click at the area you specify in the ActionSet Settings window. You can use it to click a button, open a menu, select an object, or perform any action typically performed by a mouse click.

You can configure the properties for the Click action. For more information about these properties, see ActionSet Click properties.

Procedure

1. Right-click the anchor.
   For more information about an anchor, see Anchor.
2. Click **Click**.
3. Drag and place the green plus icon ( ) to the location where you want to simulate a click.
4. **Optional:** In the Properties pane of the ActionSet Settings window, configure the properties of the Click action.
   For example, you can set a delay or change the name of the action.
5. Close the ACTIONSET SETTINGS window.

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6. **Optional:** Connect the port to let its input determine whether the Click action is performed, if you exposed the Click parameter's port in Step 4.

   (Optional) The Click parameter is described in the following table.

Port type	Port name	Data type	Purpose of connection	Notes
Data In	Click	Boolean	Determines whether the click action is performed. If the value of the Click parameter is True, the action is performed. If the value is False, the action is not performed.	The Data In port is available if you enable the Expose Port check box in the Properties section. The default Boolean value is True.

7. To test the component, under the **DESIGN** tab, click **Run**.

Use the ActionSet SetText action

Set text to fields on the Windows applications or the Internet Explorer browser by using the Set Text action in RPA Desktop Design Studio.

Before you begin

Capture an image of the target application window and create an anchor. For information about how to do this, see Use the ActionSet component.

Role required: none

About this task

The ActionSet Set Text action enters text in a field that you specify in the ActionSet Settings window. You can use it to enter any text data such as a user name, an address, a survey response, or in any situation where text entry is accepted.

You can configure the properties for the GetText component. For more information about these properties, see ActionSet-Get Text properties.

Procedure

1. Right-click the anchor.
   To learn about the anchor, see how to use the Anchor.
2. Click **Get Text**.
3. Drag the green plus icon ( ) to the location where you want to enter text.
4. **Optional:** In the Properties pane of the ActionSet Settings window, configure the properties of the Set Text action.
   For example, you can set a delay or change the name of the action.
5. Close the ACTIONSET SETTINGS window.
6. **Optional:** If you didn't hide the port for the SetText parameter in Step 4, connect the port so the action can receive the text to send to the target application.

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(Optional) The SetText parameter is described in the following table.

Port type	Port name	Data type	Purpose of connection
Data In	SetText	String	Receives text from another component.

7. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Use the ActionSet GetText action

Capture text from the Windows applications, and web pages on the Internet Explorer browser by using the Get Text action in RPA Desktop Design Studio.

Before you begin

Capture an image of the target application window and create an anchor. For information about how to do this, see Use the ActionSet component.

Role required: none

About this task

The ActionSet Get Text action captures text from an area that you specify in the ActionSet Settings window. You can use it to receive text in the target area when it is in text format. To capture text from an image, see Use the ActionSet OCR Read Text action.

You can configure the properties for the GetText component. For more information about these properties, see ActionSet-Get Text properties.

Procedure

1. Right-click the anchor.
   To learn about the anchor, see how to use the Anchor.
2. Click **Get Text**.
3. Drag the green plus icon () to the field where you want to capture text.
4. **Optional:** In the Properties pane of the ActionSet Settings window, configure the properties of the Get Text action.
   For example, you can set a delay or change the name of the action.
5. Close the ACTIONSET SETTINGS window.
6. **Optional:** If you didn't hide the port for the GetText parameter in Step 4, connect the port so the action can transmit the captured text for use.

   (Optional) The GetText parameter is described in the following table.

Port type	Port name	Data type	Purpose of connection
Data out	Get Text	String	Sends the captured text to another component.

7. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

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Use the ActionSet Text Selection action

Select, copy, or delete text from the Desktop and Windows applications, and the Internet Explorer browser by using the Text Selection action in RPA Desktop Design Studio.

Before you begin

Capture an image of the target application window and create an anchor. For information about how to do this, see Use the ActionSet component.

Role required: none

About this task

In addition to selecting text, the ActionSet Text Selection action can copy or delete text in a targeted application window. You can also set the action to trim leading or trailing white space from the captured text.

You can configure the properties for the Text Selection component. For more information about these properties, see ActionSet Text Selection- Properties.

Procedure

1. Right-click the anchor.
   To learn about the anchor, see how to use the Anchor.
2. Click **Text Selection**.
3. Drag the green rectangle icon ( ) over the area that contains the text that you want to select, copy, or delete.
4. **Optional:** To increase or decrease the area on the captured image covered by the green rectangle icon ( ), drag its edges.
5. **Optional:** In the Properties pane, select **Copy** or **Delete** from the Type list in the General section.
   For example, you can set a delay or change the nature of the action. By default, the action selects text.
6. Close the ACTIONSET SETTINGS window.
7. **Optional:** If you didn't hide the port for the TextSelection parameter in Step 4, connect the port so the action can send the captured text for use.

   (Optional) The TextSelection parameter is described in the following table.

Port type	Port name	Data type	Purpose of connection
Data Out	TextSelection	String	Sends the captured text to another component.

8. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Use the ActionSet Get Table action

Capture a table from the Windows applications, and web pages on the Internet Explorer browser by using the Get Table component in RPA Desktop Design Studio.

Before you begin

Capture an image of the target application window and create an anchor. For information about how to do this, see Use the ActionSet component.

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Role required: none

About this task

The ActionSet Get Table action captures an entire table from a location that you specify in the ActionSet Settings window. You can choose to ignore the table header by setting the Ignore Header property in Step 4 of the procedure.

Important:

For the action to successfully capture table data, the target data must already be in table form. The action cannot convert ordinary text to table data.

You can configure the properties for the Get Table action. For more information about these properties, see ActionSet- Get Table properties.

Procedure

1. Right-click the anchor.
   To learn about the anchor, see how to use the Anchor.
2. Click **Get Table**.
3. Drag the green plus icon () to the area in the target window that contains a table that you want to capture.
4. **Optional:** In the Properties pane of the ActionSet Settings window, configure the properties of the Get Table action.
5. Close the ACTIONSET SETTINGS window.
6. **Optional:** If you didn't hide the port for the Table action in Step 4, connect the port so the Table parameter can pass on the extracted table data.

   (Optional) The Table parameter is described in the following table.

Port type	Port name	Data type	Purpose of connection	Notes
Data Out	Table	DataTable	Returns the extracted table data.	The Data Out port is enabled by default. You can disable it in the PROPERTIES pane.

7. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Use the ActionSet GetImage action

Capture images from the desktop, Windows applications, and web pages on the Internet Explorer browser by using the GetImage component in RPA Desktop Design Studio.

Before you begin

Capture an image of the target application window and create an anchor. For information about how to do this, see Use the ActionSet component.

Role required: none

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About this task

The ActionSet Get Image action captures an image from the area that you specify in the ActionSet Settings window. For example, you can use it to capture a product image or a user's profile picture.

You can configure the properties for the GetImage component. For more information about these properties, see ActionSet- Get Image properties.

Procedure

1. Right-click the anchor.
   To know about the anchor, see how to use the Anchor.
2. Click **Get Image**.
3. Drag the green rectangle icon ( ) over the location of the image that you want to capture.
   If necessary, adjust the size of the selection rectangle by dragging its edges.
4. **Optional:** In the Properties pane of the ActionSet Settings window, configure the properties of the Get Image action.
   For example, you can set a delay or change the name of the action.
5. **Optional:** To change the default area in the image covered by the green rectangle icon ( ), do the following steps.

   a. Place the mouse device along the edges of the green rectangle icon ( ).
      The mouse device turns into a two-sided arrow ( ).

   b. Drag the edges of the green rectangle icon ( ).

6. Close the ACTIONSET SETTINGS window.
7. **Optional:** If you didn't hide the port for the GetImage parameter in Step 4, connect the port so the action can transmit the captured image for use.

   (Optional) The GetImage parameter is described in the following table.

Port type	Port name	Data type	Purpose of connection
Data Out	Table	Bitmap	Sends the captured image to another component.

8. **Optional:** To test the component, right-click the component bar and click **Run From Here**.

Use the ActionSet OCR Read Text action

Extract text from images in the desktop, Windows applications, and the Internet Explorer browser by using the OCR Read Text action in RPA Desktop Design Studio.

Before you begin

Capture an image of the target application window and create an anchor. For information about how to do this, see Use the ActionSet component.

Role required: none

About this task

The ActionSet OCR (optical character recognition) Read Text action can capture text from images and return it in standard text format.

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You can configure the properties for the OCR Read Text component. For more information about these properties, see ActionSet OCR Read Text properties.

Procedure

1. Right-click the anchor.
   To know about the anchor, see how to use the Anchor.
2. Navigate to **OCR** > **Read Text**.
3. Drag the green rectangle icon ( ) over the area that contains the text that you want to capture.
   If necessary, adjust the size of the selection rectangle by dragging its edges.
4. **Optional:** In the Properties pane of the ActionSet Settings window, configure the properties of the OCR Read Text action.
   In addition to properties that are common to all ActionSet actions, including the option to set a delay before or after performing the action, several properties let you improve text recognition by adjusting or scaling the captured image, or by setting the options of the text recognition engine.
5. **Optional:** To change the area in the image covered by the green rectangle icon ( ), do the following steps.
   a. Place the mouse device along the edges of the green rectangle icon ( ).
      The mouse device turns into a two-sided arrow ( ).
   b. Drag the edges of the green rectangle icon ( ).
6. Close the ACTIONSET SETTINGS window.
7. **Optional:** If you didn't hide the port for the OCR parameter in step 4, connect the port so the action can send the extracted text for use.

   (Optional) The OCR parameter is described in the following table.

Port type	Port name	Data type	Purpose of connection
Data out	OCR	String	Returns the text from the image.

8. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Use the ActionSet OCR Read Table action

Extract a table from images in the desktop, Windows applications, and web pages on the Internet Explorer browser by using the OCR Read Table action in RPA Desktop Design Studio.

Before you begin

Capture an image of the target application window and create an anchor. For information about how to do this, see Use the ActionSet component.

Role required: none

About this task

The ActionSet OCR (optical character recognition) Read Table action can capture a table even when it appears in an image instead of in a text-based format.

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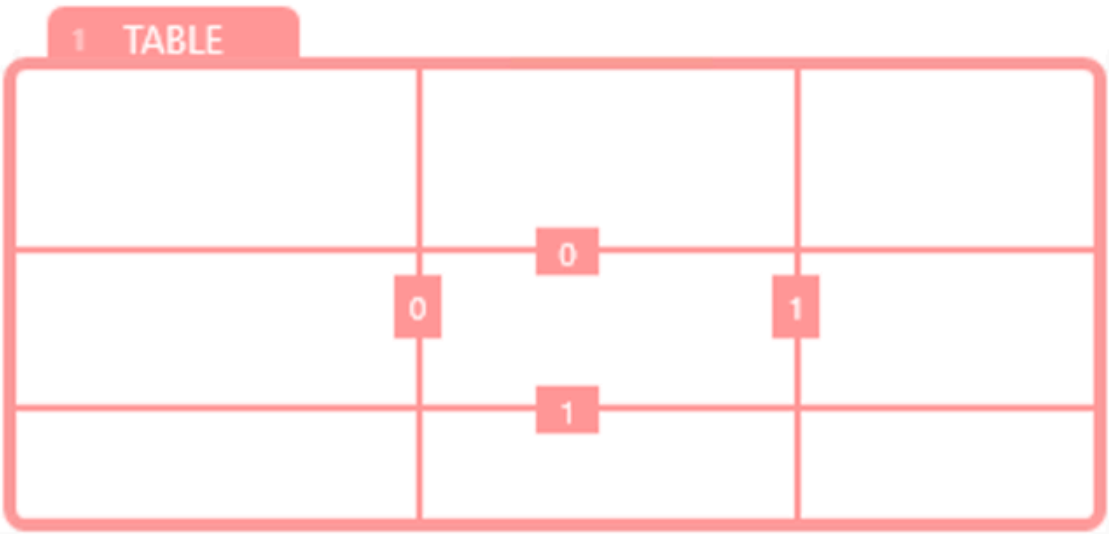
You can configure the properties for the OCR Read Table action. For more information about these properties, see ActionSet OCR Read Table properties.

Procedure

1. Right-click the anchor.
   To know about the anchor, see how to use the Anchor.
2. Navigate to **OCR** > **Read Table**.
3. Click **Read Table**.
4. Click the OCR read table icon ( ) and drag the indicator over the area that contains the table that you want to capture.

   TABLE tab of the selection indicator

5. Drag the lines that mark the cell boundaries to match the table, taking care to define the cells as accurately as possible and perform the following steps.
   The components returns OCR results from the individual cell areas.
   a. Adjust the size of the selection indicator by dragging its edges.
   b. Right-click an empty space within the selection indicator, and then select **Add Row** or **Add Column** to add rows and columns as necessary to match the table.
   c. Drag the row and column division lines inside the selection area to match the table.
6. **Optional:** Configure the properties of the OCR Read Table action in the Properties pane of the ACTIONSET SETTINGS window.

   (Optional) For example, you can choose to consider the first row of the table as a table header.

   For more information about these properties, see ActionSet OCR Read Table properties.
7. Close the ACTIONSET SETTINGS window.
8. **Optional:** If you didn't hide the port for the OcrTable action in Step 6, connect the port so the action can return the text of the extracted table.

   (Optional) The OcrTable parameter is described in the following table.

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Port type	Port name	Data type	Purpose of connection
Data out	OcrTable	String	Returns text from the extracted table.

9. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Use the ActionSet OCR ClickText action

Perform a mouse device action on a text in an image in the Internet Explorer browser or Windows applications by specifying the text using the OCR ClickText action.

Before you begin
Role required: none

About this task
You can configure the properties for the OCR ClickText action. For more information about these properties, see OCR Click Text.

Procedure

1. Right-click the anchor.
   To know about the anchor, see how to use the Anchor.
2. Navigate to **OCR** > **Click Text**.
3. Drag the OCR read table icon ( ) over the captured image to the location where the component will perform an action.
4. To increase or decrease the area on the captured image covered by the green rectangle icon ( ), drag its edges.
5. In the Properties pane, select the required action from the Type list in the General section.
6. Close the ACTIONSET SETTINGS window.
7. Connect the data and control ports of OCR ClickText to the corresponding ports of other components.

Port type	Port name	Data type	Purpose of connection	Mandatory?
Data In	OCR Click	String	Takes the text that the action matches in the application.	Yes

8. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Use the ActionSet SendKeys action

Set text or perform keyboard shortcuts on fields and elements on the desktop, Windows applications, and web pages on the Internet Explorer browser using the ActionSet Send Keys action in RPA Desktop Design Studio.

Before you begin
Role required: none

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About this task
Configure the properties for the ActionSet SendKeys action. For more information about these properties, see ActionSet Send Keys properties.

Procedure
1. Right-click the anchor.
   To know about the anchor, see Anchor.
2. Click **Send Keys**.
3. Drag and place the Green plus icon ( ) on the location in the captured image where the component will perform an action.
4. Close the ACTIONSET SETTINGS window.
5. **Optional:** Connect the data port of the ActionSet Send Keys component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Purpose of connection	Mandatory?	Notes
Data In	SendKeys	String	Takes the string or keyboard shortcuts.	No. Connecting the port is optional.	

6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ActionSet Mouse action

Do various mouse device actions on the desktop, Windows applications, and web pages on the Internet Explorer browser using the ActionSet Mouse action in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
Configure the properties for the ActionSet Mouse action. For more information about these properties, see ActionSet-Mouse Action properties.

Procedure
1. Right-click the anchor.
   To know about the anchor, see Anchor.
2. Click **Mouse Action**.
3. Drag and place the green plus icon ( ) to the location on the captured image where the component will perform an action.
4. **Optional:** To specify a mouse device action, select the action from the Type list in the PROPERTIES pane.
   The default action is LeftClick.
5. Close the ACTIONSET SETTINGS window.
6. **Optional:** Connect the data port of the ActionSet Mouse action to the corresponding port of the other components as described in the following table.

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Port type	Port name	Data type	Purpose of connection	Mandatory?	Notes
Data In	MouseAction	Boolean	If True, the Mouse action is performed, else, it is not performed.	No. Connecting the port is optional.	This port is exposed if the Expose Port option is enabled in the PROPERTIES pane.

7. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Get Table component

Extract and display data and the count of rows from the grids, lists, combo boxes, and HTML tables, by using the Get Table component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

Many properties of the Get Table component are common with other Actions UI components, to configure these properties, see Properties of Actions (UI) components.

The properties unique to the Get Table component are given.

Get Table component properties

Property	Description
Ignore Header	Option to specify whether the automation captures or ignores the header of the table. The default value is False.

Procedure

1. In the Toolbox pane, navigate to **Actions (UI)** > **Get Table**.
2. Drag the Get Table component to the Design surface.
3. In the Get Table component, click the camera icon ( ).
   The `Press "CTRL+SHIFT" for selection` message appears.
4. Press the **Ctrl + Shift** keys.
   The mouse device turns into a crossover icon ( ).
5. Drag the mouse device over the application to cover the table and release.
   The selected area of the element is captured as an image in the Get Table component.
6. Drag the green plus icon ( ) over the captured image and place on the location where you want the component to perform an action.
7. **Optional:** Add an anchor to the captured image by doing the following actions:
   An anchor is a unique identifier that enables the Get Table component to identify the application where the component will perform an action. Although adding an anchor is a good

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approach, it's optional. If you don't add an anchor, the Get Table component treats the whole captured image as an anchor. To know more about an anchor, see the steps to use the Anchor.

a. In the Get Table component, right-click the image and click **Add Anchor**.
The anchor appears as a yellow rectangle with red borders.

b. Drag and place the anchor on the captured image.

Tip:

To change the dimensions of the anchor, position the mouse device along the edge of the anchor until the mouse device turns into a diagonal two-sided arrow () and then drag the anchor.

8. **Optional:** Capture alternate images by doing the following actions:
Alternate images prevent an execution failure when the Get Table component doesn't find the image that was captured first. In that case, the Get Table component then searches for alternate images to execute. You can add as many alternate images as you need.

a. In the ALTERNATE IMAGES window, click the add image icon ().

b. Click the camera icon ().
The `Press "CTRL+SHIFT" for selection` message appears.

c. Drag the mouse device over the application to cover the table and release.
The selected area is captured as an image in the ALTERNATE IMAGES window.

d. Drag the green plus icon () over the captured image and place on the location where you want the component to perform an action.

e. To close the ALTERNATE IMAGES window, click **OK**.

9. **Optional:** To configure the ways that the output fields show the output, see Configure output port properties.
10. **Optional:** Connect the ports as described in the following table.

Port type	Port name	Data type	Purpose of connection	Mandatory?
Data out	Count	Integer	Returns the total count of rows.	Not applicable
Data out	DataTable	Not applicable	Returns the table.	Not applicable.

11. To test the component, right-click the component bar and then click **Run From Here**.

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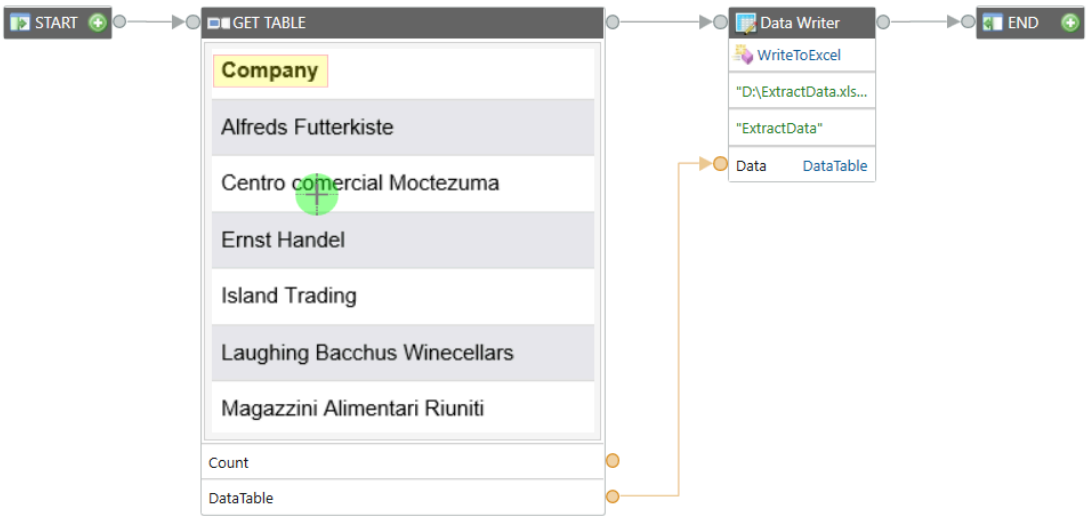
Example: Extract data from an HTML table to an Excel file



The Get Table component extracts data from an HTML table and passes the data through the DataTable Data Out port. The data is passed through the Data In port of the WriteToExcel component (To use the WriteToExcel component, see Use the WriteToExcel component). The data is written to the sheet specified in the `SheetName` field of the Excel document specified in the `Filepath` field

.

Use the Get Text component

The Get Text component captures text from an area that you specify in the target application. You can use it to receive data that exists in text format. To capture text from an image, see Use the OCR Text component.

Before you begin

Role required: none

About this task

The properties of the Get Text component are common with other Actions UI components, to configure these properties, see Properties of Actions (UI) components.

Procedure

1. In the Toolbox pane, navigate to **Actions (UI)** > **Get Text**.
2. Drag the Get Text component to the Design surface.
3. In the Get Text component, click the camera icon ( ).
   The `Press "CTRL+SHIFT" for selection` message appears.
4. Switch to the application that you want to capture text from, and press the **Ctrl + Shift** keys.
   The mouse device turns into a crossover icon ( ).
5. Drag the cursor to capture the area where you want the component to capture text.

> **Note:** For best results, include a part of the image that does not change in your selection. This can help the automation find the capture area when the unchanging part is used as an anchor. To designate an anchor, see Step 7.

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The selected area is captured as an image in the Get Text component.

6. Drag the green plus icon ( ) to the area in the captured image where you want to capture the text.
7. **Optional:** Add an anchor to the captured image by doing the following actions:
   An anchor is a unique subset of the captured image that helps the Get Text component identify where the component will perform an action. Although adding an anchor is a good approach, it's optional. If you don't add an anchor, the Get Text component treats the whole captured image as an anchor. To know more about an anchor, see the steps to use the Anchor.

   a. In the Get Text component, right-click the image, and click **Add Anchor**.
   The anchor appears as a yellow rectangle with red borders.

   b. To identify the part of the image for the Get Text component, drag and place the anchor at the unique location on the image.

   Tip:

   To change the dimensions of the anchor, position the mouse device along the edge of the anchor until the mouse device turns into a diagonal two-sided arrow ( ) and then drag the anchor.

8. **Optional:** Capture one or more alternate images by doing the following actions:
   Alternate images let the component continue when the Get Text component doesn't find the first image that was captured. When this happens, the Get Text component searches for an alternate image. You can add as many alternate images as you need. The component searches for alternate images in the same order as they were added.

   a. In the ALTERNATE IMAGES window, click the add image icon ( )

   b. Click the camera icon ( ).
   The `Press "CTRL+SHIFT" for selection` message appears.

   c. Press the **Ctrl + Shift** keys.
   The mouse device turns into a crossover icon ( ).

   d. Drag the mouse device over the application to capture the area where you want the component to perform an action and release.
   The selected area is captured as an image in the ALTERNATE IMAGES window.

   e. Drag the green plus icon ( ) over the captured image and place on the location where you want the component to perform an action.

   f. To close the ALTERNATE IMAGES window, click **OK**.

9. **Optional:** To configure the ways that the output fields show the output, see Configure output port properties.
10. **Optional:** Connect the Data Out and control ports of the Get Text component to the corresponding ports of other suitable components within the automation.

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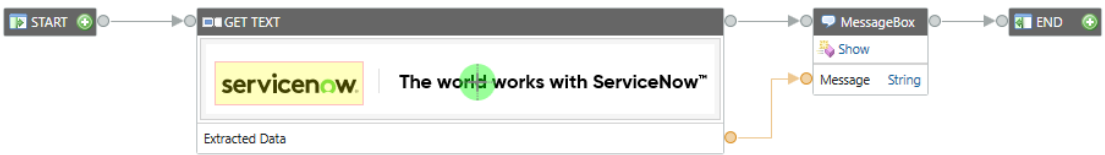
(Optional) The Extracted Data port, which sends the extracted text to another component for display or further processing, is described in the following table.

Port type	Port name	Data type	Purpose of connection
Data out	Extracted Data	String	Sends the captured text to another component

11. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Example: Extract a line of text from a window and display with the Show component



The Get Text component extracts the text "The world works with ServiceNow" and passes the text through its Data Out port to the Show component (To use the Show component, see Use the Show component). The Show component displays the same text in a pop-up window.

Use the Click component

Simulate the click actions of a mouse device by using the Click component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

The Click component uses the Inter-Process Communication (IPC) to send the click events to an application. Use it to click buttons, controls, or anything that typically expects a mouse click.

The properties of the Click component are common with other Actions UI components, to configure these properties, see Properties of Actions (UI) components.

Procedure

1. In the Toolbox pane, navigate to **Actions (UI)** > **Click**.
2. Drag the Click component to the Design surface.
3. In the Click component, click the camera icon ( ).
   The `Press "CTRL+SHIFT" for selection` message appears.
4. Press the **Ctrl + Shift** keys.
   The mouse device turns into a crossover icon ( ).
5. Drag the mouse device over the application to capture the area where the action will be performed and then release.

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Tip: Include a part of the image that does not change in your selection. This can help the automation find the capture area when the unchanging part is used as an anchor. To designate an anchor, see Step 7.

The selected area is captured as an image in the Click component.

6. Drag the green plus icon ( ) over the captured image and place on the location where the component will perform an action.
7. **Optional:** Add an anchor to the captured image by doing the following actions.
   An anchor is a unique identifier that enables the Click component to identify the content where the mouse device actions are simulated. Although adding an anchor is a good approach, it's optional. If you don't add an anchor, the Click component treats the whole captured image as an anchor. For more information on anchor, see the steps to use the Anchor.

   a. In the Click component, right-click the image, and click **Add Anchor**.
      The anchor appears as a yellow rectangle with red borders.

   b. Drag and place the anchor at the unique location on the captured image.

      Tip: To change the dimensions of the anchor, position the mouse device along the edge of the anchor until the mouse device turns into a diagonal two-sided arrow ( ) and then drag the anchor.

8. **Optional:** Capture alternate images by doing the following actions:
   Alternate images prevent an execution failure when the Click component doesn't find the image that was captured first. In that case, the Click component then searches for alternative images to execute. You can add as many alternate images as you need.

   a. In the Click component, click the component settings icon ( ).

   b. In the ALTERNATE IMAGES window, click the add image icon ( ).

   c. Click the camera icon ( ).
      The `Press "CTRL+SHIFT" for selection` message appears.

   d. Press the **Ctrl + Shift** keys.
      The mouse device turns into a crossover icon ( ).

   e. Drag the mouse device over the application to capture the area where you want the component to perform an action and release.
      The selected area is captured as an image in the ALTERNATE IMAGES window.

   f. Drag the green plus icon ( ) over the captured image and place on the location where you want the component to perform an action.

   g. To close the ALTERNATE IMAGES window, click **OK**.

9. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

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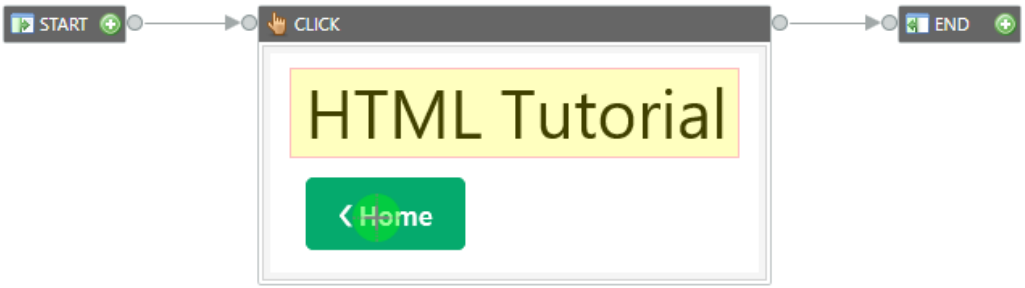
Example: Automate the clicking of an HTML button



The Click component automates the clicking of the **Home** HTML button on the window. As a result, the user navigates to the home screen or window.

Use the Mouse component

Simulate a mouse action, including alternative mouse device buttons, moves, drags, scrolls, and paste operations.

Before you begin

Role required: none

About this task

The Mouse component uses hardware interrupts to simulate the actions of a computer mouse. You can use it to simulate a manual click, drag, move, scroll, or paste operation at an area that you specify in the ActionSet Settings window. Additionally, you can use it to interact with files, objects, menus, or any other items that typically respond to mouse input.

Many properties of the Mouse component are common with other Actions UI components, to configure these properties, see Properties of Actions (UI) components.

The properties unique to the Mouse component are given.

Mouse component properties

Property	Description
Mouse Action Type	Type of mouse device action that the component will perform. The default action is Left Click.

Procedure

1. In the Toolbox pane, navigate to **Actions (UI)** > **Mouse**.
2. Drag the Mouse component to the Design surface.
3. In the Mouse component, click the camera icon ( ).
   The `Press "CTRL+SHIFT" for selection` message appears.
4. Press the **Ctrl + Shift** keys.
   The mouse device turns into a crossover icon ( )
5. Drag the cursor over the application to capture the area where you want the component to perform an action.

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Tip: Include a part of the image that does not change in your selection. This can help the automation find the capture area when the unchanging part is used as an anchor. To designate an anchor, see Step 7.

The selected part of the program is captured as an image in the Mouse component.

6. Drag the green plus icon ( ) over the captured image and place on the location where the component will perform an action.
7. **Optional:** In the Properties pane, select the mouse device action from the Type list.
   The Type list located under the Misc. heading. The default Mouse action is LeftClick.

   You can also select one of the following actions:

   - LeftDoubleClick
   - MiddleClick
   - RightClick
   - RightDoubleClick
   - Move
   - Drag
   - Drop
   - ScrollDown
   - ScrollUp
   - Paste

   Note: To copy an item to the clipboard for pasting, use a Clipboard action.

8. **Optional:** Add an anchor to the captured image by doing the following actions:
   An anchor is a unique identifier that enables the Mouse component to identify the application where the component will perform an action. Although adding an anchor is a good approach, it's optional. If you don't add an anchor, the Mouse component treats the whole captured image as an anchor. To know more about the anchor, see the steps to use the Anchor.

   a. In the Mouse component, right-click the image and click **Add Anchor**.
   The anchor appears as a yellow rectangle with red borders.

   b. To identify the content for the Mouse component, drag and place the anchor at the unique location on the image.

   Tip:

   To change the dimensions of the anchor, position the mouse device along the edge of the anchor until the mouse device turns into a diagonal two-sided arrow ( ) and then drag the anchor.

9. **Optional:** Capture alternate images by doing the following actions:
   Alternate images prevent an execution failure when the Mouse component does not find the image that was captured first. In that case, the Mouse component then searches for alternate images to execute. You can add as many alternate images as you need.

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a. In the Mouse component, click the component settings icon ( ).

b. In the ALTERNATE IMAGES window, click the add Image icon ( ).

c. Click the camera icon ( ).
The `Press "CTRL+SHIFT" for selection` message appears.

d. Press the **Ctrl + Shift** keys.
The cursor turns into a crossover icon ( ).

e. Drag the cursor over the part of the application program on which you want to perform a mouse device action and then release.
The selected part of the program is captured as an image in the Mouse component.

f. Drag the green plus icon ( ) over the captured image and place on the location where the component will perform an action.

g. Navigate to the Properties pane.

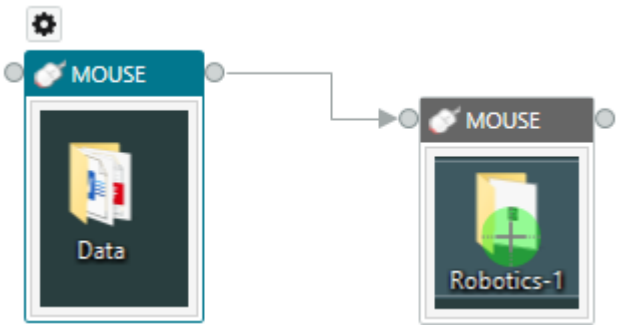
h. In the Misc heading, select the mouse device action from the Type list.

i. Click **OK**.

10. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Example: Drag a folder to another folder

Two Mouse components are used in this example. The first identifies the folder and drags it. The second identifies the destination folder and moves the folder inside.



Use the OCR Text component

Extract the text from an image by using the OCR (Optical Character Recognition) Text component in RPA Desktop Design Studio.

Before you begin
Role required: none

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About this task

Important:

Starting with the Yokohama release, the RPA Desktop Design Studio utilizes the latest version of the Tesseract OCR engine. This update improves image pre-processing, and performance optimizations. When updating older automations that include the OCR text component, you may notice slight differences in the output. Therefore, it's important to validate your automations after the update.

Many properties of the OCR Text component are common with other Actions UI components, to configure these properties, see Properties of Actions (UI) components.

The properties unique to the OCR Text component are given.

OCR Text component properties

Property	Text
Image Source	Source from which the component takes the image.

Procedure

1. In the Toolbox pane, navigate to **Actions (UI)** > **OCR Text**.
2. Drag the OCR Text component to the Design surface.
3. **Optional:** To configure the settings, click the component settings icon ( ).
   The component has default settings that you may review and use.
4. **Optional:** Configure the settings as described in the following table.

OCR Settings

Field	Description
Engine	Engine name that is used for extracting the OCR fields.
Language	Teseract engine that can support multiple languages. The user can select any language that is listed here.
Line Height Tolerance	Font line height.
ChangeDPI	Changes the Dots Per Inch (DPI) of Image as mentioned in the DPI property.
DPI	DPI value.
Extract Words	Text that is extracted in a word format. Otherwise, it's plain text.
Invert	Image color that is inverted. For example, it inverts black to white.
Language	Language that is used to extract.
Scale Image	Scales the image by the given number.
Threshold	Image that is converted out of Grayscale image or noise that is removed as per the threshold value.

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Field	Description
Threshold Value	Threshold value.
Timeout	Time after which the component operation times out.

5. To close the OCR Settings window, click **OK**.
6. To configure the input, see Configure port properties.
7. To configure the output, see Configure output port properties.
8. **Optional:** Connect the ports as described in the following table.

Port Type	Port name	Data type	Purpose	Notes
Data In	Image/File Path	Bitmap/String	Takes the image or the path to the image.	The input depends on the option selected from the **Image Source**option in the Properties. ○ **Port**: The data type is Bitmap. ○ **File Path**: The data type is String.
Data Out	Text	String	Returns the extracted text from the image.	
Data Out	Confidence	Single	Returns the extracted text accuracy figure.	

9. To test the component, right-click the component bar and then click **Run From Here**.

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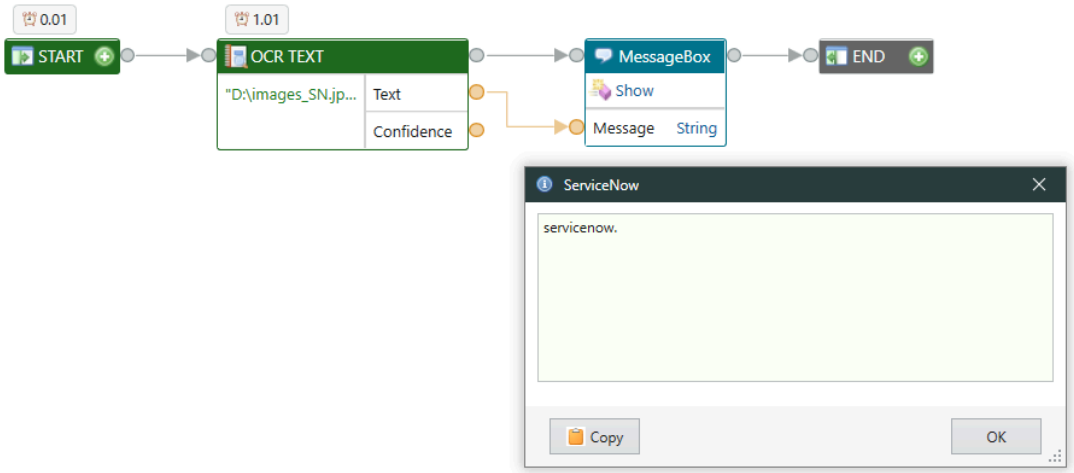
Example: Extract text from images and display with the Show component



The OCR Text component takes a path to an image. The image comprises the text "servicenow". The component extracts the text from the image and passes the string to the Show component (To use the Show component, see Use the Show component). The Show component takes the text through the Message Data In port and then displays the text in a window.

Use the Send Keys component

Send text to fields in web pages, Windows applications, or the Windows desktop using the Send Keys component in RPA Desktop Design Studio. Use the component to enter data to fields such as text boxes and lists and to send special keys such as Shift, Control, F1, and F2.

Before you begin

Role required: none

About this task

You can use the Send Keys component in situations where the Set Text component does not work or in any application where you need to send keyboard shortcuts or special functions via the keyboard.

You can use the Action Set Send Keys action to send keyboard shortcuts, regular text, or a combination of both. Enter key combinations in one set of square brackets per key combination as shown below. Any keys used in combination will be sent together as if simultaneously pressed. Keys outside brackets are sent in the order they appear in the input string. For example, the following sequence replaces text in a text box by selecting all the text (CTRL + A), sending the delete key, and then entering the regular text “ServiceNow”: `[ctrl+a][del]ServiceNow`

To see all the supported special keys and functions, click Supported keys and functions.

Many properties of the Send Keys component are common with other Actions UI components, to configure these properties, see Properties of Actions (UI) components.

The properties unique to the Send Keys component are given.

Properties of the Send Keys component

Property	Description
Input Type	Type of keyboard input sent to the application. The default input is SendInput.

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Properties of the Send Keys component (continued)

Property	Description
	• **SendInput**: Simulates key strokes to the target application. • **SendKeys**: Simulates key strokes to the target application but has certain limitations. For example, it doesn't work with RDP sessions.

Procedure

1. In the Toolbox pane, navigate to **Actions (UI)** > **Send Keys**.
2. Drag the Send Keys component to the Design surface.
3. Click the camera icon ( ).
   The `Press "CTRL+SHIFT" for selection` message appears.
4. Press the **Ctrl + Shift** keys.
   The mouse device turns into a crossover icon ( ).
5. Drag the mouse device over the application to capture the area where the component will perform an action and release.

   Tip: Include a part of the image that does not change in your selection. This can help the automation find the capture area when the unchanging part is used as an anchor. To designate an anchor, see Step 7.

   The selected area is captured as an image in the Send Keys component.
6. Drag the green plus icon ( ) over the captured image and place at the location where the Send Keys component will perform an action.
7. **Optional:** Add an anchor to the captured image by doing the following actions:
   An anchor is a unique identifier that enables the Send Keys component to identify the part where the component will perform an action. Although adding an anchor is a good approach, it's optional. If you don't add an anchor, the Send Keys component treats the whole captured image as an anchor. To view how to use the anchor, see the steps to use the Anchor.

   a. In the Send Keys component, right-click the image, and click **Add Anchor**.
      The anchor appears as a yellow rectangle with red borders.

   b. To identify the part of the image for the Send Keys component, drag and place the anchor at the unique location on the image.

      Tip:

      To change the dimensions of the anchor, position the mouse device along the edge of the anchor until the mouse device turns into a diagonal two-sided arrow ( ) and then drag the anchor.

8. **Optional:** Capture alternate images by doing the following actions:

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Alternate images prevent an execution failure when the Send Keys component doesn't find the image that was captured first. In that case, the Send Keys component searches for alternative images to execute. You can add as many alternate images as you need.

a. In the ALTERNATE IMAGES window, click the add image icon ( )

b. Click the camera icon ( ).
The `Press "CTRL+SHIFT" for selection` message appears.

c. Press the **Ctrl + Shift** keys.
The mouse device turns into a crossover icon ( ).

d. Drag the mouse device over the part of the area where you want the component to execute and then release the mouse device.
The selected area is captured as an image in the Send Keys component.

e. Drag the green plus icon ( ) over the captured image and place at the location where the Send Keys component will perform an action.

f. Click **OK**.

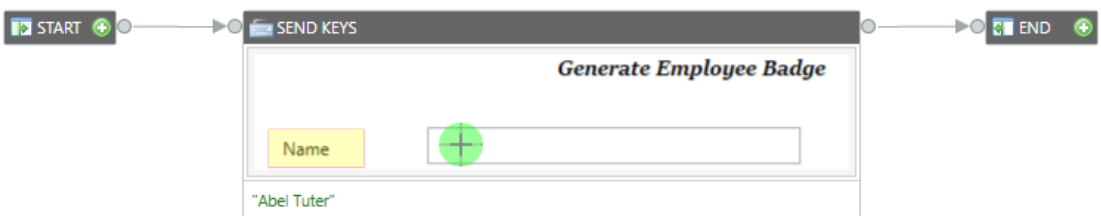
9. **Optional:** On the Properties pane, under **General**, select **SendInput** or **SendKeys** from the Input Type list.
The default action is **SendInput**.
10. To set the keys in the **Text Input** field, see Configure port properties.
11. Connect the control ports of the Send Keys component to the control ports of the preceding and next components in the automation.

    Optionally, connect the Data In port of the Send Keys component to the Data Out port of a preceding component. The Text Input parameter of the Data In port is described in the following table.

Port type	Port name	Data type	Purpose of connection
Data In	Text Input	String	Receives key strokes to send from another component.

12. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Example: Submit employee name in a badging app



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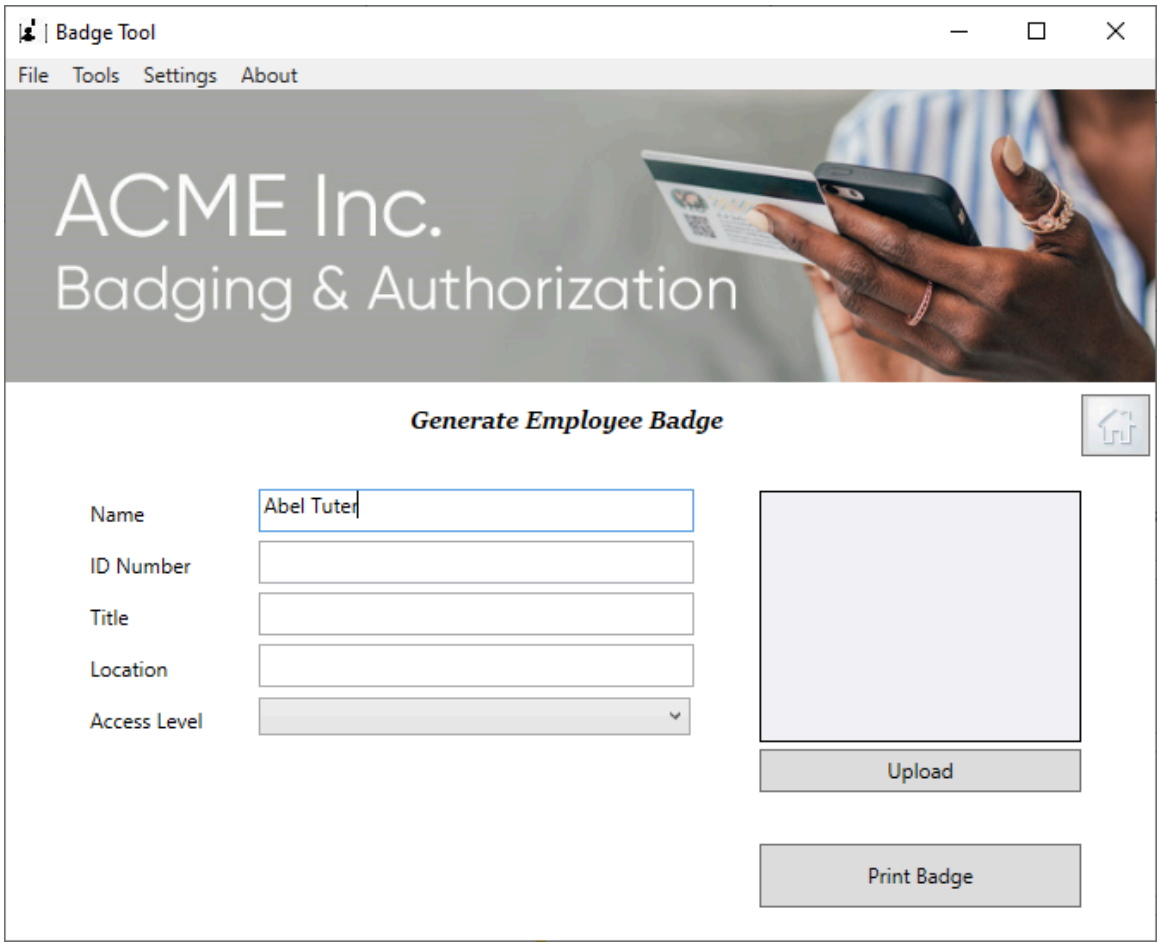
The Send Keys component has captured the Badging app image. Now, the user sends the keys "Abel Tuter" to the component. The green plus icon ( ) is the location where the text will be entered. Now, run the component.



As the user runs the component, the text "Abel Tuter" are typed in the Name field.

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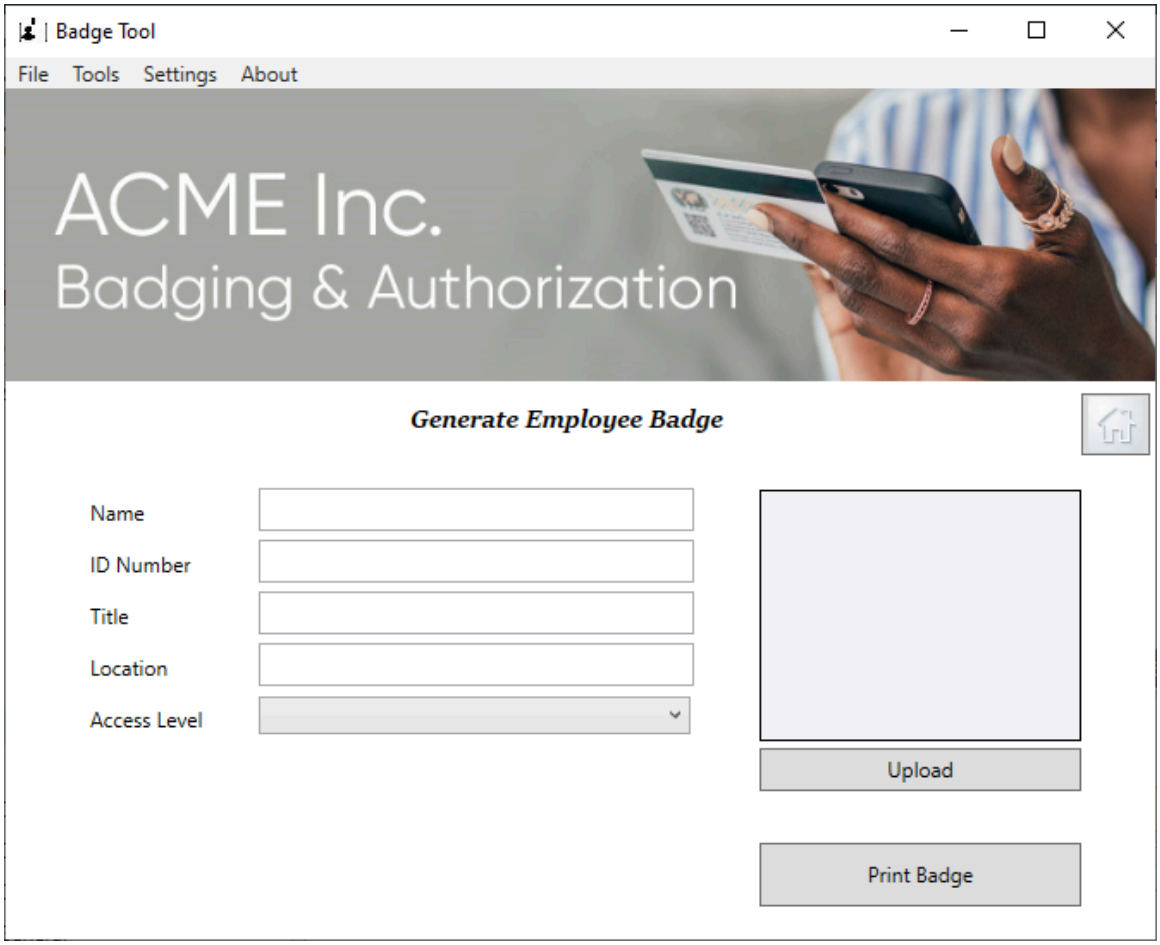

Use the Send Keys component to click the **Print Badge** button and run the component. The employee name is submitted for badging.

Use the Set Text component

Set text in text boxes and drop-down lists within applications, check boxes, radio button controls, web pages on Internet Explorer browser or Windows applications by using the Set Text component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

The Set Text component uses inter-process communication (IPC) to interact with application controls. You can use it to enter any text data, such as a user name, an address, or a survey response, in any situation where text entry is accepted.

You can configure the properties for the Set Text component. For more information about these properties, see Properties of Actions (UI) components.

Procedure

1. In the Toolbox pane, navigate to **Actions (UI)** > **Set Text**.
2. Drag the Set Text component to the Design surface.
3. In the Set Text component, click the camera icon ( ).
   The `Press "CTRL+SHIFT" for selection` message appears.
4. Press the **Ctrl + Shift** keys.

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The mouse device turns into a crossover icon ( ).

5. Drag the mouse device over the application to capture the area where the action will be performed and then release.

   Tip: Include a part of the image that does not change in your selection. This can help the automation find the capture area when the unchanging part is used as an anchor. To designate an anchor, see Step 7.

   The selected area is captured as an image in the Set Text component.

6. Drag the green plus icon ( ) over the captured image and place on the location on the captured image where the component will perform an action.
7. **Optional:** Add an anchor to the captured image by doing the following actions:
   An anchor is a unique identifier that enables the Set Text component to identify the location where the text is set. Although adding an anchor is a good approach, it's optional. If you don't add an anchor, the Set Text component treats the whole captured image as an anchor. For more information on anchor, see Anchor.

   a. In the Set Text component, right-click the image, and click **Add Anchor**.
      The anchor appears as a yellow rectangle with red borders.

   b. To identify the location for the Set Text component, drag and place the anchor at the unique location on the image.

      Tip:

      To change the dimensions of the anchor, position the mouse device along the edge of the anchor until the mouse device turns into a diagonal two-sided arrow ( ) and then drag the anchor.

8. Capture alternate images by doing the following actions:
   Alternate images prevent an execution failure when the Set Text component does not find the image that was captured first. In that case, the Set Text component then searches for alternate images to execute. You can add as many alternate images as you need.

   a. In the Set Text component, click the component settings icon ( ).

   b. In the ALTERNATE IMAGES window, click the add Image icon ( ).

   c. Click the camera icon ( ).
      The `Press "CTRL+SHIFT" for selection` message appears.

   d. Press the **Ctrl + Shift** keys.
      The mouse device turns into a crossover icon ( ).

   e. Drag the mouse device over the part of the application where the Set Text component appends text.
      The selected area is captured as an alternate image in the Set Text component.

9. To configure the text input, see Configure port properties.
10. Connect the data and control ports of the Set Text component to the corresponding ports of the other components as described in the following table.

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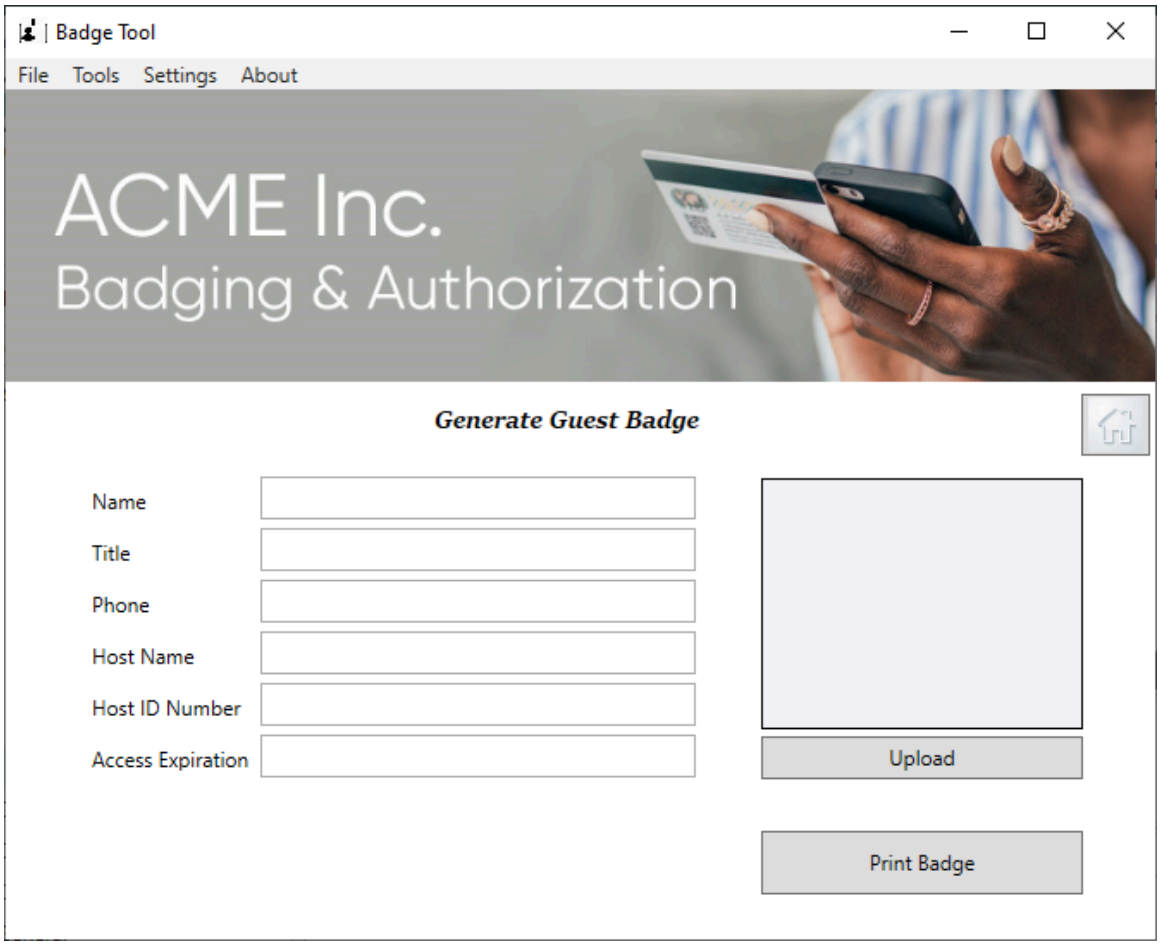
To receive the text to send from another component in your automation, connect a Data Out port from the component that provides the text to the Data In port of the Set Text component. The Text Input parameter of the Data In port is described in the following table.

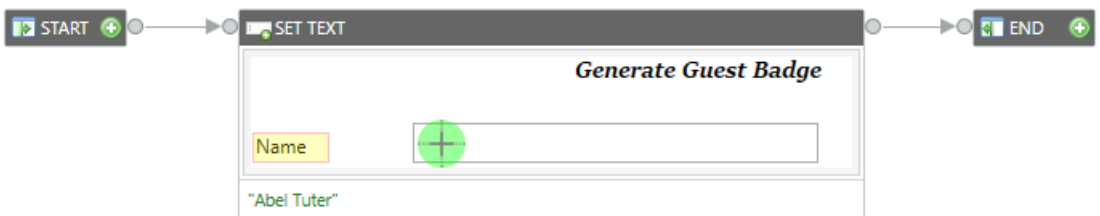
Port type	Port name	Data type	Purpose of connection
Data In	Text Input	String	Receives text from another component.

11. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Example: Enter a name in the Name field of a badging app



In this example, the Set Text component will be used to enter a name in the Name field of the badging app.



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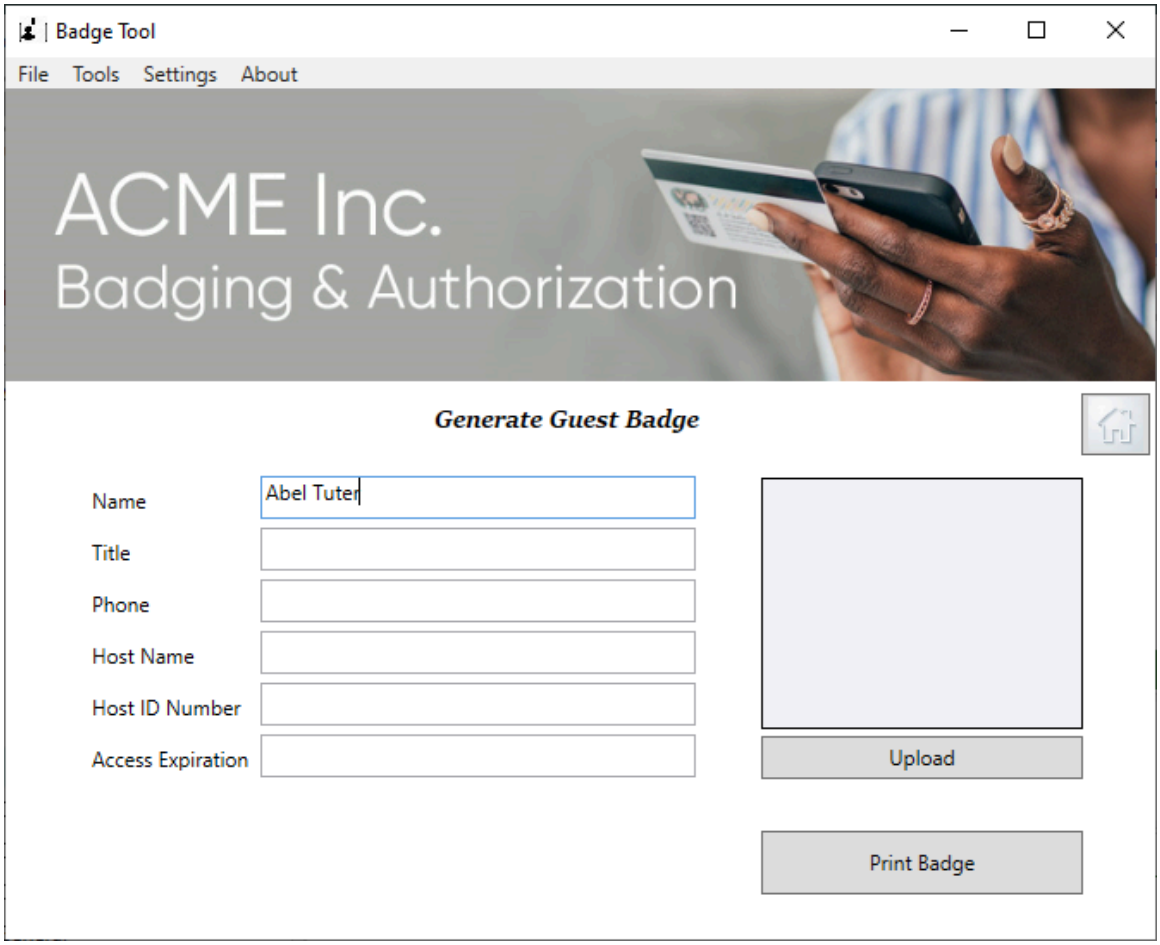
Set the name in the Text Input field, as shown in the image and run the component.

The name is set in the Name field, as shown in the image.



Supported keys and functions

The Send keys component in the RPA Desktop Design Studio supports multiple keys, special keys, and functions. The keyboard keys must be enclosed within []. For example, [Back].

Supported keys and functions

Supported Keyboard keys	Description
A	A key
AbntC1	ABNT_C2 (Brazilian) key.
Add	Add key.
Apps	Application key (Microsoft Natural Keyboard).
Attn	ATTN key.
B	B key.
Back	Backspace key.
BrowserBack	Browser Back key.
BrowserFavorites	Browser Favorites key.
BrowserForward	Browser Forward key.

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Supported keys and functions (continued)

Supported Keyboard keys	Description
BrowserHome	Browser Home key.
BrowserRefresh	Browser Refresh key.
BrowserSearch	Browser Search key.
BrowserStop	Browser Stop key.
C	C key.
Cancel	Cancel key.
Capital	Caps Lock key.
CapsLock	Caps Lock key.
Clear	Clear key.
CrSel	CRSEL key.
D	D key.
D0	0 (zero) key.
D1	1 (one) key
D2	2 key.
D3	3 key.
D4	4 key.
D5	5 key.
D6	6 key.
D7	7 key.
D8	8 key.
D9	9 key.
DbeAlphanumeric	DBE_ALPHANUMERIC key.
DbeCodeInput	DBE_CODEINPUT key.
DbeDbcsChar	DBE_DBCSCHAR key.
DbeDetermineString	DBE_DETERMINESTRING key.
DbeEnterDialogConversionMode	DBE_ENTERDLGCONVERSIONMODE key.
DbeEnterImeConfigureMode	DBE_ENTERIMECONFIGMODE key.
DbeEnterWordRegisterMode	DBE_ENTERWORDREGISTERMODE key.
DbeFlushString	DBE_FLUSHSTRING key.
DbeHiragana	DBE_HIRAGANA key.
DbeKatakana	DBE_KATAKANA key.
DbeNoCodeInput	DBE_NOCODEINPUT key.
DbeNoRoman	DBE_NOROMAN key.
DbeRoman	DBE_ROMAN key.

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Supported keys and functions (continued)

Supported Keyboard keys	Description
DbeSbcsChar	DBE_SBCSCHAR key.
DeadCharProcessed	Key that is used with another key to create a single combined character.
Decimal	Decimal key.
Delete	Delete key.
Divide	Divide key.
Down	Down Arrow key.
E	E key.
End	End key.
Enter	Enter key.
EraseEof	ERASE EOF key.
Escape	ESC key.
Execute	Execute key.
ExSel	EXSEL key.
F	F key.
F1	F1 key.
F11	F11 key.
F12	F12 key.
F13	F13 key.
F14	F14 key.
F15	F16 key.
F16	F16 key.
F17	F17 key.
F18	F18 key.
F19	F19 key.
F20	F20 key.
F21	F21 key.
F22	F22 key.
F23	F23 key.
F24	F24 key.
F3	F3 key.
F4	F4 key.
F5	F5 key.
F6	F6 key.

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Supported keys and functions (continued)

Supported Keyboard keys	Description
F7	F7 key.
F8	F8 key.
F9	F9 key.
FinalMode	IME Final mode key.
G	G key.
H	H key.
HangulMode	IME Hangul mode key.
HanjaMode	IME Hanja mode key.
Help	Help key.
Home	Home key.
I	I key.
ImeAccept	IME Accept key.
ImeConvert	IME Convert key.
ImeModeChange	IME Mode change request.
ImeNonConvert	IME NonConvert key.
ImeProcessed	Special key that masks the real key that is being processed by an IME.
Insert	Insert key.
J	J key.
JunjaMode	IME Junja mode key.
K	K key.
KanaMode	IME Kana mode key.
KanjiMode	IME Kanji mode key.
L	L key.
LaunchApplication1	Launch Application1 key.
LaunchApplication2	Launch Application2 key.
LaunchMail	Launch Mail key.
Left	Left Arrow key.
LeftAlt	Left ALT key.
LeftCtrl	Left CTRL key.
LeftShift	Left Shift key.
LineFeed	Linefeed key.
LWin	Left Windows logo key (Microsoft Natural Keyboard).

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Supported keys and functions (continued)

Supported Keyboard keys	Description
M	M key.
MediaNextTrack	Media Next Track key.
MediaPlayPause	Media Play Pause key.
MediaPreviousTrack	Media Previous Track key.
MediaStop	Media Stop key.
Multiply	Multiply key.
N	N key.
Next	Page Down key.
NoName	Constant reserved for future use.
None	No key pressed.
NumLock	Num Lock key.
NumPad0	0 key on the numeric keypad.
NumPad1	1 key on the numeric keypad.
NumPad2	2 key on the numeric keypad.
NumPad3	3 key on the numeric keypad.
NumPad4	4 key on the numeric keypad.
NumPad5	5 key on the numeric keypad.
NumPad6	6 key on the numeric keypad.
NumPad7	7 key on the numeric keypad.
NumPad8	8 key on the numeric keypad.
NumPad9	9 key on the numeric keypad.
O	O key.
Oem1	OEM 1 key.
Oem102	OEM 102 key.
Oem2	OEM 2 key.
Oem3	OEM 3 key.
Oem4	OEM 4 key.
Oem5	OEM 5 key.
Oem6	OEM 6 key.
Oem7	OEM 7 key.
Oem8	OEM 8 key.
OemAttn	OEM ATTN key.
OemAuto	OEM AUTO key.
OemBackslash	OEM Backslash key.

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Supported keys and functions (continued)

Supported Keyboard keys	Description
OemBackTab	OEM BACKTAB key.
OemClear	OEM Clear key.
OemCloseBrackets	OEM Close Brackets key.
OemComma	OEM Comma key.
OemCopy	OEM COPY key.
OemEnlw	OEM ENLW key.
OemFinish	OEM FINISH key.
OemMinus	OEM Minus key.
OemOpenBrackets	OEM Open Brackets key.
OemPeriod	OEM Period key.
OemPipe	OEM Pipe key.
OemPlus	OEM Addition key.
OemQuestion	OEM Question key.
OemQuotes	OEM Quotes key.
OemSemicolon	OEM Semicolon key.
OemTilde	OEM Tilde key.
P	P key.
Pa1	PA1 key.
PageDown	Page Down key.
PageUp	Page Up key.
Pause	Pause key.
Play	PLAY key.
Print	Print key.
PrintScreen	Print Screen key.
Prior	Page Up key.
Q	Q key.
R	R key.
Return	Return key.
Right	Right Arrow key.
RightAlt	Right ALT key.
RightCtrl	Right CTRL key.
RightShift	Right Shift key.
RWin	Right Windows logo key (Microsoft Natural Keyboard).

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Supported keys and functions (continued)

Supported Keyboard keys	Description
S	S key.
Scroll	Scroll Lock key.
Select	Select key.
SelectMedia	Select Media key.
Separator	Separator key.
Sleep	Computer Sleep key.
Snapshot	Print Screen key.
Space	Spacebar key.
Subtract	Subtract key.
System	Special key that masks the real key that is being processed as a system key.
T	T key.
Tab	Tab key.
U	U key.
Up	Up Arrow key.
V	V key.
VolumeDown	Volume Down key.
VolumeMute	Volume Mute key.
VolumeUp	Volume Up key.
W	W key.
X	X key.
Y	Y key.
Z	Z key.
ZOOM	Zoom key.

Properties of Actions (UI) components

Learn about the properties of the Actions (UI) group components. All components under the Actions (UI) group have both unique and common properties.

Common Properties of the Actions UI components

Property	Description
Delay after execution	Option to specify a delay in seconds after the component executes. The automation will wait until the specified time elapses before executing the next component.
Delay before execution	Option to specify a delay in seconds before the component executes. The automation will

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Common Properties of the Actions UI components (continued)

Property	Description
	wait until the specified time elapses before executing the component.
Name	Name of the component.
X	Location of the green plus icon ( ) on the component along the X-axis.
Y	Location of the green plus icon ( ) on the component along the Y-axis.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.
Scaled Search	Option to specify whether the component will scale the target image before trying to match the source image. The scaling is done in an increment of 10% each between 100% and 150%. The default option is False.
Search As Gray Scale Image	Option to define and search the captured area as a grayscale image. By default, the option is enabled.
Target Platform	Option to select the application platform.
Threshold	Specifies the accuracy in matching the image captured before the component performs an action. The value of 1 defines a 100% match while 0.5 defines 50% match. The default value is 0.9 or 90% match.
Max Wait Time in Seconds	Defines the number of seconds to wait for the image or application to appear on the screen.
Wait After Image Found	Specifies the wait time (in seconds) after the image or application appears on the screen.
Wait For Create	Option to specify if the component will wait for the image to appear on the screen. The default value is True.

ActionSet actions properties

The ActionSet component performs multiple actions and each action has distinct properties. You can update the properties to modify the behavior of the actions.

Click

Click properties

Property	Description
After Delay in Seconds	Specified delay after the Click action sets in.

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Click properties (continued)

Property	Description
Before Delay in Seconds	Specified delay before the Click action sets in.
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to expose a Data In port that takes the Boolean value. If True, the Click action is performed, else, if False, the Click action is not performed. By default, the option is not selected.
Name	Option to update the default name of the action. The default name is Click. The updated name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.
X	Option to set the custom location of the green plus icon () along the X-axis relative to the anchor.
Y	Option to set the custom location of the green plus icon () along the Y-axis relative to the anchor.

Set Text

Set Text properties

Property	Description
After Delay in Seconds	Specified delay after the action sets in.
Before Delay in Seconds	Specified delay before the action sets in.
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to enable or disable the Data In port that takes the text the component sets in the field. By default, the port is enabled.
Name	Option to update the default name of the action. The default name is SetText. The updated name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.

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Set Text properties (continued)

Property	Description
X	Option to specify the location of the green plus icon () along the X-axis relative to the anchor.
Y	Option to specify the location of the green plus icon () along the Y-axis relative to the anchor.

Get Text

Get Text properties

Property	Description
After Delay in Seconds	Specified delay after the action sets in.
Before Delay in Seconds	Specified delay before the action sets in.
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to enable or disable the Data Out port that returns the captured text. By default, the port is enabled.
Name	Option to update the default name of the action. The default name is GetText. The name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.
X	Option to specify the location of the green plus icon () along the X-axis relative to the anchor.
Y	Option to specify the location of the green plus icon () along the Y-axis relative to the anchor.

Get Table

Get Text properties

Property	Description
After Delay in Seconds	Specified delay after the action sets in.
Before Delay in Seconds	Specified delay before the action sets in.

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Get Text properties (continued)

Property	Description
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to enable or disable the Data Out port that returns the captured table. By default, the port is enabled.
Name	Option to update the default name of the action. The default name is Table. The name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.
X	Option to specify the location of the green plus icon ( ) along the X-axis relative to the anchor.
Y	Option to specify the location of the green plus icon ( ) along the Y-axis relative to the anchor.
IgnoreHeader	Option to ignore the header of the table while capturing.

Get Image

Get Image properties

Property	Description
After Delay in Seconds	Specified delay after the action sets in.
Before Delay in Seconds	Specified delay before the action sets in.
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to enable or disable the Data Out port that returns the captured image. By default, the port is enabled.
Name	Option to update the default name of the action. The default name is GetImage. The name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.

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Get Image properties (continued)

Property	Description
Height	Option to specify the height of the green rectangle icon ( ).
Width	Option to specify the width of the green rectangle icon ( ).
X	Option to specify the location of the green rectangle icon ( ) along the X-axis relative to the anchor.
Y	Option to specify the location of the green rectangle icon ( ) along the Y-axis relative to the anchor.

OCR Read Text

OCR Read Text properties

Property	Description
After Delay in Seconds	Specified delay after the action sets in.
Before Delay in Seconds	Specified delay before the action sets in.
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to disable the Data Out port that returns the extracted text. By default, the port is enabled.
Name	Option to update the default name of the action. The default name is OCR. The name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.
Height	Option to specify the height of the green rectangle icon ( ).
Width	Option to specify the width of the green rectangle icon ( ).
X	Option to specify the location of the green rectangle icon ( ) along the X-axis relative to the anchor.
Y	Option to specify the location of the green rectangle icon ( ) along the Y-axis relative to the anchor.
Engine	Engine name that is used for extracting the OCR fields.

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OCR Read Text properties (continued)

Property	Description
Language	Teseract engine that can support multiple languages. You can select any language listed here.
Line Height Tolerance	Font line height.
ChangeDPI	If this is enabled, it changes the Dots Per Inch (DPI) of Image as mentioned in DPI property.
DPI	DPI value.
Extract Words	Text that is extracted in words format. Else, it's plain text.
Invert	Image color that is inverted. For example, it inverts black to white.
Language	Language used to extract.
Scale Image	Scaled image by the given number.
Threshold	Converted image out of Grayscale image or noise that is removed as per the Threshold value.
Threshold Value	Threshold value.
Timeout	Time after which the operation times out.

OCR Read Table

Get Image properties

Property	Description
After Delay in Seconds	Specified delay after the action sets in.
Before Delay in Seconds	Specified delay before the action sets in.
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to expose the Data Out port that returns the captured table as an output. By default, the port is enabled.
Name	Option to update the default name of the action. The default name is OcrTable. The name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.
Height	Option to specify the height of the OCR Read table icon ( ).

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Get Image properties (continued)

Property	Description
Width	Option to specify the width of the OCR Read table icon ( ).
X	Option to specify the location of the OCR Read table icon ( ) along the X-axis relative to the anchor.
Y	Option to specify the custom location of the OCR Read table icon ( ) along the Y-axis relative to the anchor.
FirstRowHeader	Option to specify whether the first row of the captured table is a header.
Engine	Engine name that is used for extracting the OCR fields.

OCR Click Text

OCR Click Text properties

Property	Description
Type	Type of action the mouse device performs after the text is identified.
After Delay in Seconds	Specified delay after the action sets in.
Before Delay in Seconds	Specified delay before the action sets in.
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to expose the Data Out port that returns the captured table as an output. By default, the port is enabled.
Name	Option to update the default name of the action. The default name is OCR Click. The name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.
Height	Option to specify the height of the OCR Click Text icon.
Width	Option to specify the width of the OCR Read table icon.
X	Option to specify the location of the OCR Click Text icon along the X-axis relative to the anchor.

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OCR Click Text properties (continued)

Property	Description
Y	Option to specify the location of the OCR Click Text icon along the Y-axis relative to the anchor.
Engine	Engine name that is used for extracting the OCR fields.

Text Selection

Text Selection properties

Property	Description
After Delay in Seconds	Specified delay after the action sets in.
Before Delay in Seconds	Specified delay before the action sets in.
Execution Order	Order in which the action is executed. This order is assigned when you add an action from the anchor in the ACTIONSET SETTINGS window. You can change the order by dragging and placing the action at the desired order.
Expose Port	Option to expose the Data In port that passes the Boolean value to enable or disable the Set Text action.
Name	Option to update the default name of the action. The default name is TextSelection. The name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.
Trim	Option to trim the spaces at the start and end of the text.
Type	Type of action to perform.
Height	Option to specify the height of the green rectangle icon ( ).
Width	Option to specify the width of the green rectangle icon ( ).
X	Option to specify the location of the green rectangle icon ( ) along the X-axis.
Y	Option to specify the location of the green rectangle icon ( ) along the Y-axis.

Send Keys

Send Keys properties

Property	Description
After Delay in Seconds	Specified delay after the action sets in.

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Send Keys properties (continued)

Property	Description
Before Delay in Seconds	Specified delay before the action sets in.
Delay between each keypress (Seconds)	Specified delay between each key press action.
Clear Existing Value	Option to specify if the action will clear the existing value on a field before setting the text.
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to enable or disable the Data In port that takes the string. By default, the port is enabled.
Input Type	You can choose from the following options: • SendInput: Sets text in the fields. • SendKeys: Sends the keyboard shortcuts.
Name	Option to update the default name of the action. The default name is SendKeys. The name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.
Use mouse click to focus	Option to use the mouse device click to focus on the area in the application where the mouse device inputs will be passed.
X	Option to specify the location of the green plus icon () along the X-axis relative to the anchor.
Y	Option to specify the location of the green plus icon () along the Y-axis relative to the anchor.

Mouse Actions

Mouse Actions properties

Property	Description
After Delay in Seconds	Specified delay after the action sets in.
Before Delay in Seconds	Specified delay before the action sets in.
Execution Order	Order in which the action is executed when multiple actions are set up. This order is assigned when you add an action from the

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Mouse Actions properties (continued)

Property	Description
	anchor. You can change the order by dragging and placing the action under its anchor at the desired order on the ACTIONSET SETTINGS window.
Expose Port	Option to enable or disable the Data In port that takes the Boolean value. If True, the Mouse Action is performed, else, if False, the Mouse Action is not performed. By default, the option is not checked.
Name	Option to update the default name of the action. The default name is MouseAction. The name reflects in the ACTIONS LIST section of the ACTIONSET SETTINGS window.
Type	Type of mouse device action. For example, paste.
X	Option to specify the location of the green plus icon ( ) along the X-axis relative to the anchor.
Y	Option to specify the location of the green plus icon ( ) along the Y-axis relative to the anchor.

Anchor

An anchor is a unique identifier which is identified on the screen. It helps specify the target area for a simulated user interaction by defining a static area from which actions can be defined at a relative distance. The position of actions is calculated based on the anchor and the actions are performed relative to it.

In the following image, the anchor is a rectangle that identifies the location of the text “The world works with ServiceNow.” The target template where the action is to take place shows as a rectangle whose position is relative to the top left corner of the anchor’s rectangle.

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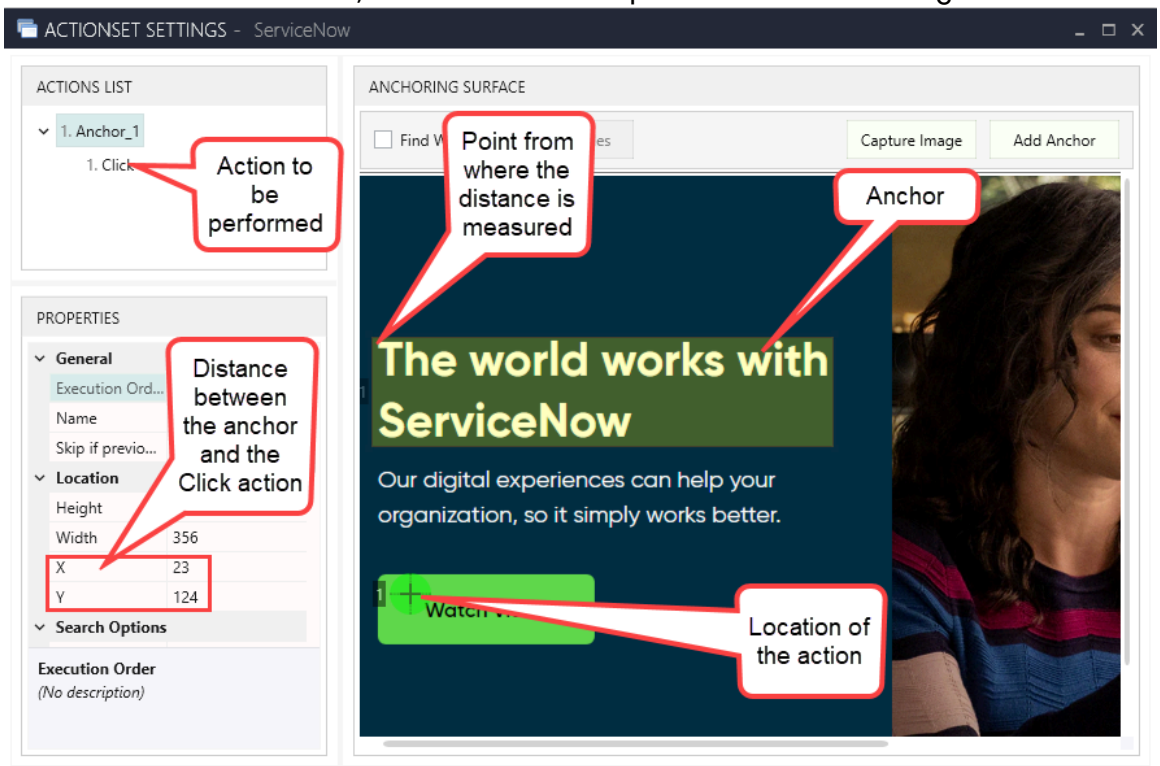
When the action is executed, the center of the template is identified and targeted for action.

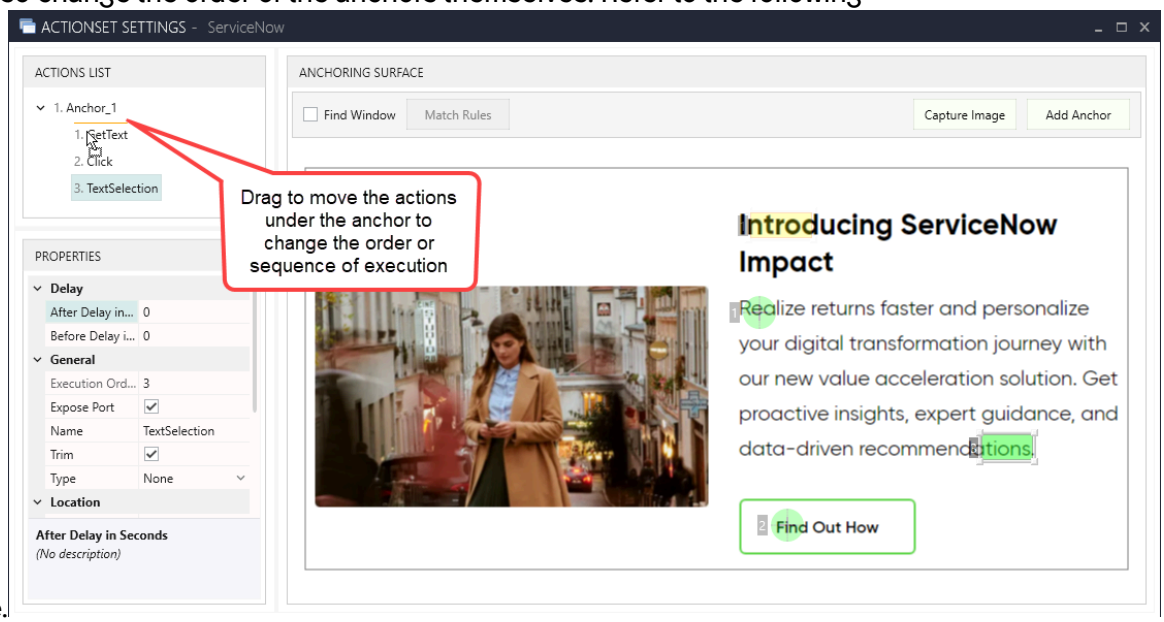


You can use a single anchor to perform multiple actions, each with its own relative distance from the anchor.

When multiple actions are configured, they are executed in the order they were added.

However, if the location of the element on which an action is performed changes, the action may occur at the wrong place. To help prevent this, you can use multiple anchors.

When you add multiple actions, the component performs the actions in the order that they are added. Likewise, when you add multiple anchors, the actions connected to each anchor execute before the actions connected to the next anchor. You can change the order of the actions connected to each anchor. You can also change the order of the anchors themselves. Refer to the following image.



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To reorder an action or an anchor, drag it to its new position. As you move it, its new location is indicated by a line (—).

To delete an anchor, in the Anchoring Surface pane of the ActionSet Settings dialog, right-click the anchor, and then select **Delete**.

Conditions

The Conditions is a group of components that you can use to automate decision making. These decisions are based on the value, input, or data matches with conditions or multiple values.

You can use the components in the Conditions group to do the following actions:

- Match an input or data with a condition to find out whether the input satisfies the condition.
- Match a value with multiple values until an exact match is found and on not finding an exact match, specify a different action.

Use the Decision component

Automate the decision-making process by using the Decision component in RPA Desktop Design Studio.

Watch this video to learn how to use the Decision component.

https://player.vimeo.com/video/1075850510?h=c6d1eea462&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

Role required: none

About this task

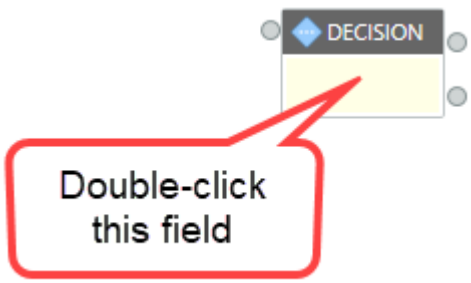
You can specify a conditional expression in the component. If the expression contains any parameters, they appear as input ports. If the expression is correct based on the inputs provided, then the True Output Port takes control. Else, the False Output port takes control and executes the automation.

For defining conditions, the Decision component provides many functions, operators, and expressions. For more information, see Functions, data types, and operators.

To configure the properties for the Decision component, see Properties of the Conditions components.

Procedure

1. In the Toolbox pane, navigate to **Conditions** > **Decision**.
2. Drag the Decision component to the Design surface.
3. Double-click the field under the DECISION component



bar.

4. Enter the condition in the field, such as a=5 where "a" is the parameter.
   A Data In port is dynamically created.

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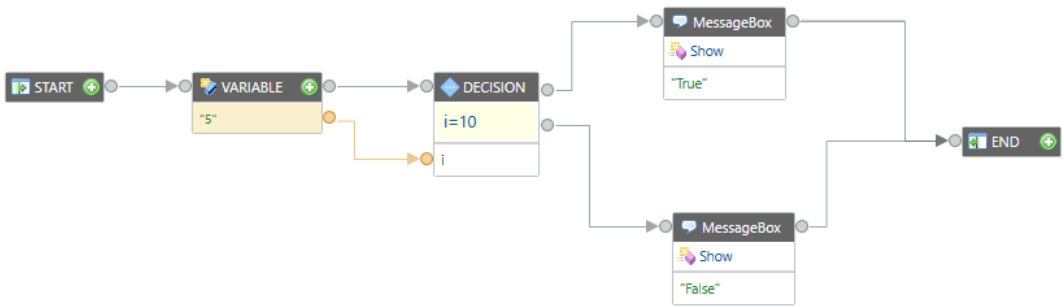
5. To enter a value in the Data In field, see Configure port properties.
6. Connect the data and control ports of the Decision component to the corresponding ports of the other components.

Port type	Port name	Data type	Purpose of connection	Default Value
Data In	The name is the same as the name of the parameter. For example, in the condition a=5, "a" will be the port name.	Object	Takes the input or data for the parameters that are created in the condition.	None

7. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Example: Accept an input and match with a condition

In the DECISION component, a conditional expression "i=10" is set. Since "i" is the parameter, an input port is dynamically created in the component. The Variable (Create and use a variable in RPA Desktop Design Studio) component provides the input "5" to the Decision component which is False. Hence, the False Output port takes control and the Show (Use the Show component) component shows the message "False."



Use the Switch component

Find the exact match of a value among multiple values as part of an automation Workflow by using the Switch component in RPA Desktop Design Studio.

Watch this video to learn how to use the Switch component.

https://player.vimeo.com/video/1072300125?h=d8635f4d4c&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin
Role required: none

About this task
The Switch component enables you to set multiple values that are matched with the value that it takes from another component or method. It switches between values until it finds an exact match. If no match is found, it enables you to execute an alternate action.

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The Switch component can work with other components or methods to execute an automation Workflow.

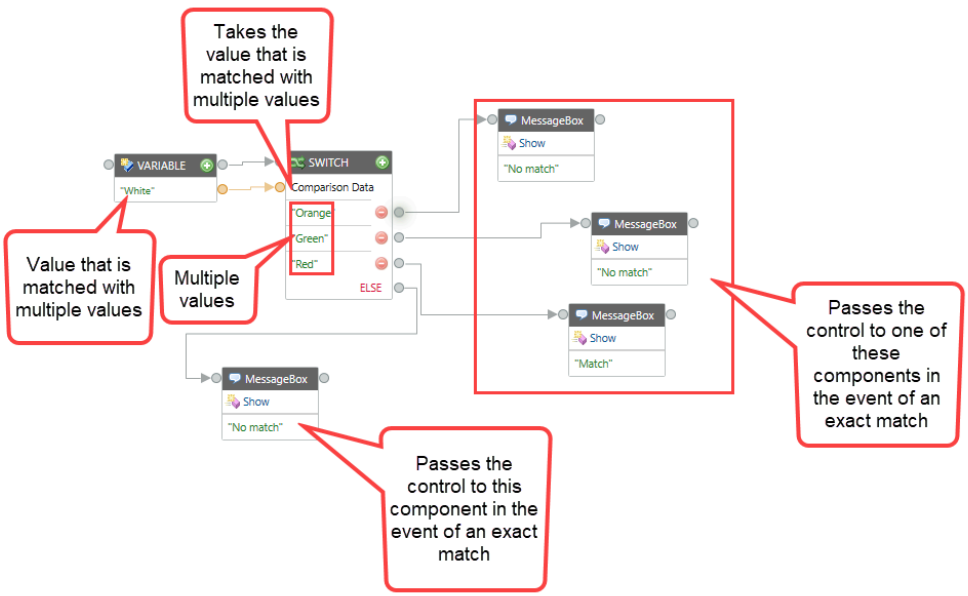
You can configure the properties for the Switch component. For more information on these properties, see Properties of the Conditions components.

Procedure

1. In the Toolbox pane, navigate to **Conditions** > **Switch**.
2. Drag the Switch component to the Design surface.
3. To set the values for matching, do the following actions:

   a. Click the add value icon ( ).

   b. **Optional:** Repeat Step 3 to add as many fields for the values as you need. Data In ports are dynamically created to accept



   values.

   c. To configure the input method to the fields, see Configure port properties.

4. Connect the data and control ports of the Switch component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Purpose of connection
Data In	Comparison Data	Object	Takes the value that is matched with the values set up in the component.
Data In	Value	String	Takes the value that is matched with the value that is passed through the

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Port type	Port name	Data type	Purpose of connection
			Comparison Data port.
Data Out	ELSE	Not applicable	If there is no match, the component passes the control to the next component.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Functions, data types, and operators

The Decision component supports certain functions and operators described in the topic. Use this topic as a reference.

Supported functions and operators

Supported functions and operators

Type	Example	Evaluated as
Values	• Integer • Floating point number • Date and time • Boolean • String • Function • Parameter	Not applicable
Integers	Represented using numbers. Example, 443, 124, and 665.	Int32
Floating point numbers	221.12, 43.76, and 5.9	Decimal
Scientific notation	You can use the e to define the power of 10 (10^). • 1.22e1 • 1e2 • 1e+2 • 1e-2 • .1e-2 • 1e10	Double
Dates and Times	Must be enclosed between `sharps`. #2008/01/31# // for en-US culture	DateTime

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Supported functions and operators (continued)

Type	Example	Evaluated as
Boolean	True or False	Boolean
Strings	Any character between single quotes ' is evaluated as String.	'ServiceNow'
Parameters	A parameter as a name, and can be optionally contained inside brackets. 2 + x, 2 + [x]	
Function	A function is made of a name followed by braces, containing optionally any value as arguments. Abs(1), doSomehting(1, 'dummy')	
Operators	Expressions can be combined using operators. Each operator as a precedence priority. Here is the list of those expression's priority. **1.** primary **2.** unary **3.** power **4.** multiplicative **5.** additive **6.** relational **7.** logical	
Logical	These operators can do some logical comparison between other expressions: • or - || • and - && • true or false The and operator has a higher priority than the or, thus in the example above, false and true are evaluated first.	
Relational	Relational operators are used to compare values. These operators always result in a boolean value.	

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Supported functions and operators (continued)

Type	Example	Evaluated as
	• =, ==, !=, <> • <, <=, >, >= • 1 < 2	

Properties of the Conditions components

Learn about the properties for the Conditions components in RPA Desktop Design Studio.

Properties

The properties in the following table apply to the Conditions components.

Conditions components properties

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Name	Name to identify the component. Choose a name that corresponds to the application field that you're working with.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Connectors

The Connectors provide specialized abilities, such as automating tasks with Microsoft Excel spreadsheets and Microsoft Word documents. Connectors are different from components because they expose multiple methods and they are used differently.

Connectors reside in the ServiceNow® app store and become available to you when the RPA Desktop Design Studio connects to the appropriate RPA Hub instance.

Some connectors are available by default under the Toolbox pane while you must install the rest. To install, see Manage plugins in RPA Desktop Design Studio.

When set up, Connector methods work just like the components. You connect methods with connectors and vice versa to create an automation.

An example of a connector is Google Chrome. The Chrome connector performs various tasks on the Chrome browser.

When you set up a connector, it exposes multiple methods that perform specific functions. For example, the Google Chrome connector exposes the following methods, and more:

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- Get the screenshot of a web page open on the Google Chrome.
- Set a focus on a Google Chrome window that is inactive or running in the background.

The example shows the Microsoft Word connector and its methods.



To use a connector, see

- Manage plugins in RPA Desktop Design Studio
- Use a connector in RPA Desktop Design Studio
- Use connector method

Chromium connector

The Chromium connector enables you to interact with various elements in web applications running on Google Chrome or Microsoft Edge Edge and build automations around them.

To use the Chromium connector, do the following actions:

- Enable the latest versions of the ServiceNow RPA Edge Extension and the ServiceNow RPA Chrome Extension. To enable, see Add the ServiceNow RPA Chrome extension and Add the ServiceNow RPA Edge extension.
- Ensure you have installed the Chromium plugin on the RPA Desktop Design Studio. To install, see Manage plugins in RPA Desktop Design Studio.
- To use the Chromium connector, see Use a connector in RPA Desktop Design Studio.
- To configure the Google Chrome connector, see Configure the Chromium connector.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.
- If you've installed a hot fix for Chromium connector, to verify that the hot fix is accurately downloaded to your machine, perform the post requisite steps. For more information, see Post requisites after installing a hot fix.

Chrome connector methods are available at the following levels:

- Application
- Screen
- Element

Types of Chrome connector methods

Method level	Description
Application	These methods can open a website on the Google Chrome browser. The connector sets

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Types of Chrome connector methods (continued)

Method level	Description
	up the browser and application for the other methods to execute.
Screen	These methods perform various actions on the screens that you have configured. For example, click a button.
Element	These methods perform various tasks on the various elements on the screen.

Note: Automation support for frameset-based pages isn't available through the Chromium connector.

Configure the Chromium connector

Capture one or more web pages from the Google Chrome or Microsoft Edge browser and then the elements on the web pages by configuring the Chromium connector.

Before you begin

Software prerequisites: The ServiceNow, Inc. RPA Google Chrome and the ServiceNow® Store RPA Microsoft Edge extensions are added. To add the extensions, see:

- Add the ServiceNow RPA Edge extension.
- Add the ServiceNow RPA Chrome extension.

Ensure you have installed the Chromium plugin on the RPA Desktop Design Studio. To install, see Manage plugins in RPA Desktop Design Studio.

Ensure that at least one website or application is open or active on both the Microsoft Edge and the Google Chrome browsers.

Frame set automation is not supported when using the Chromium connector (Google Chrome/Microsoft Edge).

Role required: none

Procedure

1. Navigate to **Connectors** > **Chromium Connector**.
2. Drag the Chromium connector under Global Objects in the Project Explorer pane.
3. Under the Global Objects, right-click the Chromium connector.
4. Click **Configure**.
5. In the Chromium Connector window, select **Edge** or **Chrome**.
6. To load the window, click the refresh icon ( ).
7. In the list, select the required screen.

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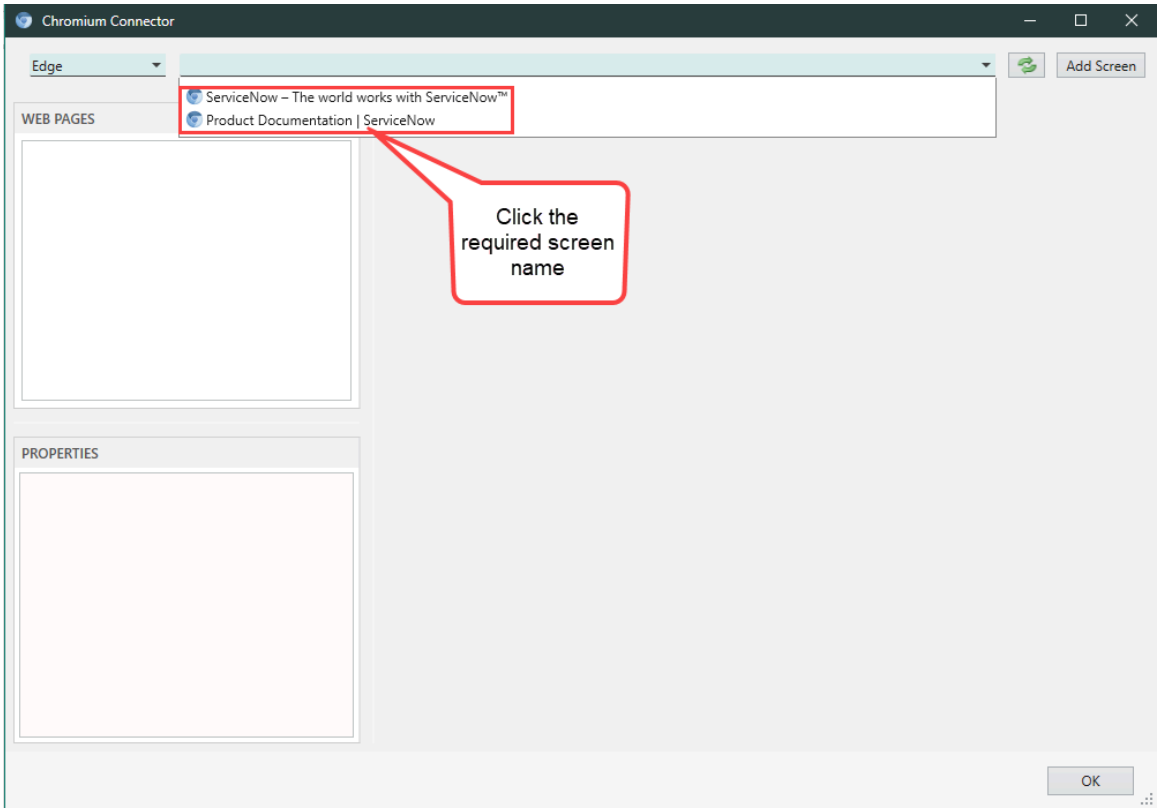

8. Click **Add Screen**.
   The screen is captured in the WEB PAGES section.
9. Under the WEB PAGES section, right-click the name of the web page.
10. Click **Capture Element**.
11. Use the context dialog to capture the elements.
    To use the context dialog, see Use the Capture element dialog.

Use the Capture element dialog

Identify and capture the elements on a web-based, Java, or Windows application screen by using the Capture element dialog.

Before you begin

The Capture element dialog is available in the following connectors:

- Java
- Chromium
- IE
- Windows
- Universal App Connector

Role required: none

Procedure

1. Move the mouse device to the element that you want to capture.
   The Capture element dialog shows information.

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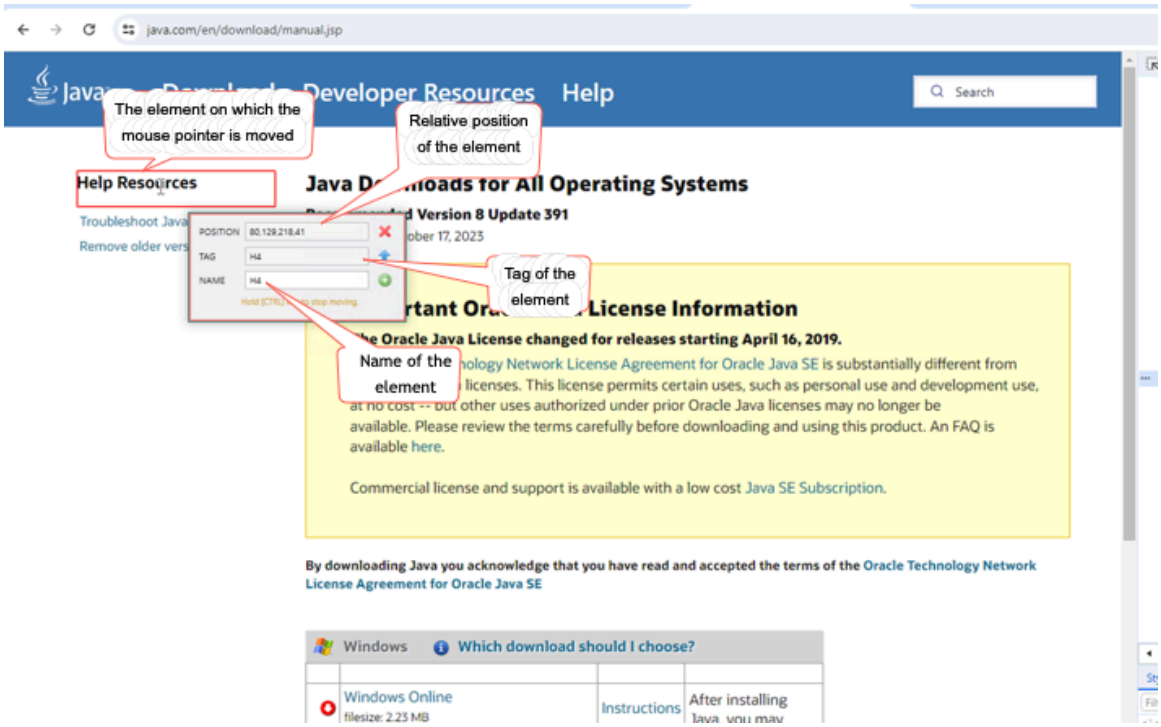

Note: By default, the name of the element appears in the **Name** field of the Capture element dialog. If the name of the element is not available, its Id appears in the **Name** field. Otherwise, the element type appears in the **Name** field.

2. To capture the element, select the Add element icon ( ).

Note:

- To prevent the Capture element dialog from moving after you have moved the mouse pointer over the screen element you want to capture, press the CTRL key.
- You can optionally provide a custom name to the element in the **NAME** field. In that case, the element is captured with the custom name in both the **Screens and elements** pane and under the Connector object in the Global Objects. Else, it's captured with the default name the target application provides.
- If you capture the same element multiple times, the Capture Dialog provides a unique name to each instance of the element. For example, if you capture an H4 element three times, its naming convention can be like H4, H4_1, and H4_2.

3. **Optional:** To capture elements that are higher in the hierarchy of the current element, select the move to parent element icon ( ).
For example, the elements in an HTML table elements appear in a hierarchical order. The `table` element is the highest and `th` is lowest. If you try to capture an HTML table elements, the Capture element dialog will move from `th` to `tr` to the `table` element. The image shows the hierarchy of elements.

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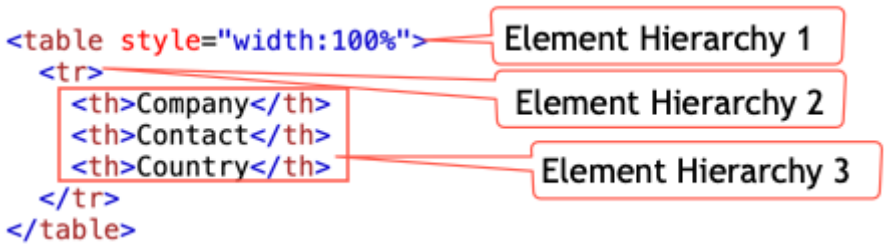
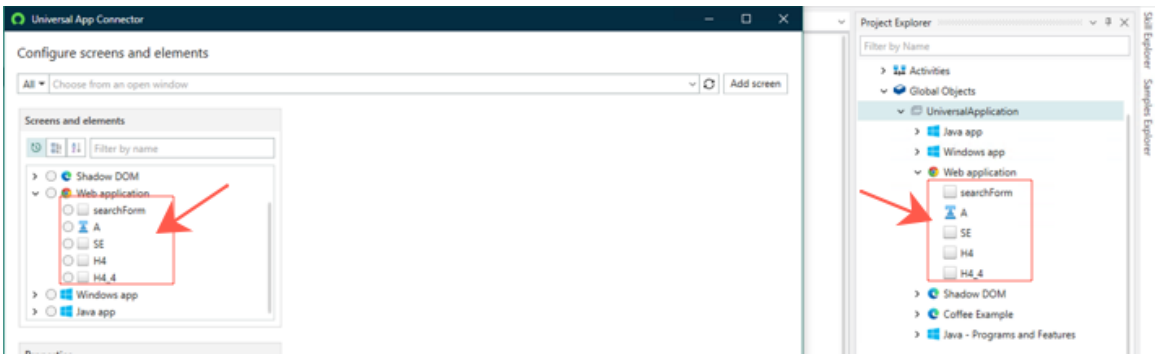


4. **Optional:** To capture more elements, move the mouse pointer over other elements and repeat the previous steps.
5. To close the Capture element dialog, select the close Capture element dialog icon .
   The captured elements appear in both the **Screens and elements** pane and under the Connector object in the Global Objects.



Chromium connector methods

The Chromium connector methods do different tasks on the applications, screens, and the elements on the screens of the Google Chrome and the Microsoft Edge browsers.

Chromium connector method levels

Application level methods

Screen level methods

Element level methods

Application level methods

Navigate

Launches the web page based on the URL specified.

To provide inputs, see Configure port properties

Navigate method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Url	URL of the web page.	Data In	String	No default value	No
Timeout	Option to specify	Data In	Integer	No default value	No

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Navigate method parameters (continued)

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
	the time in seconds after which the operation times out.				
Return	If True, the web page has launched. Else, if False, the web page hasn't launched.	Data Out	Boolean	Not applicable	Not applicable

WaitForAnyScreen

Sets a delay before the specified screens load.

To specify the screen, do the following steps:

1. Click the method settings icon ( ).
2. On the CHOOSE SCREENS window, select the required screen.
3. Click **OK**.

To provide inputs to the fields, see Configure port properties.

Navigate method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
MatchAllChildren	If True, before loading the screen, the method matches the captured elements from the web page. Else, if False, the method doesn't match any element.	Data In	Boolean	No default value	No	The elements can be found in the MATCH CHILDREN section of the Chromium Connector window.
Timeout	Specifies the time in seconds after which the	Data In	Integer	No default value	No	

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Navigate method parameters (continued)

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
	operation times out.					

Screen level methods

Close

Closes the captured screen window.

Focus

Sets the focus on the captured window.

Navigate method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Return	If True, the focus was set on the captured window. Else, if False, the focus wasn't set on the captured window.	Data out	Boolean	No default value	Not applicable

GetFields

Returns the values of the specified fields or elements. For example, it can return the text in a button.

To specify the fields, do the following steps.

1. Click the method settings icon ( ).
2. In the CHOOSE FORM ELEMENTS window, select the required fields.
3. Click **OK**.

GetFields method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Name of the field or element	Field or element for which the method returns the value.	Data out	String	No default value	Not applicable

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GetInnerHtml

Returns the inner HTML of the captured screen.

GetInnerHtml method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Return	Returns the inner HTML of the captured screen.	Data out	Object	Not applicable	Not applicable

GetPageSource

Returns the page source of the captured screen.

GetPageSource method parameters

Parameter	Description	Data Port Type	Data type	Default value	Mandatory?
Return	Returns the page source of the captured screen.	Data Out	String	Not applicable	Not applicable

GetScreenShot

Returns the screenshot of the configured screen.

GetScreenShot method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Return	Returns the screenshot of the configured screen.	Data out	Bitmap	No default value	Not applicable

GetTitle

Returns the title of the web page captured.

GetTitle method parameter

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Return	Returns the title of the web page captured.	Data out	String	No default value	Not applicable

GetURL

Returns the URL of the web page that was captured.

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GetURL method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Return	Returns the URL of the web page that was captured.	Data out	String	No default value	Not applicable

GetValueByXPath

Returns the value within an XML node from the specified XML path.

To provide inputs to the fields see Configure port properties.

GetValueByXPath method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
XPath	XPath of the web page captured.	Data In	String	No default value	No
Return	Returns the value from the XML node.	Data out	String	Not applicable	Not applicable

IsCreated

Returns the Boolean value based on whether the screen is rendered successfully on the web application.

To provide inputs to the fields see Configure port properties.

IsCreated method parameters

Parameter	Description	Data Port type	Data type	Default type	Mandatory?	Notes
MatchAllChildren	If True, before the screen is rendered, the method attempts to match all captured elements. Else, if False, no match is done.	Data In	Boolean	No default value	No	You can find the captured elements in the MATCH CHILDREN section of the Chromium Connector window.
Return	If True, the screen is rendered successfully.	Data out	Boolean	Not applicable	Not applicable	

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IsCreated method parameters (continued)

Parameter	Description	Data Port type	Data type	Default type	Mandatory?	Notes
	Else, if False, the screen has failed to render successfully.					

Element level methods

Click

Performs a click operation on the element.

Focus

Sets the focus on the element.

To provide inputs to the fields see Configure port properties.

Focus method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
scrollIntoView	If True, the method uses the scrollbar to navigate to the captured element on the web page. Else, if False, it doesn't scroll to the captured element.	Data In	Boolean	No default value	No
Return	If True, the method sets focus on the element. Else, if False, the method has failed to set focus on the element.	Data Out	Boolean	Not applicable	Not applicable

GetInnerHTML

Returns the inner HTML of the captured element.

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GetInnerHTML method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Return	Returns the inner HTML of the captured element.	Data Out	String	No default type	Not applicable

GetInnerText

Returns the inner text in the captured element.

GetInnerText method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Return	Returns the inner text in the captured element.	Data Out	String	Not applicable	Not applicable

GetOuterHTML

Returns the HTML element and its attributes, start, and end tags of the captured element.

GetOuterHTML method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Return	Returns the outer HTML of the captured element.	Data out	String	No default value	Not applicable

GetOuterText

Returns the text content of the captured element.

GetOuterText method parameters

Parameter	Description	Data Port Type	Data type	Default value	Mandatory?
Return	Returns the text content of the captured element.	Data out	String	No default value	Not applicable

IsCreated

Returns the Boolean status of whether the captured element has loaded.

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IsCreated method parameter

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Return	If True, the captured element has loaded. Else, if False, the captured element has failed to load.	Data out	Boolean	No default value	Not applicable

SetPassword

Automate entering password securely in the password field of a web-based application, for example securely enter password in the password field of a login form.

To provide inputs to the fields see Configure port properties.

SetPassword method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
Password	Accepts the password as a secured string.	Data In	Secured string	None	Yes	Since it accepts the password as a secured string, it only shows the length of the string when you right-click on the parameter and then click **Preview Data**.

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SetPassword method parameters (continued)

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
UseSendKeys	SendKeys is a method used to send keyboard inputs such as characters, numbers, and symbols to text boxes inside an application.	Data In	Boolean	False	Yes	**Tip:** If the **SetPassword** method fails to input the password in the password field, set the value to **True** and execute the method again.

SendKeys

Passes shortcut keys to the captured element.

To provide inputs to the fields see Configure port properties.

SendKeys method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
Keys	Takes the shortcut keys.	Data In	String	No default value	No
ClearExistingValue	If True, the method clears any existing value in the field. Else, if False, it doesn't clear the existing value.	Data In	Boolean	No default value	No
TypeDelay	Sets the typing delay between each key.	Data In	Double	No default value	No

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GetInstanceCount

Returns a count of the number of instances where the element is available.

GetOuterHTML

Gets the outer HTML of the captured element.

SendKeys

Simulates keystrokes on web pages and windows.

Inputs

ClearExistingValue

TypeDelay

SimulateMouseEvent

Simulates the mouse event you specify on an element on a web-based application. For example, simulate a right mouse-click on an element.

Important: To simulate a mouse event on an element, it must already have that specific event defined in the web page HTML. For example, to simulate the `contextmenu` event on an element, the element must already have the `contextmenu` event defined in the HTML.

To provide inputs to the fields see Configure port properties

SimulateMouseEvent method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
MouseEvent	Mouse event that occurs on the captured web page element. At the time of the mouse event occurring on a web page element, that element must already have the mouse event defined in the HTML.	Data In	MouseEventType	click	Yes	The method supports these mouse events. • click • dblclick • mousedown • mouseup • mouseover • mousemove • mouseout • contextmenu

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SimulateMouseEvent method parameters (continued)

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
MouseButton	Simulates the mouse button click on the captured web page element.	Data In	MouseButtonType	Left	Yes	The method supports these mouse button actions. • left • middle • right

SimulateEvent

Simulates the HTML event that you specify on a Google Chrome page or an element on the page.

To provide inputs to the fields see Configure port properties

SimulateEvent method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
EventName	Name of the HTML event. The method supports the events provided and you must enter the name of the event exactly as specified. HTML events • load • unload • abort • error • select • change • submit • reset • focus • blur	Data In	String	None	Yes

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SimulateEvent method parameters (continued)

Parameter	Description	Data Port type	Data type	Default value	Mandatory?
	• resize • scroll				

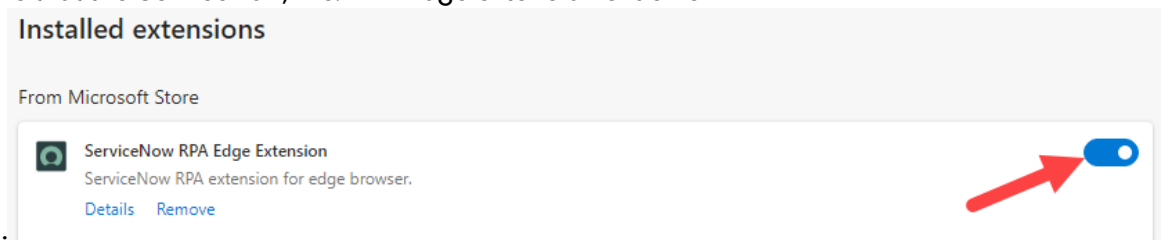
Add the ServiceNow RPA Edge extension

Add the ServiceNow RPA Edge extension to your Edge browser to enable the Chromium connector to interact with the elements on the web applications that are opened in this browser.

Before you begin
Role required: none

Procedure

1. Navigate to https://microsoftedge.microsoft.com/addons/detail/servicenow-rpa-edge-exten/cdbeoliogepmegmacldfbklgboifhkhg.
2. Click **Get**.
3. In the Add " ServiceNow, Inc. RPA Edge Extension" to Microsoft Edge dialog box, click **Add extension**.
4. To verify if the extension is added, do the following actions:
   a. Open the Edge browser.
   b. On the top-right corner, click the three dots icon (···).
   c. Click **Extensions**.
   d. In the Extensions pop-up window, click **Manage extensions**.
   e. Make sure that the ServiceNow, Inc. RPA Edge extension slider is enabled.



Counter

The Counter connector increments or decrements integers as part of an automation Workflow in RPA Desktop Design Studio.

- To use the Counter connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Counter connector methods

The Counter connector methods increment, decrement, or reset integers as part of an automation Workflow in RPA Desktop Design Studio. All methods have properties that you can update.

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Up

Increments an integer by the value that you specify.

To provide input, see Configure port properties.

Up method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Value	Custom integer value	Data In	Integer	1	Yes

To view or update the properties, see Counter method properties.

Down

Decrements an integer by the value that you specify. The default integer is 1.

To provide input, see Configure port properties.

Up method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory
Value	Custom integer value	Data In	Integer	1	Yes

To view or update the properties, see Counter method properties.

Value

Returns the value after incrementing or decrementing an integer in the Up or Down methods.

Note: You must execute the Up or Down method before executing the Value method.

Up method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory
Return	Incremented or decremented value	Data Out	Integer	0	Yes

To update the properties, see Counter method properties.

Reset

Resets the current value in the Value method to `null`.

Note: You must execute the Reset method after executing the Value method.

To view or update the properties, see Counter method properties.

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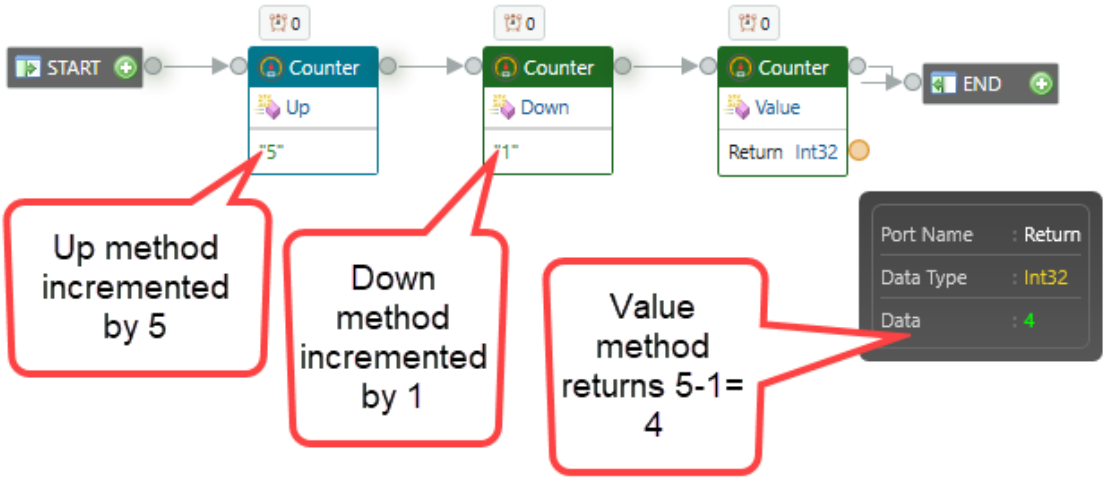
Example

The following example shows the use of the Counter connector



methods.

Counter method properties

View or update the Counter method properties.

Counter method properties

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

C#.Net

The C#.Net connector enables you to create and execute custom C#.Net scripts by setting custom classes and methods and include them as part of an automation in the RPA Desktop Design Studio.

- To install the C#.Net connector, see Manage plugins in RPA Desktop Design Studio.
- To use the C#.Net connector, see Use a connector in RPA Desktop Design Studio.
- To configure the C#.Net connector, see Configure the C#.Net connector.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Configure the C#.Net connector

Write and validate custom C#.Net scripts and execute them as part of your automation by using the C#.Net connector in RPA Desktop Design Studio.

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Before you begin

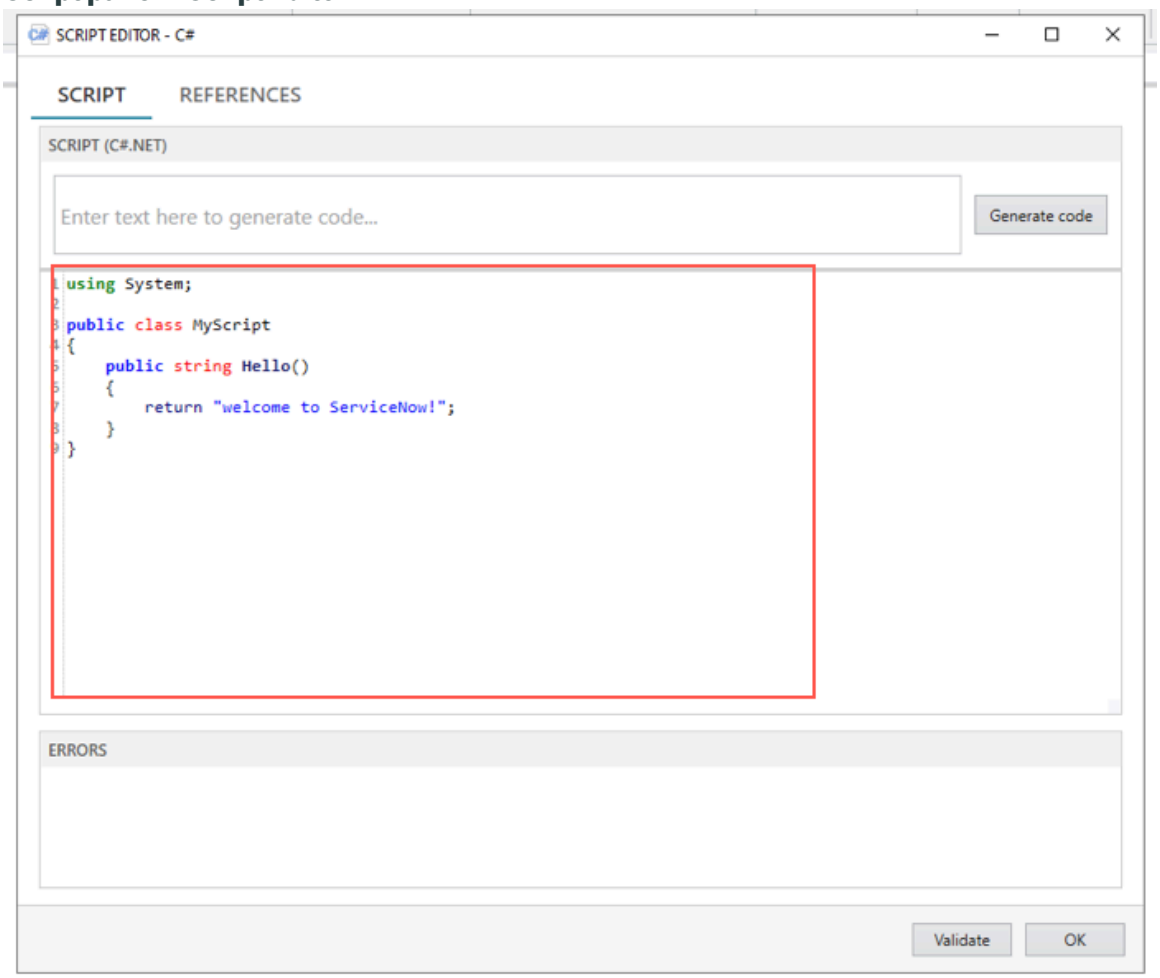
Ensure you have installed the Scripting plugin on the RPA Desktop Design Studio. To install, see Manage plugins in RPA Desktop Design Studio.

Role required: Developer

Procedure

1. In the Toolbox pane, navigate to **Connectors** > **C#.NET**.
2. Drag the C#.Net connector to **Global Objects** in the Project Explorer pane.
3. Right-click the C#.Net connector in **Global Objects** and select **Configure**.
   The Script Editor window is displayed.
4. Enter the custom script in the Script pane.

Script pane in Script Editor



5. **Optional:** Select **Add Reference** from the **References** tab section if you want to add Dynamic-link library (DLL) references to your custom script.
   You can select the references from the Reference Manager window and also from your computer.
6. Select **Validate**.
   If your custom script has any errors, it is displayed in the Errors pane. Resolve the errors and select **Validate** to check for errors again.

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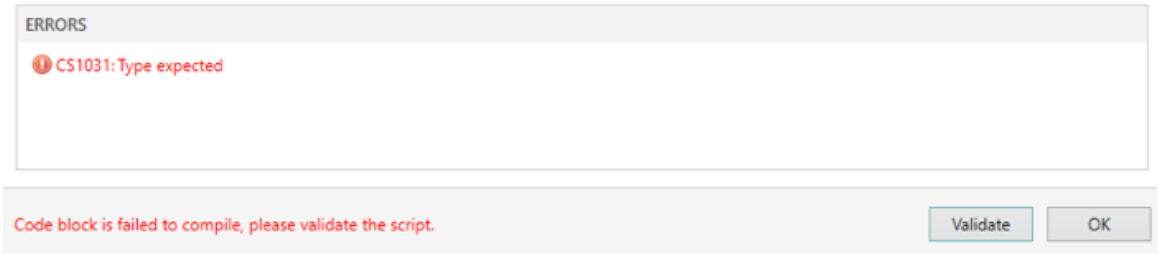
Error pane for Script Editor



7. Click **OK**.
   If you want to save the changes, select **Yes**. An error validation is performed again and the changes are saved. If you want to discard the changes, select **No**.

What to do next

The custom script you created by using the C#.Net connector is now ready to be used in your automation.

C# connector methods

The C# connector method enables you to execute the custom C# scripts you had written while configuring the C#.Net connector.

Execute

Executes C# scripts set up in the configuration window. Before executing the method, you must configure the connector. See Configure the C#.Net connector.

To execute, do the following steps.

1. Click the method settings icon ( ).
2. From the **Classes** list, select the class defined during the configuration of the C#.NET connector.
3. From the **Methods** list, select the method defined during the configuration of the C#.NET connector.
4. Click **OK**.

   A Data Out port is created to return the output.
5. To test the method, under the **DESIGN** tab, click **Run**.

Execute method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory
Result	Returns the output of the script.	Data Out	String	Not applicable	Not applicable

Email connector

The Email connector lets an RPA Desktop Design Studio automation work with email. For example, an automation can send, retrieve, and reply to email messages, and can automatically download attachments.

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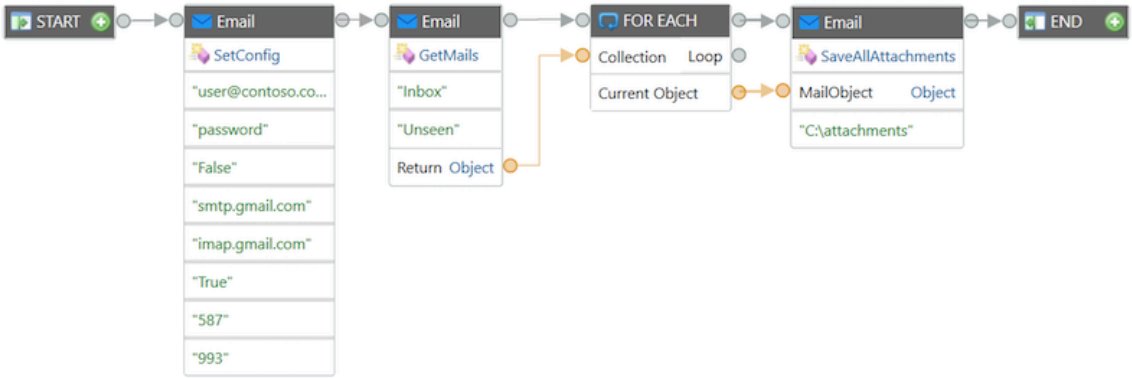
Note: The Email connector works only with IMAP mail servers, including Microsoft Outlook, Yahoo! Mail, and many others. It is not possible to access Gmail at this time.

Example automation using the Email connector



In this example automation, the SetConfig method of the Email connector logs in to the mail server using the account holder's credentials. The GetMail method then retrieves all the unread messages from the inbox of the account. By using a For Each loop, the automation iterates through the retrieved messages and saves each message's attachments to a specified location on the local drive.

- For information about using connectors in RPA Desktop Design Studio, see Use a connector in RPA Desktop Design Studio.
- For information about making connector methods visible in RPA Desktop Design Studio, see Use connector method.
- To learn how to use connector methods, see Use a component in RPA Desktop Design Studio.

Email connector methods

The methods in the Email connector retrieve, send, and reply to email messages, and can download attachments. Use the SetConfig method first to set up the connection to your mail server.

Use the SetConfig method to configure the mail server properties and access credentials. This method must precede all the other Email connector methods in the automation.

The GetMails method retrieves messages from the mail server and passes them to other methods as an object that contains one or more messages. The ReadMail, ReplyMail, and SaveAllAttachments methods operate on a single message at a time. When these methods receive an object that contains more than one message, the automation must use a For Each or For Loop method to iterate each message in the collection.

- For information about how to use the For Each method, see Use the For Each component.
- For information about how to use the For Loop method, see Use the For Loop component.

SetConfig

Sets up the connection to the mail server so that the automation can work with messages.

Note: You must run this method before running any other methods in the Email connector.

For information about how to set the parameters, see Configure port properties.

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SetConfig method parameters

Parameter	Description	Data port type	Data type	Default value	Required?	Notes
Username	User name to log in to the mail server	Data In	String	(none)	Yes	
Password	Password to log in to the mail server	Data In	String	(none)	Yes	
UseDefaultCredentials	Send the default credentials of the currently logged-in user to the SMTP server.	Data In	Boolean	False	No	
SmtpMailServer	Name of the SMTP server	Data In	String	smtp.gmail.com	No	Access to Gmail by using the Email connector is not currently supported. Make sure to change the default value.
ImapMailServer	Name of the IMAP server	Data In	String	imap.gmail.com	No	Access to Gmail by using the Email connector is not currently supported. Make sure to change the default value.
SSL	Use the Secure Socket Layer protocol	Data In	Boolean	True	No	
SmtpPort	SMTP port number	Data In	Integer	587	No	

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SetConfig method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Required?	Notes
ImapPort	IMAP port number	Data In	Integer	993	No	

GetMails

Returns messages from the mail server for use by other methods. You can set the method to retrieve either read (seen) or unread (unseen) messages and specify the folder that they're gathered.

For information about how to set the parameters, see Configure port properties.

GetMails method parameters

Parameter	Description	Data port type	Data type	Default value	Required?	Notes
FolderName	Name of the IMAP folder that the method fetches the collection (for example, **Inbox**)	Data in	String	Inbox	Yes	To specify a nested IMAP folder, enter the folder hierarchy by using backslashes (for example, Project \Meetings)
Filter	Set to get only unread (**Unseen**) or read (**Seen**) messages	Data in	FilterMode	Unseen	Yes	
Return	Returns the mail collection as an object	Data out	Object	Object	Yes	

MarkAsRead

Marks messages from a specified folder as read.

For information about how to set the parameters, see Configure port properties.

MarkAsRead method parameters

Parameter	Description	Port type	Data type	Default value	Required?	Notes
MailObject	The email object	Data in	Object	Object	Yes	

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MarkAsRead method parameters (continued)

Parameter	Description	Port type	Data type	Default value	Required?	Notes
	based on which the corresponding message is marked as read					
FolderName	Name of the IMAP folder that the email object is fetched	Data in	String	Inbox	Yes	To specify a nested IMAP folder, enter the folder hierarchy by using backslashes (for example, Project \Meetings)

MarkAsUnread

Marks messages from a specified folder as unread.

For information about how to set the parameters, see Configure port properties.

MarkAsRead method parameters

Parameter	Description	Port type	Data type	Default value	Required?	Notes
MailObject	The email object based on the corresponding email that is marked as unread.	Data in	Object	Object	Yes	
FolderName	Name of the IMAP folder that the email object is fetched.	Data in	String	Inbox	Yes	To specify a nested IMAP folder, enter the folder hierarchy by using backslashes (for example, Project \Meetings)

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ReadMail

Reads a message and returns its details, including subject, body, sender (from), recipients in the CC field, recipients in the BCC field, and the number of attachments.

For information about how to set the parameters, see Configure port properties.

ReadMail method parameters

Parameter	Description	Data port type	Data type	Default value	Required?
MailObject	MailObject that gives the details of the last message received	Data in	Object	Object	Yes
Subject	Subject of the message	Data out	String	None	No
Body	Body of the message	Data out	String	None	No
Sender	Sender of the message	Data out	String	None	No
CC	Recipients marked in CC	Data out	String	None	No
BCC	Recipients marked in BCC	Data out	String	None	No
AttachmentsCount	Number of attachments in the message	Data out	Integer	None	No

ReplyMail

Automatically replies to a message. Use the parameters to set the body of the message and other details. You can include attachments.

For information about how to set the parameters, see Configure port properties.

ReplyMail method parameters

Parameter	Description	Data port type	Data type	Default value	Required?	Notes
MailObject	Message object containing the message details	Data in	Object	Object	Yes	
ReplyToAll	Replies to all recipients	Data in	Boolean	False	No	

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ReplyMail method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Required?	Notes
	in the To and CC fields of the message					
BCC	Replies to all recipients in the BCC field of the message	Data in	String	None	No	
Body	Body of the reply message	Data in	String	None	No	
IsHtmlBody	Option to indicate whether the reply body is in HTML format	Data in	Boolean	False	No	
Attachments	Attachments to the reply message	Data in	String	None	No	To attach a file: 1. Paste the path to the file in the field. 2. Remove the quotes enclosing the path. To include multiple attachments, separate the paths by commas.

SaveAllAttachments

Saves all attachments from a message to the local drive.

For information about how to set the parameters, see Configure port properties.

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SaveAllAttachments method parameters

Parameter	Description	Data port type	Data type	Default value	Required?
MailObject	Message that the method downloads the attachments from	Data In	Object	Object	Yes
FolderPath	Path of the directory to which the attachments are downloaded	Data In	String	None	Yes

SendMail

Sends a message. Use the parameters to set the body of the message and other details. You can include attachments.

Note: Use the SetConfig method to set the From address.

For information about how to set the parameters, see Configure port properties.

SendMail method parameters

Parameter	Description	Data port type	Data type	Default value	Required?	Notes
ToAddress	Address to which to send the message	Data in	String	None	Yes	
CC	Addresses to include in the CC field	Data in	String	None	No	
BCC	Addresses to include in the BCC field	Data in	String	None	No	
Subject	Message subject	Data in	String	None	No	
Body	Message body	Data in	String	None	No	
IsHtmlBody	Option to indicate whether the reply body is in HTML format	Data in	String	False	No	

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SendMail method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Required?	Notes
Attachments	Message attachments	Data in	String	None	No	To attach a file: 1. Paste the path to the file in the field. 2. Remove the quotes enclosing the path. To include multiple attachments, separate the paths by commas.

Email method properties

The following properties can be set for each of the Email connector methods. To set the properties, double-click a method and enter the values in the *Properties* pane.

Email method properties

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Eventlog

The Eventlog connector listens from different sources and writes events and custom messages to the Microsoft Event Viewer.

The Eventlog connector provides methods and events to listen and write events and messages to the Microsoft Event Viewer and a method to unsubscribe to events.

- To use the Eventlog connector and event, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

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EventLog connector event and methods

The Eventlog connector provides methods and an event to listen to events from sources and write them to the Microsoft Event Viewer as part of an automation. The methods and events have properties that you can update.

OnEntryWritten

This is a predefined event that occurs when an entry is written to the event log of your local computer.

Event output

Type

Source

Message

Write

Writes a warning, information, or error to the Microsoft Event Viewer, which includes a message and the source of the event.

Inputs

Type

Source

Message

Dispose

When you execute the Write method, an object to the Microsoft Event Viewer is written and a connection is established with the RPA Desktop Design Studio. When you connect the Dispose method with the Write method, the object is disconnected.

ListenEvents

Listens to the events that are specified in the OnEntryWritten event.

UnsubscribeToEvents

Discontinues listening to the events from the OnEntryWritten event.

OnEntryWritten

Provides as outputs the event type, descriptive message, and the source of the event.

Parameters of the EventLog connector methods

Learn about the parameters of the EventLog connector methods in RPA Desktop Design Studio.

Parameters of the Eventlog connector methods

Parameter name	Description	Mandatory?
Type	Type of events that can be logged. All events have defined common information	Yes

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Parameters of the Eventlog connector methods (continued)

Parameter name	Description	Mandatory?
	and can include event-specific data. Three types of information are written: • Information • Error • Warning	
Message	Descriptive message for each event that is logged in the Microsoft Event Viewer.	Yes
Source	The name of the software that logs the event.	Yes

Enter inputs for parameters

To enter inputs for the parameters, see Configure port properties.

FTP

The FTP connector enables you to perform various actions on FTP servers. For example, you can upload or download files from an FTP server. The connector provides multiple methods that perform these actions as part of an automation in the RPA Desktop Design Studio.

Add the FTP plugin from the Plugins Manager before using the connector. For more information about adding the SSH plugin, see Manage plugins in RPA Desktop Design Studio.

To use the FTP connector, see Use a connector in RPA Desktop Design Studio.

To use the methods in the FTP connector, see Use connector method.

To expose the methods, see Use connector method.

To use the methods, see Use a component in RPA Desktop Design Studio.

FTP connector methods

The FTP connector methods perform various actions on the File Transfer Protocol server as part of an automation. To enable the methods, you must provide appropriate parameters.

SetConfiguration

Sets the File Transfer Protocol server access details. You must execute this method first.

To provide inputs to the parameters, see Configure port properties.

SetConfiguration method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Url	URL of the File Transfer Protocol	Data in	String	None	Yes

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SetConfiguration method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Username	Username to access the File Transfer Protocol server.	Data in	String	None	Yes
Password	Password to access the File Transfer Protocol server.	Data in	String	None	Yes

CreateFolder

Creates a folder on the File Transfer Protocol server.

To provide inputs to the parameters, see Configure port properties.

CreateFolder method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
FolderName	Path in the File Transfer Protocol server where the folder will be created with the folder name.	Data in	String	None	Yes
Return	Returns True if the folder is created, else, returns False.	Data out	Boolean	None	Not applicable

DeleteFile

Deletes a file in the FTP server.

To provide inputs to the parameters, see Configure port properties.

DeleteFile method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
RemoteFilePath	Path to the file you want to remove in the File Transfer Protocol server.	Data in	String	None	Yes

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DeleteFile method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns True if the file is deleted, else, returns False.	Data out	Boolean	Not applicable	Not applicable

DeleteFolder

Deletes the specified folder in the File Transfer Protocol server.

To provide inputs to the parameters, see Configure port properties.

DeleteFolder method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
RemoteFolderPath	Path to the folder in the File Transfer Protocol server including the folder name.	Data in	String	None	Yes
Return	Returns True if the folder is deleted, else, returns False.	Data out	Boolean	Not applicable	Not applicable

DownloadFile

Downloads a file from the File Transfer Protocol server to the local drive.

To provide inputs to the parameters, see Configure port properties.

DownloadFile method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
RemoteFile	Path to the file in the File Transfer Protocol and the name of the file.	Data in	String	None	Yes
LocalFile	Path in the local drive where the file will be downloaded.	Data in	String	None	Yes
TimeOut	Time after which the request to the	Data in	Integer	None	No

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DownloadFile method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Mandatory?
	File Transfer Protocol server times out.				
Return	Returns True if the file is downloaded, else, returns False.	Data out	Boolean	None	Not applicable

DownloadFolder

Downloads a folder from the File Transfer Protocol server to the local drive.

To provide inputs to the parameters, see Configure port properties.

DownloadFolder method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
RemoteFolderPath	Path to the folder in the File Transfer Protocol and the name of the folder.	Data in	String	None	Yes
LocalFolderPath	Path in the local drive where the folder will be downloaded.	Data in	String	None	Yes
TimeOut	Time after which the request to the File Transfer Protocol server times out.	Data in	Integer	None	No
Return	Returns True if the folder is downloaded, else, returns False.	Data out	Boolean	None	Not applicable

GetFileList

Returns the list of files in a folder in the File Transfer Protocol server.

To provide inputs to the parameters, see Configure port properties.

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GetFileList method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
RemoteFolderPath	Path to the folder in the File Transfer Protocol and the name of the folder.	Data in	String	None	Yes
Return	Returns the list of files in the folder.	Data out	String	Not applicable	Not applicable

RenameFile

Renames a file in the File Transfer Protocol server.

To provide inputs to the parameters, see Configure port properties.

RenameFile method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
RemoteFilePath	Path to the file in the File Transfer Protocol server and the name of the file.	Data in	String	None	Yes
NewNameofFile	Path to the file in the File Transfer Protocol server and the new name of the file.	Data in	String	None	Yes
Return	Returns True if the name of the file is changed, else, it returns False.	Data out	Boolean	Not applicable	Not applicable

RenameFolder

Renames a folder in the File Transfer Protocol server.

To provide inputs to the parameters, see Configure port properties.

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RenameFolder method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
RemoteFolder	Path to the folder in the File Transfer Protocol server and the name of the folder.	Data in	String	None	Yes
NewNameofFolder	Path to the folder in the File Transfer Protocol server and the new name of the folder.	Data in	String	None	Yes
Return	Returns True if the name of the folder is changed, else, it returns False.	Data out	Boolean	Not applicable	Not applicable

UploadFile

Uploads a file from the local drive to the File Transfer Protocol server.

To provide inputs to the parameters, see Configure port properties.

UploadFile method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
LocalFilePath	Path to the file in the local drive.	Data in	String	None	Yes
RemoteFilePath	Path to the location in the File Transfer Protocol server.	Data in	String	None	Yes
Return	Returns True if the file is uploaded, else, returns False.	Data out	Boolean	Not applicable	Not applicable

UploadFolder

Uploads a folder from the local drive to the File Transfer Protocol server.

To provide inputs to the parameters, see Configure port properties.

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UploadFolder method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
LocalFolderPath	Path to the folder in the local drive.	Data in	String	None	Yes
RemoteFolderPath	Path to the location in the File Transfer Protocol server.	Data in	String	None	Yes
Return	Returns True if the folder is uploaded, else, returns False.	Data out	Boolean	Not applicable	Not applicable

FTP method properties

View or update the FTP method properties.

FTP method properties

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

IdleTimer connector

The IdleTimer connector sets, starts and ends an idle time within an attended automation.

You must first use and then expose the methods in the IdleTimer connector to use its methods.

- To use the connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

IdleTimer connector methods and events

Learn about the IdleTimer connector methods and events.

Start method

Sets the maximum idle time in seconds.

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Start method parameters

Parameter name	Port type	Data type	Description	Mandatory?
MaxIdleTime	Data In	Integer	Maximum idle time in seconds.	Yes

Stop method

Stops the timer.

OnIdleStart

Triggers the automation when the Start method is executed.

OnIdleStop

Stops the automation when the Start method is executed.

IE connector

The Internet Explorer (IE) connector enables you to perform various actions on the IE browser, applications, and their screen elements on the browser. For example, you can execute a method to open a website. You perform the actions through the methods.

You must first use, configure, and then expose the methods in the IE connector to use its methods.

- To use the IE connector, see Use a connector in RPA Desktop Design Studio.
- To configure the IE connector, see Configure the Internet Explorer connector.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

IE connector methods are available at the following levels:

- Connector
- Screen
- Element

Types of IE connector methods

Method level	Description
Connector	These methods can open a website on the IE browser. It sets up the browser and application for the other methods to execute.
Screen	These methods perform various actions on the screens you have configured. For example, click a button.
Element	These methods perform various tasks on the various elements on the screen.

Note: Automation support for frameset-based pages isn't available through the Chromium connector.

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Configure the Internet Explorer connector

Access the IE connector methods at all levels by configuring the IE connector. When you configure the IE connector, you capture a screen and its elements.

Before you begin

Add the Internet Explorer plugin from the Plugins Manager. For more information about adding the SSH plugin, see Manage plugins in RPA Desktop Design Studio.

Ensure that at least a website or an application on the Internet Explorer browser window is open or active.

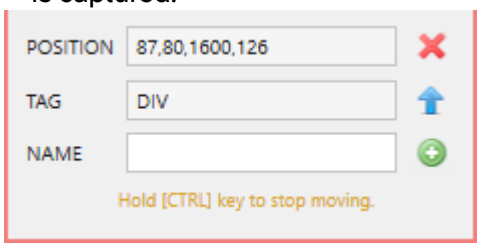
Role required: none

Procedure

1. Navigate to **Connectors** > **IE Connector**.
2. Drag the IE Connector under Global Objects in the Project Explorer pane.
3. Under the Global Objects, right-click the IE connector.
4. Click **Configure**.
5. In the AVAILABLE WEB PAGES list, select the required web page.

   Tip: If the window doesn't appear in the list, click the refresh icon ( ).

6. Click **Add Screen**.
   The web page appears under the WEB PAGES section.
7. Under the WEB PAGES section, right-click the name of the web page.
   The screen is captured.
8. Click **Capture Element**.
   For more information on the context dialog, see Use the Capture element dialog.
9. Move the mouse device over the web page to capture the element.
   As the mouse device moves over the web page, the context dialog displays the following information of each element it passes.
   - POSITION: Position of the element in the web page.
   - TAG: Name of the element tag.
   - NAME: Custom name of the element that the user enters. This field is used when an element is captured.

   As you place the mouse device over an element, a red boundary icon ( ) indicates the element.
10. In the context window, enter a custom name of the element in the **NAME** field.

    Tip: To stop the context window from moving, press and hold the **Ctrl** key.

11. To add the custom name, click the add name icon ( ).

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The element is captured.

12. To close the context window, click the close icon ().
    Methods at the connector, application, and element levels are captured.
13. To view the methods at the connector, application, and element levels, double-click the required connector level under the Global Objects in the Project Explorer pane.
14. Repeat the steps to capture multiple elements.

IE Connector methods

The IE connector methods perform different tasks on the IE connector, screens, and the elements on the screens. The methods are available at the connector, screen, and the element levels and you can expose the methods by completing appropriate steps.

IE connector method levels

Connector level methods

Screen level methods

Element level methods

Connector level methods

Navigate

Opens a web page based on the URL you specify and returns the Boolean response.

Input

URL

Output

Return (Boolean)

WaitForAnyScreen

The method executes a wait period before a screen loads up. You can specify a timeout after which the method times out the request.

Input

MatchAllChildren

Timeout

Screen level methods

DownloadFile

Downloads a file from the screen or web page based on the URL and file name you specify.

Input

Url

fileName

Output

Return (Boolean)

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ExecuteJavaScript

Executes custom JavaScript on an application or website open on the IE browser. You must configure the method before executing.

To configure the JavaScript, do the following steps.

1. Click the method settings icon ( ).
2. Enter the custom script under the JAVA SCRIPT section.
3. To add parameter to the script, click the add parameter icon ( ) under the PARAMETER heading.

   Note: A Data In port is added with each parameter.

4. Click **OK**.

Input

Parameter

Output

Return (Object)

GetValueByXPath

Converts an XPath and returns the output as a string.

Input

XPath (String)

Output

Return (String)

GetValuesByXPath

Returns the values within columns based on the specified XPath expression.

Input

You must configure the XPath expressions before executing the method. To configure, do the following steps.

1. Click the method settings icon ( ).
2. Update the name of the column.
3. Define the XPath expression.
4. Click **OK**.

Output

Returns the data table after the operation.

Hide

Hides the active browser window.

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Restore

Restores the browser window hidden using the Hide method.

GetURL

Returns the URL of the website or web page.

Output

Return (String)

WaitForCreate

Sets a delay before a web page or a window loads.

Inputs

timeoutInSeconds

MatchAllChildren

Outputs

Return (Boolean)

SetFields

Sets the data in form field types.

SendKeys

Simulates the keystrokes on web pages and windows.

Inputs

Keys

MatchAllChildren

TypeDelay

Minimize

Minimizes the window.

Maximize

Maximizes the window.

IsReady

Returns the Boolean response to the request to check whether the website is ready to accept requests from methods.

Output

Return (Boolean)

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MatchChildren

Matches all elements of a web page that you have captured and returns a Boolean response accordingly. You can configure whether the method should match all children.

Input

matchAllChildren

Output

Return (Boolean)

IsCreated

Returns the Boolean response to the request to find whether a website on an Internet Explorer browser is open. You can optionally have the method check whether all captured elements of the website matches.

Inputs

MatchAllChildren

Output

Return (Boolean)

Refresh

Reloads the contents of the active web page.

SaveAs

Saves the active web page to the local disk.

Print

Prints the active web page in the browser.

Input

NoPrompt

GetPageSource

Returns the page source of the active window open on the IE browser.

Output

Return (String)

GetScreenShot

Returns the screen shot of a window or area in a window.

Output

Return (Bitmap)

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GetTitle

Returns the title of a window open in the IE browser.

Output

Return (String)

GetFields

Accesses data in the forms returns the data as output. You must configure the method before executing.

To configure, do the following steps.

1. Click the method settings icon ( ).
2. Select the form elements.
3. Update the form element data type.
4. Click **OK**.

Output

Form field

Focus

Sets the focus on a window that is running in the background or minimized and makes it active.

Output

Return (Boolean)

Close

Closes the active window.

Element level methods

These methods are exposed when you double-click an application element under the Global Objects in the Project Explorer.

Click

Performs a click operation on the element.

GetInnerHTML

Gets the inner HTML of the element.

Output

Return (String)

GetInnerText

Gets the inner text of an element.

Output

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Return (String)

GetOuterHTML

Gets the outer HTML of the element.

Output

Return (String)

GetURL

Gets the URL of the element.

Output

Return (String)

Parameters of the IE connector methods

Learn about the parameters of the Microsoft IE Connector (Internet Explorer) methods in RPA Desktop Design Studio.

Parameters of the IE connector methods

Parameter Name	Description	Mandatory?
MatchAllChildren	Option to indicate in Boolean values whether before loading a screen, the method will match all the captured children screens and elements with the screen. You can find the children screens and elements under the MATCH CHILDREN section of the configuration window.	No
Return (String)	Returns the value.	Not applicable
Return (String)	Returns the URL of the web page or website.	Not applicable
Return (String)	Returns the title of the web page.	Not applicable
XPath	XPath value.	Yes
Return (Bitmap)	Returns the screenshot of the web page in Bitmap format.	Not applicable
Return (Boolean)	Boolean response to the request for setting focus on a window and making it active.	Not applicable
Form fields	Returns the data in the forms.	Not applicable
Return	Returns the page source of the web page.	Not applicable
Return (Object)	Returns the output as an object after executing the JavaScript.	Not applicable
url	URL of the file to download.	Yes

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Parameters of the IE connector methods (continued)

Parameter Name	Description	Mandatory?
fileName	Name of the file to download.	Yes
Return (Boolean)	Boolean response to the request for file download.	Not applicable
Parameter	Value of the parameter you added when configuring the method.	No
Return (Boolean)	Boolean value to indicate whether the website or screen on the IE browser is ready to accept requests from methods.	Not applicable
Timeout	Time in seconds after which the request for wait times out. The default value is 30 seconds.	No
GetOuterHTML	Returns the outer HTML in a string format,	Not applicable
Return (String)	Returns the inner HTML of the element in a string.	Not applicable
Return (String)	Returns the URL of the element in a string format.	Not applicable
Return (Boolean)	Boolean response to whether the method waited for the screen to load.	Not applicable
Keys	Gives the keys that will operate on the web page open in the browser.	Yes
GetInnerText	Returns the inner HTML of the element in a string.	Not applicable
MatchAllChildren	Boolean option to indicate whether the method will match all children elements of the web page before sending keys.	No
TypeDelay	Delay before the method sends the request.	No
timeoutInSeconds	Time indicated in seconds before the request times out.	Yes
NoPrompt	Boolean option to indicate whether a prompt is passed through the method to print the web page.	Yes
matchAllChildren	Boolean option to indicate whether the method will match all children elements of the screen.	Not applicable
Return (Boolean)	Returns the Boolean response to the request of opening a web page.	Not applicable
URL	Address of a web page to open.	Yes
Return (Boolean)	Boolean response to the request to check whether a website or screen is open on the browser.	Not applicable
Return (Boolean)	Boolean response to indicate whether all children elements were matched.	Not applicable
XPath (String)	Option to provide the XPath that the method converts to string.	Yes

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Parameters of the IE connector methods (continued)

Parameter Name	Description	Mandatory?
Return (String)	Returns the converted XPath as a String.	Not applicable

Enter inputs for parameters

To enter inputs, see Configure port properties.

Java

The Java connector enables you to perform various actions on Java applications as part of an automation in the RPA Desktop Design Studio

Important: Java connector uses Oracle Java Access Bridge internally to interact with applications built for Windows desktop. Any known issue or limitation published by Oracle for this library are applicable.

In the context of RPA Desktop Design Studio, a Java application has three levels- connector, screen, and element. The Java connector exposes methods at all three levels and these methods enable you to perform various actions at all three levels. For example, one method might click a minimized screen and bring it back to focus and then another method could click a button on the screen to submit data in that order.

To use the Java connector, do the following steps:

1. Use the Java connector. See Use a connector in RPA Desktop Design Studio.
2. Configure the connector. See Configure the Java connector.
3. Expose the methods. See Use connector method.
4. Use the methods. See Use a component in RPA Desktop Design Studio.

Java connector methods are available at the following levels:

- Connector
- Screen
- Element

Types of Java connector methods

Method level	Description
Connector	These methods perform various actions on the Java application. For example, you can set the working directory of the application.
Screen	These methods perform various tasks on the screen of the Java application. For example, a method can click a minimized screen and bring it back to focus.
Element	These methods perform various tasks on the elements in the screen of the Java application. For example, a method could click a button.

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Warning: The Java connector doesn't work on machines with Java 32-bit installations.

As a workaround, copy the WindowsAccessBridge-64.dll available on the Oracle website for the particular Java version to C:\Windows\System32 folder on the target machine.

Configure the Java connector

Configure the Java connector to set up the Java application screens and elements on which the automation will be performed. After setting up, you can expose methods at the connector, screen, and element levels.

Before you begin

Ensure you have installed the Java plugin on the RPA Desktop Design Studio. To install, see Manage plugins in RPA Desktop Design Studio.

Ensure that Java is installed on the computer.

Ensure that at least one Java application window is active or open.

Role required: none

Procedure

1. Navigate to **Connectors** > **Java Connector**.
2. Drag the Java connector under Global Objects in the Project Explorer pane.
3. Under Global Objects, right-click the Java connector.
4. Click **Configure**.
5. In the AVAILABLE WINDOWS list, select a Java application.

   Tip: If the window doesn't appear in the list, click the refresh icon ( ).

6. Click **Add Window**.
   The screen is captured under the WINDOWS section.
7. **Optional:** To add more applications, repeat the steps.
   To know more about the Java Connector window, see
8. Under the WINDOWS section, right-click the name of the window.
9. Click **Add Element**.
10. To capture elements, use the context dialog.
    To use the context dialog, see Use the Capture element dialog.

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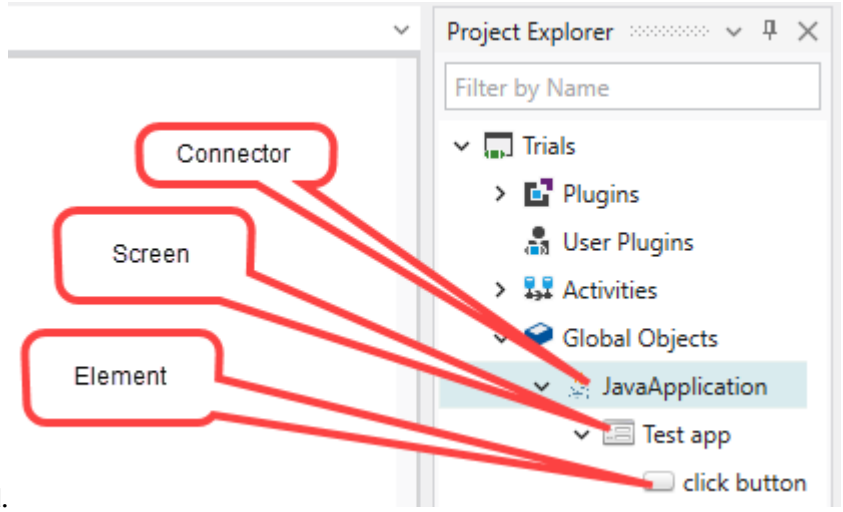
11. To close the Java Connector window, click **OK**.
    The connector, screen and its elements are



configured.

Java connector methods

The Java connector exposes methods at the connector, screen, and element levels. While all types of elements have common methods, they also have different methods.

Connector level methods

Start

Starts the Java application from its location and brings it to focus.

Note: You must execute this method first.

To provide inputs to the parameters, see Configure port properties.

Start method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Path	Path to the Java application in the local drive.	Data in	String	None	Yes
Args	Arguments for the path.	Data in	String	None	No

GetMainWindowHandle

Returns the window handle of the Java application launched by the Start method.

GetMainWindowHandle method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the Window	Data out	Integer	None	Not applicable

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GetMainWindowHandle method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Mandatory?
	handle of the application.				

GetMainWindowTitle

Returns the title of the Java application window.

GetMainWindowTitle method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the title of the window of the application.	Data out	String	None	Not applicable

CloseMainWindow

Closes the main Java application window.

Terminate

Terminates the main Java application window.

Screen level methods

Close

Closes the active Java application window.

Focus

If the Java application window is minimized or running in the background, the method restores the focus.

GetFields

Gets the data from the text fields in a Java application. You must first configure the text fields. To configure, do the following steps.

1. Configure the Java connector and capture one or more text fields.
2. Expose the screen level methods. See Use connector method.
3. From the Object Explorer pane, drag the GetFields method to the Design surface.
4. Click the method settings icon ( ).
5. Select one or more text fields.
6. Update the data type of the text field.
7. To close the CHOOSE FORM ELEMENTS window, click **OK**.

   A Data Out port is created for each text field you select.

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The GetFields method can now return the data contained in the text fields.

GetInstanceCount

Returns the total number of instances of the Java application open.

GetInstanceCount method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the total number of instances of the Java application open.	Data out	Integer	None	Not applicable

GetScreenShot

Captures and returns the screenshot of the Java application screen.

GetInstanceCount method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the screenshot of the Java application screen.	Data out	Bitmap	None	Not applicable

GetWindowHandle

Returns the Windows handle number of the Java application screen window.

GetInstanceCount method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the Windows handle number of the Java application screen window.	Data out	Integer	None	Not applicable

IsCreated

Returns the Boolean response based on whether the rules for a configured window match. When you configure a Java application screen, the MATCH RULES section of the Java connector window shows certain rules that match the screen configured. The method matches the same rules.

To provide inputs to the parameters, see Configure port properties.

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IsCreated method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?	Notes
MatchAllChildren	Returns the Boolean response after matching the rules of the elements of the screen.	Data in	Boolean	None	No	This parameter is relevant if you capture one or more elements.
Return	Returns the Boolean response to whether the rules of the Java application screen you configured matched.	Data out	Boolean	Null	Not applicable	

Maximize

Maximizes the Java application window.

Minimize

Minimizes the Java application window.

MouseAction

Performs different mouse device actions on the Java application such as left-click, right-click, and middle-click.

To provide inputs to the parameters, see Configure port properties.

MouseAction method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Action	Specifies the mouse device action.	Data in	Mouse device input	None	Yes
ClickMiddle	Whether a middle-click will be performed.	Data in	Boolean	None	No

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Resize

Changes the width, height, and the position of the Java application window along the X and Y axis.

To provide inputs to the parameters, see Configure port properties.

Resize method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
xPos	Position of the window on the screen along the X-axis.	Data in	Integer	None	No
yPos	Position of the window on the screen along the Y-axis.	Data in	Integer	None	No
Width	Width of the window.	Data in	Integer	None	No
Height	Height of the window.	Data in	Integer	None	No

Restore

Restores the original dimensions of the Java application window. You can use the method after you have executed methods like Maximize and Minimize.

SendKeys

Send any data or keyboard input to the active field on the Java application. For example, you can send a string data "RPA" or a keyboard input [Space] to clear a check box.

To provide inputs to the parameters, see Configure port properties.

WaitForCreate method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Keys	Sends the data or keyboard input to the active field.	Data in	String	None	Yes
ClearExistingVal	Before sending any data or keyboard input, clears any existing value in the active field.	Data in	Boolean	None	No

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WaitForCreate method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Mandatory?
TypeDelay	Sets a delay before sending any data or keyboard input to the active field.	Data in	Integer	None	No

SetFields

Set custom text in the text field elements captured from the Java application screen.

To use the method, do the following steps.

1. From the Object Explorer, drag the SetFields method to the Design surface.
2. Click the method settings icon ( ).
3. Select one or more text fields.
4. Update the data type of the text field.
5. Click **OK**.

   A Data In port is created for each text field you select. You can pass the string to set in the fields of the Java application.

   To provide inputs to the parameters, see Configure port properties.

WaitForCreate

Each screen you configure in the Java connector is identified by some rules, displayed under the MATCH RULES section of the Java Connector window. The method returns a Boolean response based on whether the rules of the screen you had configured matches.

To provide inputs to the parameters, see Configure port properties.

WaitForCreate method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
timeoutinSeconds	Time after which the operation of the method times out.	Data in	Integer	None	No
MatchAllChildren	Returns the Boolean response after matching the rules of the elements of the screen.	Data in	Boolean	None	No

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WaitForCreate method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the Boolean response to whether the rules of the Java application screen you configured matched.	Data out	Boolean	None	No

Element level methods

GetAccessibleActions

Returns the list of actions that you can perform on an element. For example, for a button, it returns `Click`.

GetText method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the list of actions that you can perform on an element.	Data out	List	None	Not applicable

GetInstanceCount

Returns the total count of an element type in the Java application. For example, if there are three text boxes in an application, the instance count is 3.

GetText method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the instance count of an element type in the application.	Data out	Integer	None	Not applicable

GetText

Returns the text from the captured text box element in the Java application. To capture multiple texts from multiple text boxes, you must configure multiple text box elements.

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GetText method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Text	Returns the text contained in the text box of the Java application.	Data out	String	None	Not applicable

IsCreated

Returns the Boolean response depending on whether the rules of the element you had configured match.

IsCreated method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the Boolean response depending on whether the rules of the element you had configured match.	Data out	Boolean	null	Not applicable

MouseClick

Performs a left mouse-click on the captured element.

PerformAction

Performs the specified action on an element. For example, click on a button. Each element allows a set of actions that you can get by executing the GetAccessibleActions method.

To provide inputs to the parameters, see Configure port properties.

IsCreated method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?	Notes
Action	Accepts the action to be performed on the element.	Data in	String	None	Yes	You must specify the action exactly in the format as given by the GetAccessibleActions method.

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IsCreated method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Mandatory?	Notes
Return	Returns True if the action was performed, else, False.	Data out	Boolean	None	Not applicable	

SetPassword

Automate entering password securely in the password field of a Java application.

To provide inputs to the fields see Configure port properties.

SetPassword method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
Password	Accepts the password as a secured string.	Data In	Secured string	None	Yes	Since it accepts the password as a secured string, it only shows the length of the string when you right-click on the parameter and then click **Preview Data**.

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SetPassword method parameters (continued)

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
UseSendKeys	SendKeys is a method used to send keyboard inputs such as characters, numbers, and symbols to text boxes inside an application.	Data In	Boolean	False	Yes	**Tip:** If the **SetPassword** method fails to input the password in the password field, set the value to **True** and execute the method again.

Java connector properties

View or update Java connector properties.

Java connector properties

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

JavaScript

The JavaScript connector enables you to execute custom JavaScript by writing custom classes and methods and include them as part of you automation in the RPA Desktop Design Studio.

To use the connector, you must first configure it by writing and validating custom classes and methods. After that, you must use the method the connector exposes. Use the links.

- To use the JavaScript connector, see Use a connector in RPA Desktop Design Studio.
- To configure the JavaScript connector, see Configure the JavaScript connector.

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- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Configure the JavaScript connector

Configure the JavaScript connector by writing custom script and validating custom classes and functions. Then you execute the script by providing values for the functions.

Before you begin

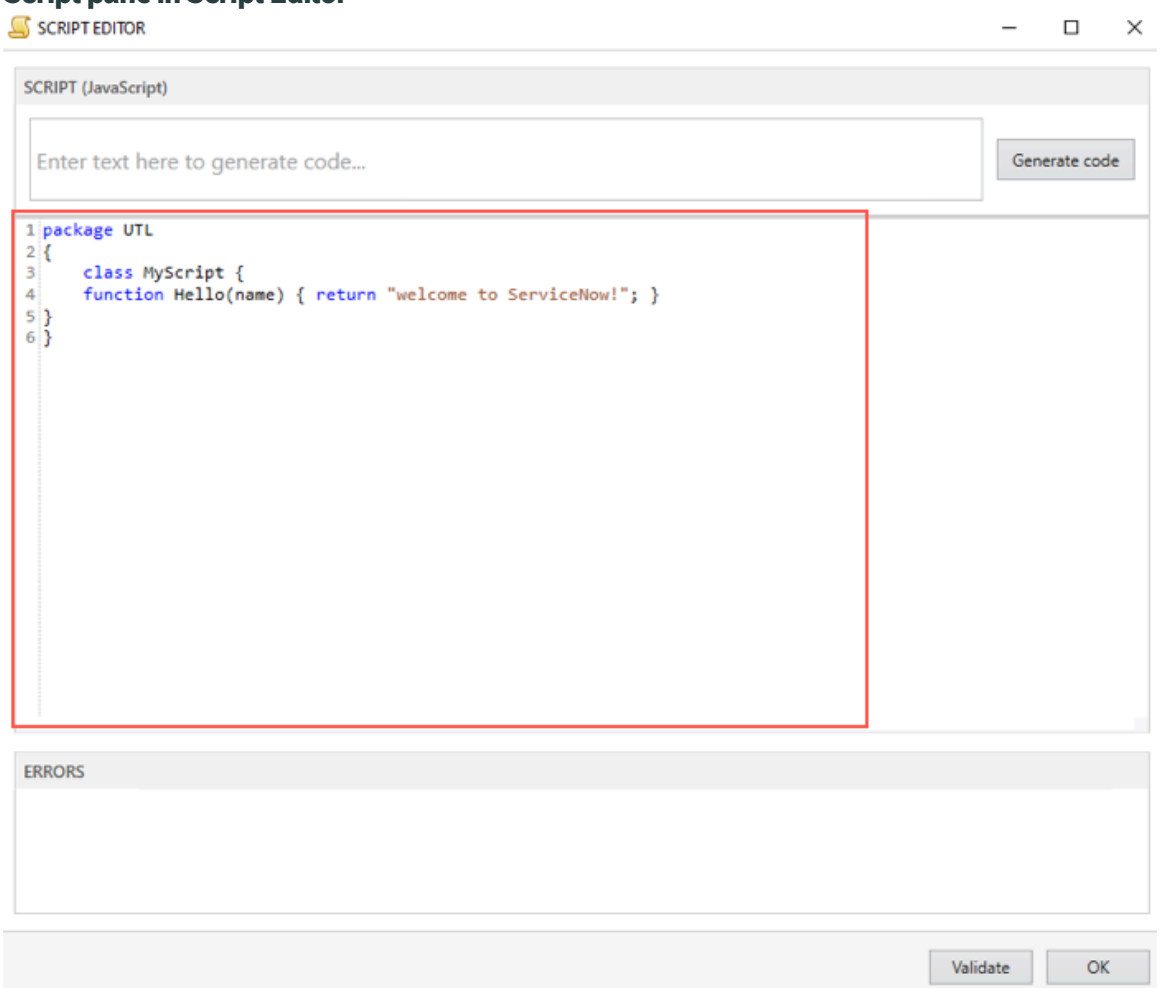
Ensure you have installed the Scripting plugin on the RPA Desktop Design Studio. To install, see Manage plugins in RPA Desktop Design Studio.

Role required: Developer

Procedure

1. In the Toolbox pane, navigate to **Connectors** > **JavaScript** .
2. Drag the **JavaScript** connector to **Global Objects** in the Project Explorer pane.
3. Right-click the **JavaScript** connector in **Global Objects** and select **Configure**.
   The Script Editor window is displayed.
4. Enter the custom JavaScript in the Script pane.

Script pane in Script Editor



5. Select **Validate**.

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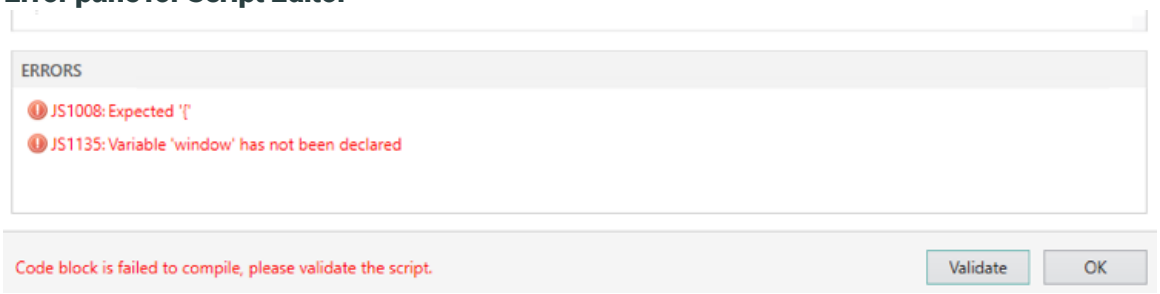
If your custom script has any errors, it is displayed in the Errors pane. Resolve the errors and select **Validate** to check for errors again.

Error pane for Script Editor



6. Click **OK**.
   If you want to save the changes, select **Yes**. An error validation is performed again and the changes are saved. If you want to discard the changes, select **No**.

What to do next

The custom script you created by using the JavaScript connector is now ready to be used in your automation.

JavaScript connector methods

Execute custom JavaScript with the Execute method as part of an automation in the RPA Desktop Design Studio.

Execute

Executes the custom JavaScript you have written. Before executing,

- Configure the JavaScript connector before executing the method. To configure, see Configure the JavaScript connector.
- Configure the Execute method.

Configure the Execute method

1. Click the method settings icon ( ).
2. Select the class from the **Classes** list as set in the custom JavaScript you had written.
3. Select the method from the **Methods** list as set in the custom JavaScript you had written.
4. Click **OK**.

   A Data In port is created to accept the value for the function you have created.

Execute method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Function value	Accepts the value for the function you have created.	Data in	Object	None	Yes
Result	Returns the output of the custom	Data out	String	None	Not applicable

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Execute method parameters (continued)

Parameter	Description	Data port type	Data type	Default value	Mandatory?
	JavaScript execution.				

Keyvalue pair

The KeyValuePair connector enables you to do multiple actions on key value pairs as part of an automation in the RPA Desktop Design Studio. For example, you can create, search, count, or delete key value pairs.

The Keyvalue pair connector exposes methods to do various actions on keyvalue pairs. These methods can work in conjunction with other methods or components in an automation.

- To use the Keyvalue pair connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

For details on the issues related to the Keyvalue pair component, see KB article KB1123557.

KeyValuePair connector methods

The Keyvalue pair connector methods perform various actions on key value pairs. In an automation flow, the methods are connected with other methods and components. To use the methods, you must first expose them.

Add

Adds a keyvalue pair.

To provide inputs to the parameters, see Configure port properties.

Add method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Key	Name of the key.	Data in	String	None	Yes
Value	Value of the key.	Data in	Object	None	Yes
IgnoreDuplicates	If the value is True, the method ignores a duplicate key. Else, if the value is False, the method returns an error message.	Data in	Boolean	None	No

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Clear

Clears all keyvalue pairs.

ContainsKey

Returns True if the specified key exists, else, returns False.

To provide inputs to the parameters, see Configure port properties.

ContainsKey method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Key	Name of the key.	Data in	String	None	Yes
Return	Returns True if the specified key exists, else, returns False.	Data out	Boolean	Not applicable	Not applicable

ContainsValue

Returns True if the specified key value exists, else, returns False.

To provide inputs to the parameters, see Configure port properties.

ContainsValue method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Value	Name of the key value.	Data in	String	None	Yes
Return	Returns True if the specified key value exists, else, returns False.	Data out	Boolean	Not applicable	Not applicable

Count

Returns the total count of keyvalue pairs.

Count method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the total count of keyvalue pairs.	Data out	Integer	Not applicable	Not applicable

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Delete

Removes the specified key.

To provide inputs to the parameters, see Configure port properties.

Delete method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Key	Name of the key.	Data in	String	None	Yes

GetItem

Returns the value of the specified key.

To provide inputs to the parameters, see Configure port properties.

GetItem method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Key	Name of the key.	Data in	String	None	Yes
Return	Returns the value of the key.	Data out	Object	Not applicable	Not applicable

GetItems

Returns the values of multiple keys. You must first configure the keys in the method.

To configure, do the following steps.

1. Click the method settings icon ( ).
2. Click the add keys icon ( ).
3. Enter the key name.
4. Update the key data type from the list.
5. Repeat the steps to set multiple key names.
6. Click **OK**.

   A Data out port is created with each key name you set.

GetItems method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Key	Returns the value of the key.	Data out	Object	Not applicable	Not applicable

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GetItemsByIndex

Returns the key values based on their index. You must first configure the indexes in the method.

To configure, do the following steps.

1. Click the method settings icon ( ).
2. Click the add indexes icon ( ).
3. Enter the key index.
4. Update the key data type from the list.
5. Repeat the steps to set multiple key indexes.
6. Click **OK**.

   A Data out port is created with each key index you set.

GetItemsByIndex method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Key index	Returns the value of the key.	Data out	Object	Not applicable	Not applicable

ParseFromText

Parses the specified text into key value pairs. It can create multiple keyvalue pairs.

To provide inputs to the parameters, see Configure port properties.

ParseFromText method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Text	Text comprising the keys and values that the method parses.	Data in	String	None	Yes
ItemSeparator	Separator between two keyvalue pairs.	Data in	String	None	Yes
KeyValueSeparator	Separator between the key and its value.	Data in	String	None	Yes
ClearBeforeParse	If True, clears any existing keyvalue pair before parsing.	Data in	Boolean	None	No

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Reverse

Reverses the key indexes.

Tip: After executing the method, you can see the output by executing the GetItemsByIndex method.

SetData

Need information.

SetItem

Updates the value of a key.

To provide inputs to the parameters, see Configure port properties.

SetItem method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Key	Name of the key.	Data in	String	None	Yes
Value	Updated value of the key.	Data in	Object	None	Yes

Tip: Test the updated value by executing the GetItemsByIndex method.

SetItems

Updates the values of the specified keys. You must first configure the keys in the method.

To configure the keys, do the following steps.

1. Click the method settings icon ( ).
2. Click the add keys icon ( ).
3. Enter the key name.
4. Update the key data type from the list.
5. Repeat the steps to set multiple key names.
6. Click **OK**.

   A Data in port is created with each key name you set.

To provide inputs to the parameters, see Configure port properties.

SetItems method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Key	Updated value of the key.	Data in	Object	None	Yes

Tip: Test the updated value by executing the GetItemsByIndex method.

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SetItemsByIndex

Updates the values of the keys based on the specified indexes. You must first configure the indexes in the method.

To configure the indexes, do the following steps.

1. Click the method settings icon ( ).
2. Click the add indexes icon ( ).
3. Enter the key index.
4. Update the key data type from the list.
5. Repeat the steps to set multiple key indexes.
6. Click **OK**.

   A Data in port is created with each key index you set.

SetItemsByIndex method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Key Index	Index of the key.	Data in	Object	None	Yes

Tip: Test the updated value by executing the GetItemsByIndex method.

ToJSON

Renders the keyvalue pairs to the JSON format.

ToText

Renders the keyvalue pairs to the text format.

To provide inputs to the parameters, see Configure port properties.

ToText method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
ValuesOnly	If True, the method renders only the values of the keys, else, renders the keyvalue pair.	Data in	Boolean	None	No
Return	Returns the keyvalue pair to the text format.	Data out	String	Not applicable	Not applicable

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List

The List connector enables you to create, view, search, and do many more actions on list items as part of an automation in the RPA Desktop Design Studio. List items can comprise key value pairs or any regular list item such as a list of employee names.

The List connector exposes multiple methods that can perform actions on list items as part of an automation workflow.

- To use the List connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

List connector methods

The List connector methods perform various actions on list items as part of an automation workflow. You must first expose the methods before using.

Add

Adds a single list item.

To provide inputs to the parameters, see Configure port properties.

Add method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Item	Name of the list item.	Data in	Object	None	Yes

AddList

Adds a list of items.

To provide inputs to the parameters, see Configure port properties.

AddList method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?	Notes
List	List of items.	Data in	Object	None	Yes	You can pass the list items from a variable or an appropriate component.

Contains

Returns the Boolean value based on whether a list item exists.

To provide inputs to the parameters, see Configure port properties.

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Contains method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Item	Name of the list item that the method searches.	Data in	Object	None	Yes
Return	Returns True if list item found, else, returns False.	Data out	Boolean	Not applicable	Not applicable

Count

Returns the total count of list items added.

Count method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the total count of list items added.	Data out	Integer	Not applicable	Not applicable

FindByProperty

Finds a list item based on the specified key and value. You must create at least one key value pair list item before executing this method.

To provide inputs to the parameters, see Configure port properties.

FindByProperty method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Prop	The key in the key value pair.	Data in	String	None	Yes
Value	The value in the key value pair.	Data in	String	None	Yes
Found	Returns True if list item found, else, returns False.	Data out	Boolean	Not applicable	Not applicable
Item	if the Found parameter is True, the method returns the list item.	Data out	Object	Not applicable	Not applicable

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FindText

Finds text or regex in the list items based on the specified filter and returns the total occurrences of the text and the text itself.

To provide inputs to the parameters, see Configure port properties.

FindByProperty method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
SearchText	Text that the method searches in the list items.	Data in	String	None	Yes
FindBy	Option to indicate whether the method searches a text or regex.	Data in	String	None	Yes
MatchType	Option to indicate whether the type of match will be: • An exact match • Match case • Containing the specified characters.	Data In	String	None	Yes
Count	Returns the total occurrences of the match.	Data out	Integer	Not applicable	Not applicable
Outlist	Returns the list of matches.	Data out	List	Not applicable	Not applicable

GetItem

Returns a list item based on its index value.

To provide inputs to the parameters, see Configure port properties.

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GetItem method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Index	Index value of the list item.	Data in	Integer	None	Yes
Return	Returns the list item.	Data out	Object	Not applicable	Not applicable

GetItems

Returns the list items based on their index values. You must configure the index values first.

To configure, do the following steps.

1. Click the method settings icon ( ).
2. Click the add index icon ( ).
3. Enter the index value.
4. Update the data type of the index value.
5. Repeat the steps to add more index values.
6. Click **OK**.

   A data out port is created with each index value. The data out port returns the list item corresponding to the index value.

GetList

Returns all list items and lists created.

GetList method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the list items and lists.	Data out	Array	None	Not applicable

Remove

Removes the specified list item.

To provide inputs to the parameters, see Configure port properties.

GetList method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Item	List item the method removes.	Data in	Object	None	Yes

RemoveAll

Removes all list items added.

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Reverse

Reverses the order of the index values of the list items.

SetItems

Updates the values of the list items. To use the method, you must first configure the method.

To configure, do the following steps.

1. Click the method settings icon ( ).
2. Click the add index icon ( ).
3. Enter the index value.
4. Update the data type of the index value.
5. Repeat the steps to add more index values.
6. Click **OK**.

   A data in port is created with each index value.

To provide inputs to the parameters, see Configure port properties.

SetItems method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Item	Accepts the value of the list items.	Data in	Object	None	Yes

Sort

Sorts the list items.

ToArray

Returns the list items in the form of an array. You must add more than one list item before executing this method.

ToArray method parameters

Parameter	Description	Data port type	Data type	Default value	Mandatory?
Return	Returns the list items in the form of an array list.	Data out	Array list	Not applicable	Not applicable

List method properties

View or update the List method properties.

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List method properties

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Microsoft Excel

The Microsoft Excel connector enables you to perform various actions on a Microsoft Excel document as part of a Robotic Process Automation. For example, open a Microsoft Excel file and export it to the PDF format.

The Microsoft Excel connector exposes methods to do various actions on Microsoft Excel documents. These methods can work in conjunction with other methods or components in an automation.

- To use the Microsoft Excel connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Note: 32 bit Microsoft Office installations are not supported.

Microsoft Excel connector methods

The Microsoft Excel connector methods perform various actions on Microsoft Excel documents. In an automation flow, the methods are connected with other methods and components. To use the methods, you must first expose them.

Open

Creates or opens an existing Microsoft Excel file depending on the inputs.

Note: You must execute this method before any other method.

Open method parameters

Parameter	Description	Data port type	Data type
Filepath	Path to the existing file that the method opens. To create a file, you must set the value of the CreateNewFile parameter to True.	Data in	String

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Open method parameters (continued)

Parameter	Description	Data port type	Data type
	Note: The path must contain the filename.		
CreateNewFile	Specifies whether a new Excel file should be created if the specified file does not exist. If CreateNewFile parameter is set to true, a new file is created at the specified file path. If set to False, it will try to open the excel from the given file path.	Data in	Boolean
DisplayAlerts	Specifies whether Excel displays alerts or prompts during the opening process. If set to true, Excel displays alerts for issues such as file conflicts or compatibility warnings. If set to false, these alerts are suppressed.	Data in	Boolean
IsVisible	Specifies if the Excel application window is visible to the user when the file is opened or not. If set to true, the Excel window is displayed on the screen. If set to false, Excel runs in the background without a visible interface.	Data in	Boolean
ReadOnlyMode	Specifies if the Excel file should be opened in the read-only mode. If set to true, the file opens in the read-only mode, preventing any	Data in	Boolean

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Open method parameters (continued)

Parameter	Description	Data port type	Data type
	changes from being made. If set to false, the file opens in the normal mode, allowing modifications.		
Password	Password required to open the Excel file if it is password-protected. If the file is not password-protected, this parameter can be left blank.	Data in	String
Return	Returns True orFalse value. If the value is True, the file is successfully opened or created.	Data out	Boolean

AddNewWorkSheet

Adds a new worksheet to the file. This method requires a sheet name as input parameter of type string that specifies the name of the new sheet.

Note: You must execute the Open method before executing this method.

AddNewWorkSheet method parameters

Parameter	Description	Data port type	Data type
SheetName	Name of the new worksheet that the method adds to the file.	Data in	String

AutoFill

Automatically populates cells within a specified range based on the content of adjacent cells or a predefined pattern. This method is useful for copying data or formatting across multiple cells. Microsoft Excel analyzes the content of the initial selection and extrapolates it to fill the desired range. It can be used to extend a series of numbers, duplicate formulas, replicate text patterns, or perform any other data entry processing.

Note: You must execute the Open method before executing this method.

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AutoFill method parameters

Parameter	Description	Data port type	Data type
SheetName	Name of the worksheet that contains the source data.	Data in	String
SourceRange	Range of cells with the data or formulas to replicate.	Data in	String

GetSheetNames

Returns the names of all the sheets in the opened Microsoft Excel document.

Note: You must execute the Open method before executing this method.

GetSheetNames method parameters

Parameter	Description	Data port type	Data type
Return	Returns the names of the sheets in the opened Microsoft Excel document.	Data Out	String

Close

Closes the active Microsoft Excel document if it is already opened and releases the memory. This method helps in memory handling.

Note: You must execute the Open method before executing this method.

Close method parameters

Parameter	Description	Data port type	Data type
saveChanges	If the value is set to True, changes to the file are saved before closing. If set to False, no changes are saved.	Data in	Boolean

ColumnsCount

Returns the total number of columns in a specified worksheet of a Microsoft Excel file. This method requires the SheetName parameter to specify the worksheet, and then returns the column count for that sheet.

Note: You must execute the Open method before executing this method.

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ColumnsCount method parameters

Parameter	Description	Data port type	Data type
SheetName	Name of the sheet that the method uses to count the number of columns.	Data in	String
Return	Returns the count of columns in the worksheet.	Data out	Integer

Copy

Copies the contents from a range of cells in a worksheet.

Tip: You can paste the copied contents with the Paste method.

Copy method parameters

Parameter	Description	Data port type	Data type
Sheetname	Name of the sheet that contains source data.	Data in	String
CellRange	Range of cells to be copied.	Data in	String

Paste

Pastes the clipboard content into specific cells provided in the CellLocation parameter of a worksheet. It can also be a range of cells.

Note: You must execute the Copy method before executing this method.

Paste method parameters

Parameter	Description	Data port type	Data type
Sheetname	Name of the sheet where the clipboard content will be pasted.	Data in	String
CellLocation	Indicates the location (cell reference) where the clipboard content will be pasted.	Data in	String

FillBlankValues

Fills empty cells in a specified column of a worksheet in a Microsoft Excel file with a given value. It requires the SheetName parameter to specify the worksheet, the ColumnName parameter to identify the column, and the Value parameter to provide the replacement value for the empty cells.

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Note: You must execute the Open method before executing this method.

FillBlankValues method parameters

Parameter	Description	Data port type	Data type
Sheetname	Name of the sheet to fill blank values.	Data in	String
ColumnName	Name of the column in the worksheet that needs to be filled with a value. ColumnName is an Enum data type that represents Excel columns from A to AZ.	Data in	ColumnName
Value	Value to be filled in the column.	Data in	String

CreateChart

Creates a chart for a specific range in a specific worksheet. This method is used to automate creation of charts.

Note: You must execute the Open method before this method.

CreateChart method parameters

Parameter	Description	Data port type	Data type
SheetName	Name of the sheet where the chart is created.	Data In	String
CellRange	Range of cells from which the chart is created.	Data In	String
ChartType	Specifies the type of chart to be created. The available chart types depend on the specific implementation of the Excel connector being used.	Data In	ExcelChartType
Return	If True, the chart is successfully created. If False, the chart creation is failed.	Data Out	Boolean

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CreatePivotTable

Generates a pivot table on the specified sheet, utilizing the settings configured in the 'Pivot Table Settings' window.

Note: You must execute the Open method before this method.

CreatePivotTable method parameters

Parameter	Description	Data port type	Data type
SheetName	Name of the sheet from where the pivot table has to be created.	Data In	String
PivotTableName	Name of the pivot table.	Data In	String

DeleteColumn

Deletes a column in a given sheet based on the specified index of the column.

DeleteColumn method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the sheet from which the column is deleted.	Data In	String
ColumnIndex	Index of the column that must be deleted. In Excel, columns are labeled alphabetically (A, B, C, etc.), and each column has a corresponding numeric index (1 for column A, 2 for column B, and so on).	Data In	Integer
Return	Returns the Boolean value that indicates whether the column was deleted. If True, the column is deleted. If False, the column was not deleted.	Data Out	Boolean

DeleteContentFromRange

Deletes contents from the specified range of cells.

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DeleteContentFromRange method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the sheet from which the contents will be deleted.	Data In	String
CellRange	Specifies the range of cells from which data is deleted.	Data In	String
Return	Returns the Boolean value that indicates whether the content from range of cells was deleted. If True, the content is deleted. If False, the content is not deleted.	Data Out	Boolean

DeleteEmptyColumns

Deletes columns that have no content in a specified worksheet of a Microsoft Excel file. This method requires the SheetName parameter to identify the worksheet.

DeleteEmptyColumns method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the sheet containing the empty column.	Data In	String

DeleteEmptyRows

Deletes rows that have no content in a specified worksheet of a Microsoft Excel file. This method requires the SheetName parameter to identify the worksheet.

DeleteEmptyColumns method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the sheet containing the empty rows.	Data In	String

DeleteRow

Deletes a row from the worksheet based on the RowNumber parameter.

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DeleteRow method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the sheet from which the row is deleted.	Data In	String
RowNumber	Indicates the number of the row that must be deleted.	Data In	Integer
Return	Returns the Boolean value that indicates whether the row is deleted. If True, the row is deleted. If False, the row is not deleted.	Data Out	Boolean

DeleteWorksheet

Deletes the specified worksheet. This method requires the SheetName parameter to identify the worksheet.

DeleteWorksheet method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the sheet which must be deleted.	Data In	String
Return	Returns the Boolean value that indicates whether the worksheet was deleted. If True, the worksheet is deleted. If False, the worksheet is not deleted.	Data Out	Boolean

ExportChartAsImages

Exports and saves a chart present in a sheet into an image file that is saved in the specified path. This process separates the chart from the Excel workbook, providing a standalone visual representation that can be easily shared or inserted into various documents, presentations, or reports.

ExportChartAsImages method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the sheet that contains the chart.	Data In	String

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ExportChartAsImages method parameters (continued)

Parameter	Description	Data Port Type	Data type
SaveFolderpath	Specifies the folder path where the charts are saved as image files.	Data In	String

ExportToPDF

Exports an Excel file as a PDF file to the path location mentioned in the FilePath parameter.

ExportToPDF method parameters

Parameter	Description	Data Port Type	Data type
Filepath	Specifies the file path to which the PDF file is exported.	Data In	String

FindAndReplace

Locates the text given in the FindText parameter in a given worksheet specified by the SheetName parameter and replaces it with another text given in the ReplaceTo parameter.

FindAndReplace method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the text will be replaced.	Data In	String
FindText	The text that is searched for within the cells of the worksheet.	Data In	String
ReplaceTo	The desired text to replace the text found using the FindText parameter.	Data In	String
Return	Returns the Boolean value that indicates whether the text is replaced. If True, the text is replaced. If False, the text is not replaced.	Data Out	Boolean

GetActiveSheetName

Returns the name of the active worksheet.

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GetActiveSheetName method parameters

Parameter	Description	Data Port Type	Data type
Return	Returns the name of the active worksheet in a string format.	Data Out	String

GetCellAddressIfRowHas

Searches a given text in the specified sheet. It scans through the specified column name, starting from the indicated row index. If the text is found, it returns true. Else, it returns false. Additionally, the matched cell address can be stored in the configured value.

Note: Execute the Open method before executing this method.

GetCellAddressIfRowHas method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet to search within.	Data In	String
SearchText	The text to search for within the specified column.	Data In	String
SearchColumn	The column where the search will be conducted. ColumnName is an Enum data type that represents Excel columns from A to AZ.	Data In	ColumnName
StartRowIndex	The row index from which the search will begin.	Data In	Integer
Return	Returns a Boolean value indicating whether the SearchText was found. If True, the text is found. If False, the text is not found.	Data Out	Boolean

GetCellFormula

Retrieves the cell formula from a worksheet.

Note: Execute the Open method before executing this method.

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GetCellFormula method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet to retrieve the cell formula from.	Data In	String
CellName	Specifies the name or reference of the cell to retrieve the formula from.	Data In	String
Return	Returns the specified cell formula in a string format.	Data Out	String

GetCellValue

Retrieves the value of a cell from a worksheet specified by the CellName parameter.

Note: Execute the Open method before executing this method.

GetCellValue method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet from which the cell value will be retrieved.	Data In	String
CellName	Returns the cell value or display text based on the configuration set in GetCellValue.	Data In	String
Return	Returns the value in a specified cell in the string format.	Data Out	String

GetCellValueIfRowHas

Searches the specified sheet for a given text. It scans through the specified column, starting from the indicated row index. If the text is found, it returns true. Else, it returns false. Additionally, the matched cell value can be stored in the configured value.

Note: Execute the Open method before executing this method.

GetCellAddressIfRowHas method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet to search within.	Data In	String

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GetCellAddressIfRowHas method parameters (continued)

Parameter	Description	Data Port Type	Data type
SearchText	The text to search for within the specified column.	Data In	String
SearchColumn	The column where the search is conducted. ColumnName is an Enum data type that represents Excel columns from A to AZ.	Data In	ColumnName
StartRowIndex	The row index from which the search begins.	Data In	Integer
Return	Returns a Boolean value indicating whether the SearchText was found. If True, the text is found. If False, the text is not found.	Data Out	Boolean

GetCellValues

Returns the values of cells from a worksheet.

Note: Execute the Open method before executing this method.

GetCellValues method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String

GetColor

Returns the RGB value of a cell specified in the CellName parameter from a worksheet.

Note: Execute the Open method before executing this method.

GetColor method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet to retrieve the cell color from.	Data In	String

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GetColor method parameters (continued)

Parameter	Description	Data Port Type	Data type
CellName	Name or reference of the cell to retrieve the color of.	Data In	String
Return	Returns the color of the specified cell in the string format.	Data Out	String

GetColumnNameByIndex

Returns the column name corresponding to the given column number, where, for example, 1 corresponds to 'A'.

Note: Execute the Open method before executing this method.

GetColumnNameByIndex method parameters

Parameter	Description	Data Port Type	Data type
ColumnNumber	The column number that you want to retrieve the name of.	Data In	Integer
Return	Returns the name of the column in the string format.	Data Out	String

GetFilterData

Returns filtered data from a worksheet based on the specified filter criteria. Data is obtained starting from the row number provided in the RowNumber parameter.

Note: Execute the Open method before executing this method.

GetFilterData method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
RowNumber	The row number of the row that is the starting row for the extraction of data.	Data In	Integer
FirstRowAsHeader	Determines whether the first row of the filtered data should be treated as header row. If set to true, the first row will be	Data In	Boolean

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GetFilterData method parameters (continued)

Parameter	Description	Data Port Type	Data type
	considered as header row and not included in the extracted data rows. If set to false, the first row will be included as part of the extracted data rows.		
Return	Returns the filtered data in a table format. Operations can be performed on the rows and columns of this table.	Data Out	Data table

GetFilteredDataAddress

Returns the address of the filtered data in the worksheet provided in the SheetName parameter.

Note: Execute the Open method before executing this method.

RowsCount method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet to retrieve the address of filtered data from.	Data In	String
Return	Returns a list or collection of strings where the strings are filtered data addresses.	Data Out	List(Of string)

GetRowValues

Returns cell values from the specified SheetName parameter to extract the values from. By default, if RowNumber is not specified (or set to -1), it reads values from the last row. Additionally, you can include output parameters to add column names and store their values in the output.

Note: Execute the Open method before executing this method.

GetRowValues method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Specifies the name of the worksheet to retrieve the values from.	Data In	String

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GetRowValues method parameters (continued)

Parameter	Description	Data Port Type	Data type
RowNumber	The row to read values from. If set to -1, it defaults to the last row.	Data In	Integer

GetSelectedRange

Returns the currently selected range of cells from the worksheet specified in the SheetName parameter. Data is extracted from the specific areas of the worksheet that have been highlighted or chosen.

Note: Execute the Open method before executing this method.

GetSelectedRange method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
Return	Returns the range of cells selected in a sheet in the string format.	Data Out	String

GetSheetNames

Returns a list of all worksheet names present in an Excel file.

Note: Execute the Open method before executing this method.

GetSheetNames method parameters

Parameter	Description	Data Port Type	Data type
Return	Returns all the available sheet names in a string array format.	Data Out	String[]

GetUsedRange

Returns the range of used cells of the specified sheet.

Note: Execute the Open method before executing this method.

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GetUsedRange method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet to read the range from.	Data In	String
IncludeHeaders	Indicates whether headers should be included.	Data In	Boolean
Return	Returns the range of used cells in string format.	Data Out	String

GetValuesByColumn

Returns a list of values from a specified ColumnName in the given SheetName based on the Distinct, FirstRowAsHeader, and ValueType parameters criteria.

Note: Execute the Open method before executing this method.

GetValuesByColumn method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
ColumnName	Denotes the name of the column from which values are retrieved. ColumnName is an Enum data type that represents Excel columns from A to AZ.	Data In	ColumnName
FirstRowAsHeader	Indicates whether the first row in the specified column contains headers.	Data In	Boolean
Distinct	Specifies whether the retrieved values should be distinct or unique.	Data In	Boolean
ValueType	Extracts values based on visibility.	Data In	ValueT
Return	Returns the number of rows.	Data Out	Integer

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InsertNewColumn

Inserts a new column at the index provided in the ColumnNumber parameter in the specified worksheet.

InsertNewColumn method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the column must be inserted.	Data In	String
ColumnIndex	Specifies the index of the column where the new column is inserted. For example, 1 is A, 2 is B, and so on.	Data In	Integer

InsertNewRow

Inserts a new row at the specified index in the specified worksheet.

InsertNewRow method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the row will be inserted.	Data In	String
RowIndex	Index of the row. The row will be inserted at the specified index.	Data In	Integer
Return	Returns the Boolean value that indicates whether a row is inserted. If True, the row is inserted. If False, the row is not inserted.	Data Out	Boolean

InsertObject

Inserts an embedded object into a cell identified by the index value in the CellName parameter in the specified worksheet. The path to that embedded object is provided in the Filepath parameter. Example of an object could be an excel file, an image, or a PDF file.

Note: Execute the Open method before executing this method.

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InsertObject method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the method inserts the object.	Data In	String
CellName	Name of the cell where the method inserts the object. For example, A1.	Data In	String
Filepath	File path of the object that the method inserts.	Data In	String

IsOpen

Checks whether a Microsoft Excel workbook or file at the location provided in the Filepath parameter is open or not.

IsOpen method parameters

Parameter	Description	Data Port Type	Data type
Filepath	Path to the Excel file in the local drive.	Data In	String
Return	Returns the Boolean value that indicates whether the Excel file is open. If True, the Excel file is open. If False, the Excel file is not open.	Data Out	Boolean

MergeCells

Merges the cells specified in the range in the specified worksheet.

MergeCells method parameters

Parameter	Description	Data Port Type	Data type
Sheetname	Name of the worksheet on which the cells will be merged.	Data In	String
CellRange	Range of cells. All cells within the range are merged.	Data In	String

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ReadFromRange

Retrieves data from a specified worksheet and returns it. You need to provide the worksheet name to indicate from which worksheet to extract the cell range, specify the cell range to determine the range of cells to read, and indicate whether the first row is a header in the FirstRowAsHeader parameter.

ReadFromRange method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet from where the method reads the data.	Data In	String
CellRange	Range of cells. The method reads data from these cells.	Data In	String
FirstRowAsHeader	Boolean value that indicates whether the method treats the first row as the header. If True, the first row is treated as a header. If False, the first row is not treated as a header.	Data In	Boolean
Return	Returns the data table that comprises the data from the cells.	Data Out	Data Table

ReadFromSheet

Extracts data from a worksheet and convert it into a structured format, such as a DataTable.

ReadFromSheet method parameters

Parameter	Description	Data Port Type	Data type
Sheetname	Name of the worksheet from which the method reads the data.	Data In	String
Return	Returns all the data in the specified worksheet.	Data Out	DataTable

RenameSheetName

Renames an existing worksheet.

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RenameSheetName method parameters

Parameter	Description	Data Port Type	Data type
OldSheetName	The existing name of the worksheet.	Data In	String
NewSheetName	The new name of the worksheet.	Data In	String
Return	Returns the Boolean response that indicates whether the worksheet is renamed. If True, the worksheet is renamed. If False, the worksheet is not renamed.	Data Out	Boolean

RowsCount

Returns the count of rows in the specified worksheet.

RowsCount method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet from where the count of rows are returned.	Data In	String
Return	Returns the number of rows.	Data Out	Integer

RunMacro

Executes an existing macro in the Excel file. The method requires the name of the macro that the user intends to run.

RunMacro method parameters

Parameter	Description	Data Port Type	Data type
MacroName	The name of the Macro to execute.	Data In	String
Return	Returns boolean value indicating if macro was successfully run or not.	Data Out	Boolean

Resize

Changes Excel application window's width and height dimensions. Layout and appearance of the Excel application can be customized to accommodate specific display requirements.

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RowsCount method parameters

Parameter	Description	Data Port Type	Data type
Left	This parameter specifies the horizontal position of the top-left corner of the Excel application window relative to the screen's left edge. It defines the distance, in pixels or points, from the left edge of the screen to the left edge of the Excel window.	Data In	Integer
Top	This parameter indicates the vertical position of the top-left corner of the Excel application window relative to the screen's top edge. It defines the distance, in pixels or points, from the top edge of the screen to the top edge of the Excel window.	Data In	Integer
Width	This parameter specifies the width of the Excel application window in pixels or points. It determines the horizontal size of the window, extending from the left edge to the right edge.	Data In	Integer
Height	This parameter indicates the height of the Excel application window in pixels or points. It defines the vertical size of the window, extending from the top edge to the bottom edge.	Data In	Integer

RemoveFilter

Removes filters from a worksheet given in the SheetName parameter.

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RemoveFilter method parameters

Parameter	Description	Data Port Type	Data type
Sheetname	Name of the worksheet from which the method removes the filters.	Data In	String

Save

Saves any updates, changes, additions, or deletions made to the data or formatting within a Microsoft Excel document to ensure that the work is preserved and that the Excel file reflects the most recent updates.

SaveAs

Saves an Excel file with a different name or format to a file path provided in the Filepath parameter. The file can also be password protected by providing the value in the Password parameter.

SaveAs method parameters

Parameter	Description	Data Port Type	Data type
Filepath	The file path where the Excel file is saved with a different name or format.	Data In	String
Password	Password to protect the Excel file that will be saved. This parameter is optional and has a default value of an empty string.	Data In	String

SaveCopyAs

Saves a copy of the Excel file to a specified path that serves as a destination for the saved copy.

SaveCopyAs method parameters

Parameter	Description	Data Port Type	Data type
Filepath	The file path where the Excel file is saved with a different name or format.	Data In	String
Password	Password to protect the Excel file that is saved. This parameter is optional and has a default value of an empty string.	Data In	String

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SelectRange

Specifies and highlights a range of cells within an Excel worksheet.

SelectRange method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
CellRange	The range of cells that are selected within the specified worksheet. It defines the group of cells, typically identified by the starting and ending cell references, that will be highlighted or activated.	Data In	String

SelectRowByIndex

Selects the entire row based on the index provided in the RowNumber parameter in the worksheet.

SelectRowByIndex method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the row is selected.	Data In	String
RowNumber	The index of the row to be selected.	Data In	Integer

SetActiveWorksheet

Marks the worksheet specified in the Sheetname as the active worksheet.

SetActiveWorksheet method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet which needs to be set as active.	Data In	String
Return	Returns the boolean value indicating if the provided sheet has	Data Out	Boolean

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SetActiveWorksheet method parameters (continued)

Parameter	Description	Data Port Type	Data type
	been set as active or not.		

SetAlignment

Adjusts the alignment settings of cells given in the CellRange to control the presentation and appearance of data within the Excel worksheet and enhancing the visual appeal and readability of spreadsheet data, improving data presentation, and communication.

SetAlignment method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
CellRange	Range of cells to which the alignment settings or properties are applied.	Data In	String
HorizantalAlignment	Horizontal alignment of cell contents within the specified range. It determines how the content (such as text or numbers) is positioned within each cell horizontally. Possible values include left, center, right, justified, or distributed.	Data In	HorizantalAlignment
VerticalAlignment	Vertical alignment of cell contents within the specified range. It determines how the content is positioned within each cell vertically. Possible values include top, middle, bottom, or justified.	Data In	VerticalAlignment

SetCellColor

Sets a color given in the Color parameter on a particular cell specified in the CellName parameter in a worksheet.

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SetCellColor method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the cell is located.	Data In	String
CellName	Indicates the name or reference of the cell for which the color will be set.	Data In	String
Color	Specifies the RGB color value to be applied to the cell.	Data In	ExcelRgbColor
Return	Returns boolean value indicating if the formula is set for a particular cell provided.	Data Out	Boolean

SetCellFormula

Assigns a formula to a specified cell in the Excel file. This method requires the SheetName, CellName, and Formula parameters to determine the worksheet, cell, and formula to be set, respectively.

SetCellFormula method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the action will be performed.	Data In	String
CellName	The cell within the worksheet where the operation will take place.	Data In	String
Formula	The mathematical or logical expression to be applied to the specified cell.	Data In	String
Return	Returns boolean value indicating if the formula is set for the specified cell.	Data Out	Boolean

SetCellValue

Assigns a value to a specific cell in a worksheet, replacing any existing content in that cell.

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SetCellValue method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
CellName	This parameter indicates the reference or identifier of the target cell within the specified worksheet. It can be represented by the cell address (e.g., 'A1', 'B2', 'C3').	Data In	String
Value	Value that will be assigned to the specified cell which can be of any data type supported by Excel, including numbers, text, dates, formulas, or logical values.	Data In	String

SetCellValues

Sets values in multiple cells as configured in the method editor dialog within a specified sheet.

SetCellValues method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the cell values will be set.	Data In	String

SetCellValuesIfRowHas

Scans the specified sheet for a provided text, examining the designated column name from the indicated row index. If the text is found, it sets the value of the specified cell with the provided values. It returns true if the value was successfully set, otherwise false.

SetCellValuesIfRowHas method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet to search within.	Data In	String

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SetCellValuesIfRowHas method parameters (continued)

Parameter	Description	Data Port Type	Data type
SearchText	The text to search for within the specified column.	Data In	String
SearchColumn	The column where the search is conducted. ColumnName is an Enum data type that represents Excel columns from A to AZ.	Data In	ColumnName
StartRowIndex	The row index from which the search begins.	Data In	Integer
Return	Returns True if SearchText is found in the specified column. Else, it returns False.	Data Out	Boolean

SetColumnType

Modify the data type of a specified column within a worksheet. For example, users can convert a column containing numeric values to a text format or change a column of text data to numeric format. It is possible to adjust the data format to better suit analysis or reporting needs, ensuring consistency and accuracy in data representation. Useful for tasks such as data conversion, formatting, and manipulation in Excel.

SetColumnType method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
FormatType	The desired format type the column is converted to. This parameter determines how the data within the column is interpreted or displayed. Possible values may include numeric, text, date, time, currency, percentage, or custom formats.	Data In	String
Column	The column reference or identifier within the	Data In	String

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SetColumnType method parameters (continued)

Parameter	Description	Data Port Type	Data type
	specified worksheet for which the data type is changed. It could be represented by the column letter (e.g., 'A', 'B', 'C').		
Return	Returns boolean value identifying if the column type has been set or not.	Data Out	Boolean

SetColumnWidth

Sets the width of all the columns provided in the width parameter.

SetColumnWidth method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the column width is adjusted.	Data In	String
Width	The width in characters to which the column is set. Only integer value is accepted. Decimal values are not accepted.	Data In	Integer
Return	Returns boolean value identifying if the column type has been set or not.	Data Out	Boolean

SetFilter

Applies a filter to a specific column. This method finds the worksheet based on the given sheet name and then applies the provided filter value.

SetFilter method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the column is located.	Data In	String
ColumnName	Column where the filter is applied.	Data In	ColumnName

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SetFilter method parameters (continued)

Parameter	Description	Data Port Type	Data type
	ColumnName is an Enum data type that represents Excel columns from A to AZ.		
FilterValue	The value to filter by within the identified column.	Data In	String

SetFilterByRow

Applies a filter to a specified column, starting from a given row number. This method finds the worksheet based on the given sheet name and then applies the provided filter value.

SetFilterByRow method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
RowNumber	Indicates the row number within the specified worksheet where the filtering criteria are defined. It identifies the row containing the criteria that will be used to filter the data.	Data In	Integer
ColumnName	Name or identifier of the column based on which the filtering will be performed. It represents the column to which the filtering criteria apply. ColumnName is an Enum data type that represents Excel columns from A to AZ. The provided ColumnName refers to the column name relative to the starting column of your data. For example, if your data begins at column	Data In	ColumnName

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SetFilterByRow method parameters (continued)

Parameter	Description	Data Port Type	Data type
	B in the Excel sheet, the relative column index A corresponds to column B, the relative column index B corresponds to column C, and so on.		
FilterValue	Value or condition used as the filter criteria. It represents the specific value that the data in the designated column must match to be displayed after the filter is applied.	Data In	String

SetFontStyle

Formats the cells within a specified range by setting parameters such as Color, FontStyle, FontName, Bold, and Underline.

SetFontStyle method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the font style will be set.	Data In	String
CellRange	The range of cells for which the font style will be set.	Data In	String
Color	Specifies the RGB color value of the font.	Data In	ExcelRgbColor
FontSize	Specifies the size of the font. The default value is 11.	Data In	Integer
FontName	Specifies the name of the font. The default value is Calibri.	Data In	String
Bold	Indicates whether the font should be bold. The default value is False.	Data In	Boolean
Underline	Specifies the underline style for the font. The default value is None.	Data In	Underline

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SetRowHeight

Modifies the height of a specific row within an Excel worksheet.

SetRowHeight method parameters

Parameter	Description	Data Port Type	Data type
SheetName	The name of the worksheet where the rows are located.	Data In	String
Height	Specifies the desired height.	Data In	Integer
StartIndex	The starting row index.	Data In	String
EndIndex	The ending row index.	Data In	String
Return	Returns boolean value indicating if the row height was set successfully or not.	Data Out	Boolean

SetRowValues

Sets values for a specific row in an Excel spreadsheet. By default, when the RowIndex parameter is set to -1, the function inserts the values at the end of the spreadsheet. This means that if you don't specify a specific row index, the values are appended to the bottom of the existing data in the spreadsheet.

SetRowValues method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
RowNumber	Denotes row number where the values will be set or updated. In Excel, rows are numbered sequentially from top to bottom, starting with 1 by specifying the RowNumber, you indicate the specific row where the values should be placed. If -1 is passed as the RowNumber, it typically indicates that the values will be inserted at the end of the spreadsheet.	Data In	Integer

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Sort

Organizes data within a specified cell range in either ascending or descending order.

Sort method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet where the data will be sorted.	Data In	String
CellRange	The range of cells containing the data to be sorted.	Data In	String
ColumnName	The name of the column by which the data will be sorted. ColumnName is an Enum data type that represents Excel columns from A to AZ.	Data In	ColumnName
SortingOrder	The sorting order (ascending or descending) for the data.	Data In	SortingOrder

VLookUp

Searches for a specific value in the first column of a specified cell range and then returns a corresponding value from a column you designate within the same row.

VLookUp method parameters

Parameter	Description	Data Port Type	Data type
Sheetname	Name of the worksheet to search within.	Data In	String
SearchText	The text to search for within the specified column.	Data In	String
LookupRange	Range to scan for the text.	Data In	String
ApproximateMatch	This is a logical value that specifies whether you want an exact match or an approximate match.	Data In	Boolean
Return	Returns boolean value indicating if macro	Data Out	Boolean

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VLookUp method parameters (continued)

Parameter	Description	Data Port Type	Data type
	was successfully run or not.		

WrapText

Enable text wrapping for all cells in a specified row in an Excel worksheet. Text wrapping ensures that long text strings are displayed within the cell boundaries, automatically adjusting the row height to accommodate the wrapped text. By using the WrapText method, users can improve the readability of their data by ensuring that all text is fully visible within each cell, even if it extends beyond the cell's original width. This can be particularly useful for displaying lengthy text entries or multi-line content within spreadsheet cells.

WrapText method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet that contains the source data.	Data In	String
RowNumber	The row number within the specified worksheet where text wrapping is set for all cells in that row.	Data In	Integer

WriteToRange

Writes a datatable provided in the Data parameter into a worksheet starting from the cell provided in the CellName parameter. Headers can also be included by setting the IncludeHeaders parameter.

WriteToRange method parameters

Parameter	Description	Data Port Type	Data type
SheetName	Name of the worksheet on which the data is written.	Data In	String
CellName	Name of the cell on which the data is written.	Data In	String
Data	Data that is written.	Data In	Data Table
IncludeHeaders	Boolean value that Indicates whether to include headers when writing the data. The default value is set to True.	Data In	Boolean

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Parameters of the Microsoft Excel connector methods

Learn about the parameters of the Microsoft Excel connector methods in RPA Desktop Design Studio.

Parameters of the Microsoft Excel connector methods

Parameter Name	Description	Mandatory?
CellName	Cell name in a Microsoft Excel worksheet to perform an operation.	
ApproximateMatch	Boolean option to find an exact or an approximate match.	Not applicable
CellLocation	Cell location in a Microsoft Excel worksheet to perform an operation.	Yes
CellRange	Set of one or more continuous cells in a worksheet. Example: A cell range of B2:E4 represents the cells from columns B through E and rows 2 through 4.	Yes
SheetName	Name of the sheet from where the data is taken to create a chart.	Yes
ChartType	Type of chart you can create in a Microsoft Excel such as an area, bar, line, and pie.	Yes
Color	Color to set on a cell.	
SheetName	Name of the sheet from where the data is taken to create a Pivot table.	
SheetName	Name of the sheet from which the rows will be deleted.	Yes
SheetName	Name of the sheet from where the empty columns will be deleted.	Yes
ColumnIndex	Index number of the column. **Note:** Index number must be greater than zero.	Yes
ColumnName	Column name in a Microsoft Excel worksheet from which values are to be obtained.	Yes
CreateNewFile	Boolean values to indicate whether you want to create a file. If you choose • **True**: You must provide the filepath including the new file name. • **False**: You are not creating a file.	No
Return (Integer)	Returns the Boolean response on whether the column was deleted.	Not applicable
DisplayAlerts	Option to display alerts when the file is opened. If you choose:	No

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Parameters of the Microsoft Excel connector methods (continued)

Parameter Name	Description	Mandatory?
	• **True**: Alert is displayed. • **False**: Alerts are not displayed.	
Return	Returns the Boolean value that indicates whether a file was open or created. • **True**: A file was opened or created. • **False**: No file was opened or created.	Not applicable
Distinct	Option to get only unique values. Set to **True** to get only distinct values or to **False** to get all values from a cell range.	
EndColumnName	Name of the last column in a set of columns.	Yes
EndRowIndex	Last row number in a set of rows in a Microsoft Excel worksheet for a bulk operation such as to search, set values, or get values.	Yes
FileName	Name of the Microsoft Excel file.	Yes
Filepath	Path to the file including the file name. This parameter is used for both opening existing files or creating new files.	Yes
Filepath	Path where the exported PDF will be saved. You must provide the name of the file followed by the PDF extension.	Yes
FillType	One of the following fill types values: • xlFillFormats: Copy only the formats from the source range to the target range, and repeat if necessary. • xlFillSeries: Extend the values in the source range into the target range as a series (for example, '1, 2' is extended as '3, 4, 5'). Formats are copied from the source range to the target range, and repeat if necessary. • xlFillValues: Copy only the values from the source range to the target range, and repeat if necessary. • xlFillCopy: Copy the values and formats from the source range to the target range, and repeat if necessary. • xlFillDays: Extend the names of the days of the week in the source range into the target range. Copy the formats from the source range to the target range, and repeat if necessary. • xlFillWeekdays: Extend the names of the days of the workweek in the source range into the target range. Copy the formats from the source range to the target range, and repeat if necessary. • xlFillMonths: Extend the names of the months in the source range into the target range. Copy the formats	Yes

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Parameters of the Microsoft Excel connector methods (continued)

Parameter Name	Description	Mandatory?
	from the source range to the target range, and repeat if necessary. • xlFillYears: Extend the years in the source range into the target range. Copy the formats from the source range to the target range, and repeat if necessary. • xlGrowthTrend: Extend the numeric values from the source range into the target range, assuming that the relationships between the numbers in the source range are multiplicative (for example, '1, 2,' is extended as '4, 8, 16' assuming that each number is a result of multiplying the previous number by some value). Copy the formats from the source range to the target range, and repeat if necessary. • xlLinearTrend: Extend the numeric values from the source range into the target range, assuming that the relationship between the numbers is additive (for example, '1, 2,' is extended as '3, 4, 5' assuming that each number is a result of adding some value to the previous number). Copy the formats from the source range to the target range, and repeat if necessary.	
FilterValue	Filter expression that consists of alphanumeric characters and one or more of the following operators: <, >, \, &, |, and =.	Yes
FindText	Text to search in a Microsoft Excel worksheet.	Yes
StartColumnName	Name of the first column in a set of columns.	Yes
FirstRowAsHeader	Option to indicate whether the first row in a Microsoft Excel worksheet is a header row.	Yes
FormatType	Format type that is supported in a Microsoft Excel. Example: Currency, Number, Long Date	Yes
Formula	Formula to be applied on a cell in a Microsoft Excel file.	Yes
Height	Height of a row in pixels.	Yes
HorizontalAlignment	Horizontal alignment formatting of the specified cells. Example: Left, Right, Center, Justify	Yes
IsVisible	Boolean value to indicate whether the file will be visible when it's open. If you choose: • **True**: The file is displayed. • **False**: The file is not displayed.	No
IncludeHeaders	Option to include the header row while getting a used cell range in a Microsoft Excel.	No
LookupRange	Range of columns of data.	Yes

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Parameters of the Microsoft Excel connector methods (continued)

Parameter Name	Description	Mandatory?
	The values in the first column of the range are the values searched.	
OldSheetName	Current name of the worksheet in a Microsoft Excel file that you want to rename.	Yes
MacroName	Name of the macro to run.	Yes
NewSheetName	New name of the worksheet in a Microsoft Excel file	Yes
Password	Password to open a protected file.	No
PivotTableName	Name of the new PivotTable.	
ReadOnlyMode	Boolean value to indicate whether the file will be opened or created in read-only mode. If you choose: • **True**: The file is opened or created in read-only mode. • **False**: The file is opened or created in write mode.	No
DestinationRange	The range of cells to be filled in the Microsoft Excel file.	Yes
ReplaceTo	Text with which to replace the found text in a Microsoft Excel worksheet.	Yes
RowIndex	Index value of a row.	Yes
RowNumber	Row number in a Microsoft Excel worksheet to perform an operation.	Yes
SaveFolderpath	Folder path to save the file.	Yes
SearchColumn	Column name in a Microsoft Excel worksheet where to search the specified text.	Yes
Return (String)	Returns the name of the active or selected sheet.	Not applicable
SheetName	Name of the sheet that will be deleted.	Yes
SheetName	Name of the sheet from where data will be exported.	Yes
SheetName	The name of the sheet where the data will be filled.	Yes
SearchText	Text to search in a Microsoft Excel worksheet.	Yes
saveChanges	Boolean values to indicate whether the changes will be saved while closing. • **True**: The method requests inputs on whether to save changes. • **False**: The method closes the file and unsaved changes, if any, are lost.	Yes
SheetName	Name of the worksheet added to the file.	Yes
SheetName	Name of the sheet where the formula will be applied.	
SheetName	Name of the sheet from where the column will be deleted.	Yes

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Parameters of the Microsoft Excel connector methods (continued)

Parameter Name	Description	Mandatory?
SortingOrder	Sorting order—ascending or descending—set on a column.	
SheetName	Name of the sheet from where the row will be deleted.	Yes
SheetName	Name of the sheet from where the cell data will be deleted.	Yes
StartRowIndex	First row number in a set of rows in a Microsoft Excel worksheet for a bulk operation, such as to search, set values, get values.	Yes
Sheetname	Name of the sheet from where the cells will be copied.	Yes
Return	Returns the integer value of the number of columns counted.	Not applicable
SheetName	Name of the sheet on which the column count will be performed.	Yes
Value	Value to be set on a cell.	Yes
VerticalAlignment	Vertical alignment formatting of the specified cells. Example: Top, Middle, Bottom	No
Width	Width of a column in a Microsoft Excel.	Yes
Password	Option to make the Excel file password-protected. Provide the password in string format.	No

Enter inputs for parameters

To enter inputs for the parameters, see Configure port properties.

Microsoft Outlook

The Microsoft Outlook connector enables you to automate standard actions on the Microsoft Outlook application as part of an automation. For example, you can automate sending or replying to emails.

The Microsoft Outlook connector exposes methods to automate the actions on Microsoft Outlook. These methods can work with other methods or components in an automation.

To use the Microsoft Outlook connector, see Use a connector in RPA Desktop Design Studio.

To expose the Microsoft Outlook methods, see Use connector method.

To use the Microsoft Outlook connector methods, see Use a component in RPA Desktop Design Studio.

Note: 32 bit Microsoft Office installations are not supported.

Microsoft Outlook connector methods

The Microsoft Outlook connector methods automate various actions on the Microsoft Outlook. In an automation flow, the methods are connected with other methods and components. To use the methods, you must first expose them.

The Microsoft Outlook connector enables the automation of routine tasks within the Microsoft Outlook application, integrating these functions into broader automated workflows.

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You can automate processes such as sending or replying to emails without manual intervention. This connector provides various methods to facilitate the automation of actions within Microsoft Outlook. These methods can be seamlessly combined with other methods or components within an automation framework, enabling more complex and efficient workflow designs.

AddFolder

Adds a new folder within a specified hierarchy and, optionally, a sub folder to the Outlook account set.

AddFolder method parameters

Parameter	Description	Data port type	Data type
MainFolder	Name of the folder that the method adds to the Outlook account. This parameter specifies the main folder where the new folder is added.	Data in	String
SubFolderName	Name of the sub folder that the method adds under the main folder. This parameter specifies the name of the new folder to be created. If you use this parameter, you must use the IsSubFolder parameter.	Data in	String
IsSubFolder	Option to indicate that the folder created in the SubFolderName parameter is a subfolder under the main folder. This parameter indicates whether the SubFolderName must be added as a subfolder within the main folder. Defaults to False, meaning SubFolderName is added directly under the main folder.	Data in	Boolean

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Close

Closes the Microsoft Outlook explorer by specifying the profile name.

This method can be used as a cleanup activity after all automation tasks are completed.

Close method parameters

Parameter	Description	Data port type	Data type
ProfileName	This parameter specifies the Outlook profile name that you want to close.	Data in	String

DeleteFolder

Deletes the specified folder and all subfolders under it.

DeleteFolder method parameters

Parameter	Description	Data port type	Data type
FolderName	Name of the folder that the method deletes.	Data in	String

DeleteMail

Deletes one or more emails. Deletes an email based on its unique entry ID.

Tip: Use the GetMails method to provide the emails the DeleteMail method will delete.

DeleteMail method parameters

Parameter	Description	Data port type	Data type
MailId	Takes the email from which the method deletes the emails. This parameter specifies the unique entry ID of the email that needs to be deleted.	Data in	String

ForwardMail

Forwards an email based on its unique entry ID to a specified email address (EmailID).

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ForwardMail method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email that needs to be forwarded.	Data in	String
EmailID	This parameter specifies the email address to which the email must be forwarded.	Data in	String
CC	This parameter specifies Email address to send a carbon copy (CC) of the forwarded email.	Data in	String
BCC	This parameter specifies Email address to send a blind carbon copy (BCC) of the forwarded email.	Data in	String
Subject	This parameter specifies the subject line of the forwarded email.	Data in	String
Return	This method returns a boolean value indicating whether the email was successfully forwarded. A return value of true signifies that the operation was successful.	Data out	Boolean

GetAttachmentNames

Retrieves a list of attachment names associated with an email specified by its unique entry ID.

GetAttachmentNames method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email for which attachment	Data in	String

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GetAttachmentNames method parameters (continued)

Parameter	Description	Data port type	Data type
	names are to be retrieved.		

GetExistingAccounts

Retrieves information about configured accounts such as a list of configured accounts and their count.

This is helpful when there are multiple accounts configured in the outlook.

GetExistingAccounts method parameters

Parameter	Description	Data port type	Data type
Accounts	This parameter is passed by reference and is expected to be a List (Of String). Upon calling this method, it is populated with the list of configured account names.	Data out	List1
Count	This parameter is passed by reference. Upon calling this method, this parameter is populated with the count of configured accounts.	Data out	Int32

GetFolderNames

Retrieves and returns a list of folder names from the active outlook account.

GetFolderNames method parameters

Parameter	Description	Data port type	Data type
Return	Returns the list of folder names from the active outlook account.	Data out	List1

GetMail

Retrieves all details of an email, specified by its unique entry ID (MailId).

To specify additional criteria for retrieving all details of an email, on the GetMail method bar, click the method settings icon ( ), select the required mail items such as CC, BCC, Subject, Body, Sender, To, AttachmentsCount, ReceivedTime, EntryId.

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GetMail method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email to retrieve details from.	Data in	String

GetMails

Retrieves a list of mail entry IDs from a specified folder within an email system.

The GetMails method retrieves a list of mail entry IDs from a specified folder within an email system.

GetMails method parameters

Parameter	Description	Data port type	Data type
FolderName	This parameter specifies the name of the folder from which to retrieve mail entry IDs. Default value is "Inbox".	Data in	String
Filter	This parameter specifies a filter condition to apply when retrieving mail entry IDs.	Data in	String
NoOfMails	This parameter specifies the maximum number of mail entry IDs to retrieve. Default value is 10.	Data in	Int32
UnreadOnly	This parameter indicates whether to retrieve only unread mails (True) or all mails (False). Default is True.	Data in	Boolean
AvoidMeetingItems	This parameter specifies whether to exclude meeting items from the retrieved mail entry IDs. Default is True.	Data in	Boolean
FetchingOrder	This parameter specifies the order in which mails are	Data in	FetchingOrder

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GetMails method parameters (continued)

Parameter	Description	Data port type	Data type
	fetched. For example, FIFO, LIFO. Default is FIFO.		
Return	This parameter returns a list of emails from the specified folder.	Data out	List1
Count	This parameter specifies total count of mail entry IDs retrieved.	Data out	Int32

GetSenderName

Retrieves the sender's email address associated with an email specified by its unique entry ID.

GetSenderName method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email for which the sender's email address is to be retrieved.	Data in	String
Return	This method returns a string value indicating sender name.	Data out	String

MarkAsRead

Marks an email as read based on its unique entry ID.

MarkAsRead method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email for which the sender's email address is to be retrieved.	Data in	String
Return	This method returns a boolean value indicating whether the email was successfully marked as read.	Data out	Boolean

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MarkAsRead method parameters (continued)

Parameter	Description	Data port type	Data type
	A return value of true signifies that the operation was successful.		

MarkAsUnread

Marks an email as unread based on its unique entry ID.

MarkAsUnread method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email that needs to be marked as unread.	Data in	String
Return	This method returns a boolean value indicating whether the email was successfully marked as unread. A return value of true signifies that the operation was successful.	Data out	Boolean

MoveMail

Moves an email based on its unique entry ID from one folder to another folder within the email system.

MoveMail method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email that must be moved.	Data in	String
DestinationFolder	This parameter specifies the name or path of the destination folder where the email must be moved.	Data in	String

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ReadMsgFile

Reads the contents of a .msg file from the file system.

ReadMsgFile method parameters

Parameter	Description	Data port type	Data type
Filepath	This parameter specifies the path to the .msg file that must be read.	Data in	String
Body	This parameter is passed by reference (ByRef) and is populated with the body content of the .msg file after the method call.	Data out	String

Reply

Generates and sends a reply to an email specified by its unique entry ID.

Reply method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email to which the reply is sent.	Data in	String
CC	This parameter specifies Email address to send a carbon copy (CC) of the reply.	Data in	String
BCC	This parameter specifies email address to send a blind carbon copy (BCC) of the reply.	Data in	String
Subject	This parameter specifies the subject line of the reply email.	Data in	String
Body	This parameter specifies the body content of the reply email.	Data in	String
Attachments	This parameter specifies file paths of the attachments to	Data in	String

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Reply method parameters (continued)

Parameter	Description	Data port type	Data type
	include in the reply email. Multiple files can be separated by the pipe symbol or the vertical bar (|) to split the attachment file paths. When you upgrade automations to plugins above 13.0, update earlier automations that use "," or ";" with "|", when multiple file paths are passed. Use the pipe symbol or the vertical bar (|) to split the attachment file paths.		
IsHtmlBody	This parameter indicates whether the body content of the reply email is in HTML format. Default is False.	Data in	Boolean
Return	This method returns a boolean value indicating whether the reply was successfully sent. A return value of true signifies that the operation was successful.	Data out	Boolean

SaveAllAttachments

Saves all attachments from an email specified by its unique entry ID into a specified folder path.

SaveAllAttachments method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email from which	Data in	String

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SaveAllAttachments method parameters (continued)

Parameter	Description	Data port type	Data type
	attachments must be saved.		
FolderPath	This parameter specifies the path of the folder where attachments must be saved.	Data in	String

SaveAttachment

Saves specified attachment of a mail with given entry ID into a given file.

SaveAttachment method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email from which attachment must be saved.	Data in	String
AttachmentName	This parameter specifies the name of the attachment that must be saved.	Data in	String
Filepath	This parameter specifies the path of the file where attachment must be saved.	Data in	String

SaveMail

Saves an email specified by its unique entry ID (MailId) to a file at a specified file path.

SaveMail method parameters

Parameter	Description	Data port type	Data type
MailId	This parameter specifies the unique entry ID of the email to be saved.	Data in	String
Filepath	This parameter specifies the path where the email must be saved as a file	Data in	String
SaveType	This parameter specifies the format in	Data in	MsgSaveType

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SaveMail method parameters (continued)

Parameter	Description	Data port type	Data type
	which the email must be saved. Default is MsgSaveType.olMSG, indicating Microsoft Outlook MSG format.		

SendMail

Sends an email to recipient. It offers various optional parameters to customize the email, including the ability to add images, set the sender's address, and specify CC and BCC recipients.

SendMail method parameters

Parameter	Description	Data port type	Data type
ToEmailId	This parameter specifies email address of the recipient.	Data in	String
Image	This parameter specifies an optional image to include in the email.	Data in	Drawing.Bitmap
From	This parameter specifies the email address of the sender. If not specified, the default sender's address is used.	Data in	String
CC	This parameter specifies Email address to send a carbon copy (CC) to.	Data in	String
BCC	This parameter specifies email address to send a blind carbon copy (BCC) to.	Data in	String
Subject	This parameter specifies the subject line of the email.	Data in	String
Body	This parameter specifies the body content of the email.	Data in	String

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SendMail method parameters (continued)

Parameter	Description	Data port type	Data type
Attachments	This parameter specifies file paths of the attachments to include in the email. Multiple files can be separated by the pipe symbol (|) to split the attachment file paths. When you upgrade automations to plugins above 13.0, update earlier automations that use "," or ";" with "|", when multiple file paths are passed. Use the pipe symbol or the vertical bar (|) to split the attachment file paths.	Data in	String
IsHtmlBody	This parameter indicates whether the body of the email is in HTML format. Default is False.	Data in	Boolean
Return	This method returns a boolean value indicating whether the email was successfully sent. A return value of true signifies that the operation was successful.	Data out	Boolean

SentAs

Sends an email on behalf of another email account.

SentAs method parameters

Parameter	Description	Data port type	Data type
ToEmailId	This parameter specifies email address of the recipient.	Data in	String

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SentAs method parameters (continued)

Parameter	Description	Data port type	Data type
SentOnBehalfEmailID	This parameter specifies email address on whose behalf the email will be sent.	Data in	String
Subject	This parameter specifies the subject line of the email.	Data in	String
Body	This parameter specifies the body content of the email.	Data in	String
Attachments	This parameter specifies file paths of the attachments to include in the email. Multiple files can be separated by the pipe symbol (|) to split the attachment file paths. When you upgrade automations to plugins above 13.0, update earlier automations that use "," or ";" with "|", when multiple file paths are passed. Use the pipe symbol or the vertical bar (|) to split the attachment file paths.	Data in	String
IsHtmlBody	This parameter indicates whether the body of the email is in HTML format. Default is False.	Data in	Boolean

SetAccount

Specifies the outlook account on which you want to perform operations for your automation tasks.

The SetAccount method must be used initially, before any other method of this connector, to specify or set the context or email account for subsequent methods to execute upon.

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SetAccount method parameters

Parameter	Description	Data port type	Data type
AccountName	This parameter specifies the Outlook email account ID on which you want to perform operations.	Data in	String

Microsoft Word

The Microsoft Word connector enables you to perform various tasks on a Microsoft Word document through its methods. For example, you can add a footer to a document.

- To use the Microsoft Word connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Note: 32 bit Microsoft Office installations are not supported.

Microsoft Word connector methods

The Microsoft Word connector methods enable you to perform various day-to-day tasks with Microsoft Word documents and automate them. For example, add a page footer.

Open

Opens a Microsoft Word file saved on the local disk.

Note: You must execute this method before executing any other method on the Microsoft Word connector.

Open method parameters

Parameter	Description	Data port type	Data type
Filepath	Specifies the path to the Microsoft Word file in the local disk.	Data in	String
Timeout	Specifies the time after which the operation times out.	Data in	Integer
Password	Use a password if the document is password protected.	Data in	String
Return	Returns the boolean value based on the outcome of the operation. If True, the file is opened. Else, if False, the file failed to open.	Data out	Boolean

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For details on the issues related to the Open method, see KB article KB1123558 and KB article KB1123548.

AddFooter

Adds a footer to the Microsoft Word document in the specified font size.

To use this method, provide the text to be added to the Text parameter and the font size in which the footer text needs to be displayed to the FontSize parameter. Default value of the FontSize parameter is 12.

Note: You must execute the Open method before executing this method.

AddFooter method parameters

Parameter	Description	Data port type	Data type
Text	Specifies the text in the footer.	Data in	String
FontSize	Specifies the font size of the text in the footer. Default value is 12.	Data in	Integer

To provide inputs, see Configure port properties

AddHeader

Adds a header to a Microsoft Word document in specified font size.

To use this method, provide the text to be added to the Text parameter and the font size in which the header text needs to be displayed to the FontSize parameter. Default value of the FontSize parameter is 12.

Note: You must execute the Open method before executing this method.

AddHeader method parameters

Parameter	Description	Data port type	Data type
Text	Specifies the text in the header.	Data in	String
FontSize	Specifies the font size of the text in the header. Default value is 12.	Data in	Integer

CellCopy

Copies the content of a table cell identified using the row index and column index of the table in a Microsoft Word document.

To use this method, provide the row index to the RowIndex parameter and column index to the ColumnIndex parameter. The default value for RowIndex and ColumnIndex is -1 each.

Note: You must execute the SetTable method before executing this method.

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CellCopy method parameters

Parameter	Description	Data port type	Data type
RowIndex	Index of the row of the cell that needs to be copied. The row index value must be equal or greater than zero. Default value is -1, which means there is no cell available.	Data in	Integer
ColumnIndex	Index of the column of the cell that needs to be copied. The column index must be equal to or greater than zero. Default value is -1 which means there is no cell available.	Data in	Integer

CellPaste

Pastes the copied table cell content into a table cell identified using the row index and column index of the table in a Microsoft Word document.

To use this method, provide the row index to the RowIndex parameter and column index to the ColumnIndex parameter. The default value for RowIndex and ColumnIndex is -1 each.

Note: You must execute the SetTable and CellCopy methods before executing this method.

CellPaste method parameters

Parameter	Description	Data port type	Data type
RowIndex	Index of the row of the cell to which data needs to be pasted. The row index value must be equal or greater than zero. Default value is -1, which means there is no row available to paste data.	Data in	Integer
ColumnIndex	Index of the column of the cell to which data needs to be pasted. The column index must be equal to or greater than zero. Default value is -1 which means there is	Data in	Integer

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CellPaste method parameters (continued)

Parameter	Description	Data port type	Data type
	no column available to paste data.		

Close

Closes the last opened Microsoft Word document. While closing the document, it is optional to save changes.

If modification done to the word document needs to be saved then set the saveChanges boolean parameter to True, else set it to False. By default the saveChanges boolean parameter is set to True.

Note: You must execute the Open method before executing this method.

Close method parameters

Parameter	Description	Data port type	Data type
saveChanges	Specifies whether to save the changes made in the word document before closing. By default, it is set to True, meaning the changes will be saved before closing. If changes are not required to be saved before closing, set to False.	Data in	Boolean

DeleteColumn

Deletes a column from a table based on a specified index value of the column in a Microsoft Word document.

To use this method, provide the index of the column that needs to be deleted to the ColumnIndex parameter. Default value is -1.

Note: You must execute the SetTable method before executing this method.

DeleteColumn method parameters

Parameter	Description	Data port type	Data type
ColumnIndex	Index of the column that needs to be deleted. The column index must be equal to or greater than zero. Default value is -1 which means there is	Data in	Integer

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DeleteColumn method parameters (continued)

Parameter	Description	Data port type	Data type
	no column available to be deleted.		

DeletePage

Deletes a page based on a specified index value from a Microsoft Word document.

To use this method, provide the index value of the page that needs to be deleted to the PageIndex parameter.

Note: You must execute the Open method before executing this method.

DeletePage method parameters

Parameter	Description	Data port type	Data type
PageIndex	Specifies the index number of the page that needs to be removed or deleted. If you don't provide any index number, the method deletes the first page by default.	Data in	Integer

DeleteRow

Deletes a row based on the specified index value from a table in a Microsoft Word document.

To use this method, provide the index of the row that needs to be deleted to the RowIndex parameter. Default value is -1.

Note: You must execute the SetTable method before executing this method.

DeleteRow method parameters

Parameter	Description	Data port type	Data type
RowIndex	Index of the row that needs to be deleted. The row index value must be equal or greater than zero. Default value is -1, which means there is no row available to be deleted.	Data in	Integer

DeleteTable

Deletes a table from a Microsoft Word document.

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If the document has multiple tables, the method deletes the first table in the document.

Note: You must execute the SetTable method before executing this method.

ExportToPDF

Exports a Microsoft Word document to a PDF document at a specified path.

To use this method, provide the path where the PDF file needs to be extracted to the Filepath parameter.

Note: You must execute the Open method before executing this method.

ExportToPDF method parameters

Parameter	Description	Data port type	Data type
Filepath	Specifies the folder path where the Word document is exported to PDF.	Data in	String

Find

Finds the text you specify in a Microsoft Word document and returns a Boolean response.

To use this method, provide the text that you want to find in the document to the Text parameter.

Find method parameters

Parameter	Description	Data port type	Data type
Text	Text to find in the Word document.	Data in	string
Return	Returns a true/false value indicating whether the text is found in the Word document.	Data out	Boolean

GetCellValueByIndex

Returns the value of a cell in a table in a Microsoft Word document.

To use this method, provide the index of the cell to retrieve the cell value to the CellIndex parameter.

Note: You must execute the SetTable method before executing this method.

GetCellValueByIndex method parameters

Parameter	Description	Data port type	Data type
CellIndex	Index of a cell to retrieve the value.	Data in	String

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GetCellValueByIndex method parameters (continued)

Parameter	Description	Data port type	Data type
Return	Returns the value present in the required cell.	Data out	String

GetFooterText

Returns the footer text in a Microsoft Word document.

Note: You must execute the Open method before executing this method.

GetFooterText method parameters

Parameter	Description	Data port type	Data type
Return	Returns the footer text in the string format.	Data out	String

GetHeaderText

Returns the header text in a Microsoft Word document.

Note: You must execute the Open method before executing this method.

GetHeaderText method parameters

Parameter	Description	Data port type	Data type
Return	Returns the header text in the string format.	Data out	String

GetPageCount

Returns the total number of pages in a Microsoft Word document.

GetPageCount method parameters

Parameter	Description	Data port type	Data type
Return	Returns the integer number or numeric value of the total pages in a Word document.	Data out	Integer

GetRowIndexByValue

Returns the row index value of a row based on the specified value of a cell in the row.

To use this method, provide the document table to the Table parameter to retrieve the index of the row based on the value provided to the Value parameter.

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Note: You must execute the GetTable and SetTable methods before executing this method.

GetRowIndexByValue method parameters

Parameter	Description	Data port type	Data type
Table	Table object in the word document as a reference to perform further actions on it.	Data in	Object
Value	Search text that corresponds to a certain row in the table.	Data in	String

GetTable

Returns the data in a table of a Microsoft Word document as a table object and data table. If the document contains multiple tables, you can specify the table index to identify the table for the method. You can also specify the table type, if needed.

To use this method, provide the index of the expected table to the TableIndex parameter. Set the FirstRowIsHeader parameter to True if the first row needs to be treated as header, else it is set to False.

Depending on the table structure, you can optionally configure the table type for the method. To configure the table, do the following steps.

1. Click the method settings icon ( ).
2. Select the table type.
3. Click **OK**.

GetTable method parameters

Parameter	Description	Data port type	Data type
		Data in	
TableIndex	Index of a table in a Microsoft Word document.	Data in	String
FirstRowIsHeader	Boolean value to indicate whether the method should treat the first row as a header of the table. By default, it is set to True, which means that the first row is considered as a header. If first row is not header, then	Data in	Boolean

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GetTable method parameters (continued)

Parameter	Description	Data port type	Data type
	set this parameter to False.		
Table	Returns the data in a table as an object.	Data out	Object
Data	Returns the data in the table.	Data out	Data

GetTableCellValues

Returns the values in one or more table cells.

To use this method, provide the indices of the table cells whose value is required, in the configuration window.

To specify the number of cells, you must configure the index values of the cells. To configure, do the following.

1. Click the method settings icon ( ).
2. Click ( ).
3. Enter the index values for the cells.
4. Repeat the steps to add more index values.
5. Click **OK**.

GetTableCount

Returns the number of tables in a Microsoft Word document. You can optionally specify the type of table for the method to identify.

Select the table type from the config window. If you expect to receive total number of tables in a word document, then the table type is set to 'Default'. If a count of nested tables within a cell in a table is expected then set the table type to 'Nested'. Provide the index of table which has nested tables to the TableIndex parameter and table cell index from which count of nested tables is expected to CellIndex parameter.

To configure the type of table, do the following steps.

1. Click the method settings icon ( ).
2. Select the table type.
3. Click **OK**.

GetTableCount method parameters

Parameter	Description	Data port type	Data type
Return	Returns the integer value of total number of tables in word document.	Data in	Integer

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GetTableRowData

Returns the values in one or more cells of a row in a Microsoft Word document. You can specify the index values of the cells of the row.

Note: You must execute the SetTable method before executing this method.

You can configure the index values of the cells in a row. To configure, do the following steps.

1. Click the method settings icon ( ).
2. Click the add index value icon ( ).
3. Enter the index value of the cell.
4. Repeat the steps to add more index values.
5. Click **OK**.

GetTableRowData method parameters

Parameter	Description	Data port type	Data type
RowIndex	Index of the row from which data needs to be retrieved. Default value is 0, meaning the data will be fetched from the first row.	Data in	Integer

GetText

Returns all the text content in a Microsoft Word document.

GetText method parameters

Parameter	Description	Data port type	Data type
Return	Returns the complete document's text in a string format.	Data Out	String

InsertNewColumn

Inserts a new column in the first table in the document based on the specified index value.

To use this method, provide the index number at which a new column needs to be inserted to the ColumnIndex parameter. Default value is -1, which means that a column is inserted before the first column.

InsertNewColumn method parameters

Parameter	Description	Data port type	Data type
ColumnIndex	Index at which new column must be inserted. Default value is -1, which means	Data in	Integer

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InsertNewColumn method parameters (continued)

Parameter	Description	Data port type	Data type
	there are no columns in the table.		

InsertNewRow

Inserts a new row based on the index value.

To use this method, provide the index number at which a new row needs to be inserted to the RowIndex parameter. Default value is -1, which means a row is inserted before the first row.

InsertNewRow method parameters

Parameter	Description	Data port type	Data type
RowIndex	Index at which new row must be inserted. Default value is -1, which means there are no rows in the table.	Data in	Integer

InsertPicture

Inserts an image into Microsoft Word document from the file path provided at a particular bookmark.

To use this method, provide the file path of the image that needs to be inserted to the ImageFilePath parameter. Provide the identification place at which the image needs to be inserted in the Word document to the Bookmark parameter.

InsertPicture method parameters

Parameter	Description	Data port type	Data type
ImageFilePath	System folder path to the image that needs to be inserted.	Data in	String
Bookmark	Point at which the image needs to be added.	Data in	String

InsertTable

Inserts a table into a Microsoft Word document. You can optionally customize the document by configuring it before inserting.

To use this method, the point at which the table needs to be added is provided to the Bookmark parameter and the table that needs to be added should be passed to the Data parameter.

Note: Before executing this method, you must execute the GetTable and SetTable methods.

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To customize the table before inserting, do the following steps.

1. Click the method settings icon( ).
2. Select Include Headers.
3. Select border style and autofit behavior.
4. Select Include Empty Rows.
5. To ignore specific columns, click the add index value icon ( ).
6. Enter the index value of the column.
7. Click **OK**.

InsertTable method parameters

Parameter	Description	Data port type	Data type
Bookmark	Specific position in the Word document where the table will be inserted. Before inserting the table, you must add a bookmark.	Data in	String
Data	Table data that will be inserted at the bookmark point.	Data in	Data

InsertText

Inserts text in the beginning of the Microsoft Word document.

To use this method, provide a value that needs to be inserted to the text parameter.

InsertText method parameters

Parameter	Description	Data port type	Data type
text	Text value that needs to be inserted.	Data In	String

IsOpen

Checks whether a Microsoft Word document is open.

IsOpen method parameters

Parameter	Description	Data port type	Data type
Filepath	System folder path to word document or file.	Data in	String
Return	System folder path to word document or file.	Data Out	Boolean

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MergeByCellIndices

Merges the range of cells specified in the form of index value range.

To use this method, provide the starting cell index value to the StartCellIndex parameter and ending cell index value to the EndCellIndex parameter.

MergeByCellIndices method parameters

Parameter	Description	Data port type	Data type
StartCellIndex	Index of starting cell point to start merging cells.	Data in	Integer
EndCellIndex	Index of ending cell point to end merging cells.	Data in	Integer

MergeByRowCol

Merges a range of cells of a table in a Microsoft Word document.

To use this method, provide the starting row index to the StartRowIndex parameter, ending row index to the EndRowIndex parameter, and starting column index to the StartColIndex parameter and ending column index to the EndColIndex parameter.

MergeByRowCol method parameters

Parameter	Description	Data port type	Data type
StartRowIndex	Index of starting row.	Data in	Integer
StartColIndex	Index of starting column.	Data in	Integer
EndRowIndex	Index of ending row.	Data in	Integer
EndColIndex	Index of ending column.	Data in	Integer

ReplaceBookmark

Replaces a bookmark in a Microsoft Word document with the specified text.

To use this method, provide the identification bookmark to Bookmark parameter with the text to be replaced given to the ReplaceText parameter.

ReplaceBookmark method parameters

Parameter	Description	Data port type	Data type
Bookmark	Identification bookmark in the word document.	Data in	String
ReplaceText	Replace text at the bookmarked location	Data in	String

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ReplaceBookmark method parameters (continued)

Parameter	Description	Data port type	Data type
	with the new value provided.		

ReplaceBookmarks

Finds and replaces multiple bookmarks in a Microsoft Word document with the specified text.

To use this method, provide value to the added field(s) which is the text with which the bookmark needs to be replaced.

Provide more details of the bookmark text to replace as follows:

1. Double-click the component.
2. In the PROVIDE LABELS/BOOKMARKS dialog box, click the click to add label icon ( ) and enter the bookmark to replace it.

   Repeat this step to add more bookmarks.
3. Click **OK**.

ReplaceBookmarks method parameters

Parameter	Description	Data port type	Data type
Text	Text to be replaced in a Microsoft Word document.	Data in	String

ReplaceFooterText

Finds and replaces the footer text in a Microsoft Word document with the specified text.

Provide the original footer text value that is present in the word document to the FindText parameter and the text with which original footer text has to be replaced to the ReplaceText parameter.

ReplaceFooterText method parameters

Parameter	Description	Data port type	Data type
FindText	Current value that is present in the footer.	Data in	String
ReplaceText	Value that is required to replace the FindText value with, in the footer.	Data in	String

ReplaceHeaderText

Finds and replaces the header text in a Microsoft Word document with the specified text.

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Provide the original header text value that is present in the word document to the FindText parameter and the text with which original header text has to be replaced to the ReplaceText parameter.

ReplaceHeaderText method parameters

Parameter	Description	Data port type	Data type
FindText	Current value that is present in the header.	Data in	String
ReplaceText	Value that is required to replace the FindText value with, in the header.	Data in	String

ReplaceStaticText

Finds and replaces the text in a Microsoft Word document with the specified text. Replaces bookmarks, headings, or any text based on the configuration.

To use this method, provide a value to the added field which is the text with which the label / bookmark needs to be replaced.

You must configure the method before executing. To configure, do the steps.

1. Click the method settings icon ( ).
2. Click the add text icon ( )
3. Enter the heading, bookmark, or text that you want to replace.
4. Repeat the steps to enter more text.
5. Click **OK**.

ReplaceText

Finds and replaces the text in a Microsoft Word document with the specified text.

Provide the original text value that is present in the word document to the FindText parameter and the text with which original text has to be replaced to the ReplaceText parameter.

ReplaceText method parameters

Parameter	Description	Data port type	Data type
FindText	Current value that is present in the Word document.	Data in	String
ReplaceText	Value that is required to replace the FindText value with, in the Word document.	Data in	String

Resize

Resizes the window of a Microsoft Word document according to the left, top, width and height parameters.

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To use this method, specify the Left and Top margins and the Width and Height parameters for the content.

Resize method parameters

Parameter	Description	Data port type	Data type
Left	Left margin of content in word document.	Data in	Integer
Top	Top margin of content in word document.	Data in	Integer
Width	Width of the word document.	Data in	Integer
Height	Height of the word document.	Data in	Integer

Save

Saves the opened Microsoft Word document.

SaveAs

Saves a copy of the opened Microsoft Word document with another name at a location provided in the Filepath parameter.

To use this method, provide the new location to which the Microsoft Word document needs to be saved in the Filepath parameter. If the file needs to be password protected, pass the value to the Password parameter.

SaveAs method parameters

Parameter	Description	Data port type	Data type
Filepath	System folder path to the word document or file.	Data in	String
Password	Open a password protected word document with the password provided. The default value is empty.	Data in	String

SetTable

Sets a table in a Microsoft Word document.

To use this method, it is necessary to pass the table object to the Table parameter.

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SetTable method parameters

Parameter	Description	Data port type	Data type
Table	Table that needs to be set in the word document.	Data in	Object

SetTableCellValues

Sets the content of a table cell in a Microsoft Word document.

To use this method, provide the indices of the table cells whose value needs to be set in the configuration window.

Provide one or more cell indexes and value types as follows:

1. Double-click the component.
2. In the PROVIDE CELL INDEXES dialog box, click the click to add cell index icon ( ) and enter a cell index and select a value type.

   Repeat this step to add more cell indexes and value types.
3. Click **OK**.

SetTableRowData

Sets the content in a row of a table in a Microsoft Word document.

To use this method, index of the table row at which the data needs to be set is passed to the RowIndex parameter.

Note: You must execute the SetTable method before executing this method.

Input

RowIndex

Provide the column index as follows:

1. Double-click the component.
2. In the PROVIDE COLUMN INDEXES dialog box, click the click to add cell index icon ( ) and enter a column index.
3. Click **OK**.

SetTableRowData method parameters

Parameter	Description	Data port type	Data type
RowIndex	Index of row at which data needs to be set. Default value is 0, meaning the data will be set to the first row.	Data in	Integer

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Parameters of the Microsoft Word connector methods

Learn about the parameters of the Microsoft Word connector methods in RPA Desktop Design Studio.

Parameters of the Microsoft Word connector methods

Parameter Name	Description	Mandatory?
Bookmark	Bookmark in a Microsoft Word document.	Yes
CellIndex	Index of a cell in a table.	Yes
ColumnIndex	Column sequence in a table.	Yes. The column index must be equal to or greater than zero.
Data	Table that contains data to add into a Microsoft Word document.	Yes
Filepath	Folder location including the name of the document.	Yes
EndCellIndex	Last cell number of a range.	Yes
ImageFilePath	The path to the image with the filename that you want to insert.	Yes
Filepath	location where the document will be exported as a PDF.	Yes. You must provide the filename and the PDF extension.
Bookmark	Exact location on the Word document where the image will be inserted. You must define a bookmark in the document first.	Yes
FilePath	Path to the Microsoft Word file including the filename.	Yes
EndColIndex	Last column number of a range for a bulk operation on a table, such as merging cells, searching text, and setting or getting values.	Yes
EndRowIndex	Last row number of a range for a bulk operation on a table, such as merging cells, searching text, and setting or getting values.	Yes
FirstRowIsHeader	Boolean value to indicate whether the method should treat the first row as a header of the table.	No
PageIndex	Page index value.	No.
Return (Boolean)	Boolean response to indicate whether the request was successful.	Not applicable
Timeout	Seconds after which the request to open the document will time out if no response is received.	No
StartCellIndex	First cell number of a range.	Yes

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Parameters of the Microsoft Word connector methods (continued)

Parameter Name	Description	Mandatory?
StartColIndex	First column number of a range for a bulk operation on a table, such as merging cells, searching text, and setting or getting values.	Yes
StartRowIndex	First row number of a range for a bulk operation on a table, such as merging cells, searching text, and setting or getting values.	Yes
RowIndex	Row sequence in a table in the document.	Yes. The row index value must be equal or greater than zero.
Table	The table data.	Yes
TableIndex	Index of a table in a Microsoft Word document.	No
Text Or, FindText Or, ReplaceText	Text to be added in a Microsoft Word document in the AddFooter, AddHeader, or InsertText methods. Text to be searched in the document in the Find method. Text to be replaced within the ReplaceBookmark, ReplaceFooterText, ReplaceHeaderText, or ReplaceText methods.	Yes
Value	Value in a cell.	Yes
Text	Text to be added to the footer.	Yes
FontSize	Font size of the footer text.	No
Text	Custom text to be added to the header.	Yes
FontSize	Font size of the header text.	Yes
Text	Text to find in the document.	Yes
Return (String)	Returns the footer text.	Not applicable
Return (Integer)	Returns the number of pages.	Not applicable
Return (String)	Returns the header text.	Not applicable
Return (String)	Returns the text content.	Not applicable
Text	Text that is inserted in the Word document.	Yes
Return (Boolean)	Returns the Boolean value to indicate whether a Word document is open.	Not applicable
saveChanges	Boolean response to indicate whether you want to save the changes before closing the document.	No
Return (Boolean)	Boolean response to whether the text was found in the document.	Not applicable
Table (Object)	Returns the data in a table as an object.	Not applicable

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Parameters of the Microsoft Word connector methods (continued)

Parameter Name	Description	Mandatory?
Data (DataTable)	Returns the data in the table.	Not applicable
Cell Index (Object)	Returns the value of the cell.	Not applicable
Return (Integer)	Returns the total count of tables in the Microsoft Word document.	Not applicable
Row index (Object)	Returns the data in the cell based on the index value.	Not applicable
ColumnIndex	The index value of the column based on which the position of the new column is determined.	No.
RowIndex	Index value of the row based on which the position of the row is determined.	No
Bookmark	Specific position in the Word document where the table will be inserted. Before inserting the table, you must add a bookmark.	Yes
Data (DataTable)	Table that will be inserted.	Yes
FindText	Footer text that will be replaced.	Yes
ReplaceText	Text that will replace the footer text.	Yes
FindText	Header text that will be replaced.	Yes
ReplaceText	Text that will replace the header text.	Yes
Object	Text to replace the text in the document.	Yes
FindText (String)	Text to be replaced.	Yes
ReplaceText	Text that will replace the existing text.	Yes
Left	Resize value from the left margin.	Yes
Top	Resize value from the top margin.	Yes
Width	Resize width value.	Yes
Height	Resize height value.	Yes

Enter inputs for parameters

To enter inputs for the parameters, see Configure port properties.

PDF connector

Use the PDF connector to perform all your PDF operations from a single, unified space in RPA Desktop Design Studio. Use this connector to accelerate PDF processing for your document automation.

The PDF connector is available as a plugin by default in RPA Desktop Design Studio. Use the different methods available in the connector to perform activities such as converting, splitting, and combining PDFs.

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Note: RPA Desktop Design Studio still supports automation projects that are designed by using the older PDF methods in **Utilities** from Toolbox.

- RPA Desktop Design Studio still supports automation projects that are designed by using the older PDF methods in **Utilities** from Toolbox.
- You can't manipulate e-signed PDFs such as performing merge and split. This action corrupts the PDF files.

- To use a connector in RPA Desktop Design Studio, see Use a connector in RPA Desktop Design Studio.
- To understand the various methods in the PDF connector, see PDF connector methods.

PDF connector methods

Accelerate PDF processing for your document automation by using the various methods of PDF connector in RPA Desktop Design Studio.

Prerequisites for using the PDF connector

Use the Load method in PDF connector before using the other methods. Call this method with the full path to the PDF file (FilePath) and optionally provide a password (Password) if the PDF is protected.

Close

Closes the resources associated with the PDF document. Use this method to release any references and resources after using the Load method.

Call this method when you no longer need to use the PDF document or after completing operations with it.

ConvertToExcel

Converts a PDF document to a Microsoft Excel document. Optionally, only tables can be converted if specified.

Call this method with the file path where the converted Excel document must be saved, and optionally set **ConvertTablesOnly** to **True** if only tables must be converted.

Parameters of the ConvertToExcel method

Parameter	Description	Data type
ExcelFilepath	The file path where the converted Excel document (.xlsx) is saved. Ensure the file path includes the file name and extension.	String
ConvertTablesOnly	If set to **True**, only tables from the PDF document are converted to Excel. Default is **True**.	Boolean

ConvertToHTML

Converts a specified page of a PDF to HTML format. If the page number is less than or equal to 0, all pages of the PDF are converted to HTML.

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Call this method with the page number of the PDF that you want to convert to HTML. If you pass a page number less than or equal to 0, the entire PDF will be converted to HTML. The method returns the HTML content as a string.

Parameters of the ConvertToHTML method

Parameter	Description	Data type
PageNumber (Data In)	The page number of the PDF to be converted to HTML. If this parameter is less than or equal to 0, all pages of the PDF are converted to HTML. Page numbers typically start from 1.	Int32
Return (Data Out)	This method returns the HTML content as a string, representing the content of the PDF file.	String

ConvertToImage

Converts a specified page of a PDF document to an image. Optionally, specify the image path where the image is saved, DPI (dots per inch), and image quality.

Call this method with the page number of the PDF to convert, the file path where the image must be saved, and optionally adjust the DPI and image quality parameters.

Parameters of the ConvertToImage method

Parameter	Description	Data type
PageNumber	The page number of the PDF to be converted to an image. Page numbers typically start from 1.	Int32
ImagePath	The file path where the converted image is saved. Ensure the file path includes the file name and extension	String
Dpi	The DPI (dots per inch) resolution for the generated image. Default is 200 DPI.	Int32
Quality	The quality level of the generated image, ranging from 0 (lowest) to 100 (highest). Default is 95.	Int32

ConvertToImages

Converts a PDF document to images. Optionally, specify the folder path where the images are saved, DPI (dots per inch), image quality, and an optional list to store the generated file names.

Call this method with the folder path where the images must be saved. Optionally, adjust the DPI and image quality parameters. If you provide a list as the **FileNames** parameter, it is populated with the names of the generated image files.

Parameters of the ConvertToImages method

Parameter	Description	Data type
Folderpath	The folder path where the converted images will be saved. Ensure the folder exists and has appropriate write permissions.	String

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Parameters of the ConvertToImages method (continued)

Parameter	Description	Data type
	For example, `/Users/Username/Documents/MyFolder`	
Dpi	The DPI (dots per inch) resolution for the generated images. Default is 200 DPI.	Int32
Quality	The quality level of the generated images, ranging from 0 (lowest) to 100 (highest). Default is 95.	Int32

ConvertToWord

Converts a PDF to a Microsoft Word document.

Call this method with the file path where the converted Word document must be saved. The method creates a Word document from the PDF content at the specified path.

Parameter of the ConvertToWord method

Parameter	Description	Data type
WordFilepath	The file path where the converted Word document (.doc) is saved. Ensure the file path includes the file name and extension.	String

ConvertToXml

Converts a specified page of a PDF document to Microsoft XML format. Optionally, only tables can be converted if specified.

Call this method with the page number of the PDF to convert, the file path where the XML output must be saved, and optionally set **ConvertTablesOnly** to **True** if only tables must be converted.

Parameters of the ConvertToXml method

Parameter	Description	Data type
PageNumber	The page number of the PDF to be converted to XML format. Page numbers typically start from 1.	Int32
XmlFilePath	The file path where the converted XML document will be saved. Ensure the file path includes the file name and extension	String
ConvertTablesOnly	If set to True, only tables from the specified page will be converted to XML. Default is True.	Boolean

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ExtractImages

Extracts images from specified pages of a PDF document. Optionally, specify the folder path where the images are saved and an output list to store the generated file names.

Call this method with the folder path where the images must be saved, the starting and ending page numbers from which to extract images, and an empty list to store the file names of the extracted images.

Parameters for the ExtractImages method

Parameter	Description	Data type
Folderpath	The folder path where the extracted images are saved. Ensure the folder exists and has appropriate write permissions.	String
FromPage	The starting page number from which to extract images. Page numbers typically start from 1.	Int32
ToPage	The ending page number up to which images must be extracted. This number must be greater than or equal to the **FromPage** number.	Int32
FileNames	An output parameter that stores the file names of the extracted images.	List`1

GetAllTables

Extracts all tables from a PDF document and returns them as a list of DataTables.

Use the **Return** parameter to retrieve the extracted table data as a list.

Call this method without any parameters to retrieve all tables from the PDF document. The method returns a list of DataTables, where each DataTable represents a table extracted from the PDF.

Parameter of the GetAllTables method

Parameter	Description	Data type
Return	This method returns list of DataTable that represents a tables extracted from the PDF file.	List`1

GetPageAsImage

Extracts data from a PDF document page and store it as an in-memory image.

Returns a specified page of a PDF document as an in-memory image.

Call this method with the page number of the PDF to retrieve the page as an image. The method returns the page as a System.Drawing.Image object.

Parameters of the GetPageAsImage method

Parameter	Description	Data type
PageNumber	The page number of the PDF to be converted to an image. Page numbers typically start from 1.	Int32

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Parameters of the GetPageAsImage method (continued)

Parameter	Description	Data type
Return	This method returns an image that represents a specified page of the PDF file.	Drawing.Image

GetPageCount

Retrieves the total number of pages in a PDF document. You must use the **Return** parameter to retrieve the total page count in the PDF as an integer.

Parameter of the GetPageCount method

Parameter	Description	Data type
Return	This method returns an integer representing count of pages of the PDF file.	Int32

GetTable

Extracts a table from a PDF and returns it as a DataTable. The extraction method is specified by the **ExtractBy** parameter.

Call this method with the extraction type and the corresponding value. The method returns the extracted table as a DataTable.

Parameters of the GetTable method

Parameter	Description	Data type
ExtractBy	The method of extraction to use. This parameter must be ExtractType, which includes the following options: Index (0) - extract by page number, and ContainsText (1) - extract by matching text.	ExtractType
Value	The value corresponding to the extraction type. For example, if **ExtractBy** is Index, this would be the page number as a string; if **ExtractBy** is ContainsText, this would be the text to match.	String
Return	This method returns a DataTable that represents a table extracted from the PDF file.	Table

GetText

Retrieves text from the given range of PDF pages.

Call this method with the starting and ending page numbers to retrieve text from those pages. The method returns the extracted text as a string.

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Parameters of the GetText method

Parameter	Description	Data type
FromPage	The starting page number of the range from which to extract text. Page numbers typically start from 1.	Int32
ToPage	The page number to which you retrieve text from the start page. **Note:** Ensure that the ToPage value is higher than the **FromPage** value.	Int32
Return	This method returns a string representing the text content of the PDF file.	String

Load

Loads a PDF file for interaction, enabling further operations such as extracting content.

Call this method with the full path to the PDF file (FilePath) and optionally provide a password (Password) if the PDF is protected.

Parameters of Load method

Parameter	Description	Data type
FilePath	The full path to the PDF file to be loaded. This must include the file name and extension.	String
Password	The password for the PDF file if it is protected. If the PDF is not password-protected, this parameter can be an empty string.	String

Merge

Merges a list of PDF files into a single PDF file.

Call this method with a list of file paths of the PDFs to be merged, the output file path, and an optional overwrite flag.

Parameters of Merge method

Parameter	Description	Data type
FileList	A list of file paths for the PDF files to be merged. Each path must be a valid path to a PDF file.	ArrayList
OutputFilePath	The file path where the merged PDF is saved. This must include the file name and extension.	String
Overwrite	If set to **True**, the method overwrites the existing file at the output path if it exists. If set to **False**, the method does not overwrite the existing file. Default is **False**.	Boolean

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Note: If the PDF files are password protected or in an incorrect format in the **FileList** parameter, the automation displays an error.

Split

Splits a single PDF into multiple files, where each page in the PDF is saved as a separate file.

Call this method with the output folder path where the split PDF pages must be saved.

Parameter of Split method

Parameter	Description	Data type
OutputFolderPath	The path to the folder where the split PDF pages are saved. Ensure the folder exists or has appropriate permissions for writing files.	String

SAP connector

The SAP connector automates workflows on the SAP Graphical user interfaces (GUI). For example, create and save a vendor entry. Create custom automations with the SAP connector on the RPA Desktop Design Studio. The SAP Connector is built by Bristlecone Inc.

To create automations using the SAP Graphical user interfaces (GUI), you must first configure the SAP connector.

To use the SAP connector, do the following steps:

- Enable the SAP connector. See Use a connector in RPA Desktop Design Studio.
- Configure the SAP connector. See Configure the SAP connector.
- Expose the methods. See Use connector method.
- Use the methods. See Use a component in RPA Desktop Design Studio.

Configure the SAP connector

Capture one or more SAP application screens, UI elements on the screen, and then expose the methods at the application, screen, or element levels by configuring the SAP connector.

Before you begin

Ensure that the SAP plugin on the RPA Desktop Design Studio is installed. For more information, see Manage plugins in RPA Desktop Design Studio.

Ensure that at least one SAP application window is active or open on your machine.

The SAP application must support these environments:

- Windows – Windows 10, Windows 11, Windows Server 2016, Windows Server 2019
- SAP ECC EH8 Client
- .Net 4.7.1

Role required: none

Procedure

1. Navigate to **Connectors** > **SAP**.
2. Drag the SAP connector under the Global Objects in the Project Explorer pane.

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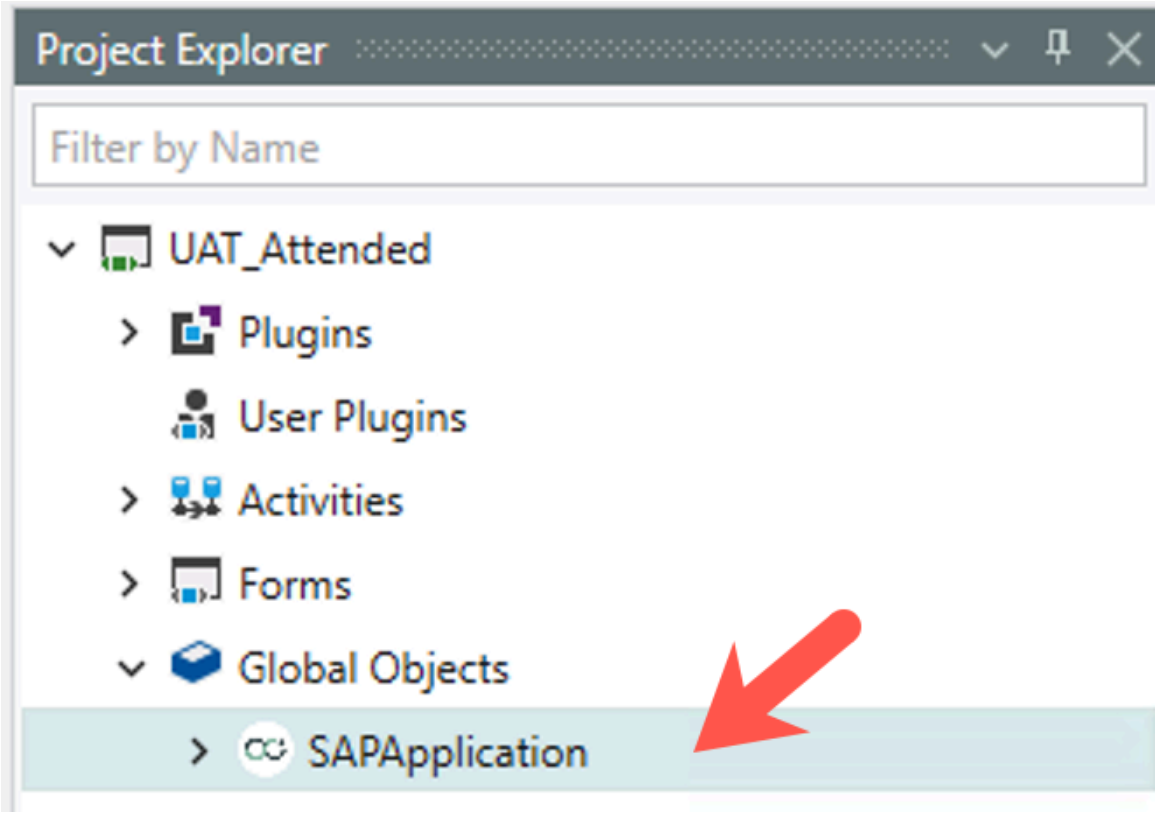
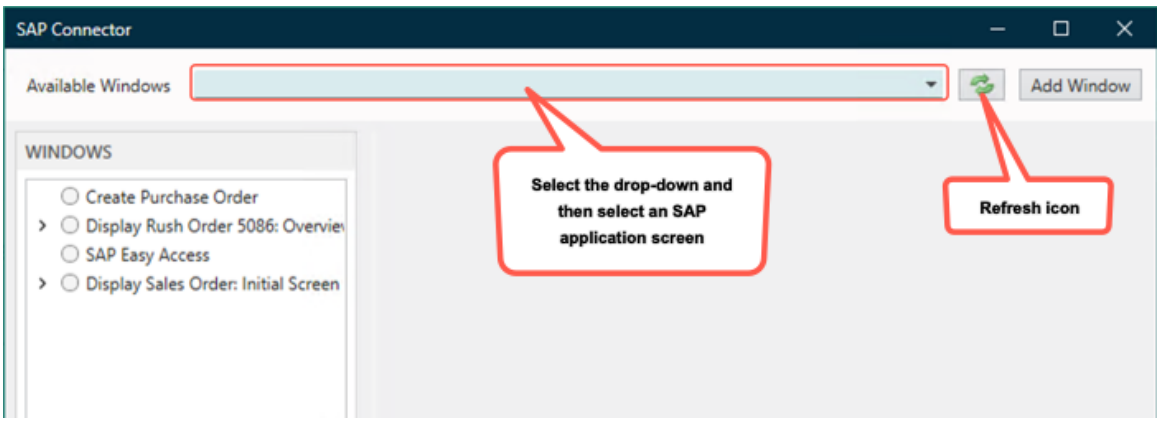
To learn more about how to add the SAP connector, see Use a connector in RPA Desktop Design Studio.
The SAP Application object is added under the Global Objects.



3. Under the Global Objects, right-click the SAP Application and select **Configure**.
4. In the **SAP Connector** window, select the drop-down and then select the SAP application screen.



Note: To load any SAP application window that you have opened after opening the **SAP Connector** window, select the Refresh icon ( ).

5. Select **Add Window**.
   The application screen appears in the WINDOWS pane.
6. To close the SAP Connector window, select **OK**.
   The SAP application screens that you added appear under the Global Objects in the Project Explorer pane.

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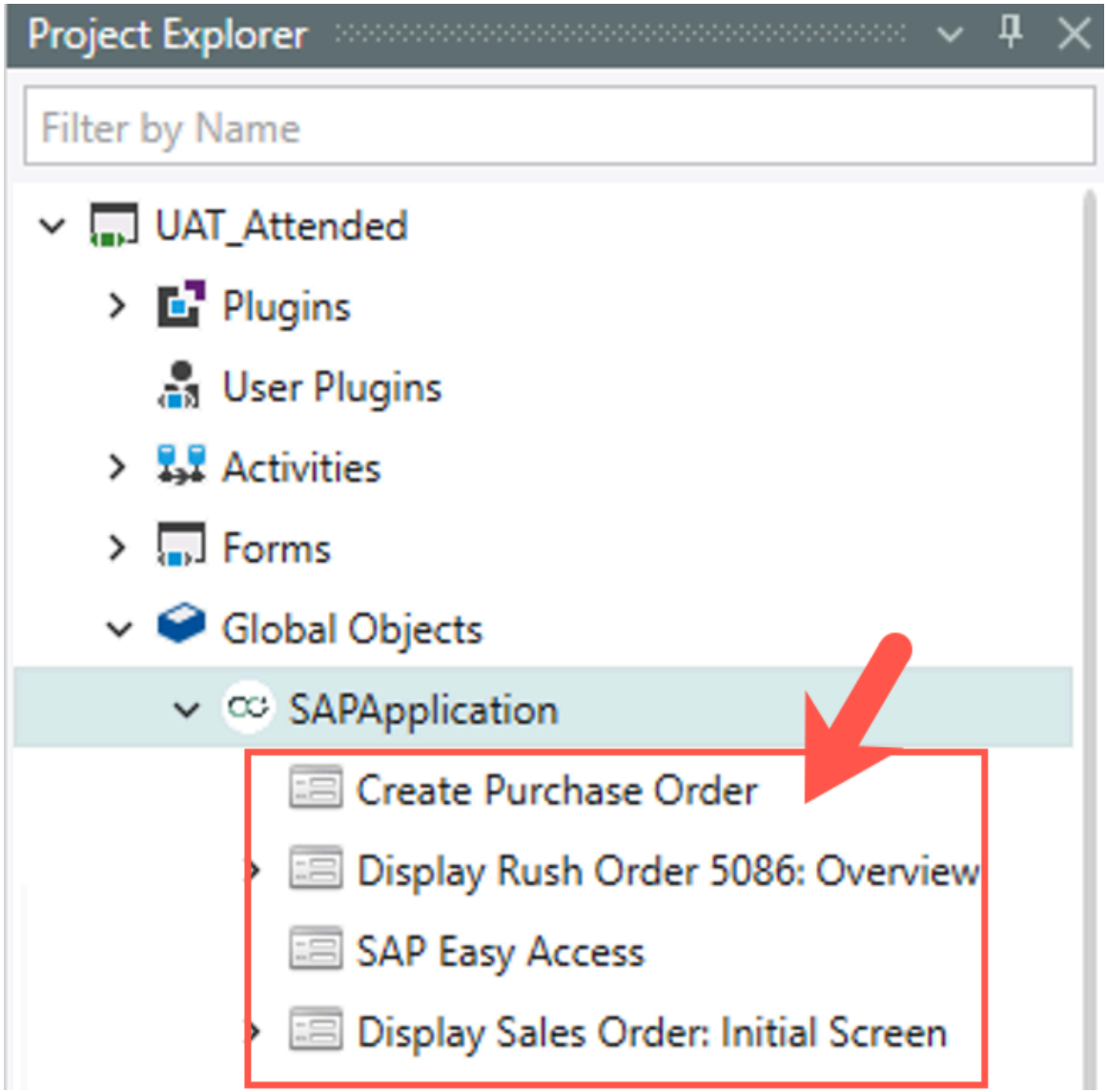

7. To expose the application-level methods, double-click the SAP application object under Global Objects in the Project Explorer pane.
   The application-level methods appear under the Object Explorer pane.

8. To expose the screen-level methods, select the SAP Application object expand icon (›) and double-click the SAP application.

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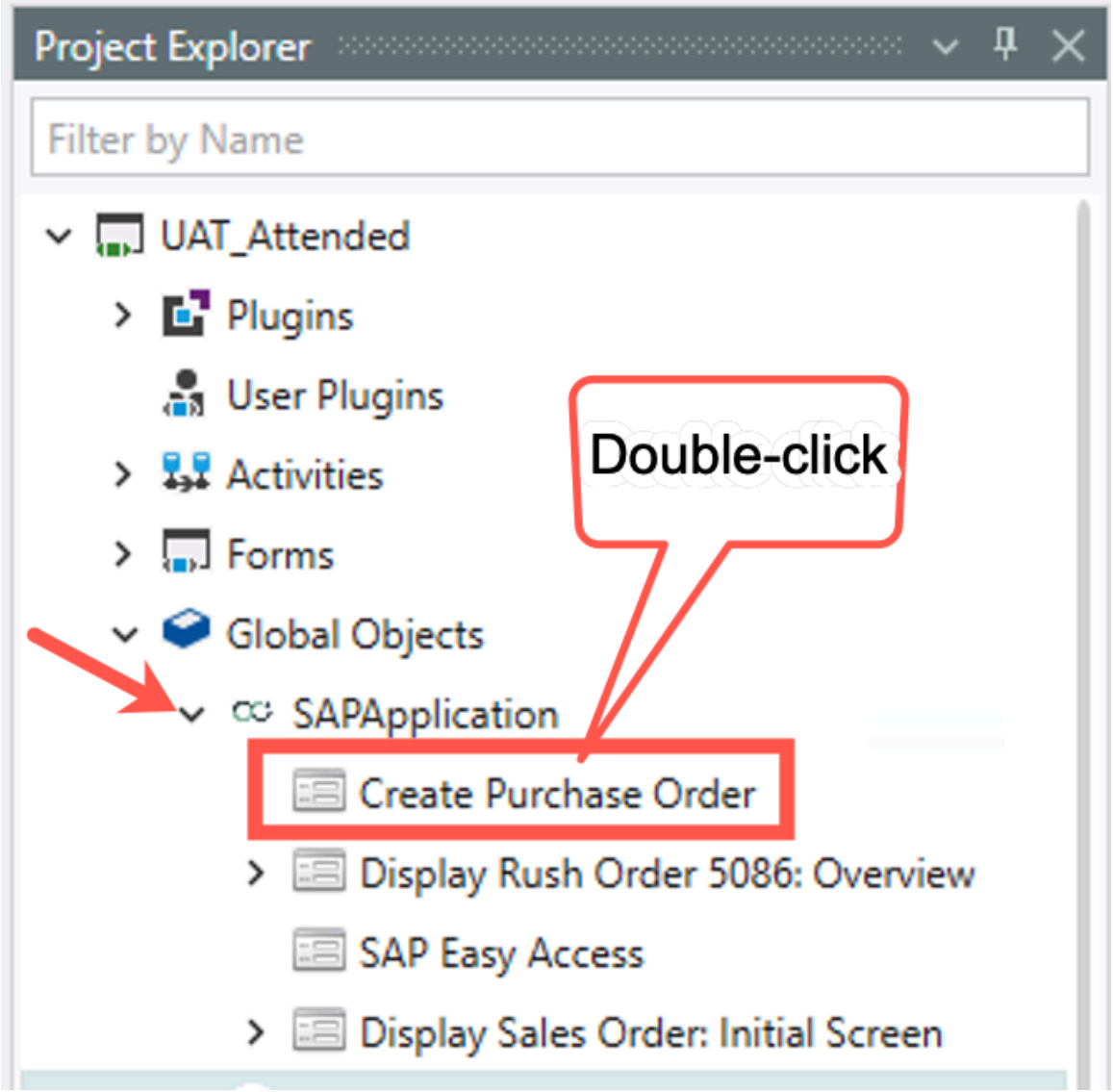

The screen-level methods appear under the Object Explorer pane.

9. To expose the element-level methods, do the following steps.

   a. In the Project Explorer pane, under Global Objects, right-click the SAP Connector object.

   b. Select **Configure**.

   c. In the **SAP Connector** window, in the WINDOWS pane, right-click the SAP application screen that you had added.

   d. Select **Add Element**.
   The Capture element dialog appears.

   e. Use the Capture element dialog to capture one or more SAP application screen elements. For more information about how to use the Capture element dialog, see Use the Capture element dialog.

   f. To expose the element-level methods, in the Project Explorer pane, expand the SAP Connector under Global Objects.

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g. Under SAP Connector, expand the name of the screen you had captured.

h. Double-click the screen element that you had captured.
The screen element-level methods appear under the Object Explorer pane.

SAP Connector methods

The SAP connector provides various methods that you can use to automate workflows on SAP graphical user interface (GUI) interfaces. SAP connector methods are available at different levels - connector, screen, and element.

SAP Connector methods

The SAP Connector methods are available at three levels.

- **Application**: You can find these methods when you double-click the SAP connector object. To access these methods, do the following steps:
  1. Add the SAP connector under the **Global Objects** in the **Project Explorer** pane.

     For more information, see Configure the SAP connector.
  2. Double-click the SAP connector object.

     The methods appear in the Object Explorer pane.
- **Screen**: Use these methods to automate tasks on an SAP application screen that you have added. For example, automate the maximizing of an application window. To access these methods, do the following steps:
  1. Add one or more SAP application screens. To learn to configure, see Configure the SAP connector.
  2. Double-click the screen that you've added.

     The methods appear in the Object Explorer pane.
- **Element**: Use these methods to automate actions on the SAP screen UI elements, for example, a button or a check box. For example, automate the selecting of a button. To access these methods, do the following steps:
  1. Add one or more SAP application screens. To learn to configure, see Configure the SAP connector.
  2. Capture one or more screen elements. To learn to capture, see Use the Capture element dialog.

     The screen elements appear under the captured SAP screen.
  3. Double-click the screen element.

     The methods appear in the Object Explorer pane.

Use the methods

To create an automation by using the methods, drag them from the Object Explorer pane to the Design surface and connect them.

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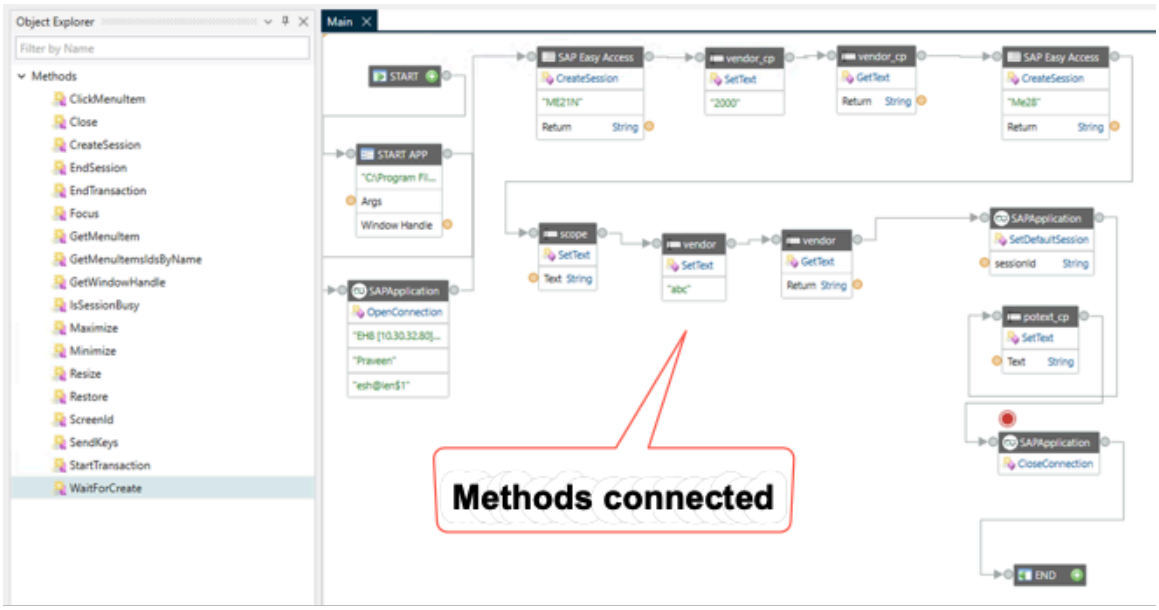

Application-level methods

OpenConnection

Establishes a connection between the connector and the SAP application. You must first use this method before executing an automation.

OpenConnection method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
name	Name of the connection.	Data In	String	None	Yes
username	User name for making the connection.	Data In	String	None	Yes
password	Password for making the connection.	Data In	String	None	Yes

SetDefaultSession

Makes the selected session a default session.

SetDefaultSession method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
sessionId	Unique Id of the session that you want to set as default.	Data In	String	None	Yes

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CloseConnection

Closes the connection between the connector and the SAP application.

Screen-level methods

ClickMenuItem

Selects the menu item that you specify the ID of on the SAP screen.

ClickMenuItem method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
menuId	The ID of the menu that must be selected.	Data In	String	None	Yes

Close

Closes the session of the SAP screen.

CreateSession

Creates a session of the SAP screen.

CreateSession method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
tCode	Transaction code that enables you to access specific part of the SAP application.	Data In	String	NA	Yes
Return	Returns the Id of the session created.	Data Out	String	NA	NA

EndSession

Ends the open session.

EndTransaction

Ends a transaction.

Focus

Sets the focus on the open session.

GetMenuItem

Gets the name of the specified menu item.

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GetMenuItem method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
menuId	ID of the menu item to get the name.	Data In	String	None	Yes
Return	Returns the name of the menu item	Data Out	String	None	NA

GetMenuItemsIdsByName

Retrieves the ID of the menu that you specify by its name.

GetMenuItemsIdsByName method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
menuItemName	Name of the menu item.	Data Out	List	None	NA

GetWindowHandle

Returns the window handle of the SAP application screen.

IsCreated

Returns `true` if the session is created, `false` if the session isn't created.

IsSessionBusy

Returns `true` if the session is busy, and `false` if the session isn't busy.

Maximise

Maximizes the SAP screen.

Minimise

Minimizes the SAP screen.

Resize

Resizes the SAP screen according to the dimensions specified.

Resize method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
xPos	Position of the screen along the X-axis.	Data In	Integer	None	Yes
yPos	Position of the screen along the Y-axis.	Data In	Integer	None	Yes

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Resize method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
Width	Width of the screen.	Data In	Integer	None	Yes
Height	Height of the screen.	Data In	Integer	None	Yes

Restore

Restores the screen to its original dimensions.

ScreenId

Returns the ID of the SAP application screen as a string.

SendKeys

Sends the keyboard strokes to the SAP application screen.

SendKeys method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
Keys	Keyboard strokes that you want to send to the SAP screen.	Data In	String	NA	Yes

StartTransaction

Starts a transaction.

StartTransaction method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
tCode	Transaction code that enables you to access specific part of the SAP application.	Data In	String	NA	Yes

WaitForCreate

Waits for the specified duration while the screen is being created. This enables all the dynamic controls to load after the screen is created.

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WaitForCreate method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
timeoutInSeconds	Duration after which the method times out.	Data In	Integer	None	Yes
MatchAllChildren	Option to indicate whether before loading the screen, the method matches all the captured children screens and elements with the screen.	Data In	Boolean	False	No

Element-level methods

In the SAP connector, you can use these element-level methods to identify elements, verify their presence on the screen, or define actions to be performed on the elements.

The following tables include elements and their available methods. For the description of these methods and their parameters, see SAP Connector methods.

GuiButton methods

Element	Methods
GuiButton	Click
	Highlight
	IsCreated
	MouseClick
	SendKeys
	SetFocus
	WaitForCreate

GuiCheckBox methods

Element	Methods
GuiCheckBox	Check
	Highlight

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GuiCheckBox methods (continued)

Element	Methods
	IsChecked
	IsCreated
	SendKeys
	SetFocus
	Uncheck
	MouseClick
	WaitForCreate

GuiComboBox methods

Element	Methods
GuiComboBox	Get
	GetIconName
	GetList
	Highlight
	IsCreated
	SendKeys
	Set
	SetFocus
	MouseClick
	WaitForCreate

GuiCtrlGridView methods

Element	Methods
GuiCtrlGridView	ClickButtonCell
	ClickCell
	DeselectAllRows
	GetCellType
	GetCellValue
	GetColumns
	GetColumnsKeyValuePair
	GetRowCount
	GetRows
	GetRowsByColumn
	GetSelectedColumns

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GuiCtrlGridView methods (continued)

Element	Methods
	GetSelectedRows
	GetSingleRow
	GetVisibleRows
	Highlight
	IsCreated
	MouseClick
	SendKeys
	SetFocus
	SelectAllRows
	SelectCell
	SelectContextMenuItemById
	SelectContextMenuItemByPosition
	SelectContextMenuItemByText
	SelectSingleRow
	SelectToolbarMenuItemById
	SelectToolbarMenuItemByPosition
	SelectToolbarMenuItemByText
	SetCellValue
	WaitForCreate

GuiLabel methods

Element	Methods
GuiLabel	GetText
	Highlight
	IsCreated
	MouseClick
	SendKeys
	SetFocus
	WaitForCreate

GuiPassword methods

Element	Methods
GuiPassword	Highlight
	IsCreated

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GuiPassword methods (continued)

Element	Methods
	SendKeys
	SetCaretPosition
	SetFocus
	SetText
	MouseClick
	WaitForCreate

GuiRadioButton methods

Element	Methods
GuiRadioButton	Highlight
	IsChecked
	IsCreated
	Select
	SendKeys
	SetFocus
	MouseClick
	WaitForCreate

GuiStatusBar methods

Element	Methods
GuiStatusBar	GetStatus
	Highlight
	IsCreated
	MouseClick
	SendKeys
	SetFocus
	WaitForCreate

GuiTab methods

Element	Methods
GuiTab	Highlight
	IsCreated
	SelectTab
	SendKeys

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GuiTab methods (continued)

Element	Methods
	SetFocus
	MouseClick
	WaitForCreate

GuiTableControl methods

Element	Methods
GuiTableControl	DeselectAllVisibleRows
	DeselectRow
	DeselectVisibleRow
	GetAllVisibleRows
	GetColumnNames
	GetMaximumScrollOffset
	GetScrollPosition
	GetSingleRow
	GetTable
	GetVisibleRowCount
	Highlight
	IsCreated
	MouseClick
	ScrollDownByOneRow
	ScrollToHorizontalPosition
	ScrollToNextPage
	ScrollToPreviousPage
	ScrollToVerticalPosition
	ScrollUpByOneRow
	SelectAllRows
	SelectSingleRow
	SelectVisibleRow
	SendKeys
	SetFocus
	WaitForCreate

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GuiTextBox methods

Element	Methods
GuiTextBox	GetText
	Highlight
	IsCreated
	SendKeys
	SetCaretPosition
	SetFocus
	SetText
	MouseClick
	WaitForCreate

GuiTree methods

Element	Methods
GuiTree	Check
	ClickNodeItem
	CollapseNodeItem
	DoubleClickNode
	DoubleClickNodeItem
	GetColumnsKeyValuePair
	GetTreeType
	GetNodeKeyByPath
	GetNodeKeyByText
	GetNodeItemText
	GetSelectedNodes
	GetNodeItemCheckBoxState
	Highlight
	IsCreated
	PressNodeItemButton
	SelectTab
	SendKeys
	SetFocus
	MouseClick
	SelectNodeItem
	SelectNode
	SelectContextMenuItemById

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GuiTree methods (continued)

Element	Methods
	SelectContextMenuItemByText
	SelectContextMenuItemByPosition
	Uncheck
	WaitForCreate

GuiUserArea methods

Element	Methods
GuiUserArea	Highlight
	IsCreated
	MouseClick
	ScrollToNextPage
	ScrollToPreviousPage
	SendKeys
	SetFocus
	SetHorizontalScroll
	SetVerticalScroll
	WaitForCreate

SAP element-level method descriptions

The SAP connector provides various element-level methods that you can use to automate actions on the SAP screen UI elements, for example, a button or a check box.

Common methods

The following methods apply to all elements on the SAP screen.

Note: Any other elements that you see on the SAP screen that aren't listed in this topic support only the common methods.

Highlight

Highlights the element on the SAP screen.

IsCreated

Returns `true` if the element is present on the SAP screen, and `false` if the element is not present.

MouseClick

Performs a mouse-click action on the element on the SAP screen.

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MouseClick method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
clickType	Option to select the type of mouse click: left or right.	Data In	Enum	Left	No

SendKeys

Sends the keyboard strokes such as Enter or Ctrl, to the element on the SAP screen.

SendKeys method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
keys	Keyboard strokes that you want to send to the element.	Data In	String	NA	Yes
clearExistingValue	Option to specify whether to clear the existing value of the element before entering the keys value.	Data In	Boolean	False	No
typeDelay	Option to specify the time delay in seconds between each key stroke.	Data In	Double	0.09	No

SetFocus

Sets focus on the element on the SAP screen.

WaitForCreate

Waits for the specified duration while the element is being loaded. This enables all the dynamic controls to load.

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WaitForCreate method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
timeoutInSeconds	Duration in seconds after which the method times out.	Data In	Integer	30 seconds	No

GuiButton methods

Click

Selects the button on the SAP screen.

GuiCheckbox methods

Check

Selects the check box on the SAP screen.

IsChecked

Returns `true` if the element is selected on the SAP screen, and `false` if the element isn't selected.

Uncheck

Clears the check box on the SAP screen.

GuiComboBox

Get

Gets the selected value of the combo box on the SAP screen.

GetIconName

Gets the property icon name of the element on the SAP screen.

GetList

Gets all the list of values from the combo box on the SAP screen.

Set

Sets the value of the combo box against the key passed.

Set method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
value	Value that you want to set for the combo box.	Data In	String	None	Yes
selectedItem	Option to specify whether you want to set the value	Data In	Enum	None	Yes

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Set method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
	for "Key" or "Value".				

GuiCtrlGridView

ClickButtonCell

Selects a button in the grid cell defined by the row number and the column code.

ClickButtonCell method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the grid.	Data In	Integer	None	Yes
columnCode	The column identifier of the grid cell.	Data In	String	None	Yes

ClickCell

Selects a grid cell defined by the row number and the column code.

ClickCell method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the grid.	Data In	Integer	None	Yes
columnCode	The column identifier of the grid cell.	Data In	String	None	Yes

DeselectAllRows

Deselects all the rows that are selected in the grid.

GetCellType

Retrieves the type of the grid cell defined by the row number and the column code.

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GetCellType method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the grid.	Data In	Integer	None	Yes
columnCode	The column identifier of the grid cell.	Data In	String	None	Yes

GetCellValue

Retrieves the value of the grid cell defined by the row number and the column code.

GetCellValue method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the grid.	Data In	Integer	None	Yes
columnCode	The column identifier of the grid cell.	Data In	String	None	Yes

GetColumns

Retrieves the list of active column headers of the grid.

GetColumnsKeyValuePair

Retrieves the column name and column code as key-value pair from the columns of the grid.

GetRowCount

Retrieves the number of the rows of the grid.

GetRows

Retrieves the number of grid rows defined in the rowNumber parameter, starting from the row defined in the startIndex parameter.

GetRows method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
startIndex	The starting row index to begin retrieving rows.	Data In	Integer	None	Yes

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GetRows method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	Indicates the number of rows to retrieve from the grid	Data In	Integer	None	Yes

GetRowsByColumn

Retrieves a subset of rows from a specific column based on the startIndex, rowNumber, and columnCode parameters.

GetRowsByColumn method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
startIndex	The starting index of the row to begin retrieving the data in the specified column (columnCode).	Data In	Integer	None	Yes
rowNumber	The number of rows to retrieve starting from the startIndex.	Data In	Integer	None	Yes
columnCode	The column from which the row data is retrieved.	Data In	String	None	Yes

GetSelectedColumns

Retrieves the columns that are selected.

GetSelectedRows

Retrieves the rows that are selected.

GetSingleRow

Retrieves a specific row of the grid defined by the row number.

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GetSingleRow method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index (or row number) specifying which row of the grid you want to retrieve data for.	Data In	Integer	None	Yes

GetVisibleRows

Retrieves the rows that are visible.

SelectAllRows

Selects all rows of the grid.

SelectCell

Selects the grid cell defined by the row number and the column code.

SelectCell method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the grid.	Data In	Integer	None	Yes
columnCode	The column identifier of the grid cell.	Data In	String	None	Yes

SelectContextMenuItemById

Selects the context menu item from the grid based on the ID that you specify.

SelectContextMenuItemById method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
Id	The unique identifier of the context menu item you want to select.	Data In	String	None	Yes

SelectContextMenuItemByPosition

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Selects the context menu item from the grid based on the position that you specify.

SelectContextMenuItemByPosition method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
menuItemPosition	The position of the context menu item that you want to select.	Data In	String	None	Yes

SelectContextMenuItemByText

Selects the context menu item from the grid based on the text that you specify.

SelectContextMenuItemByText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
menuItemText	The text of the context menu item that you want to select.	Data In	String	None	Yes

SelectSingleRow

Selects the row of the grid defined by the row number.

SelectSingleRow method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row number that the method uses to select a row in the grid.	Data In	String	None	Yes

SelectToolbarMenuItemById

Selects the toolbar menu item from the grid based on the ID that you specify.

SelectToolbarMenuItemById method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
Id	The unique identifier of	Data In	String	None	Yes

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SelectToolbarMenuItemById method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
	the toolbar menu item you want to select.				

SelectToolbarMenuItemByPosition

Selects the toolbar menu item from the grid based on the position that you specify.

SelectToolbarMenuItemByPosition method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
menuItemPosition	The position (or index) of a menu item in the toolbar.	Data In	Integer	None	Yes

SelectToolbarMenuItemByText

Selects the toolbar menu item from the grid based on the text that you specify.

SelectToolbarMenuItemByText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
menuItemText	The text displayed on the toolbar menu item that you want to select.	Data In	String	None	Yes

SetCellValue

Sets the value of a cell in a grid defined by the row number and the column code.

SetCellValue method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
value	The value is set for the cell.	Data In	String	None	Yes
rowNumber	The row number of	Data In	Integer	None	Yes

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SetCellValue method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
	the cell to modify.				
columnCode	The code (or identifier) for the column of the cell to modify.	Data In	String	None	Yes

GuiLabel

GetText

Retrieves the text of the label on the SAP screen.

GuiPassword

SetText

Sets a given value as a password in the Password element on the SAP screen.

GuiRadioButton

IsChecked

Returns `true` if the radio button is selected, and `false` if not selected.

Select

Select the radio button on the SAP screen.

GuiStatusBar

GetStatus

Retrieves the status information of a specific SAP screen.

GuiTab

SelectTab

Selects the tab on the SAP screen.

GuiTableControl

DeselectVisibleRow

Clears a visible row based on the row number that you specify.

DeselectVisibleRow method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of	Data In	Integer	None	Yes

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DeselectVisibleRow method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
	a cell in the table.				

DeselectAllVisibleRows

Clears all the selected rows.

DeselectRow

Clears a particular row based on the row number that you specify.

DeselectRow method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the table.	Data In	Integer	None	Yes

GetAllVisibleRows

Returns all the visible rows in the table.

GetColumnNames

Gets the list of active column headers in the table.

GetMaximumScrollOffset

Gets the maximum value up to which scrolling is possible within the table.

GetMaximumScrollOffset method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
type	Option to select the type of scroll: horizontal or vertical.	Data In	Enum	None	Yes

GetScrollPosition

Gets the current position of the scroll bar.

GetScrollPosition method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
type	Option to select	Data In	Enum	None	Yes

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GetScrollPosition method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
	the type of scroll: horizontal or vertical.				

GetSingleRow

Retrieves a specific row of the table defined by the row number.

GetSingleRow method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the table.	Data In	Integer	None	Yes

GetTable

Fetches the entire table.

GetVisibleRowCount

Returns count of visible rows.

ScrollDownByOneRow

Scrolls down to move the focus to the next row.

ScrollToHorizontalPosition

Scrolls horizontally to move focus to the specified position.

ScrollToHorizontalPosition method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
position	Position of the scroll.	Data In	Integer	None	Yes

ScrollToNextPage

Scrolls down to move the focus to the next page.

ScrollToPreviousPage

Scrolls up to move the focus to the previous page.

ScrollToVerticalPosition

Scrolls vertically to move focus to the specified position.

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ScrollToVerticalPosition method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
position	Position of the scroll.	Data In	Integer	None	Yes

ScrollUpByOneRow

Scrolls up to move the focus to the previous row.

SelectAllRows

Selects all the rows of the table, whether they are visible.

SelectSingleRow

Selects the row of the table defined by the row number.

GetRowsByColumn method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the table.	Data In	Integer	None	Yes

SelectCell

Selects a cell in the table defined by the row number and the column code.

SelectCell method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the table.	Data In	Integer	None	Yes
columnCode	Code number of the column in the cell.	Data In	String	None	Yes

SelectVisibleRow

Selects a visible row of the table defined by the row number.

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SelectVisibleRow method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
rowNumber	The row index or row number of a cell in the table.	Data In	Integer	None	Yes

GuiTextBox

GetText

Retrieves the text of the text box on the SAP screen.

SetCaretPosition

Sets the caret to the specified position in the text box on the SAP screen.

SetCaretPosition method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
position	Position of the caret.	Data In	Integer	None	Yes

SetText

Sets a given value in the text box on the SAP screen.

SetText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
text	Text value that you want to set in the text box.	Data In	String	None	Yes

GuiTree

Check

Selects a particular item in a node on the SAP screen.

Check method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific node within the tree.	Data In	String	None	Yes

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Check method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
column	The column name or identifier within the specified node.	Data In	String	None	Yes

ClickNodeItem

Clicks a particular item in a node on the SAP screen.

ClickNodeItem method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific node within the tree.	Data In	String	None	Yes
column	The column name or identifier within the specified node.	Data In	String	None	Yes

CollapseNodeItem

Collapses a particular node item on the SAP screen.

CollapseNodeItem method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific node within the tree.	Data In	String	None	Yes

DoubleClickNode

Performs a double-click mouse action on a particular node on the SAP screen.

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DoubleClickNode method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific node within the tree.	Data In	String	None	Yes

DoubleClickNodeItem

Performs a double-click mouse action on a particular item in a node on the SAP screen.

DoubleClickNodeItem method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific node within the tree.	Data In	String	None	Yes
column	The column name or identifier within the specified node.	Data In	String	None	Yes

GetColumnsKeyValuePair

Retrieves the column name and column code as key-value pair from the columns of the tree.

GetTreeType

Retrieves the type of the tree, such as simple, list, or column. If the type isn't one of these, the method returns an empty value.

GetNodeKeyByPath

Retrieves the node key based on the path that you specify.

GetNodeKeyByPath method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
path	Route or hierarchy to find a specific node in the tree.	Data In	String	None	Yes

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GetNodeKeyByText

Retrieves the node key based on the text that you specify.

GetNodeKeyByText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeText	The text value that you want to match with a node key. The value is matched to any node's text, ignoring case and extra spaces.	Data In	String	None	Yes

GetNodeItemText

Retrieves the text of the node item based on the key and name that you specify.

GetNodeItemText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
key	The key associated with the node. This key is the unique identifier of the node that you want to retrieve the text of.	Data In	String	None	Yes
name	The name of the specific item or property within the node, used to filter or further identify the node.	Data In	String	None	Yes

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GetSelectedNodes

Retrieves the values of the selected nodes.

GetNodeItemCheckBoxState

Retrieves the state of a check box in a node item.

GetNodeItemCheckBoxState method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific node within the tree.	Data In	String	None	Yes
column	The column name or identifier within the specified node.	Data In	String	None	Yes

PressNodeItemButton

Clicks the button in a specified node item on the SAP screen.

PressNodeItemButton method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific node within the tree.	Data In	String	None	Yes
column	The column name or identifier within the specified node.	Data In	String	None	Yes

SelectNodeItem

Selects the specified node item on the SAP screen.

SelectNodeItem method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific	Data In	String	None	Yes

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SelectNodeItem method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
	node within the tree.				
column	The column name or identifier within the specified node.	Data In	String	None	Yes

SelectNode

Selects the specified node on the SAP screen.

SelectNode method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific node within the tree.	Data In	String	None	Yes

SelectContextMenuItemById

Selects a context menu item based on the ID that you specify.

SelectContextMenuItemById method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
type	The type of context menu (Tree,Node,Node Item).	Data In	Enum	None	Yes
menuId	The identifier of the context menu item that must be selected.	Data In	String	None	Yes
nodeKey	Unique identifier for a specific node in the tree on which the context	Data In	String	None	Yes

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SelectContextMenuItemById method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
	menu is to be invoked.				
ColumnName	The name of the column within the node. This helps narrow down which specific column in the node the context menu should apply to.	Data In	String	None	Yes

SelectContextMenuItemByText

Selects a context menu item based on the text that you specify.

SelectContextMenuItemByText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
type	The type of context menu (Tree,Node,Node Item).	Data In	Enum	None	Yes
menuText	The visible text of the context menu item that you want to select.	Data In	String	None	Yes
nodeKey	Unique identifier for a specific node in the tree on which the context menu is to be invoked.	Data In	String	None	Yes
ColumnName	The name of the	Data In	String	None	Yes

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SelectContextMenuItemByText method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
	column within the node. This name helps narrow down which specific column in the node the context menu should apply to.				

SelectContextMenuItemByPosition

Selects a context menu item based on the position that you specify.

SelectContextMenuItemByPosition method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
type	The type of context menu (Tree,Node,Node Item).	Data In	Enum	None	Yes
menuPosition	The position of the context menu item that you want to select. It could be the index or a string representing the position.	Data In	String	None	Yes
nodeKey	Unique identifier for a specific node in the tree on which the context menu is to be invoked.	Data In	String	None	Yes
ColumnName	The name of the	Data In	String	None	Yes

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SelectContextMenuItemByPosition method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
	column within the node. This name helps narrow down which specific column in the node the context menu should apply to.				

Uncheck

Clears a particular item in a node from the SAP screen.

Uncheck method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
nodeKey	Unique identifier for a specific node within the tree.	Data In	String	None	Yes
column	The column name or identifier within the specified node.	Data In	String	None	Yes

GuiUserArea

ScrollToNextPage

Scrolls down to move the focus to the next page.

ScrollToPreviousPage

Scrolls up to move the focus to the previous page.

SetHorizontalScroll

Scrolls horizontally to a value that you specify.

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SetHorizontalScroll method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
scrolVal	Numeric value for scroll bar.	Data In	Integer	None	Yes

SetVerticalScroll

Scrolls vertically to a value that you specify.

SetVerticalScroll method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?
scrolVal	Numeric value for scroll bar.	Data In	Integer	None	Yes

Secure Shell (SSH) connector

Secure Shell (SSH) connector helps establish an SSH connection to a remote server and execute commands.

In the UNIX environment, SSH is the preferred way to access remote systems. In an automation workflow, when you need to connect to a remote system and perform an operation, you can use SSH connector methods to accomplish the task efficiently.

The SSH connector is available as a plugin by default in RPA Desktop Design Studio from 12.0.X versions. Add the SSH plugin from the Plugins Manager. For more information about adding the SSH plugin, see Manage plugins in RPA Desktop Design Studio.

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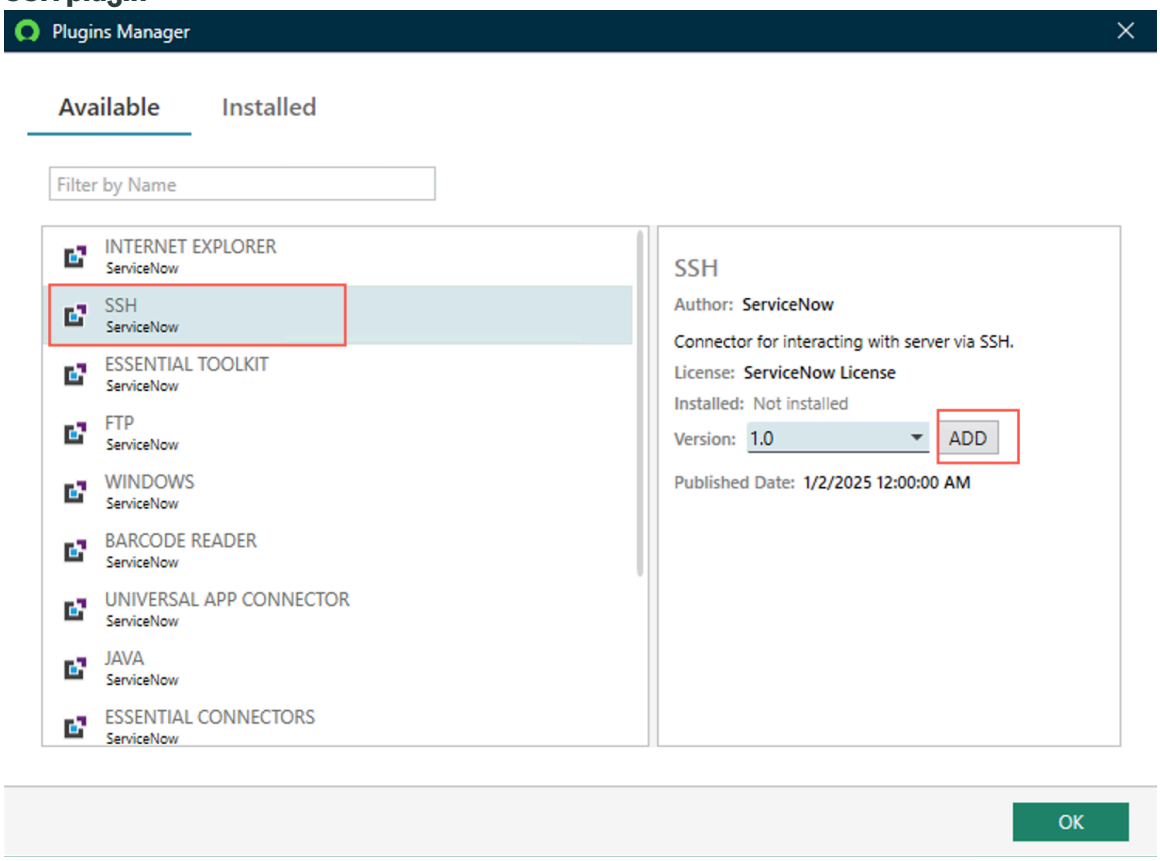
SSH plugin



Use the different methods available in the connector to perform activities such as establishing an SSH connection, executing command over an established connection, and disconnecting the session that was established using Connect method.

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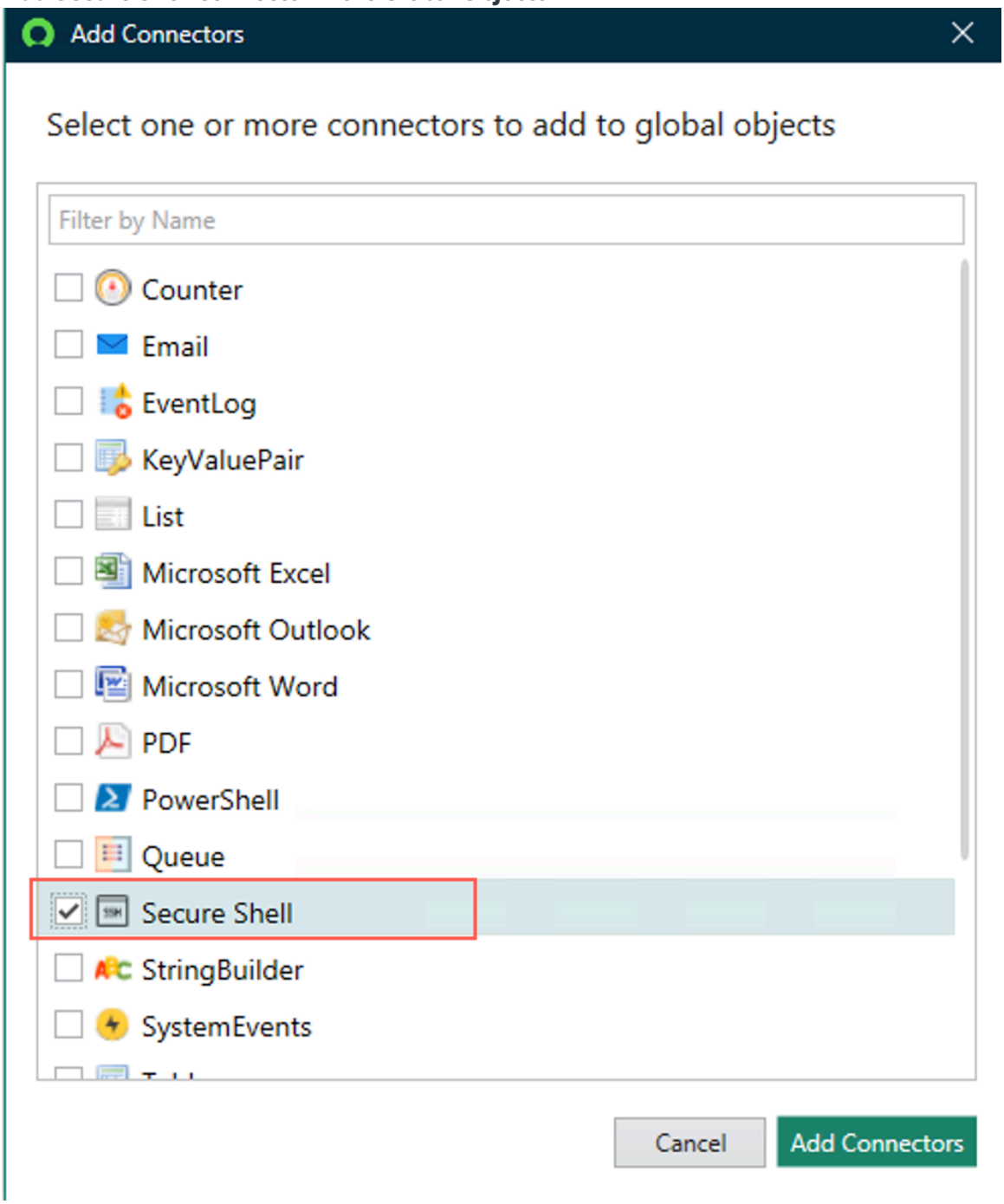
- To use a connector in RPA Desktop Design Studio, see Use a connector in RPA Desktop Design Studio. Add the Secure Shell connector in the Global Objects.

Add Secure Shell connector in the Global Objects



- To learn more about the various methods in the SSH connector, see Secure Shell (SSH) connector methods.

Secure Shell (SSH) connector methods

The Secure Shell (SSH) connector methods establish an SSH connection, execute commands over the established connection, and disconnect the session.

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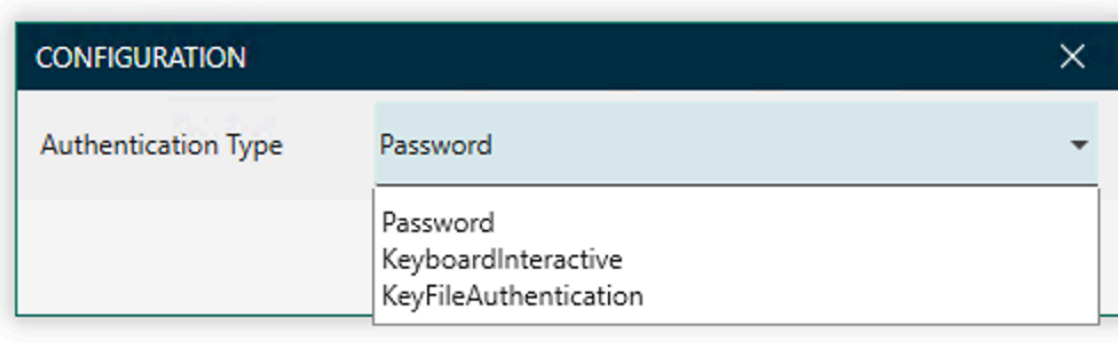
Connect

Establishes an SSH connection. Provide the information required to connect to a remote machine.

Select the settings icon ( ) to choose the authentication type.

Supported authentication types are Password, KeyboardInteractive, and KeyFileAuthentication.



Password is the default authentication type.

Connect method parameters

Parameter	Description	Data Port Type	Data type
HostName	Host name of the remote server or IP address.	Data In	String
Username	User name of the SSH account.	Data In	String
Password	Secure string representation of the password. Password of the SSH account. You can use the SecureStringEncode component to encode the secure string password as mentioned in the following example. For more information, see Use the SecureStringEncode component.	Data In	SecureString

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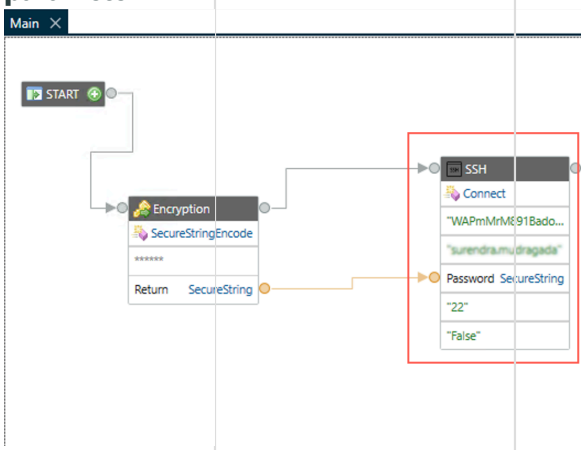
Connect method parameters (continued)

Parameter	Description	Data Port Type	Data type
	Connect method with Password parameter  After you perform this task, you can connect to the remote server.		
Port	Optional. The port number for the SSH connection. Default value is 22.	Data In	Integer
CreateShell	Optional. If True, a shell stream is created on successful connection. Any command that is executing on this connection uses the shell. If False, any command that is executing on this connection does not the shell. Default value is True.	Data In	Boolean
KeyboardInteractiveAuth	Password as a challenge. If True, the server prompts the client for password to verify the user's identity. Value provided in the password parameter is shared	Data In	Boolean

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Connect method parameters (continued)

Parameter	Description	Data Port Type	Data type
	as a response from client. This parameter appears only when **KeyboardInteractive** is selected from the Authentication Type.		
KeyFilepath	Path of the private key. This parameter appears only when **KeyFileAuthentication** is selected from the Authentication Type.	Data In	String
Passphrase	Optional. If private key is encrypted using Passphrase, same value is provided inside the Passphrase parameter to use the private key. This parameter appears only when **KeyFileAuthentication** is selected from the Authentication Type.	Data In	String

RunCommand

After establishing an SSH connection, execute commands over the established connection using the RunCommand method.

RunCommand method parameters

Parameter	Description	Data Port Type	Data type
Command	Commands that must be executed on the remote SSH server, such as messages or scripts, can be valid shell commands or executable commands that the remote server can understand. For example, `echo hello`.	Data In	String

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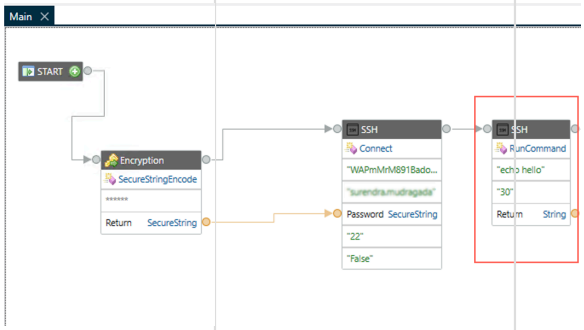
RunCommand method parameters (continued)

Parameter	Description	Data Port Type	Data type
	RunCommand method - Command parameter 		
Timeout	Optional. The parameter that specifies the maximum time (in seconds) to wait for the command's output from the SSH server when using an interactive shell. Default value is 30.	Data In	Integer
Return	The result of the executed command. For example, after executing the automation, in the Data Preview of Return parameter, "hello" is displayed.	Data Out	String

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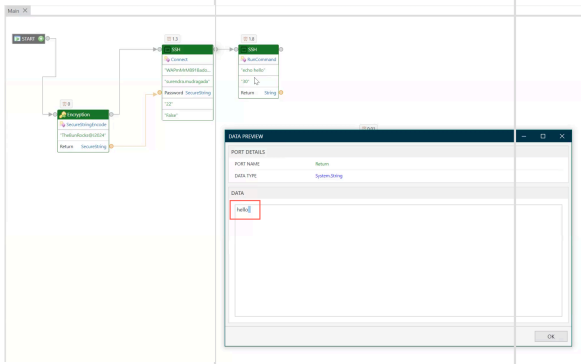
RunCommand method parameters (continued)

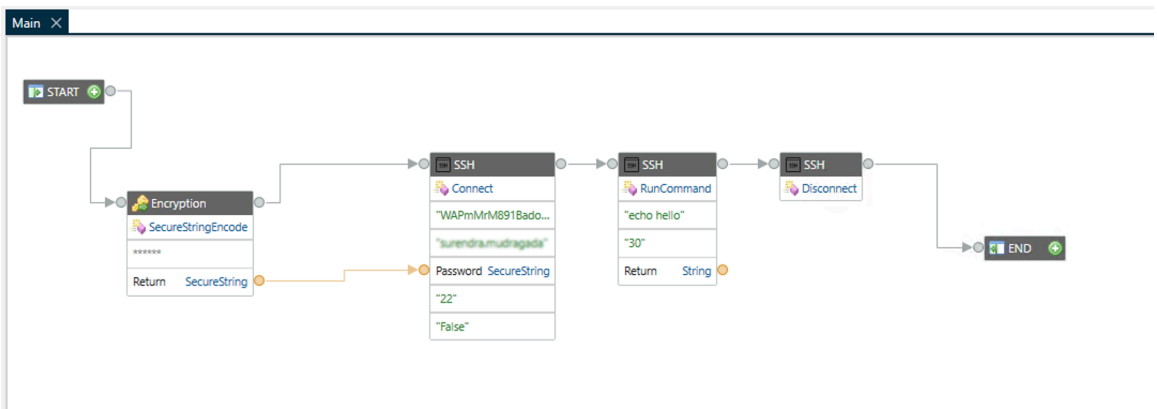
Parameter	Description	Data Port Type	Data type
	Return parameter of RunCommand method 		

Disconnect

After executing commands, disconnect the established connection using the Disconnect method.

The following example shows the entire automation after adding the Disconnect method.

Disconnect method



StringBuilder

The StringBuilder connector enables you to create, append, update, replace, or remove strings as part of your automation Workflow in RPA Desktop Design Studio.

You must first use and then expose the methods in the StringBuilder connector to use its methods.

- To use the connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

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StringBuilder connector methods

The StringBuilder connector methods enable you to create, append, update, replace, or remove strings in your automation workflow in RPA Desktop Design Studio.

Append

Adds string to an existing string. You can create multiple strings by using multiple copies of the method. To view the output, use the ToString method.

Note: The method doesn't insert a line between the strings.

Append method parameters

Parameter name	Description	Data Port type	Data type
Value	The string to be appended to the existing content. **Example** Existing string: "Hello" Value: " World!" Output: Hello World!	Data In	String

AppendLine

Adds a string followed by a newline character (\n) automatically. When you add multiple strings using multiple copies of the method, it inserts a line between the strings. It functions exactly like the **Enter** key on a Microsoft Word document. To view the output, use the ToString method.

AppendLine method parameters

Parameter name	Description	Data Port type	Data type
Value	String to append followed by a line break. **Example** Existing string: "Hello" Value: "World!" Output: Hello World!	Data In	String

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Replace

Replaces a string with a string that you specify in both the Append and AppendLine methods.

Replace method parameters

Parameter name	Description	Data Port type	Data type
OldValue	Existing string that is replaced with a string specified in the **NewValue** field. **Example** OldValue: User	Data In	String
NewValue	String that replaces the **OldValue** string. **Example** NewValue: Abel Tutor	Data In	String

Clear

Clears the string content in the methods.

ToString

Returns the output of the Append and AppendLine methods.

ToString method parameters

Parameter name	Description	Data Port type	Data type
Return	Output that is returned after the execution of the Append and AppendLine methods. For examples, see Append and AppendLine parameters.	Data Out	String

Configure inputs for the parameters

To enter inputs for parameters, see Configure port properties.

System Events

Track various system events such as creation of files or loss of the network with the System Events connector as part of your automation Workflow. The connector also enables you to stop tracking events, whenever needed.

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The System Events connector provides methods for tracking various system events. See the table.

System Events methods and events

Method	Purpose
WatchFileSystem	Tracks the following events: • FileChanged • FileDeleted • FileCreated • FileRenamed • FileWatchError
WatchNetworkAvailability	Tracks the following events: • NetworkAvailable • NetworkUnavailable
WatchSessionEvents	Tracks the following events: • OnSessionLock • OnSessionUnlock • OnSessionRemoteControl • OnSessionLogoff
UnWatchFileSystem	Stops tracking the following events: • FileChanged • FileDeleted • FileCreated • FileRenamed • FileWatchError
UnWatchNetworkAvailability	Stops tracking the following events: • NetworkAvailable • NetworkUnavailable
UnWatchSessionEvents	Stops tracking the following events: • OnSessionLock • OnSessionUnlock • OnSessionRemoteControl • OnSessionLogoff

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You must first use and then expose the methods in the SystemEvents connector to use its methods.

- To use the connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

SystemEvents connector methods

The SystemEvents connector methods watch various system events and, if needed, stop watching.

Methods

Provides the following methods and the events these methods track:

WatchFileSystem

Watches the following events.

File system events

Event	Description	Parameter
FileChanged	Update to the file.	• **Name**: Name of the file that is updated. • **Path**: Path to the file. • **ChangeType**: Type of update to the file.
FileCreated	New file created in the path watched by the WatchFileSystem method.	• **Name**: Name of the file created. • **Path**: Path to the file that was created.
FileDeleted	File deleted from the path watched by the WatchFileSystem method.	• **Name**: Name of the file deleted. • **Path**: Path to the file that was deleted.
FileRenamed	Name of the file changed.	• **OldName**: Previous name of the file. • **OldPath**: Previous path to the file, if path has also changed. • **NewName**: New name of the file. • **NewPath**: New path to the file, if applicable.

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File system events (continued)

Event	Description	Parameter
FileWatchError	WatchFileSystem method error.	

Input

Path

FileTypes

SubDirectories (Boolean)

WatchNetworkAvailability

Watches the network availability in the system. It uses the following events. You must execute the WatchNetworkAvailability method before executing any of the following events.

Network event availability

Event	Description	Parameter
NetworkAvailable	Watches the system when network is available.	
NetworkUnavailable	Watches the system when network is unavailable.	

WatchSessionEvents

Watches the following events.

Session events

Event	Description	Parameter
OnSessionLock	When a session is locked by the user.	
OnSessionUnlock	When a session is unlocked by the user.	
OnSessionRemoteControl	When a session is remote controlled by the user.	
OnSessionLogoff	When the session is logged off.	

UnwatchFileSystem

Stops or prevents the RPA Desktop Design Studio from watching the file system events. You can use this method before or after the WatchFileSystem method was already used.

UnwatchNetworkAvailability

Stops or prevents the RPA Desktop Design Studio watching the network availability events. You can use this method before or after the WatchNetworkAvailability method was already used.

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UnwatchSessionEvents

Stops or prevents RPA Desktop Design Studio watching the network availability events. You can use this method before or after the WatchSessionEvents method was already used.

Parameters of the SystemEvent connector methods

Learn about the various parameters of the SystemEvent connector methods in RPA Desktop Design Studio.

Parameters of the SystemEvent connector methods

Parameter name	Description	Mandatory?
Path	Path to the folder or file that the WatchFileSystem method will track.	Yes
FileTypes	File types that WatchFileSystem will track.	Yes
SubDirectories (Boolean)	Option to indicate whether WatchFileSystem will track subdirectories.	No
Name	Name of a file that is tracked by a SystemEvent method changes.	Yes
Path	Path of a file that is tracked by a SystemEvent method.	Yes
ChangeType	Type of change.	Yes
Name	Name of the file created.	Yes
Path	Path of the file created.	Yes
Name	Name of the file deleted.	Yes
Path	Path of the file deleted.	Yes
OldName	File name before a name change.	Yes
OldPath	File path before a path change.	Yes
NewName	New file name.	Yes
NewPath	New file path.	Yes

Configure inputs for the parameters

To enter inputs for parameters, see Configure port properties.

Table

The Table connector enables you to perform various actions on a table of any kind. For example, you can create or delete columns or rows or get the values from the cells in a table as part of a Workflow in RPA Desktop Design Studio.

You must first use and then expose the methods in the Table connector to use its methods.

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- To use the connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Table connector methods

The Table connector provides multiple methods that perform various actions on tabular data as part of an automation Workflow in the RPA Desktop Design Studio. For example, tasks such as getting a table, getting a row data, and removing empty rows.

SetTable

Inserts a table into the workflow. The SetTable method must be used before you do any other operations on a data table. You must provide the table object that needs to be set.

SetTable parameters

Parameter Name	Description	Data Port type	Data type
Table	Name of the table that you want to add or modify. **Example** DataTable	Data In	DataTable

AddColumn

Adds a column to a table. The position of the column is determined by the column index value that you specify. You must provide the name of the new column and the column index at which the new column needs to be added.

AddColumn parameters

Parameter Name	Description	Data type
Name	Name of the new column that you want to add. **Example** Customer data	String
ColumnIndex	Index of the column where the new column needs to be added. By default, -1 is the index value that you can update. For example, 0, 1, 2 can indicate the positions of columns from the left to the right.	Integer

AddColumns

Adds multiple columns to a table by accepting column names from another method or component. To view the columns added, use the GetTable method. You must provide a list of names of new columns which needs to be added in the datatable.

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AddColumns parameters

Parameter Name	Description	Data type
Names	Accepts names of columns in the form of an array, array list, or list. **Example** { "OrderID", "CustomerName", "OrderDate", "Status"};	IEnumerable

AddRow

Adds a row and its contents at the specified index. You must provide the RowIndex at which the row needs to be added.

To set the index values where you add the contents of the row, do the following actions:

1. Click the component settings icon ( ).
2. Click the add index icon ( ).
3. Enter the index.
4. Repeat the steps to add multiple indexes.
5. Click **OK**.

Note: A Data In port is added with each row that you add.

AddRow parameters

Parameter Name	Description	Data Port type	Data type
RowIndex	Index of row at which the new row needs to be added.	Data In	Integer

GetTable

Returns the table that you created with the AddColumn, AddColumns, and AddRow methods.

Note: You must execute this method after executing the AddColumn, AddColumns, and AddRow methods.

GetTable parameters

Parameter Name	Description	Data Port type	Data type
DataTable	Returns DataTable type representing underlying DataTable object.	Data Out	DataTable

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ClearColumns

Clears all column values from a table.

ClearRows

Clears all row values from a table.

DeleteColumnByIndex

Deletes a column based on the index value that you specify. You must provide the index of the column to be deleted to the Index parameter.

DeleteColumnByIndex parameters

Parameter Name	Description	Data Port type	Data type
Index	Index value of the column that must be deleted.	Data In	Integer

DeleteColumnByName

Deletes a column based on the name that you specify. You must provide the name of the column that needs to be deleted.

DeleteColumnByName parameters

Parameter Name	Description	Data Port type	Data type
Name	Name of the column that must be deleted.	Data In	String

DeleteRow

Deletes a row based on the index value provided. Before executing this method, you must assign custom index values to the rows. You must provide index of the row which needs to be deleted.

DeleteRow parameters

Parameter Name	Description	Data Port type	Data type
Index	Index of the row which needs to be deleted.	Data In	Integer

FilterAndSort

Filters and sorts the table based on a expression that you specify. You must provide the expression to calculate the value of a column, column name to be sorted in SortColumnName and Order. It returns the count of the rows available based on the criteria set and also returns the complete data table.

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FilterAndSort parameters

Parameter Name	Description	Data Port type	Data type
Expression	Expression to calculate the value of a column. **Example** "Status = 'Pending'" - Based on this query expression, the data is filtered.	Data In	String
SortColumnName	Column name by which the method will sort the data. **Example** Date - The method will sort the data based on the Date column.	Data In	String
Order	Order of the column name	Data In	String
DataTable	Returns the data table containing filtered data from the underlying DataTable object.	Data Out	DataTable
Count	Returns the count of rows after sort.	Data Out	Integer

FilterByRegEx

Filters the table data based on a regular expression or RegEx that you specify. You must provide the column index to ColumnIndex parameter and the regular expression to RegExpression parameter, which are used for filtering. This method returns the rows count and the data table.

FilterByRegEx parameters

Parameter Name	Description	Data Port type	Data type
ColumnIndex	Index of column on which filtering logic needs to be applied. The default index	Data In	Integer

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FilterByRegEx parameters (continued)

Parameter Name	Description	Data Port type	Data type
	value is -1 for the first column. Providing a custom index value is optional. If the field receives no custom index value, the method automatically sets the order of the columns.		
RegExpression	Regular expression which is used as a filtering logic.	Data In	String
Return	Returns a DataTable containing filtered data from the underlying DataTable object.	Data Out	DataTable
RowsCount	Returns the number of rows available based on the filter using RegExpression.	Data Out	Integer

FindText

Finds the text in the table that you specify based on one or more criteria and returns cell value. You must provide the text to search in SearchText parameter, position from where the search should start in StartPosition and the type of match required.

FindText parameters

Parameter Name	Description	Data Port type	Data type
SearchText	Text to be searched in the table. **Example** "John Doe"	Data In	String
StartPosition	Position of the column from where the search should start.	Data In	Integer
MatchType	Type of match of the text: • **ExactMatch**: The specified text and the searched text must match exactly. This is a default value.	Data In	MatchType

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FindText parameters (continued)

Parameter Name	Description	Data Port type	Data type
	• **MatchCase**: The specified text case should match the case of the searched text. • **Contains**: The specified text should contain one or more characters of the searched text.		
CellValue	Returns the value in the cell based on the search.	Data Out	Object
ColIndex	Returns the index of the column that has that searched text.	Data Out	Integer
RowIndex	Returns the index of the row that has that searched text.	Data Out	Integer

GetCellValue

Returns the value in a cell based on the row and column index values that you specify. You must provide the row number and column number of the cell from which value needs to be retrieved.

GetCellValue parameters

Parameter Name	Description	Data Port type	Data type
Row	Row number of the required cell.	Data In	Integer
Column	Column number of the required cell.	Data In	Integer
Return	Returns Object type representing cell value from underlying DataTable object.	Data Out	Object

GetCellValueIfRowHas

Returns True if the method finds the text that you specify and the row values based on the index values that you specify. You must provide the text to be searched. Perform the search on a particular column provided by SearchColumnIndex and start searching the text from a particular row provided to StartRowIndex. Default value is 1 meaning 1st row of the table.

To specify the row values, you must configure the method.

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1. Click the method settings icon ( ).
2. Click the add row index icon ( ).
3. Update the row index value data type.
4. Enter the row index value.
5. Click **OK**.

GetCellValueIfRowHas parameters

Parameter Name	Description	Data Port type	Data type
SearchText	Text to be searched in the row. **Example** "John Doe"	Data In	String
SearchColumnIndex	Index of column in which the text needs to be searched.	Data In	Integer
StartRowIndex	Starting row from which the search needs to be performed.	Data In	Integer
Found	Returns True if the text matched.	Data Out	Boolean

GetCellValues

Returns values of the multiple cells based on the index values that you specify. You must provide the row index of the cell whose value needs to be retrieved. Additional row indexes can also be added to get those cell values using the config window.

To configure, do the following actions:

1. Click the method settings icon ( ).
2. Click the add row index icon ( ).
3. Update the row index value data type.
4. Enter the row index value.
5. Click **OK**.

GetCellValue parameters

Parameter Name	Description	Data Port type	Data type
RowIndex	Index of the row whose cell value is required.	Data In	Integer

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GetCount

Returns the total count of rows and columns of a data table.

GetCount parameters

Parameter Name	Description	Data Port type	Data type
Row	Returns the total count of rows created.	Data Out	Integer
Column	Returns the total count of columns created.	Data Out	Integer

GetRowData

Returns row data based on the index value that you specify. You must provide the index value of the row from which data needs to be retrieved.

GetRowData parameters

Parameter Name	Description	Data Port type	Data type
RowIndex	Index value of the row from which data needs to be retrieved.	Data In	Integer
Return	Returns list Of Object type representing row data from underlying DataTable object. The **IEnumerable** data type accepts the row value data as array, list, or array list and returns as object.	Data Out	IEnumerable

GetTableAsCSV

Saves the table data in the CSV format to the local drive. You must provide the file path to which the CSV file needs to be written to and also provide the separator between the two records.

GetTableAsCSV parameters

Parameter Name	Description	Data Port type	Data type
Filepath	Folder path in the local drive where the method saves the table data as CSV. In the file path, you must include the filename. **Example** D: \Projects	Data In	String

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GetTableAsCSV parameters (continued)

Parameter Name	Description	Data Port type	Data type
	\Customer data.csv		
Delimiter	Delimiter that separates the table data. **Example** Comma (",")	Data In	String

GetTableAsHTML

Returns the table data in an HTML file format. Before you execute this method, you must create columns, rows, and data and then execute them with the GetTable method.

GetTableAsHTML parameters

Parameter Name	Description	Data Port type	Data type
Return	Returns the tabular data in the HTML format.	Data In	String

GetTableAsJson

Returns the table data in a JSON file format. Before you execute this method, you must create columns, rows, and data and then execute them with the GetTable method.

GetTableAsJson parameters

Parameter Name	Description	Data Port type	Data type
Return	Returns the tabular data as a JSON object.	Data In	String

LoadFromExcel

Imports the sheet or data from the specified Excel file to the data table. You must provide the path of the Excel file from which the data needs to be loaded. Give the sheet name or provide a query to SheetOrQuery parameter. If a query is provided, then set the IsQuery Boolean to True, and if a sheet name is provided, then set the IsQuery Boolean to False. You can test whether the data was imported correctly with the GetTable method.

LoadFromExcel parameters

Parameter Name	Description	Data Port type	Data type
FilePath	Path to the Excel file from which the data is imported.	Data In	String

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LoadFromExcel parameters (continued)

Parameter Name	Description	Data Port type	Data type
	D: \Projects \Sales \Sales data.xlsx		
SheetOrQuery	Indicates whether data is imported from a sheet in the Excel file or through a query to the file.	Data In	String
IsQuery	Boolean value to indicate whether the data is loaded through a query.	Data In	Boolean

MatchColumn

Matches another datatable's columns with the current table's column based on the column index. You must provide the datatable whose columns need to be matched provided in dtTable with the index of column in current table in ColumnIndex parameter. Before you execute this method, you must execute the GetTable method.

MatchColumn parameters

Parameter Name	Description	Data Port type	Data type
dtTable	Data table whose columns need to be matched.	Data In	DataTable
ColumnIndex	Index of the column with which it has to be matched.	Data In	Integer
Return	Returns a true or false value indicating whether the specified column is matched.	Data Out	Boolean

RemoveEmptyColumns

Removes all the empty columns in the table and returns the data table after the operation.

RemoveEmptyColumns parameters

Parameter Name	Description	Data Port type	Data type
Return	Returns the data table after removing the empty columns.	Data Out	DataTable

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RemoveEmptyRows

Removes all the empty rows in the table and returns the data table after the operation.

RemoveEmptyRows parameters

Parameter Name	Description	Data Port type	Data type
Return	Returns the data table after removing the empty rows.	Data Out	DataTable

SetCellValue

Adds data to a cell based on column and row index values. You must provide the row number, column number and the value in Value parameter that needs to be set.

Before you execute this method, you must create columns, rows, and data and then execute them with the GetTable method.

SetCellValue parameters

Parameter Name	Description	Data Port type	Data type
Row	Index number of the row which the method will use to fill data.	Data In	Integer
Column	Index number of the column which the method will use to fill data.	Data In	Integer
Value	Value that must be set in the cell.	Data In	Object

SetCellValueIfRowHas

Sets cell value(s) of a particular row if row contains specified text. You must provide the row index in the Row Index configuration dialog. The name of the row index parameter added is considered for setting the value and the value provide to that parameter is the actual value that will be set to the row of the table.

SetCellValueIfRowHas parameters

Parameter Name	Description	Data Port type	Data type
SearchText	Text to be searched in the row.	Data In	String
SearchColumnIndex	Index of the column in which the text needs to be searched.	Data In	Integer
StartRowIndex	Starting row from which the text needs to be searched.	Data In	Integer

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SetCellValueIfRowHas parameters (continued)

Parameter Name	Description	Data Port type	Data type
Found	Returns True if the text matches.	Data Out	Boolean

SetColumnName

Updates a column name based on the column index and name that you specify. You must first create or import a table by using the SetTable method.

SetColumnName parameters

Parameter Name	Description	Data Port type	Data type
ColumnIndex	Index of the column which needs to be named.	Data In	Integer
Name	New name of the column.	Data In	String

SetJson

Converts a JSON object to a DataTable. Provide JSON data that needs to be converted to DataTable.

Tip: To create a JSON object, use the GetTableAsJson method and then pass the values to the SetJson method.

SetJson parameters

Parameter Name	Description	Data Port type	Data type
JSON	JSON object needs to be converted to a DataTable.	Data In	String

SetList

Converts a list to a DataTable. Provide the data list that needs to be converted to table.

SetList parameters

Parameter Name	Description	Data Port type	Data type
Data	List type data that needs to be converted to table. The **IEnumerable** input data type accepts the data as array, list, or array list. { "OrderID": 102,	Data In	IEnumerable

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SetList parameters (continued)

Parameter Name	Description	Data Port type	Data type
	"CustomerName": "John Doe", "OrderDate": "2024-02-02", "Status": "Shipped" };		

SetRowData

Inserts the specified row data into a data table. You must provide the index number of the row to the RowIndex parameter and data that needs to be added to the row to the Data parameter.

SetRowData parameters

Parameter Name	Description	Data Port type	Data type
RowIndex	Index number of the row that needs to be modified.	Data In	Integer
Data	Data in a row that is inserted into a data table. The **IEnumerable** input data type accepts the data as array, list, or array list. { "OrderID": 102, "CustomerName": "John Doe", "OrderDate": "2024-02-02", "Status": "Shipped" };	Data In	IEnumerable

ToList

Converts the specified table to a list.

ToList parameters

Parameter Name	Description	Data Port type	Data type
Return	Returns an IEnumerable representing a DataTable object converted into a List. The **IEnumerable** data	Data Out	IEnumerable

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ToList parameters (continued)

Parameter Name	Description	Data Port type	Data type
	type accepts the data as array, list, or array list and returns the list.		

VLookUp

Gets cell value(s) of a particular row if row contains specified text.

To input the values, do the following actions:

1. Click the method settings icon ( ).
2. Click .
3. Enter the values.
4. Click **OK**.

VLookUp parameters

Parameter Name	Description	Data Port type	Data type
Port name	Name of the port of the component.	Data In	String
SearchText	Text that the method will search in the rows and columns.	Data In	String
DataColumnIndex	Integer value that indicates the order of the column from the left. The default index value is -1 for the first column. Providing a custom index value is optional. If the field receives no custom index value, the method automatically sets the order of the columns.	Data In	Integer
SearchColumnIndex	Integer value that indicates the order of the column from the left. The default index value is -1 for the first column. Providing a custom index value is optional. If the field receives no custom index value, the method automatically	Data In	Integer

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VLookUp parameters (continued)

Parameter Name	Description	Data Port type	Data type
	sets the order of the columns.		
StartRowIndex	Integer value that indicates the order of the column from the left. The default index value is -1 for the first row. Providing a custom index value is optional. If the field receives no custom index value, the method automatically sets the order of the columns.	Data In	Integer

VLookUpSet

Sets cell value(s) of a particular row if row contains specified text.

To input the values, do the following actions:

1. Click the method settings icon ( ).
2. Click .
3. Enter the values.
4. Click **OK**.

VLookUpSet parameters

Parameter Name	Description	Data Port type	Data type
Port name	Name of the port of the component.	Data In	String
SearchText	Text that the method will search in the rows and columns.	Data In	String
DataColumnIndex	Integer value that indicates the order of the column from the left. The default index value is -1 for the first column. Providing a custom index value is optional. If the field receives no custom index value, the method automatically sets the order of the columns.	Data In	Integer

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VLookUpSet parameters (continued)

Parameter Name	Description	Data Port type	Data type
SearchColumnIndex	Integer value that indicates the order of the column from the left. The default index value is -1 for the first column. Providing a custom index value is optional. If the field receives no custom index value, the method automatically sets the order of the columns.	Data In	Integer
StartRowIndex	Integer value that indicates the order of the column from the left. The default index value is -1 for the first row. Providing a custom index value is optional. If the field receives no custom index value, the method automatically sets the order of the columns.	Data In	Integer

Timer

The Timer connector sets a user-defined timer within a workflow and when the timer stops, it triggers an automation.

You must first use and then expose the methods in the Timer connector to use its methods.

- To use the connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Timer connector methods

Learn about the Timer connector methods and event.

Start method

The Start method enables you to set a time in milliseconds.

Input

Interval

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Start method parameters

Parameter name	Port type	Data type	Description	Mandatory?
Interval	Data In	Integer	Timer interval in milliseconds.	Yes

Stop method

Stops the timer.

OnTimeTick event

The event starts when the Start method starts.

OnTimeTick event parameters

Parameter name	Port type	Data type	Description	Mandatory?
SignalTime	Data Out	Integer	The system date and time when the trigger starts operating.	Yes
ElapsedTime	Data Out	Integer	Total time in the timer elapsed.	Yes

Terminal (Mainframe) connector

Automate various actions on the IBM Personal Communications and Rocket BlueZone emulators by using the Terminal connector that RPA Desktop Design Studio provides. For example, you can simulate a command on the emulator screen or get text from the screen.

Important: The Terminal connector uses the IBM Personal Communications and the Rocket BlueZone APIs internally to interact and automate applications that are hosted on Mainframe or AS/400 applications. Any known issue or limitation of IBM Personal Communications and the Rocket BlueZone API is applicable.

You must first make the Terminal connector available for use on the Design surface of RPA Desktop Design Studio. To learn how to make the Terminal connector available for use, see Use a connector in RPA Desktop Design Studio.

Configure the Terminal connector by capturing the IBM Personal Communications and Rocket BlueZone emulator screens and their elements on which the connector performs actions. To learn how to configure the Terminal connector, see Configure the Terminal connector.

Automate actions on the IBM Personal Communications (PCOMM) and Rocket BlueZone emulator screens by using the methods that the Terminal connector provides. To learn how to use the methods, see Use a component in RPA Desktop Design Studio.

Configure the Terminal connector

Create automations on the IBM Personal Communications (PCOMM) and the Rocket BlueZone emulators by using the Terminal connector that RPA Desktop Design Studio provides. By capturing these emulator screens and their elements, you can automate actions on them.

Ensure you have installed the Terminal (Mainframe) plugin on the RPA Desktop Design Studio. To install, see Manage plugins in RPA Desktop Design Studio.

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Ensure that you have added the Terminal connector object under the Global Objects in the Project Explorer pane.

Ensure that you have started an emulator session and connected it to a server.

Role required: none

Configure the IBM Personal Communications emulator

Configure the IBM Personal Communications (PCOMM) emulator on the RPA Desktop Design Studio by capturing the PCOMM emulator screens and their elements. After capturing the screens, you can use the screen and element methods to automate actions on the screens and elements.

Before you begin

Add the Terminal connector object to the Global Objects list in the Project Explorer pane so the Terminal connector is available to all the activities, components, and connectors in the automation project.

Start an emulator session and connect it to a server.

Role required: none

Procedure

1. Navigate to the Project Explorer pane **> Global Objects** and right-click the **TerminalSession** object.
2. Select **Configure**.

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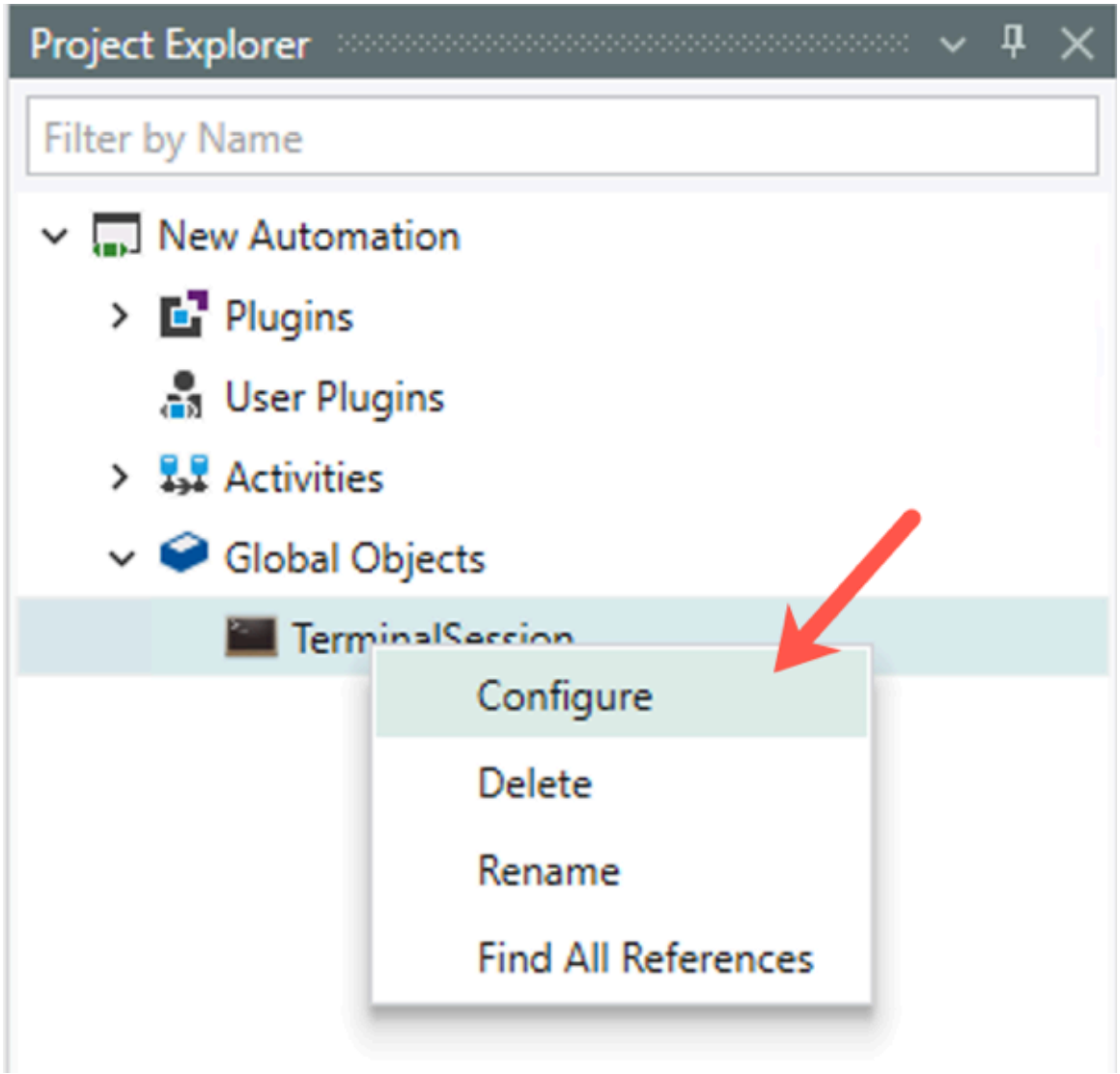

3. On the Terminal Connector window, make sure that Pcomm is selected.

   By default, Pcomm is selected.



   Tip: To load a PCOMM emulator screen that doesn't appear in the list, select the refresh icon ( ).

4. Capture a PCOMM emulator screen.

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a. In the Pcomm list, select a PCOMM Mainframe emulator screen.



Note: When the PCOMM emulator establishes a connection with the server, a session is created with the name of the session. For example, the name of the session in the example is A.

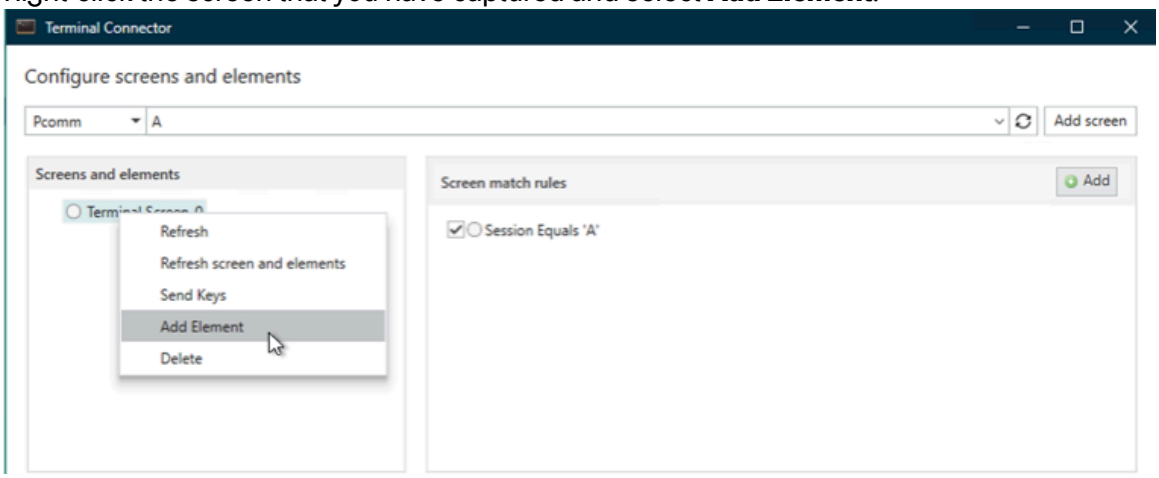
b. Select **Add Screen**.
The emulator screen is added and appears in the Screens and elements pane and under the TerminalSession object in the Project Explorer pane.



When you capture multiple screens and elements and want to automate tasks on one screen or element, the connector must first find the screen or element by using the match rules. To know about the match rules, see Use the screen or element match rules.

5. Capture an element from the Pcomm emulator screen.

a. Right-click the screen that you have captured and select **Add Element**.



b. In the TERMINAL PREVIEW screen, move your mouse device to the element that you want to capture.
The element displays its information.

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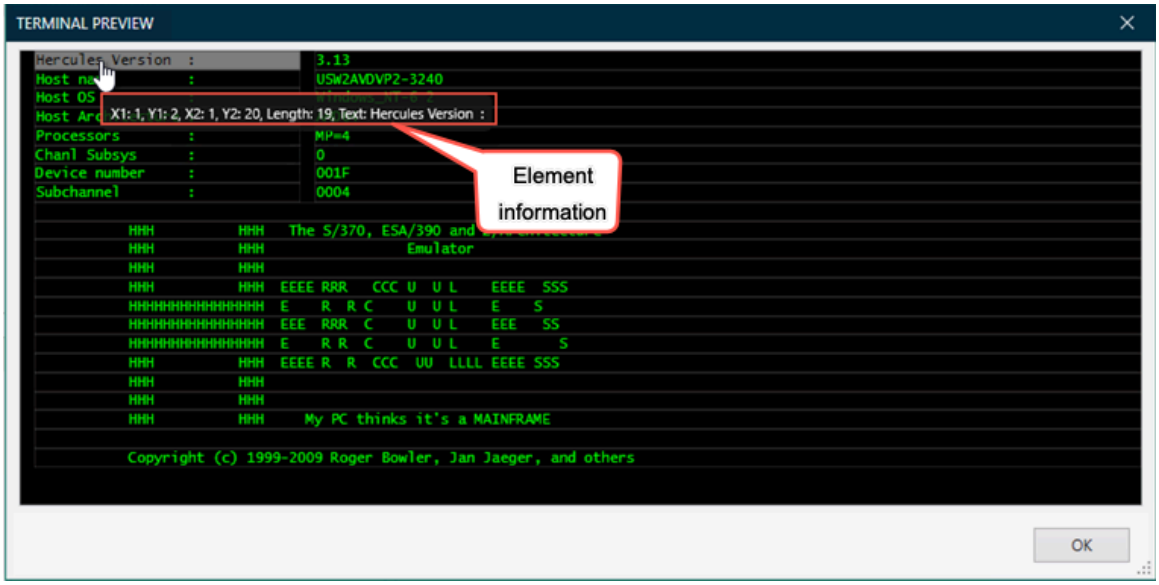
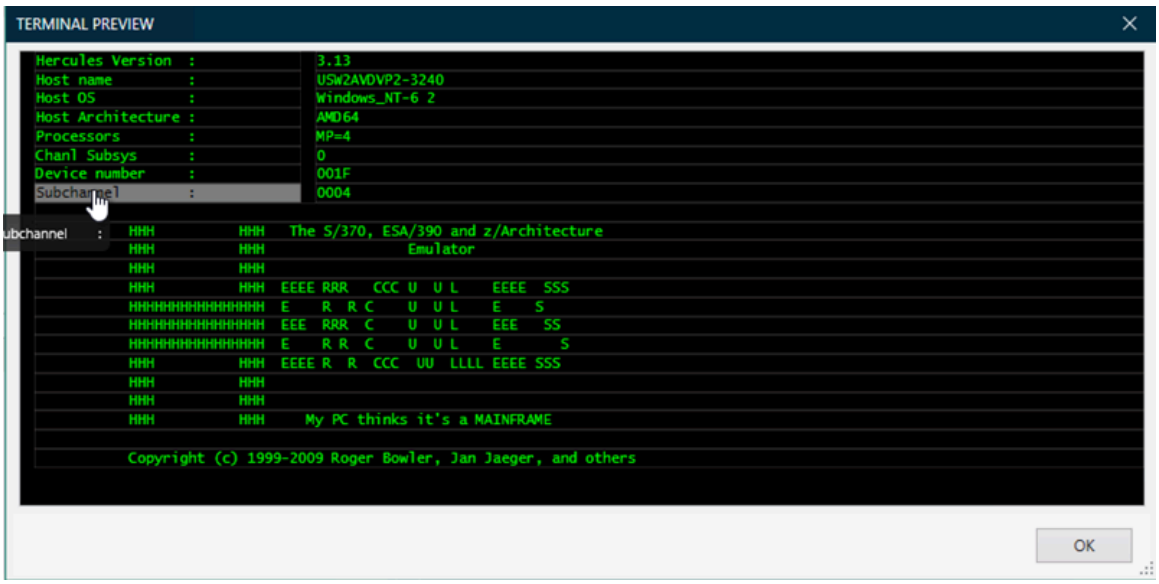


c. Add the element as a field by right-clicking the element and selecting **Add as Field**.

The data in a Mainframe screen is displayed within fields. The emulator screen that you configure in the RPA Desktop Design Studio indicates a field with a rectangle. The following image shows a field within a rectangle.



When you select **Add as Field**, the connector treats the element as a field that displays the data or enables data entry. With this option, you can get the text or data from a field and then enter the data in a form.

d. Add fields after selecting them in a tabular format.

To add fields after selecting them in a tabular format, select the contiguous fields that make up a table. The following example shows how you must select the fields to capture a table.

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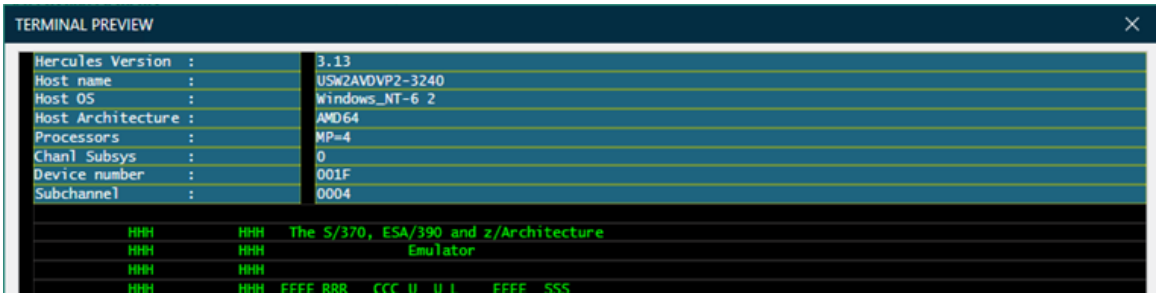


Select the fields.

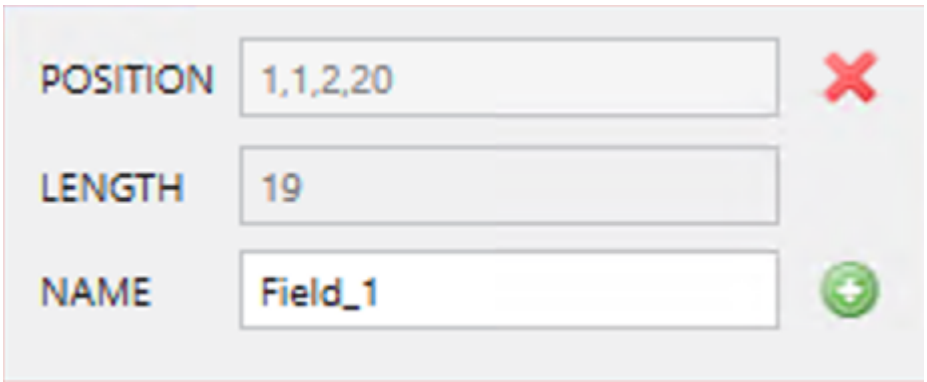
i. Select the first field in the table.

ii. On your keyboard, press **Shift**.

iii. Select the last field in the table.

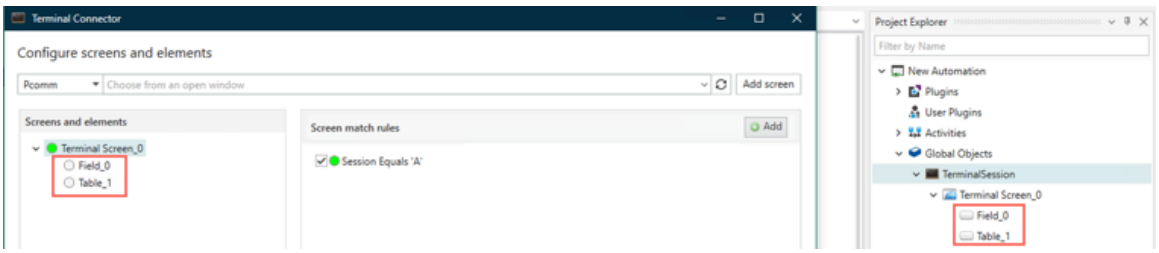
Right-click and select **Add as Table**.

e. In the context dialog box, enter the name of the field or table in the **NAME** field.



f. Select the Add Field icon  .
To capture more elements, you can repeat steps 5a through 5f.

g. Close the **TERMINAL PREVIEW** screen by selecting **OK**.
The element is added and appears in the Screens and elements pane in the Terminal Connector screen under the TerminalScreen_0 object.



6. **Optional:** Use the screen match rules to enable the terminal connector to locate a screen or element.
When you capture multiple screens, fields, or tables and want to automate tasks on one screen or element, the connector must first find the screen or element. To enable the connector to find the screen or element, use the screen match rules at Use the screen or element match rules.

7. View the screen and element methods.

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a. View the screen-level methods under the TerminalSession object in the Project Explorer pane by double-clicking the screen that you captured.
The methods appear in the Object Explorer pane.

b. View the element-level methods in the Project Explorer pane by navigating to the element under the screen that you captured and double-clicking the element.
The methods appear in the Object Explorer pane.

Related topics

IBM Personal Communications emulator methods

Configure the Rocket BlueZone emulator

Configure the Rocket BlueZone emulator on the RPA Desktop Design Studio by capturing the Rocket BlueZone emulator screens and their elements. After capturing the screens, you can use the screen and element methods to automate actions on the screens and elements.

Before you begin

Add the Terminal connector object to the Global Objects list in the Project Explorer pane so the Terminal connector is available to all the activities, components, and connectors in the automation project.

Start an emulator session and connect it to a server.

Role required: none

Procedure

1. Navigate to the Project Explorer pane **> Global Objects** and right-click the **TerminalSession** object.
2. Select **Configure**.

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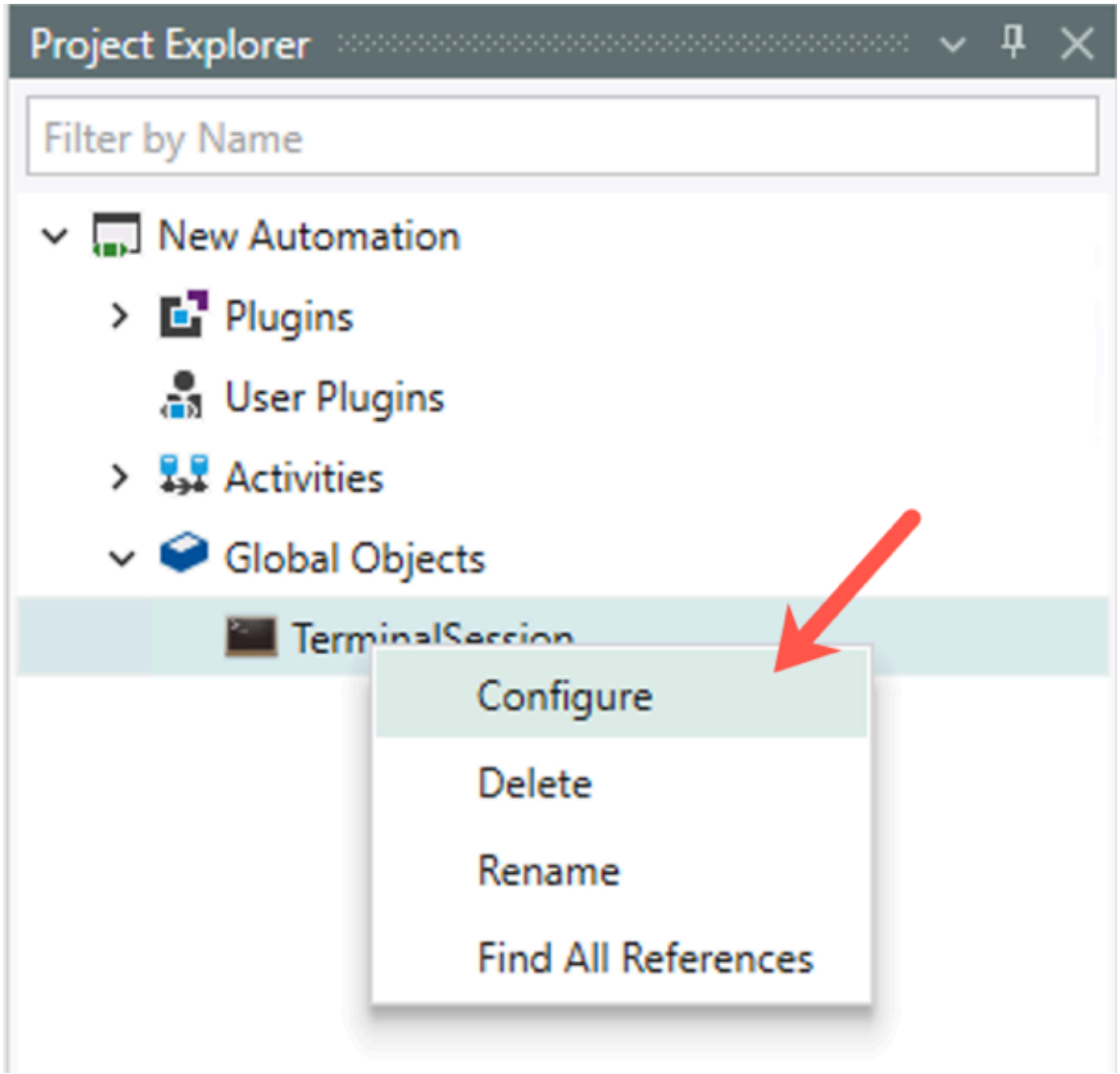
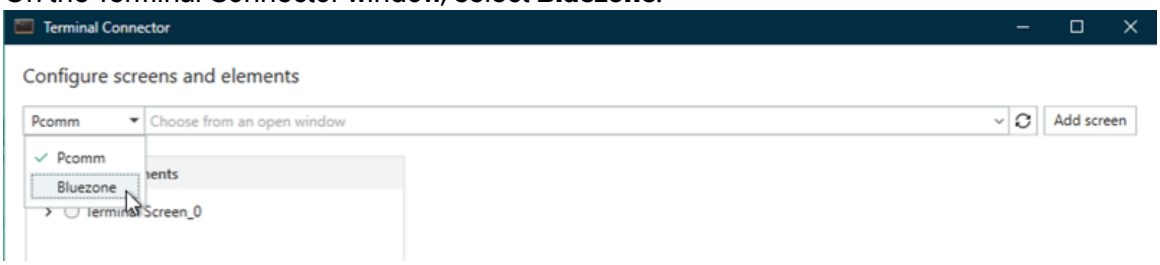


3. On the Terminal Connector window, select **Bluezone**.



> **Tip:** To load a BlueZone emulator screen that doesn't appear in the list, select the refresh icon ( ).

4. Capture a BlueZone emulator screen.

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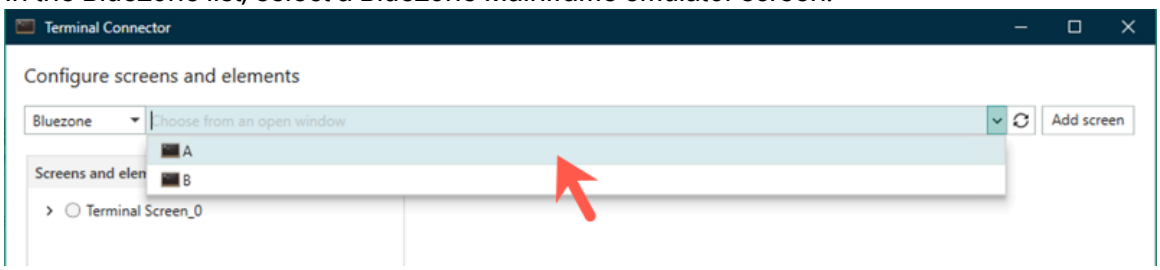
a. In the BlueZone list, select a BlueZone Mainframe emulator screen.



Note: When the BlueZone emulator establishes a connection with the server, a session is created with the name of the session. For example, the name of the session in the example is A.

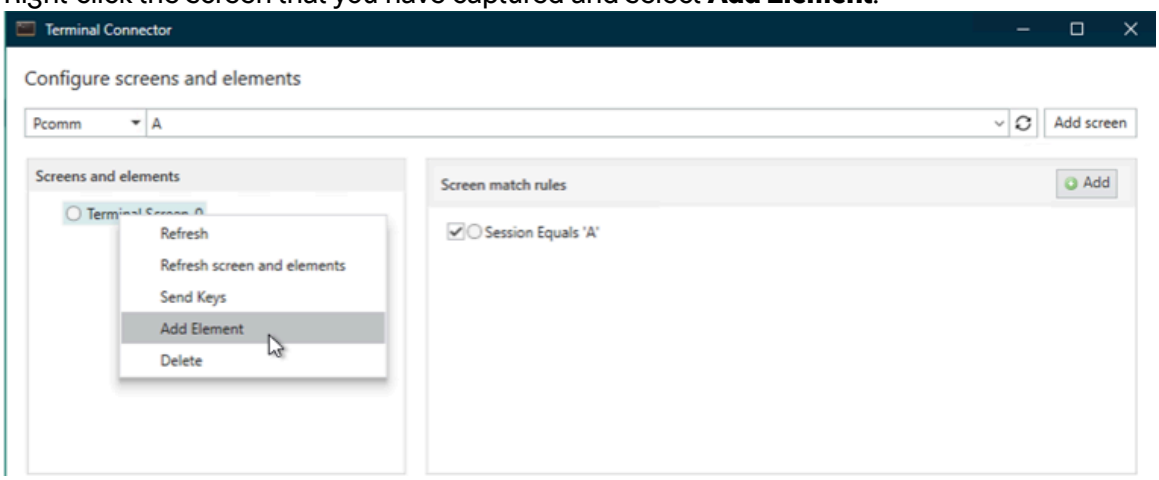
b. Select **Add Screen**.
The emulator screen is added and appears in the Screens and elements pane and under the TerminalSession object in the Project Explorer pane.



When you capture multiple screens and elements and want to automate tasks on one screen or element, the connector must first find the screen or element by using the match rules. To know about the match rules, see Use the screen or element match rules.

5. Capture an element from the BlueZone emulator screen.

a. Right-click the screen that you have captured and select **Add Element**.



b. In the TERMINAL PREVIEW screen, move your mouse device to the element that you want to capture.
The element displays its information.

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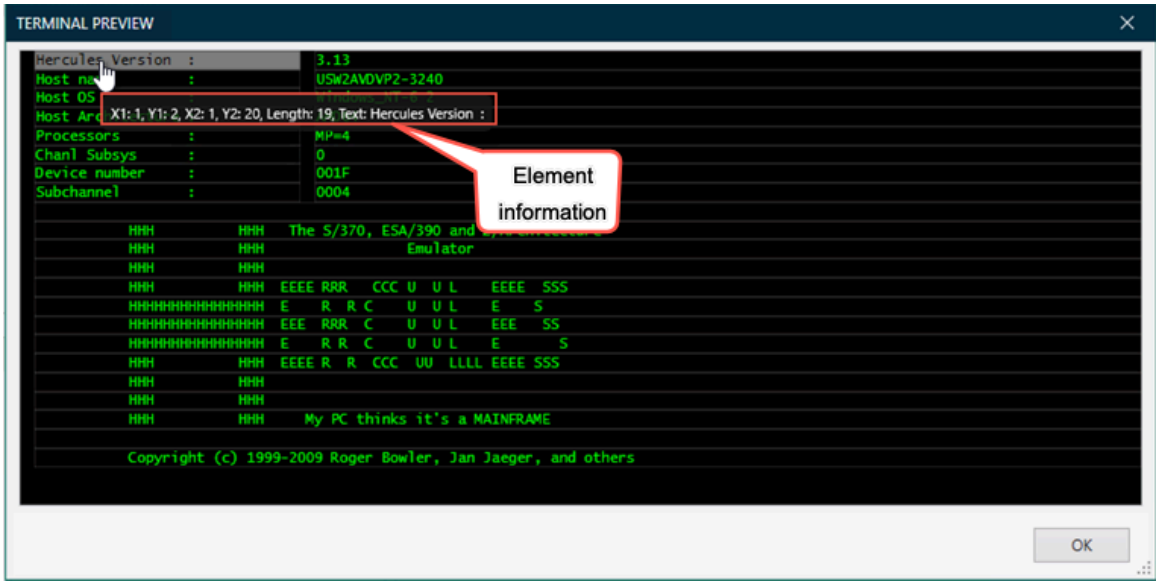
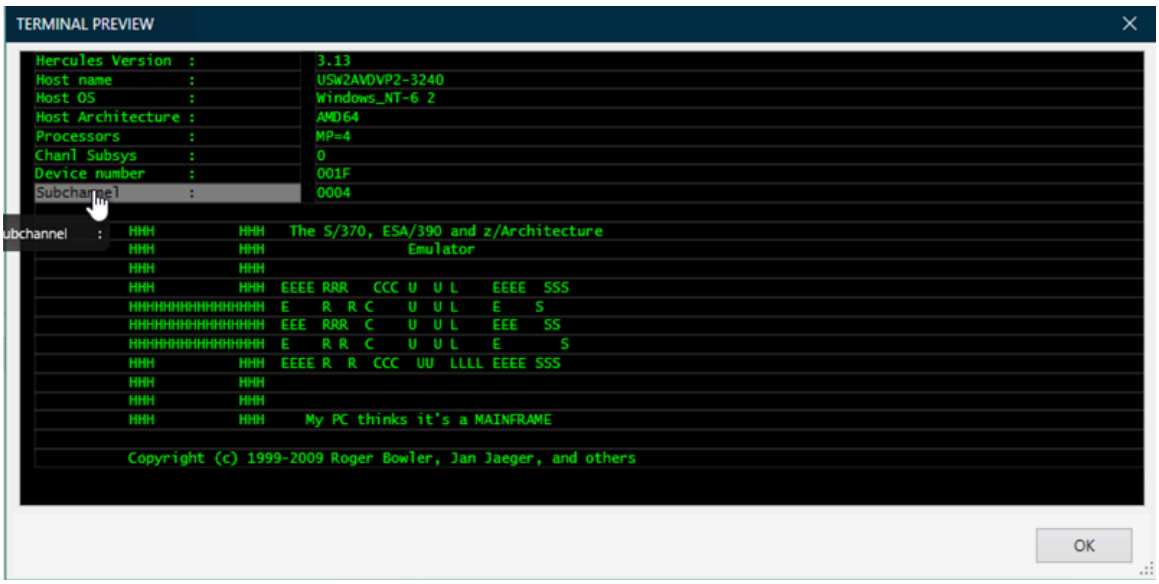


c. Add the element as a single field by right-clicking the element and selecting **Add as Field**.

The data in a Mainframe screen is displayed within fields. The BlueZone emulator screen in the RPA Desktop Design Studio indicates a field with a rectangle. The following image shows a field.



When you select **Add as Field**, the connector treats the element as a field that displays the data or enables data entry. With this option, you can get the text or data from a field and then enter the data in a form.

d. Add fields after selecting them in a tabular format.

To add fields after selecting them in a tabular format, select the contiguous fields that create a tabular format. The following example shows how you must select the fields to capture them in a tabular format.

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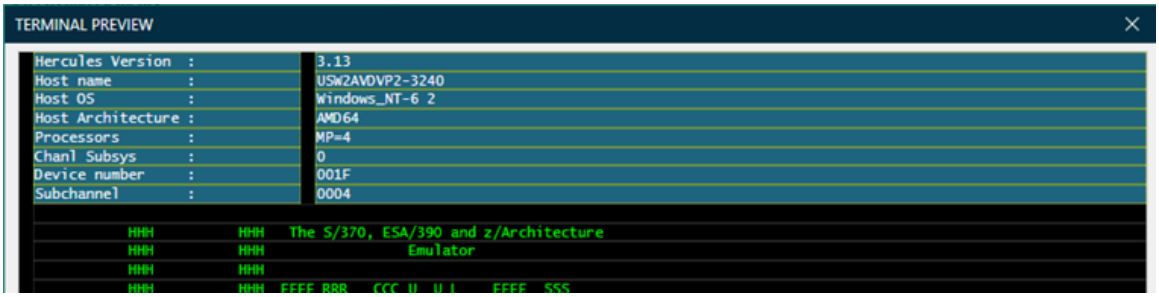


Select the fields.

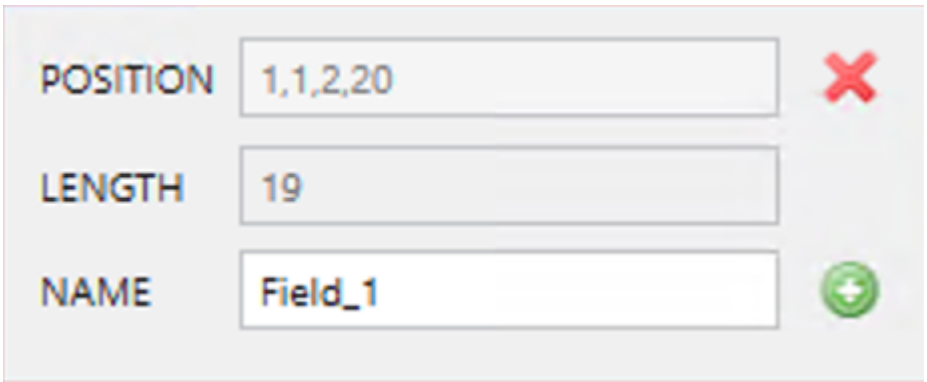
i. Select the first field in the tabular area that you have identified.

ii. On your keyboard, press **Shift**.

iii. Select the last field in the tabular area that you have identified.

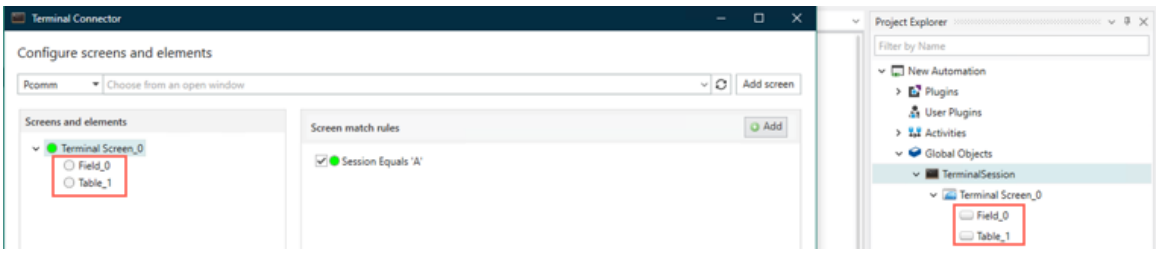
Right-click and select **Add as Table**.

e. In the context dialog box, enter the name of the field or table in the **NAME** field.



f. Select the Add Field icon  .
To capture more elements, you can repeat steps 5a through 5f.

g. Close the **TERMINAL PREVIEW** screen by selecting **OK**.
The element is added and appears in the Screens and elements pane in the Terminal Connector screen under the TerminalScreen_0 object.



6. **Optional:** Use the screen match rules to enable the terminal connector to locate a screen or element.
When you capture multiple screens, fields, or tables and want to automate tasks on one screen or element, the connector must first find the screen or element. To enable the connector to find the screen or element, use the screen match rules at Use the screen or element match rules.

7. View the screen and element methods.

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a. View the screen-level methods under the TerminalSession object in the Project Explorer pane by double-clicking the screen that you captured.
The methods appear in the Object Explorer pane.

b. View the element-level methods in the Project Explorer pane by navigating to the element under the screen that you captured and double-clicking the element.
The methods appear in the Object Explorer pane.

Related topics

Rocket BlueZone emulator methods

Use the screen or element match rules

Use the screen or element match rules to match a screen or element from among multiple screens and elements with its corresponding rules. Match rules enables the connector to identify the appropriate screen or element and perform tasks.

Before you begin

Capture at least one emulator screen and an element.

Role required: none

About this task

To perform tasks on a specific emulator screen or element from among multiple emulator screens and elements, the Terminal connector must first identify a screen. To identify a screen or element, the Terminal connector uses the screen match rules, attributes, and the element locators. The screen match rules, locators, and attributes provide unique identification criteria for each screen and element.

All captured screens have a default screen match rule. Additionally, you can define one or more screen match rules. You can modify or remove the default screen match rules or the screen match rules that you define.

Screen and elements have different match rules. For a screen, the terminal connector uses screen match rules and for an element, it uses locators.

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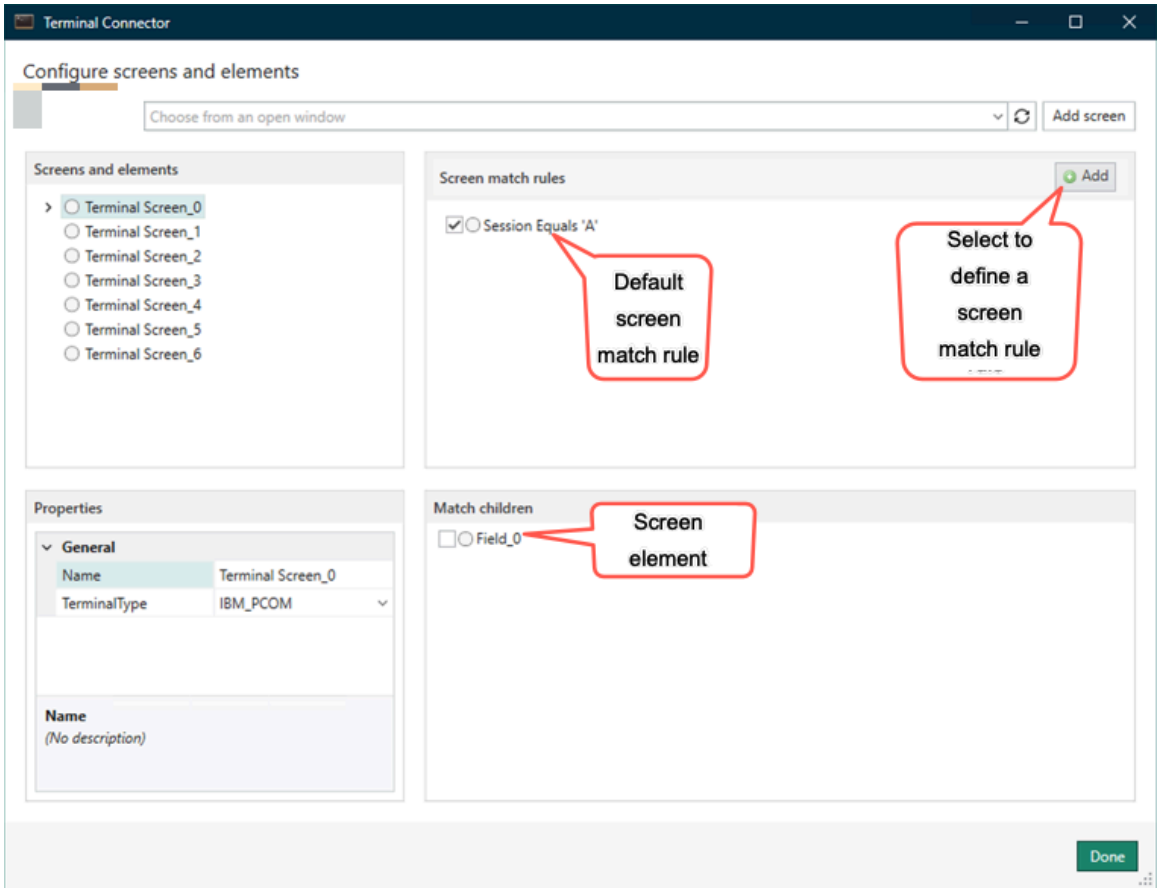
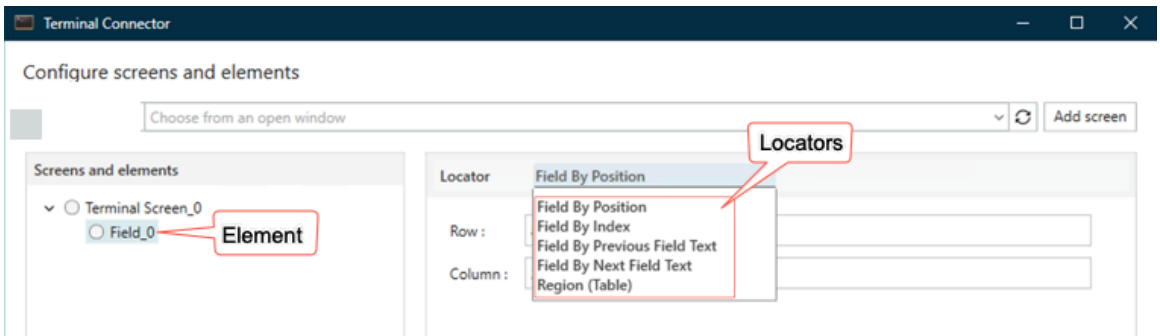


The image shows the locators for a screen element.



Procedure

1. **Optional:** Rename the screen with a unique name.

   a. Under the Screen and elements pane, select the screen.

   b. Under the **Properties** pane, rename the screen and press **Enter**.

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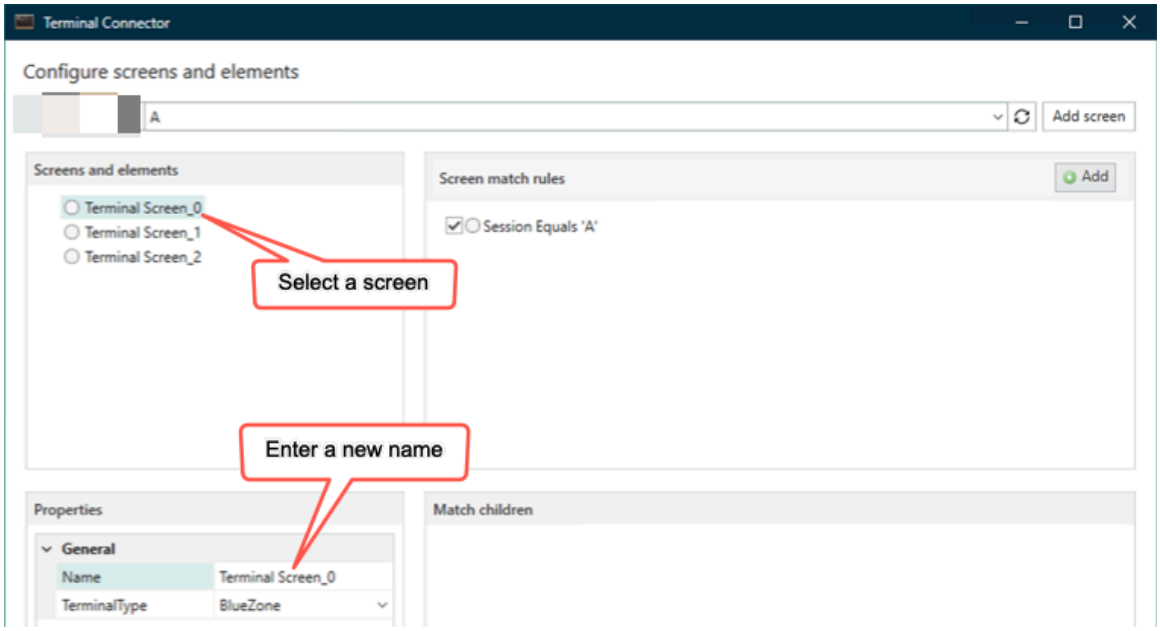
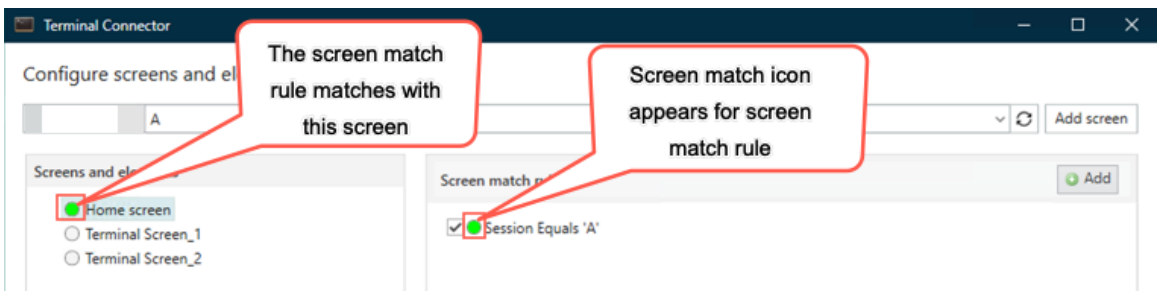


The new screen name appears under the Screen and elements pane.

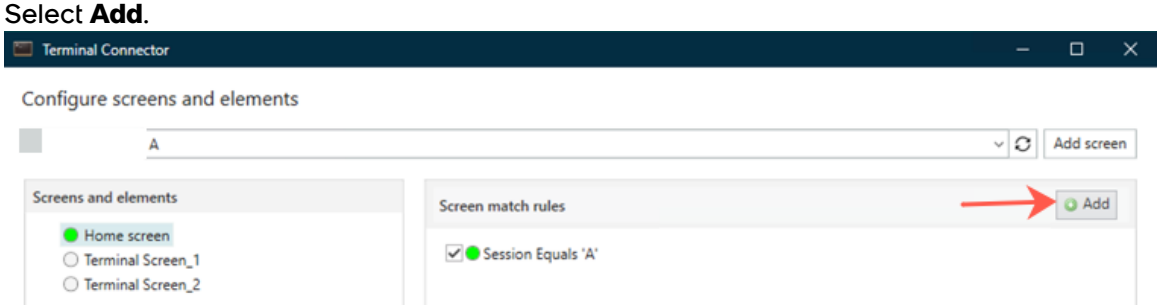
c. Under the Screen and elements pane, right-click the screen and select **Refresh**.

If the screen match rule matches a screen, the screen match icon ( ) appears for both the screen and the screen match rule. The icon indicates that the screen match rule matches with the screen.



2. Optional: Define a screen match rule.
You can add a field or text from the emulator screen that the Terminal connector uses as a screen match rule.

a. Select **Add**.



b. Right-click on the required field and select either of the options.

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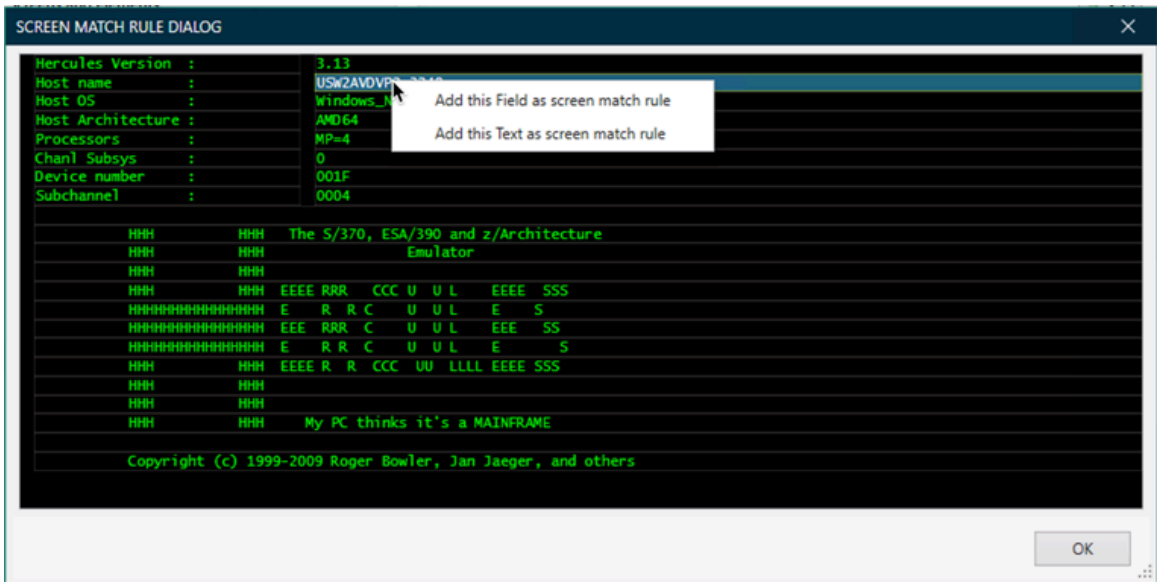
- **Add this Field as screen match rule**: The connector uses the field details such as row, column, and text as a screen match rule.
- **Add this Text as screen match rule**: The connector uses the field text as a screen match rule.



The screen match rule appears under the **Screen match rules** pane.

c. Select **OK**.

3. **Optional:** Define an element and match rules.
The Terminal connector provides multiple rules or locators that provide information about elements. For example, the row and column numbers of the field on the screen is one of the match rules. The Terminal connector provides five locators and you can choose any locator to match the element.

a. Rename the field.

(Optional) When you capture multiple elements, the Terminal connector provides them default names such as Field_0, Field_1, Table_0, and Table_1. To easily identify an element, you can rename it.

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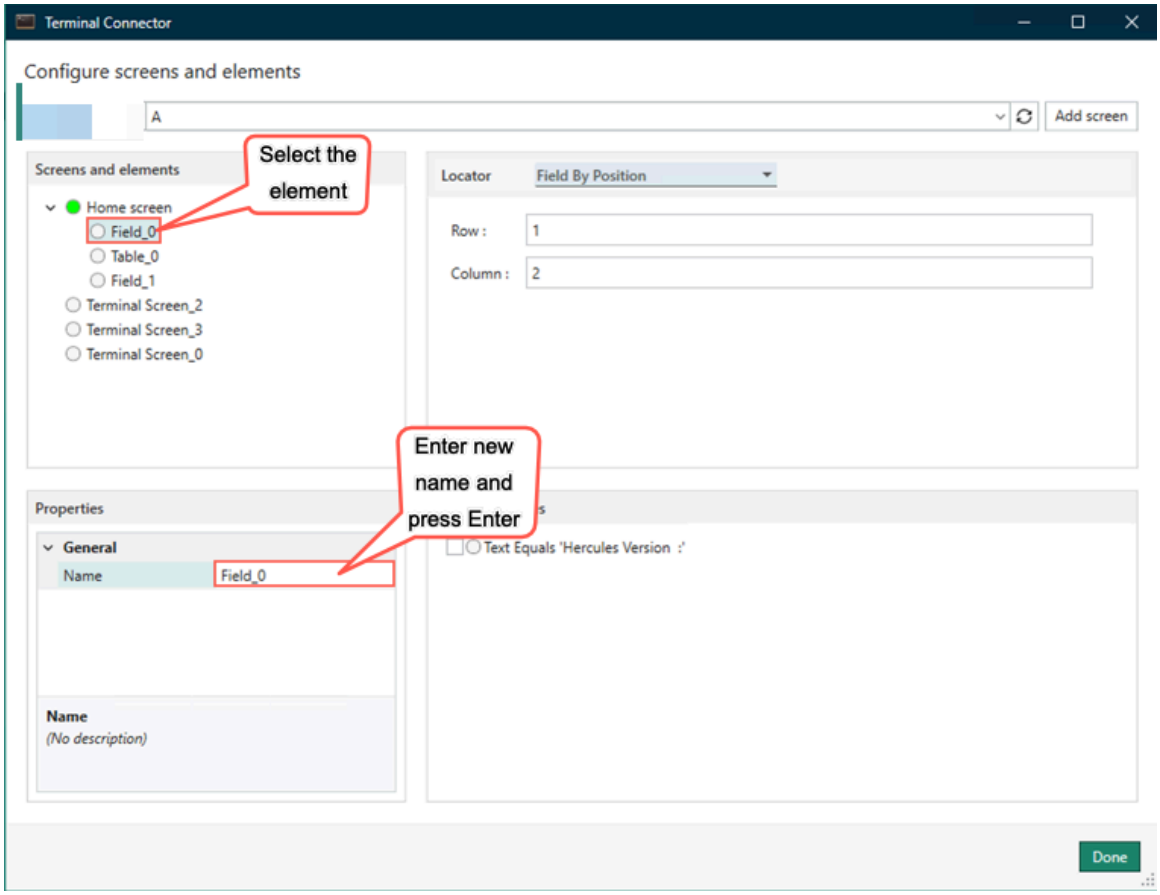

The updated element name appears under the Screens and elements pane.

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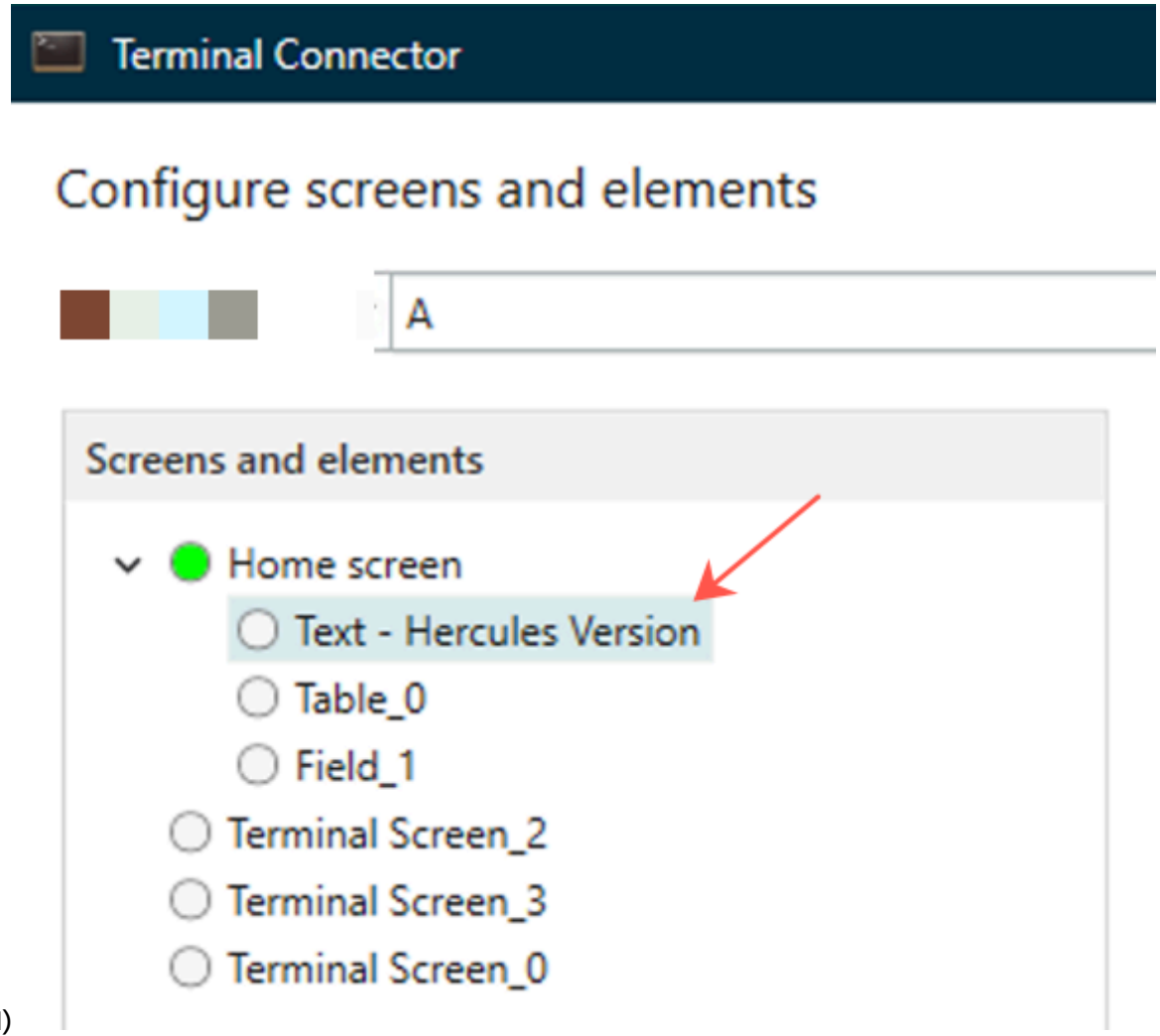
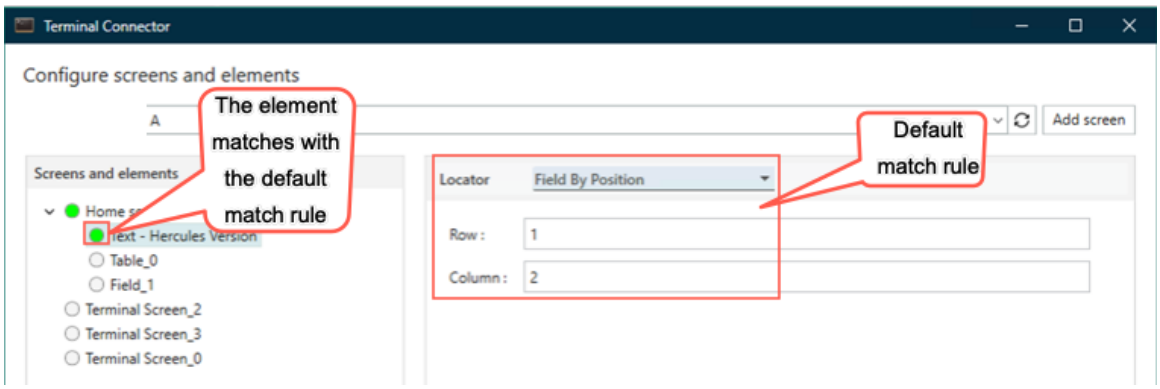


(Optional)

b. Right-click the element and select **Refresh**.

The element match icon ( ) appears for the element. The icon indicates that the locator matched with the element.



c. Optional: Use the other locators in the **Locator** drop-down to match the element. The table describes the locators.

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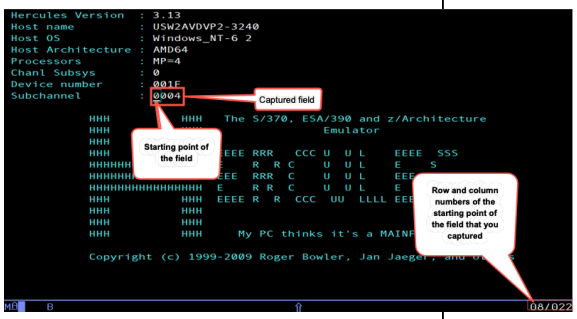
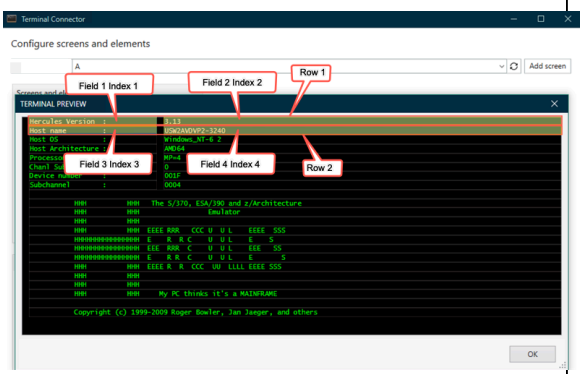
Element locators

Rule	Description
Field By Position	Matches a field with its row and column number in the screen. The Row and Column fields show the row and column numbers of the starting point of the field that you captured from the screen.  (Optional)
Field By Index	Matches a field with its index number in the screen. (Optional) An index number is a unique identifier of a field in the Mainframe screen that enables the connector to identify a field. Each field on the emulator screen has a unique index number. The first field in the first row gets index 1, then the second field in the first row gets index 2, and so on. Index numbers are first assigned to the fields in the second row until all fields in the screen get index numbers. 
Field By Previous Field Text	Matches a captured field with the text in the field that is located immediately before the field that you captured. The **Previous Field Text** match rule shows the text in the previous field.

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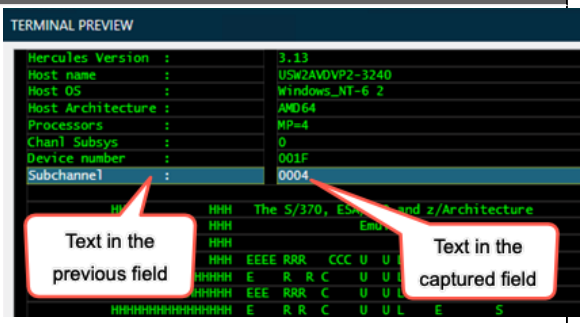
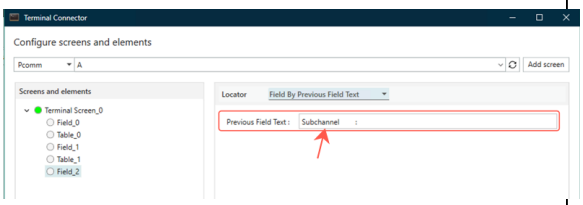
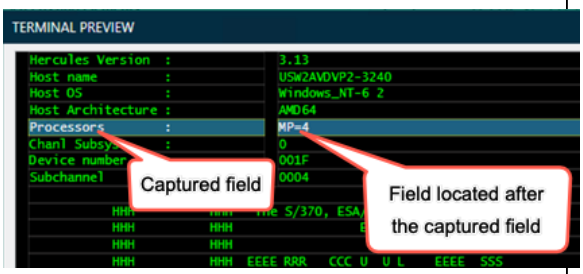
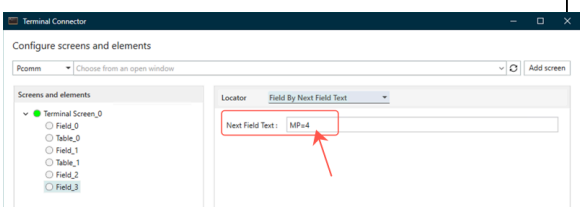
Rule	Description
	  If there is no previous field, the **Previous Field Text** field shows no value.
Field By Next Field Text	Matches a field with the text in the field that is located immediately after the field that you captured. The **Next Field Text** match rule shows the text in the next field.   If there's no next field, the **Next Field Text** field shows no value.
Region (Table)	Use this locator when you want to capture data from an emulator screen in the tabular

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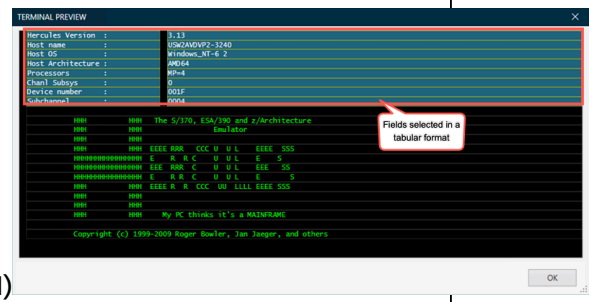
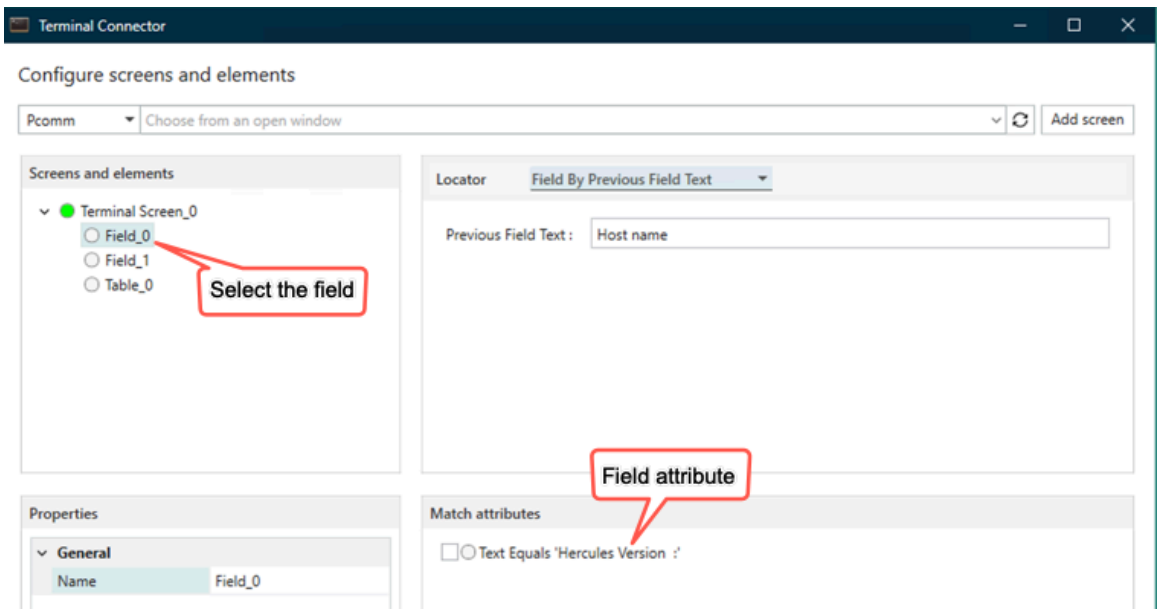
Rule	Description
	format. The image shows the selected the fields with data in a tabular format.  (Optional)

4. Define an attribute and match rules.

   a. Select the field.
   The field attribute appears under the **Match attributes** pane.



   b. Select the attribute.

   c. Right-click the element and select **Refresh**.

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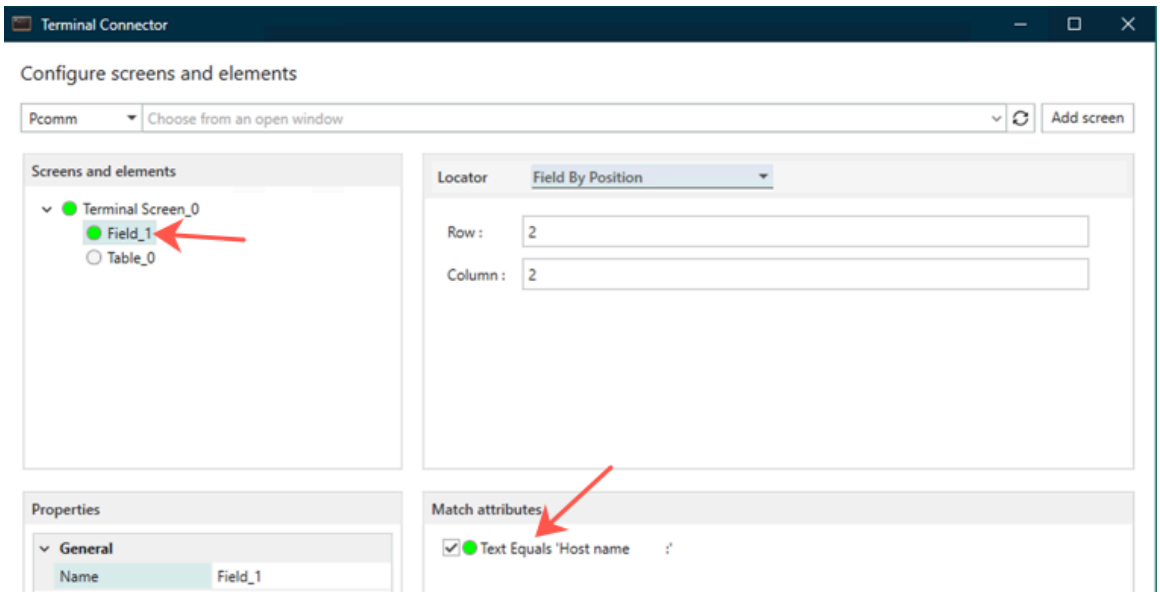
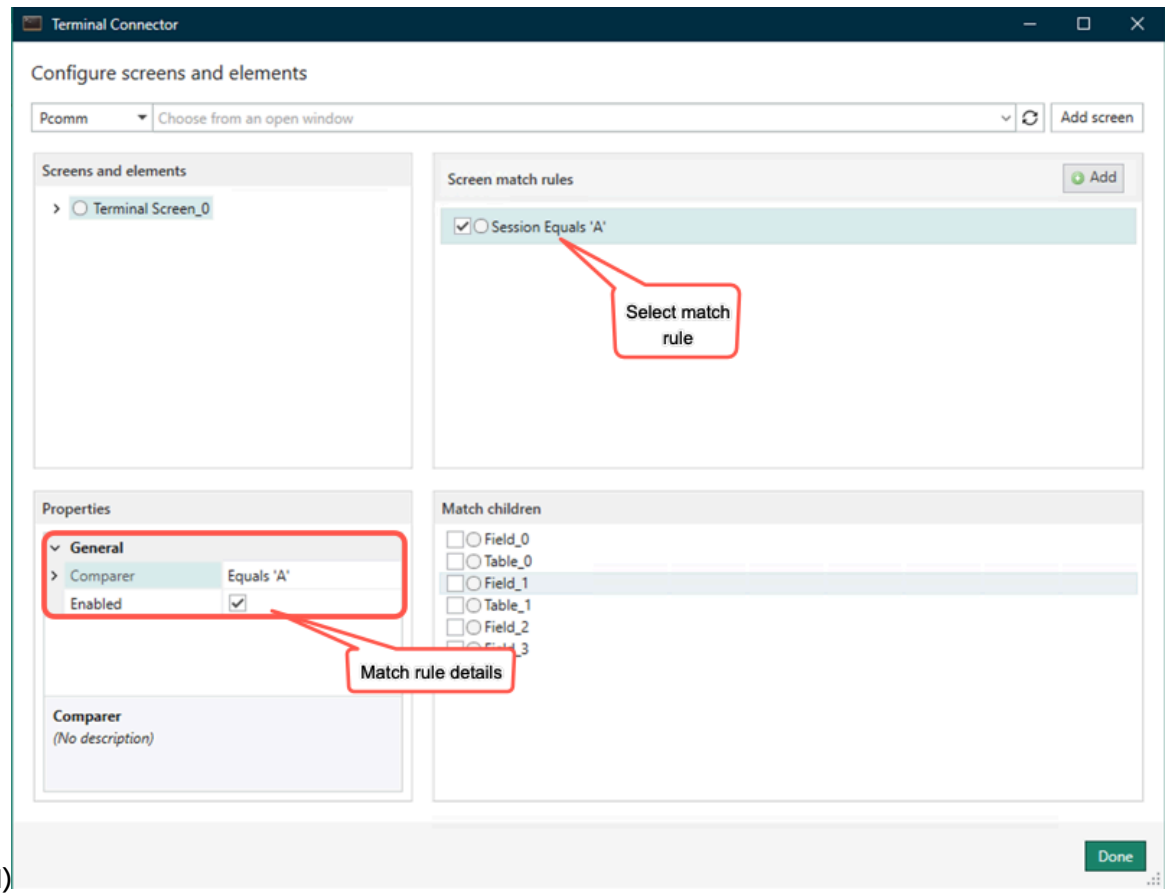
The element match icon ( ) appears for the element and the attribute. The icon indicates that the attribute matches with the element.



5. Optional: Modify screen match rules.

a. In the screen match rules section, select the rule.
The Properties pane shows the match rule details.

(Optional)



b. In the Properties pane, select the expand match rule icon (›)

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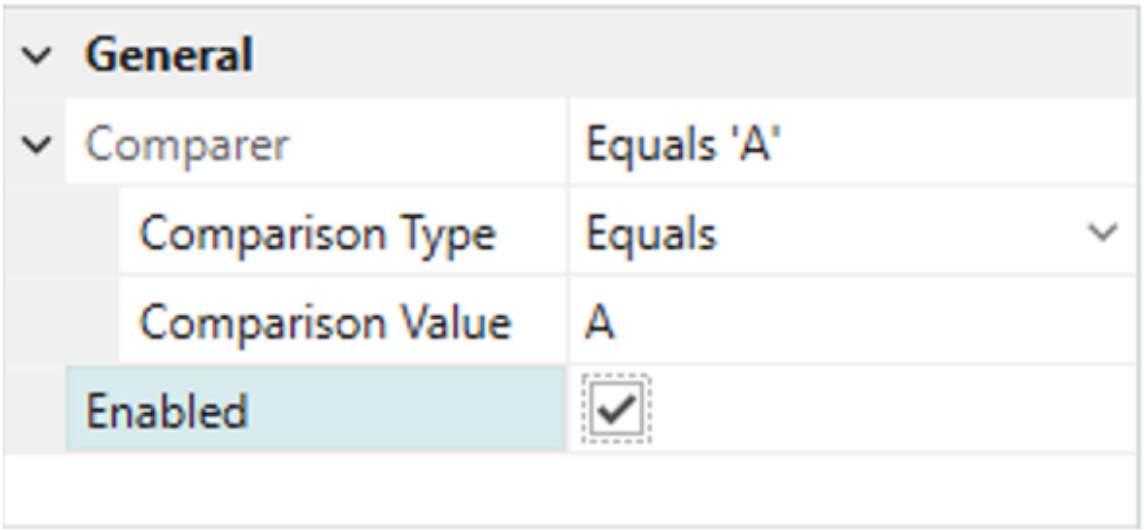
c. Update the values in the **Comparison Type** or **Comparison Value** fields.

d. Clear the **Enabled** option.

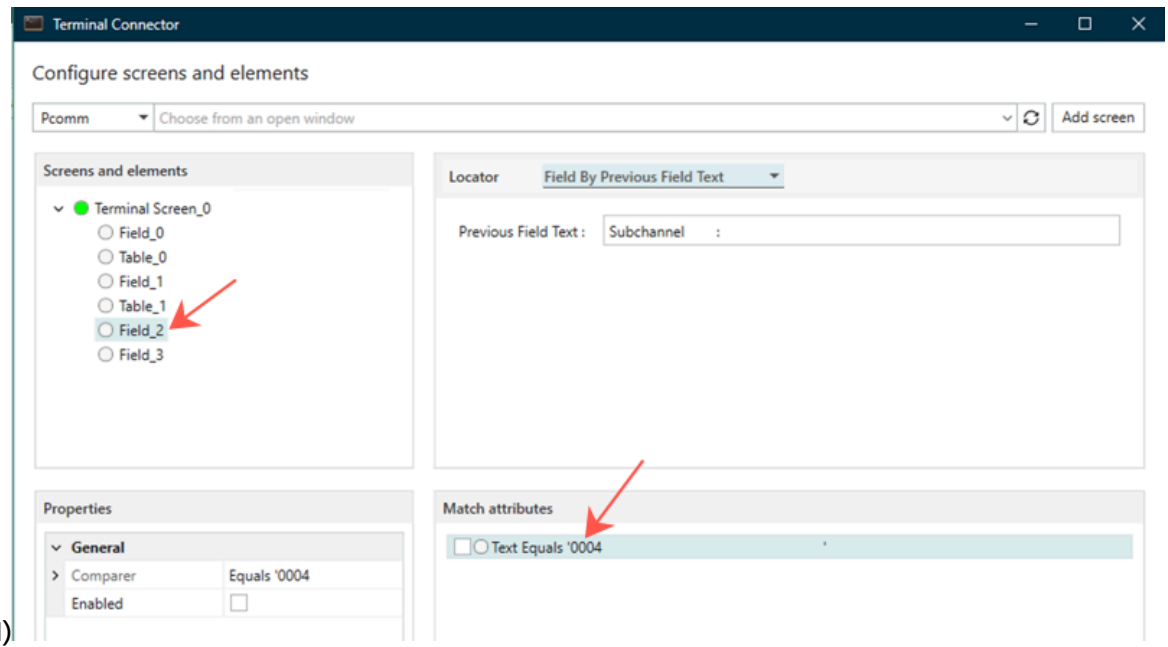


e. Select **Done**.

6. **Optional:** Modify a field match rule.

a. Under the Screens and elements pane, select the required field that you captured.
The Match attributes pane shows the field attributes.

(Optional)



b. In the Properties pane, select the expand match rule icon (›)

c. Update the values in the **Comparison Type** or **Comparison Value** fields.

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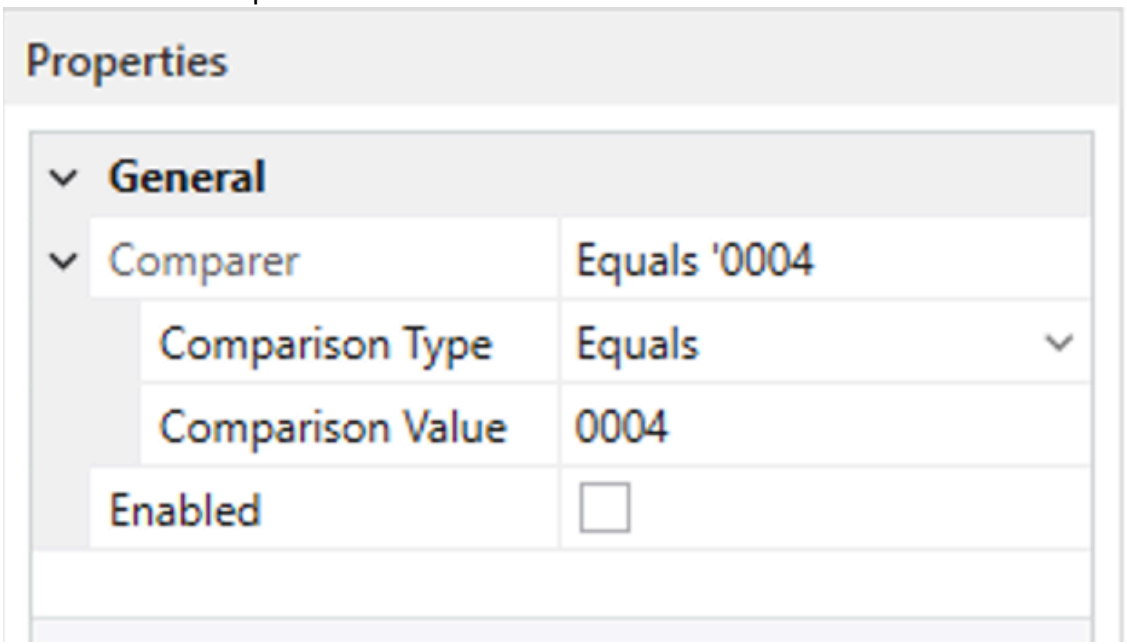
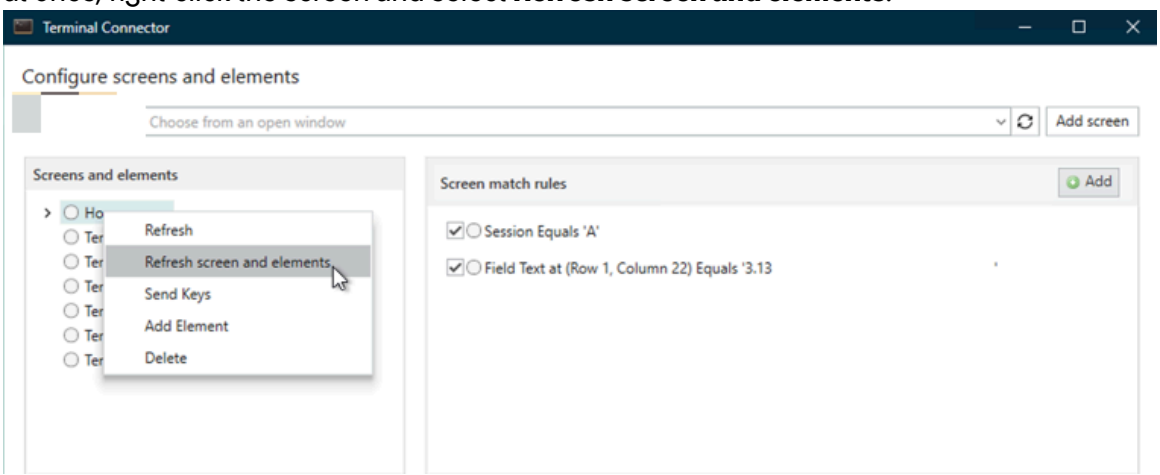
d. Clear the **Enabled** option.



7. To match both the screen and its elements with the corresponding rules, locators, or attributes at once, right-click the screen and select **Refresh screen and elements**.



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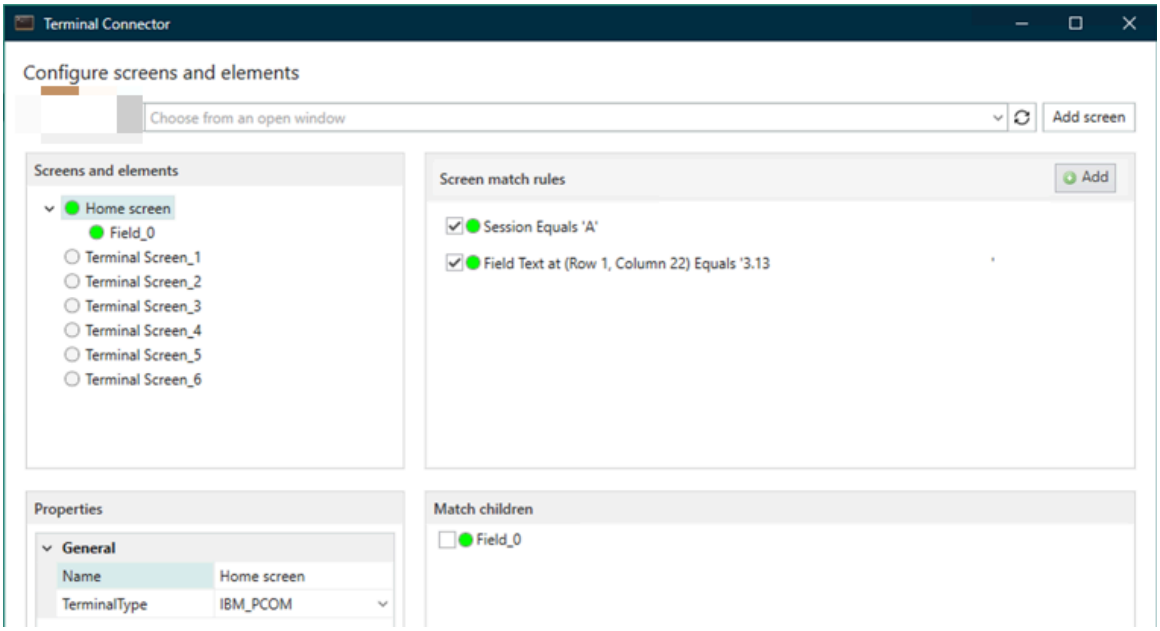
The element match icon ( ) appears for the screen and its elements and the corresponding rules, locators, or attributes.



Terminal connector methods

The Terminal connector methods enable you to perform various tasks on the emulator screens. For example, you can extract login data from a variable and use a method to enter the data and log in to a Mainframe application.

IBM Personal Communications emulator methods

Use the IBM Personal Communications emulator methods to perform various automation tasks on the IBM Personal Communications emulator.

Screen-level methods

Use screen-level methods to perform the automation tasks on the emulator screen. For example, you can simulate a command on the screen or get text from the screen.

GetFieldText

Returns the text that a field contains after it identifies the field by the row and column number that you specify. The row and column that you specify are the starting point of the field. The method identifies the whole field and then returns the text in the field. In the following example, H is the first letter and the starting point in the field and `Host OS :` is the complete text in the field.

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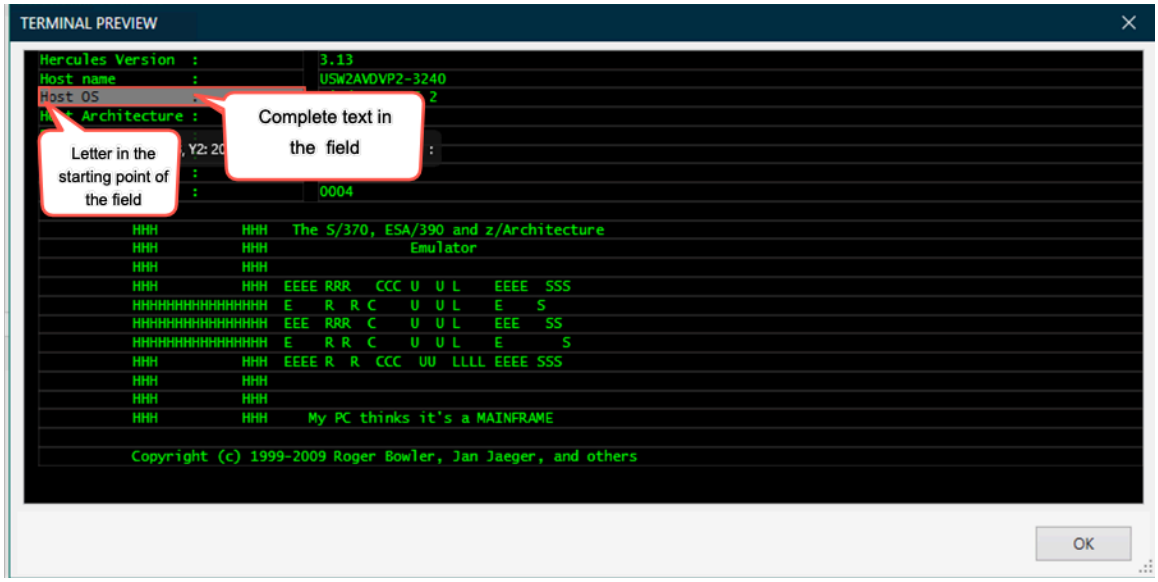

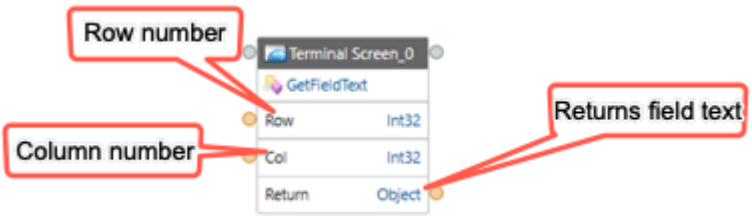

GetFieldText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Row	Field row number that identifies the field.	Data In	Integer	NA	Yes	
Column	Field column number that identifies the field.	Data In	Integer	NA	Yes	
Return	Returns the text in the field.	Data Out	String	NA	NA	

GetTextFromRect

Returns the text in all the fields of a rectangular area that you define on the screen. You define an area by providing the starting and ending rows and column numbers. The method locates and identifies the first and the last fields and returns all the text in all the fields within that area. The following example shows the area that you defined.

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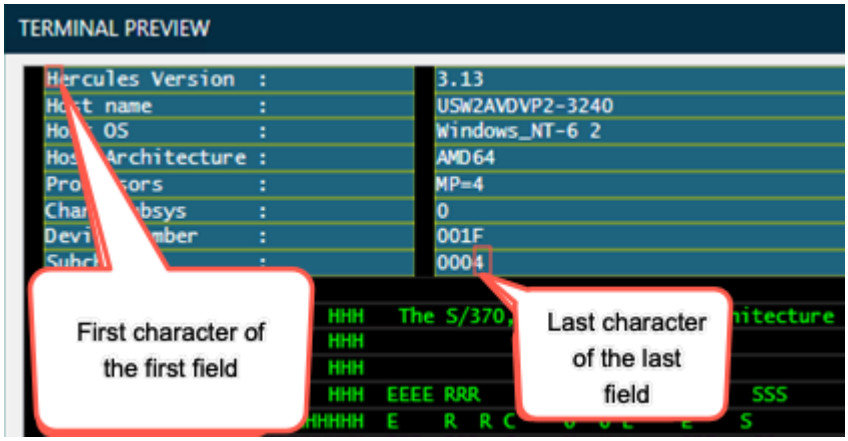

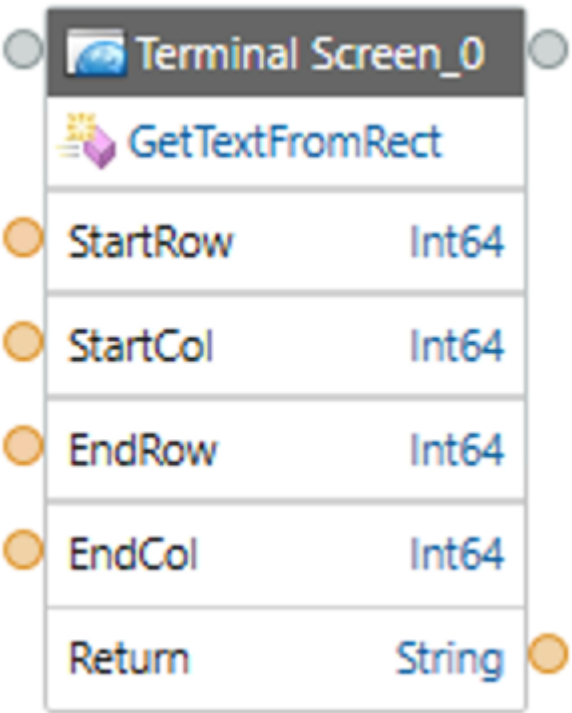

GetTextFromRect method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
StartRow	Row number that indicates the first character of the first field in the rectangular area.	Data In	Integer	NA	Yes	
StartCol	Column number that contains the first	Data In	Integer	NA	Yes	

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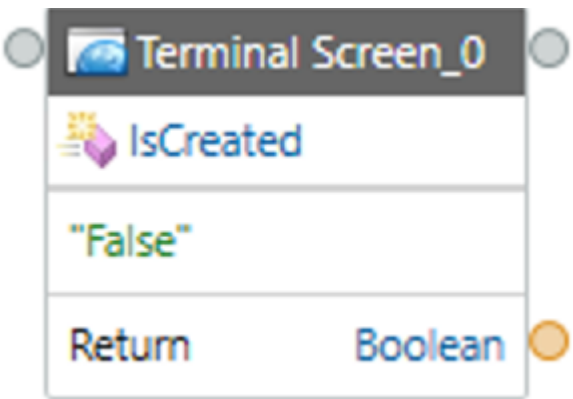
GetTextFromRect method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
	character of the first field in the rectangular area.					
EndRow	Row number that contains the last character of the last field in the rectangular area.	Data In	Integer	NA	Yes	
EndCol	Column number that contains the last character of the last field in the rectangular area.	Data In	Integer	NA	Yes	
Return	Returns the text from all the fields within the rectangular area.	Data Out	String	NA	NA	

IsCreated

Verifies whether the emulator screen exists based on the screen match rule and can accept inputs from the user. After verification, the method returns the appropriate Boolean value.



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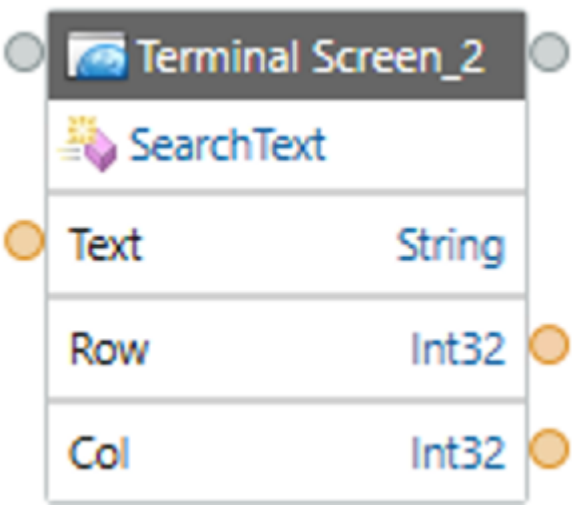
IsCreated method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
MatchAllChildOpt	Option to find the emulator screen by matching the child elements that you have captured.	Data In	Boolean	False	Yes	**Warning:** Using this option may slow down the method.
Return	Returns the Boolean value depending on whether emulator screen exists based on the screen match rule and can accept inputs from the user.	Data Out	Boolean	NA	NA	

SearchText

Returns the numbers of the row and column that holds the first character of the text that you specify. For example, if you specify the string `emulator`, the method returns the row and column numbers of the starting point of the word `emulator` which is `e`.

Note: If you provide the text that spans multiple fields, the Row and Col ports return 0 because the method supports the text only from a single field.



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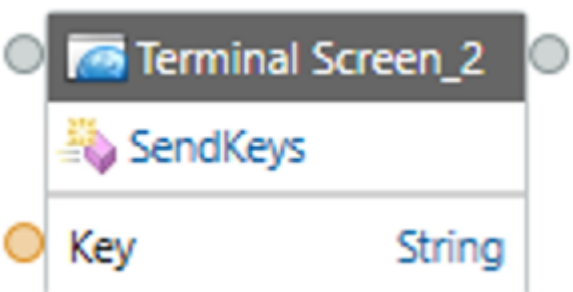
SearchText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Text	Text that the method searches.	Data In	String	NA	Yes	The text you specify may be case-sensitive depending on the emulator you use.
Row	Row number that has the first character of the text you specify.	Data Out	Integer	NA	NA	If the text that you specify occurs at multiple rows and columns, the method returns the first row and column that contains the text.
Col	Column number that has the first character of the text that you specify.	Data Out	Integer	NA	NA	If the text that you specify occurs at multiple rows and columns, the method returns the first row and column that contains the text.

SendKeys

Simulates the keystrokes that you enter from the keyboard at the mouse device position on the emulator screen. For example, you can simulate the **[enter]** keystroke on the screen.



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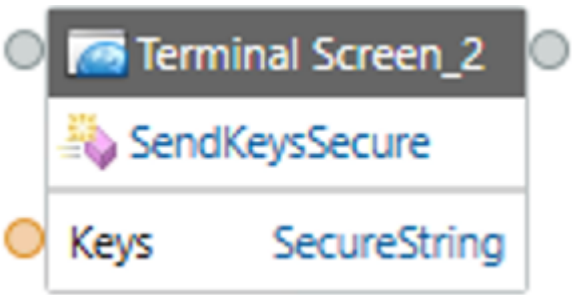
SendKeys method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Keys	Keystrokes that you enter from your keyboard.	Data In	String	None	Yes	**Tip:** To learn about the keystrokes, refer the respective terminal emulator documentation.

SendKeysSecure

Simulates the keystrokes that is a secured string at the mouse device position on the emulator screen.



SendKeysSecure method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Keys	Keystrokes that you enter as a secured string.	Data In	Secured String	None	Yes	**Tip:** To learn about the keystrokes, refer to the respective terminal emulator documentation.

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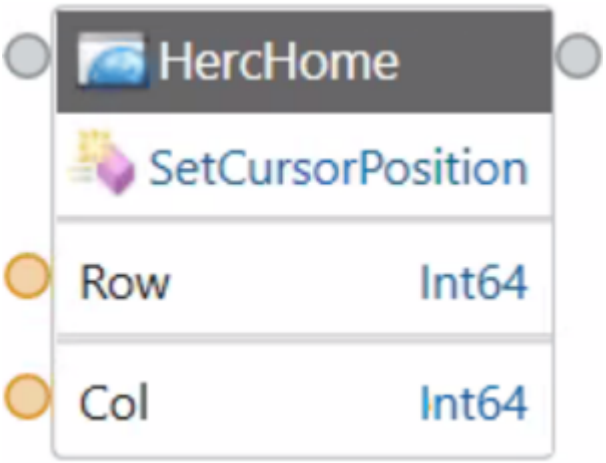
SetCursorPosition

Attempts to set the mouse device at the row and column number that you specify.



SetCursorPosition method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Row	Option to provide the number of the row based on which the method attempts to set the mouse device on the screen.	Data In	Integer	NA	NA	The row number must be positive and within the size of the emulator screen. For example, if the screen size is 24X80, the maximum value that you can provide for a row is 24.
Col	Option to provide the number of the row based on which the method attempts to set the mouse device on the screen.	Data In	Integer	NA	NA	The column number must be positive and within the size of the emulator screen. For example, if the screen size is 24X80, the maximum value that you can

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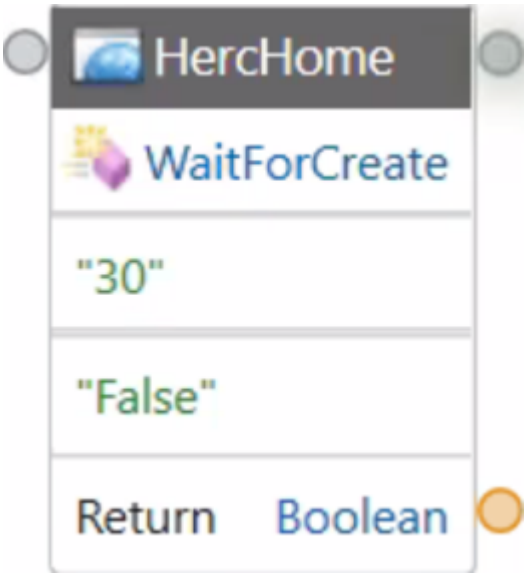
SetCursorPosition method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
						provide for a column is 80.

WaitForCreate

Waits for the duration that you specify while the connector uses the screen match rule to find whether the screen exists.



WaitForCreate method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
timeoutinSeconds	Option to provide the number of seconds for which the method waits while the connector uses the screen match rule to find if the screen exists.	Data In	Integer	30	Yes	

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WaitForCreate method parameters (continued)

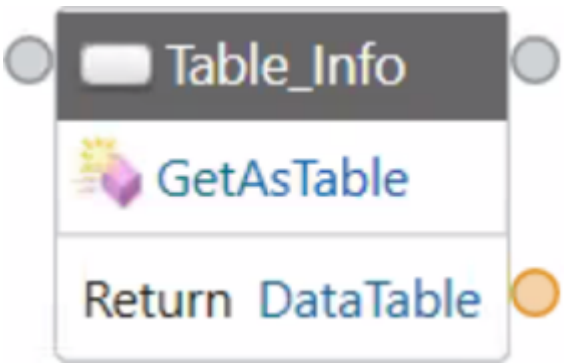
Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
MatchAllChildren	Option to match all screen elements that you had captured to find if the screen exists.	Data In	Boolean	False	Yes	**Warning:** Using this option may delay the execution of the method.
Return	Returns the Boolean value based on whether the emulator screen was found.	Data Out	Boolean	NA	NA	

Element-level methods

Element-level methods perform automation tasks on the emulator screen elements that you add from the Terminal Connector screen. You can add a screen element as a field or a table.

GetAsTable

Returns the text that you captured as a data table object. Use this method when you capture the data from a screen as a table. However, you can also use the method for the data that you capture as a field. To learn how to capture the data as a table, see Configure the IBM Personal Communications emulator.



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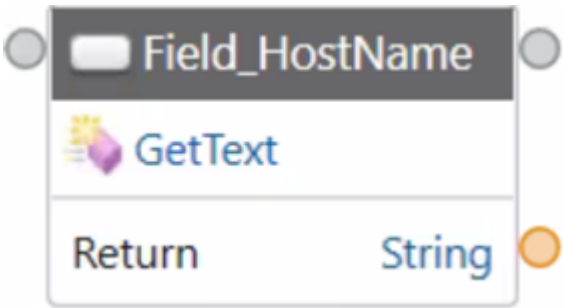
GetAsTable method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Return	Returns the captured text from the terminal screen as a data table object.	Data Out	Data Table	NA	NA	To view the table, right-click the parameter and select **Preview Data**.

GetText

Returns the text in the field that you captured from the emulator screen. If you use this method for a table that you captured, it returns the text in the first field of the rectangle.

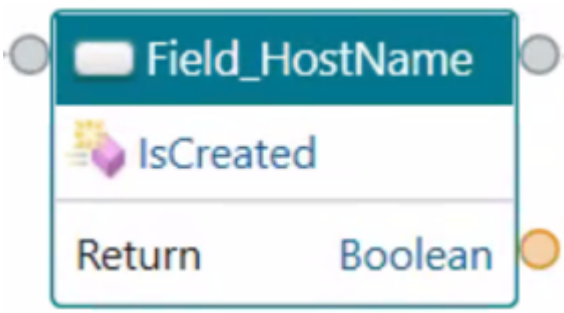


GetText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?	Notes
Return	Returns the text from the captured field.	Data Out	String	NA	NA	

IsCreated

Matches the rules and verifies whether the captured element exists.



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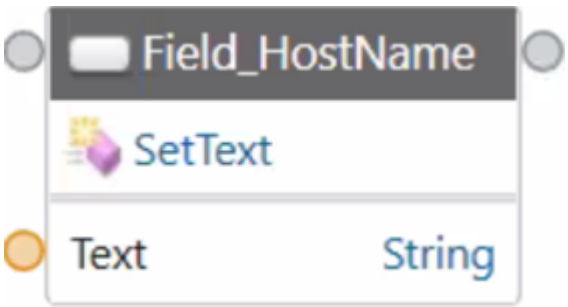
IsCreated method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Return	Returns the Boolean value based on whether the element is active.	Data Out	Boolean	NA	NA	

SetText

Attempts to set the text to the field.



SetText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Text	Option to specify the text that the method attempts to set in the field.	Data In	String	NA	Yes	You can't use this method on protected emulator screens.

WaitForCreate

Waits for the duration that you specify while the connector uses the match rule to find whether the element exists.

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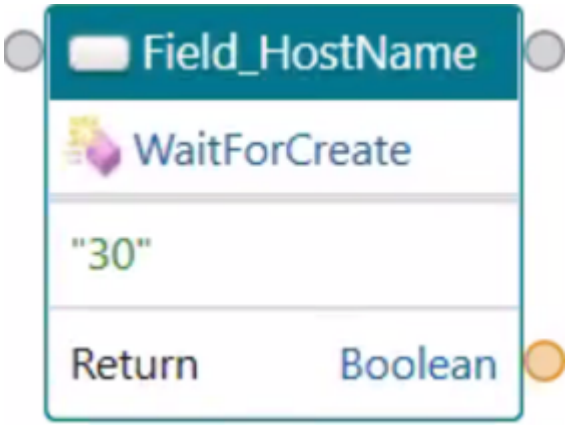

WaitForCreate method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
timeoutinSeconds	Option to provide the number of seconds for which the method waits while the connector uses the match rule to find whether the element exists.	Data In	Integer	30	Yes	
Return	Returns the Boolean value depending on whether the element was found.	Data Out	Boolean	NA	NA	

Rocket BlueZone emulator methods

Use the Rocket BlueZone emulator methods to perform various automation tasks on the Rocket BlueZone emulator.

Screen-level methods

Use screen-level methods to perform the automation tasks on the emulator screen. For example, you can use simulate a command on the screen or get text from the screen.

GetFieldText

Returns the text that a field contains after it identifies the field by the row and column number that you specify. The row and column that you specify are the starting point of the field. The method identifies the whole field and then returns the text in the field. In the following example,

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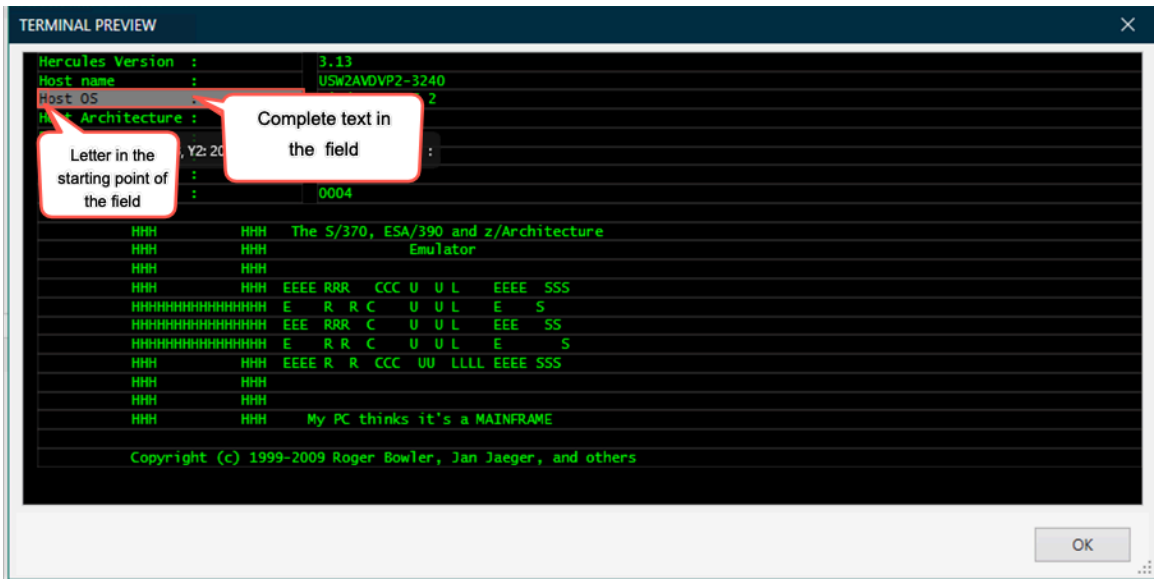
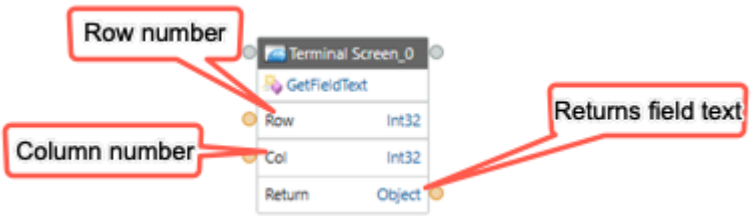
H is the first letter and the starting point in the field and `Host OS :` is the complete text in the field.





GetFieldText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Row	Field row number that identifies the field.	Data In	Integer	NA	Yes	
Column	Field column number that identifies the field.	Data In	Integer	NA	Yes	
Return	Returns the text in the field.	Data Out	String	NA	NA	

GetTextFromRect

Returns the text in all the fields of a rectangular area that you define on the screen. You define an area by providing the starting and ending rows and column numbers. The method locates and identifies the first and the last fields and returns all the text in all the fields within that area. The following example shows the area that you defined.

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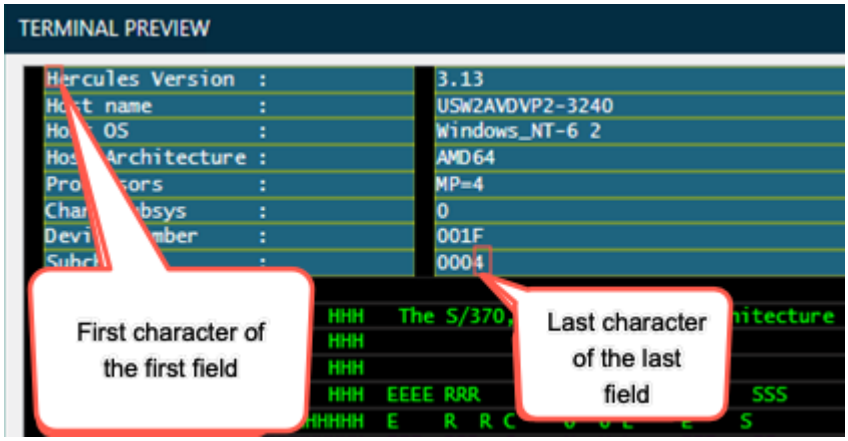

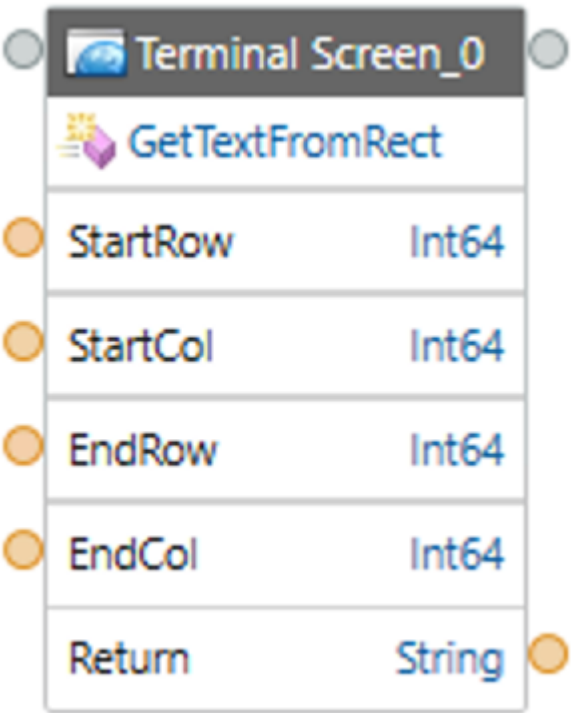

GetTextFromRect method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
StartRow	Row number that indicates the first character of the first field in the rectangular area.	Data In	Integer	NA	Yes	
StartCol	Column number that contains the first	Data In	Integer	NA	Yes	

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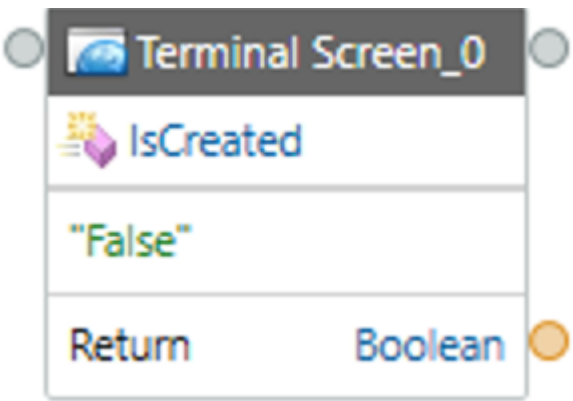
GetTextFromRect method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
	character of the first field in the rectangular area.					
EndRow	Row number that contains the last character of the last field in the rectangular area.	Data In	Integer	NA	Yes	
EndCol	Column number that contains the last character of the last field in the rectangular area.	Data In	Integer	NA	Yes	
Return	Returns the text from all the fields within the rectangular area.	Data Out	String	NA	NA	

IsCreated

Verifies whether the emulator screen exists based on the screen match rule and can accept inputs from the user. After verification, the method returns the appropriate Boolean value.



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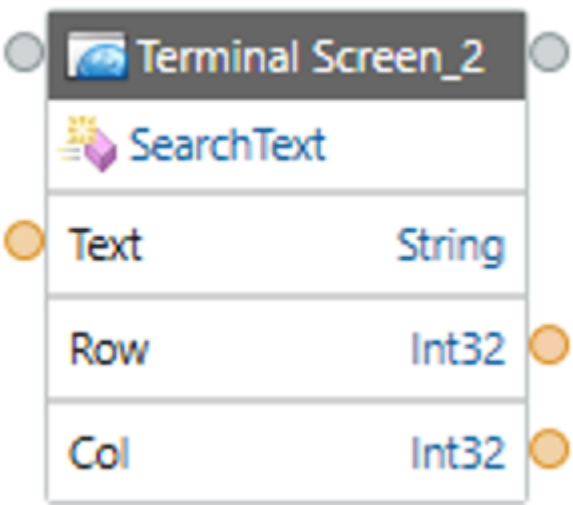
IsCreated method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
MatchAllChildOpt	Option to find the emulator screen by matching the child elements that you have captured.	Data In	Boolean	False	Yes	**Warning:** Using this option may slow down the method.
Return	Returns the Boolean value depending on whether emulator screen exists based on the screen match rule and can accept inputs from the user.	Data Out	Boolean	NA	NA	

SearchText

Returns the numbers of the row and column that holds the first character of the text that you specify. For example, if you specify the string `emulator`, the method returns the row and column numbers of the starting point of the word `emulator` which is `e`.

Note: If you provide the text that spans multiple fields, the Row and Col ports return 0 because the method supports the text only from a single field.



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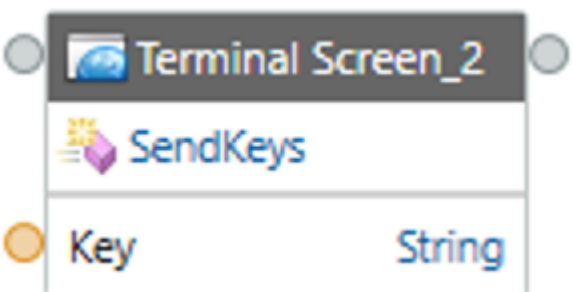
SearchText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Text	Text that the method searches.	Data In	String	NA	Yes	The text you specify may be case-sensitive depending on the emulator you use.
Row	Row number that has the first character of the text you specify.	Data Out	Integer	NA	NA	If the text that you specify occurs at multiple rows and columns, the method returns the first row and column that contains the text.
Col	Column number that has the first character of the text that you specify.	Data Out	Integer	NA	NA	If the text that you specify occurs at multiple rows and columns, the method returns the first row and column that contains the text.

SendKeys

Simulates the keystrokes that you enter from the keyboard at the mouse device position on the emulator screen. For example, you can simulate the **<enter>** keystroke on the screen.



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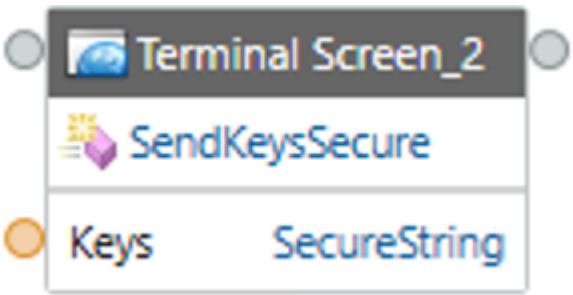
SendKeys method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Keys	Keystrokes that you enter from your keyboard.	Data In	String	None	Yes	**Tip:** To learn about the keystrokes, refer the respective terminal emulator documentation.

SendKeysSecure

Simulates the keystrokes that is a secured string at the mouse device position on the emulator screen.



SendKeysSecure method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Keys	Keystrokes that you enter as a secured string.	Data In	Secured String	None	Yes	**Tip:** To learn about the keystrokes, refer to the respective terminal emulator documentation.

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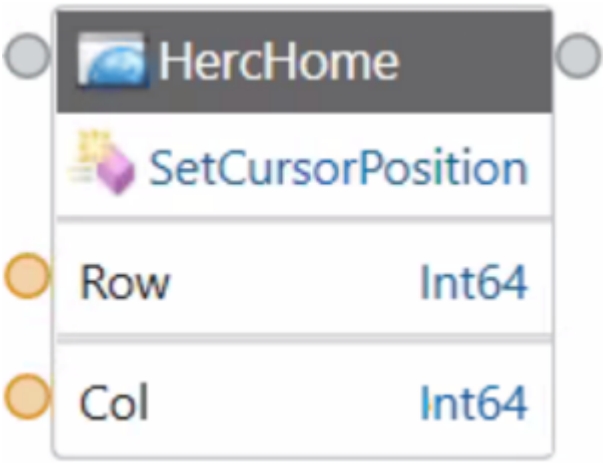
SetCursorPosition

Attempts to set the mouse device at the row and column number that you specify.



SetCursorPosition method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Row	Option to provide the number of the row based on which the method attempts to set the mouse device on the screen.	Data In	Integer	NA	NA	The row number must be positive and within the size of the emulator screen. For example, if the screen size is 24X80, the maximum value that you can provide for a row is 24.
Col	Option to provide the number of the row based on which the method attempts to set the mouse device on the screen.	Data In	Integer	NA	NA	The column number must be positive and within the size of the emulator screen. For example, if the screen size is 24X80, the maximum value that you can

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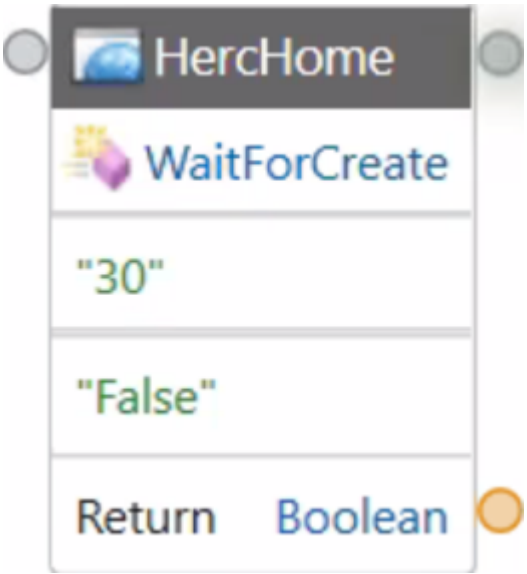
SetCursorPosition method parameters (continued)

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
						provide for a column is 80.

WaitForCreate

Waits for the duration that you specify while the connector uses the screen match rule to find whether the screen exists.



WaitForCreate method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
timeoutinSeconds	Option to provide the number of seconds for which the method waits while the connector uses the screen match rule to find if the screen exists.	Data In	Integer	30	Yes	

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WaitForCreate method parameters (continued)

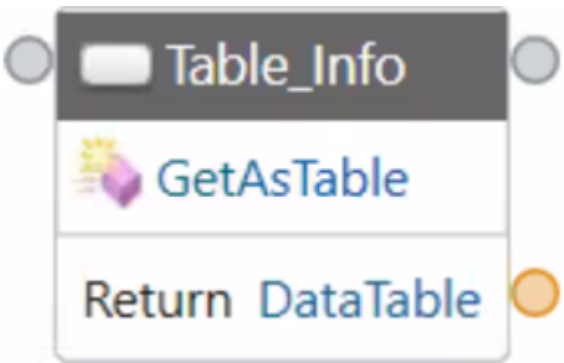
Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
MatchAllChildren	Option to match all screen elements that you had captured to find if the screen exists.	Data In	Boolean	False	Yes	**Warning:** Using this option may delay the execution of the method.
Return	Returns the Boolean value based on whether the emulator screen was found.	Data Out	Boolean	NA	NA	

Element-level methods

Element-level methods perform automation tasks on the emulator screen elements that you add from the Terminal Connector screen. You can add a screen element as a field or a table.

GetAsTable

Returns the text that you captured as a data table object. Use this method when you capture the data from a screen as a table. However, you can also use the method for the data that you capture as a field. To learn how to capture the data as a table, see Configure the IBM Personal Communications emulator.



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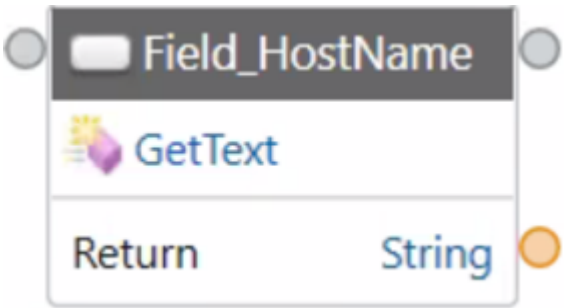
GetAsTable method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Return	Returns the captured text from the terminal screen as a data table object.	Data Out	Data Table	NA	NA	To view the table, right-click the parameter and select **Preview Data**.

GetText

Returns the text in the field that you captured from the emulator screen. If you use this method for a table that you captured, it returns the text in the first field of the rectangle.

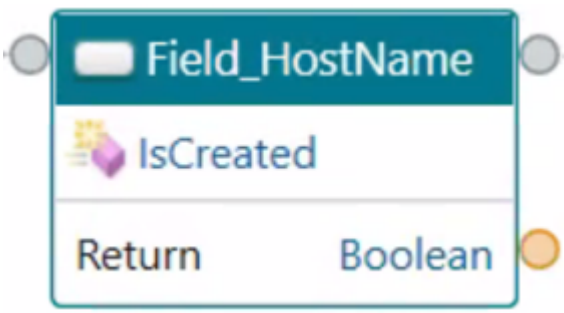


GetText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory?	Notes
Return	Returns the text from the captured field.	Data Out	String	NA	NA	

IsCreated

Matches the rules and verifies whether the captured element exists.



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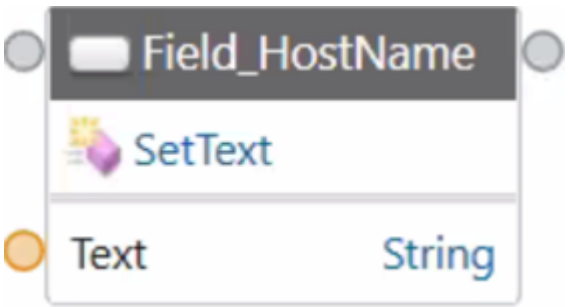
IsCreated method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Return	Returns the Boolean value based on whether the element is active.	Data Out	Boolean	NA	NA	

SetText

Attempts to set the text to the field.



SetText method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
Text	Option to specify the text that the method attempts to set in the field.	Data In	String	NA	Yes	You can't use this method on protected emulator screens.

WaitForCreate

Waits for the duration that you specify while the connector uses the match rule to find whether the element exists.

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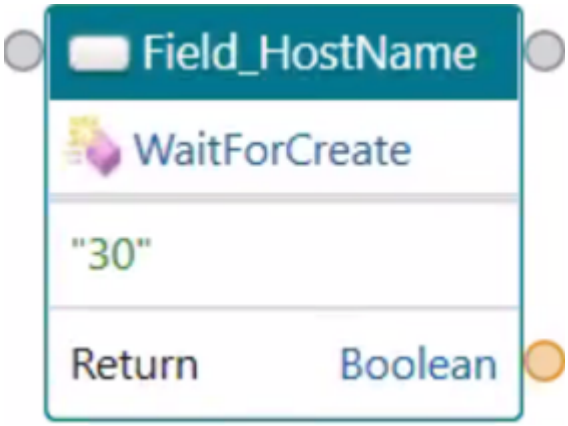

WaitForCreate method parameters

Parameter	Description	Data port entry type	Data type	Default value	Mandatory	Notes
timeoutinSeconds	Option to provide the number of seconds for which the method waits while the connector uses the match rule to find whether the element exists.	Data In	Integer	30	Yes	
Return	Returns the Boolean value depending on whether the element was found.	Data Out	Boolean	NA	NA	

Universal app connector

Create automations for your Windows, Java, and web applications by using the Universal App Connector (UAC) of RPA Desktop Design Studio. Configure the application screens and their elements from a single, unified connector instead of using the individual connectors of these applications.

How UAC works

UAC is automatically added as a default connector to any attended, unattended, or skilled automation project of RPA Desktop Design Studio. UAC currently supports Windows, Java, and web applications (Google Chrome and Microsoft Edge browsers only).

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Important: It is recommended that you create automations for Windows, Java, and web applications using UAC instead of using their individual connectors. However, RPA Desktop Design Studio still supports automation projects that are designed using the individual connectors.

Tip: If you've installed a hot fix for UAC connector, to verify that the hot fix is accurately downloaded to your machine, perform the post requisite steps. For more information, see Post requisites after installing a hot fix.

UAC is added as an object to Global Objects in Project Explorer similar to how the other connectors are added. For more information on how to use a connector, see Use connector method.

Add the screens and elements of Windows, Java, and web applications that are open in your machine while you configure UAC. Modify the screens and elements match rules during the configuration. Add the methods related to the screens and elements from the Design surface, and then build your automation.

For more information on using a UAC, see Use the Universal App Connector.

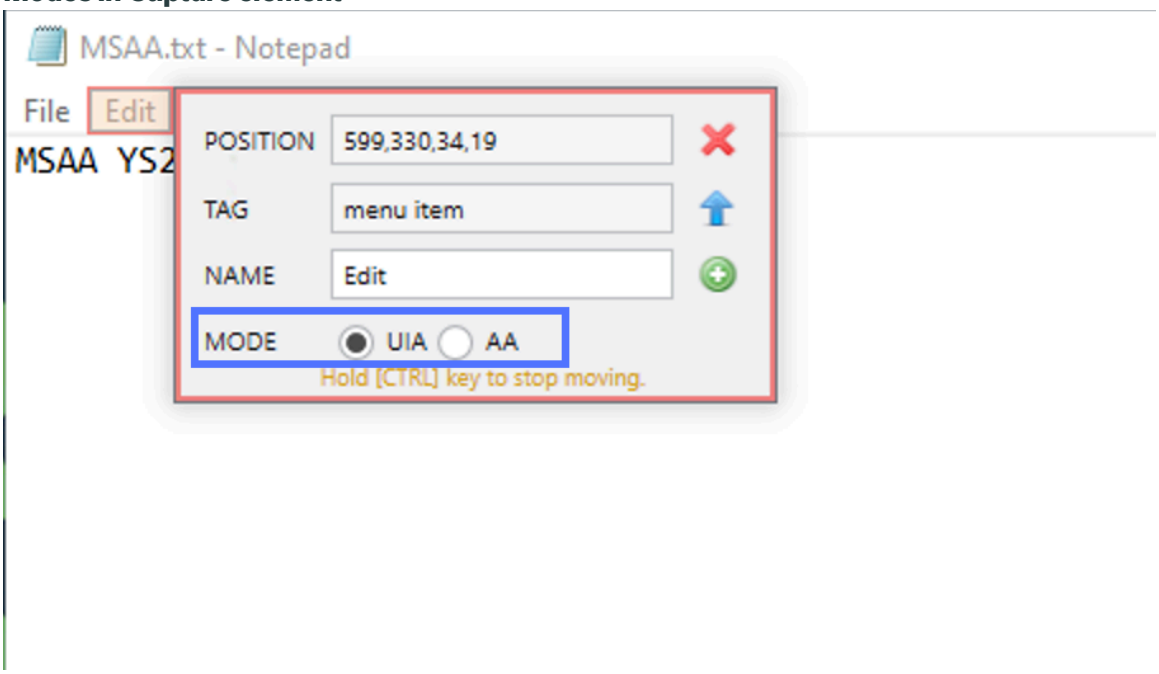
Modes in UAC for Windows applications

Starting from Yokohama release, Active Accessibility is supported when adding elements in the Universal App Connector, for Windows applications.

Select the mode, UI automation or active accessibility, while capturing the elements and showing the captured elements. The mode determines which internal library is used for automating Windows applications. UI automation mode refers to UI automation library and active accessibility refers to active accessibility library of Microsoft. Active accessibility mode is for legacy Windows applications.

To capture the elements from the screen, under the Screen and elements pane, right-click the added screen and select **Capture Element**. There are two modes **UIA** and **AA**. **UIA** is the default mode.

Modes in Capture element



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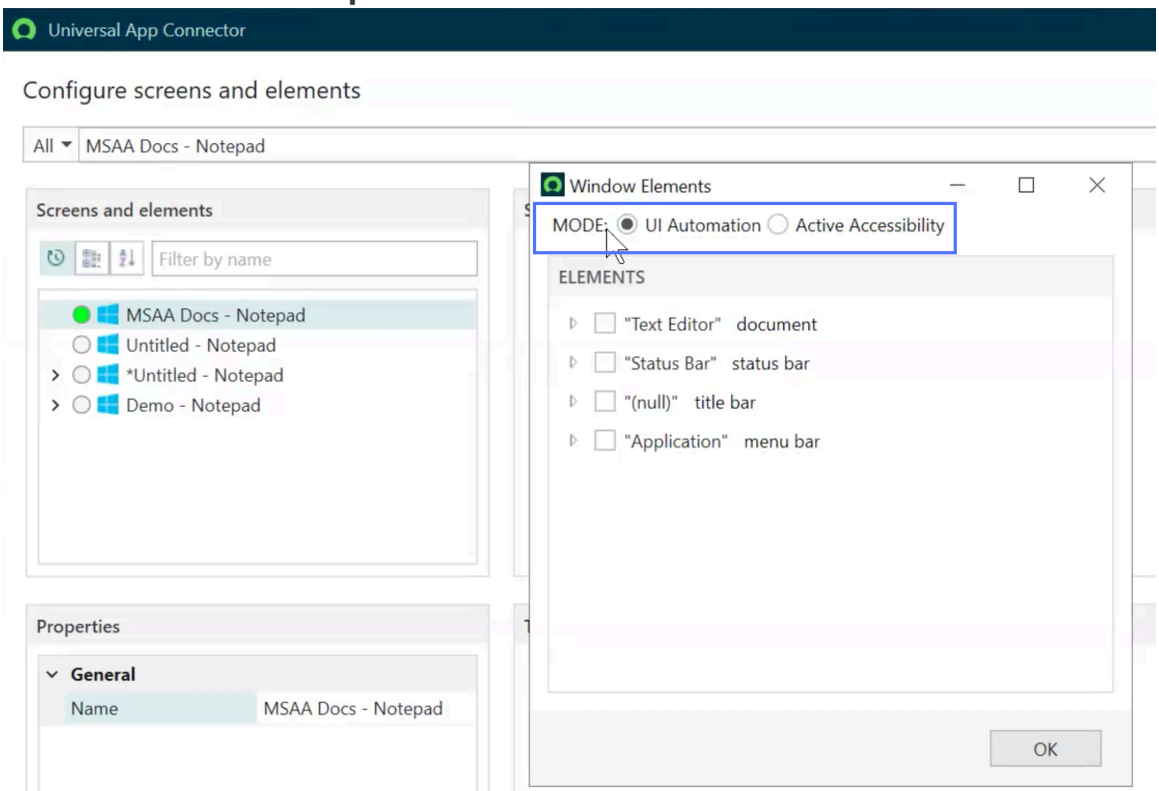
For more information about capturing an element in the Windows application, see Use the Universal App Connector.

From the Screen and elements pane, right-click the added screen and select **Show Elements** to display all the existing elements in the target application screen in a tree view. There are two modes **UI Automation** and **Active Accessibility**. **UI Automation** is the default mode.

Modes in Show Elements options



For more information about showing captured elements of the Windows application, see Additional options for application screens and elements in Universal App Connector.

For more information about the methods for UI Automation mode and Active Accessibility mode, see Methods of UI Automation mode and Active Accessibility mode.

Use the Universal App Connector

Create automations for your Windows, Java, Google Chrome, and Edge browser-based applications by using the Universal App Connector (UAC). Configure the applications from a single, unified connector and capture the screens and elements or screen controls such as check boxes, and buttons. Use the methods of these screens and elements to build your automation.

Before you begin

Add the Universal App Connector plugin from the Plugins Manager before using the connector. For more information about adding the SSH plugin, see Manage plugins in RPA Desktop Design Studio.

Verify that you have open or active Windows, Java, Google Chrome, or Edge applications.

Role required: None

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Procedure

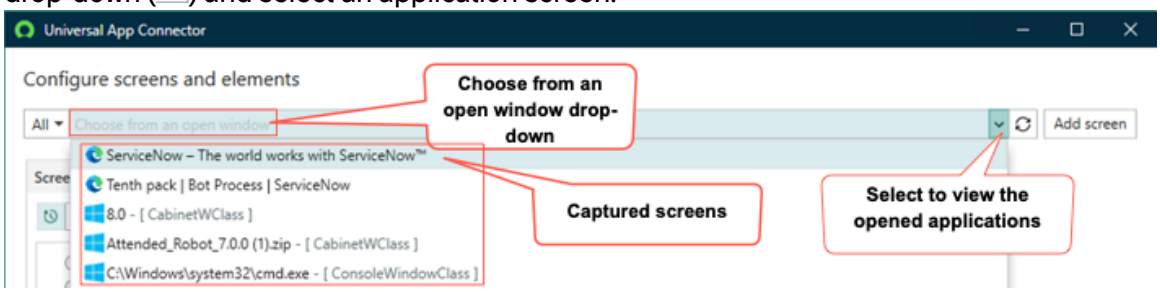
1. In the Toolbox pane, navigate to **Connectors**, and drag **Universal App Connector** to **Global Objects** in the Project Explorer pane.
   The connector is added as a **UniversalApplication** object under **Global Objects**.
2. To use the methods at the **Universal App Connector** connector level, double-click the **UniversalApplication** object.

Method name	Reference
Click	Use the Click method for Universal App Connector
GetValue	Use the GetValue method for Universal App Connector
SetValue	Use the SetValue method for Universal App Connector
Start	Use the Start method for Universal App Connector
WaitForAnyScreen	Use the WaitForAnyScreen method for Universal App Connector

   For example, the Start method is used if you want the browser or application to start before interacting with any application screens or elements.
   The methods appear in the Object Explorer pane.
3. To configure the screens and elements in the UAC, do the steps.

   a. Under Global Objects, right-click **UniversalApplication** and select **Configure**.

   b. On the Configure screens and elements window, select the **Choose from an open window** drop-down ( ) and select an application screen.



   Note:

   - If no supported applications are open, the `App window not found message` is displayed.
   - To display newly opened application screens on the list, select the Click to refresh windows icon ( ).

   c. **Optional:** To filter the opened applications by their type, select the **All** filter application type icon ( ) and select All or the application type.

   (Optional) For example, if you select **Chrome**, only Google Chrome web pages appear in the **Choose from an open window** list.

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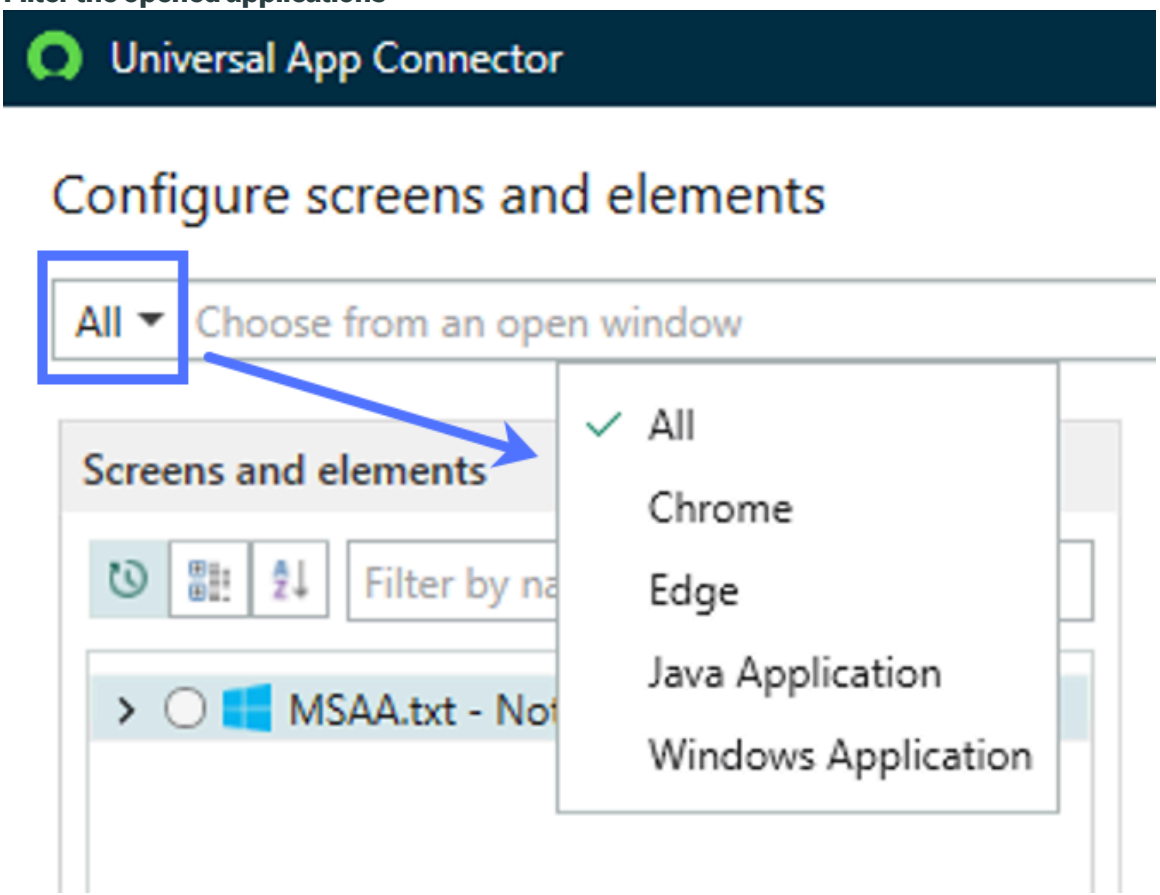
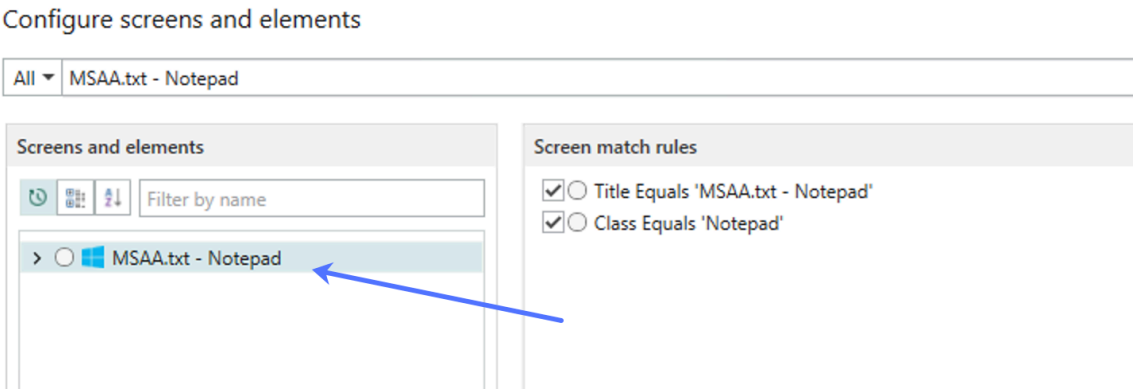
For example, if you select *Windows* **Application**, only Windows screens appear in the **Choose from an open window** list.

Filter the opened applications



d. To add the selected application screen, select **Add screen**.
After you do this step, you can capture the screen elements to perform actions.
The application screen appears under the Screens and elements pane.



e. To capture the elements from the screen, under the Screen and elements pane, right-click the added screen and select **Capture Element**.

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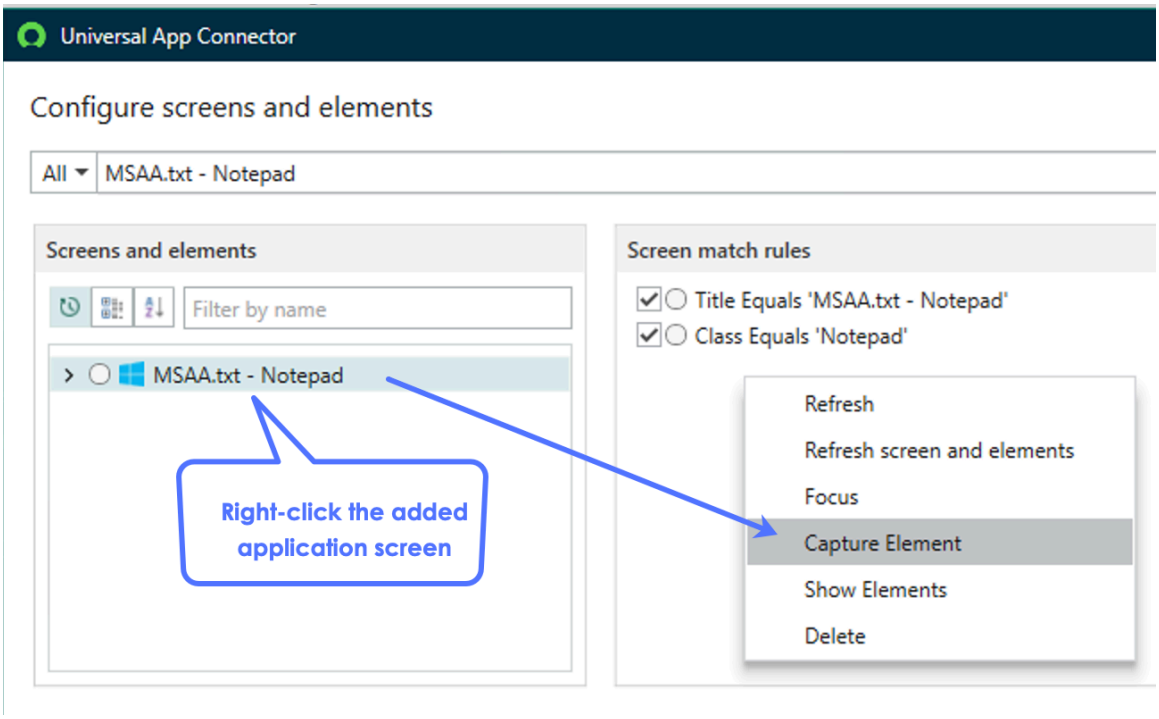

The focus is set on the application screen that you had captured and the capture elements dialog appears.

For example, when you are capturing elements of a *Windows* application such as Notepad. If you select the **UIA** mode (UI Automation), the scroll bar of the Notepad is also captured.

Capture dialog for Windows application - Notepad - UIA mode



If you select the **AA** mode (Active Accessibility), the scroll bar of the Notepad is not captured.

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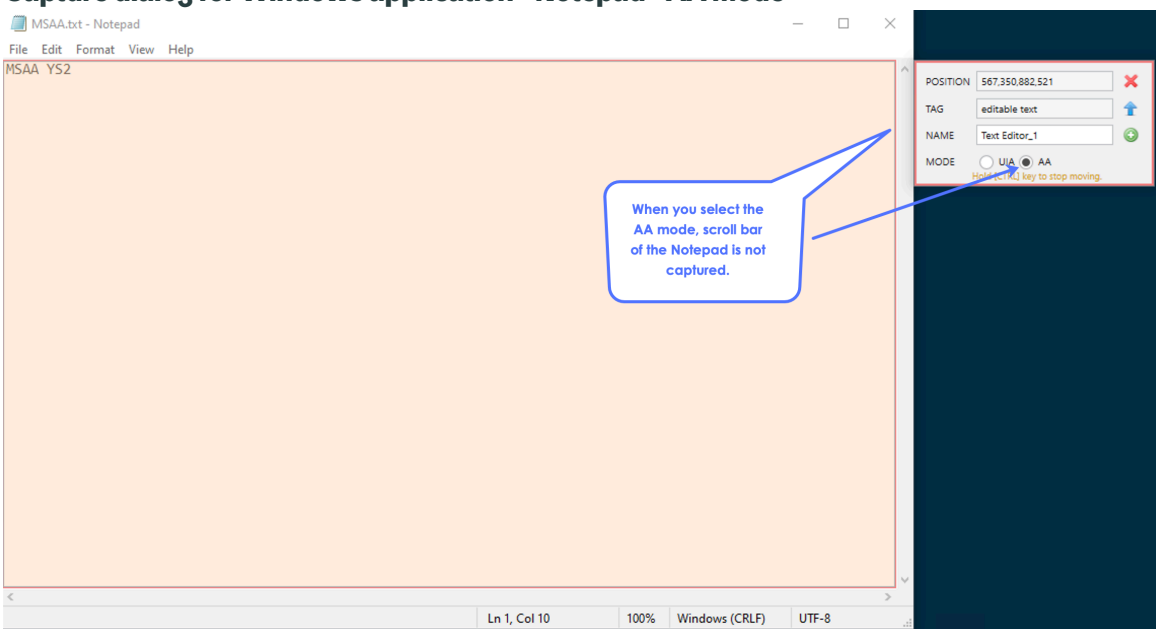
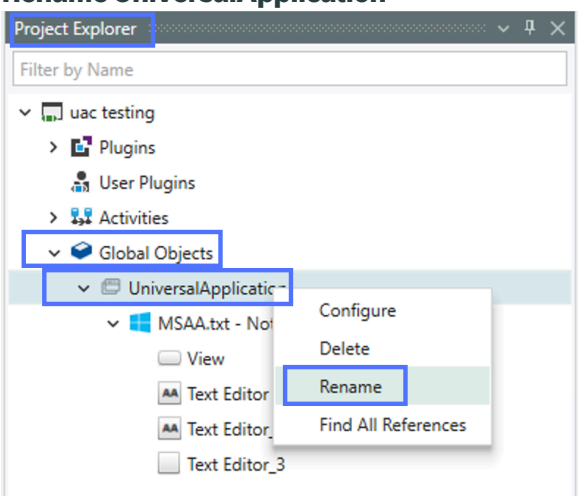
Capture dialog for Windows application - Notepad - AA mode



f. To use the methods at the **Universal App Connector** connector level for the two modes, UI Automation and Active Accessibility, double-click the **UniversalApplication** object.
For more information about the methods for UI Automation mode and Active Accessibility mode, see Methods of UI Automation mode and Active Accessibility mode.
The methods appear in the Object Explorer pane.

4. Do any of the following options for a desired action.

Option	Action
To rename UniversalApplication	Navigate to **Global Objects** in the Project Explorer pane, right-click the **UniversalApplication** and select **Rename**. **Rename UniversalApplication** 

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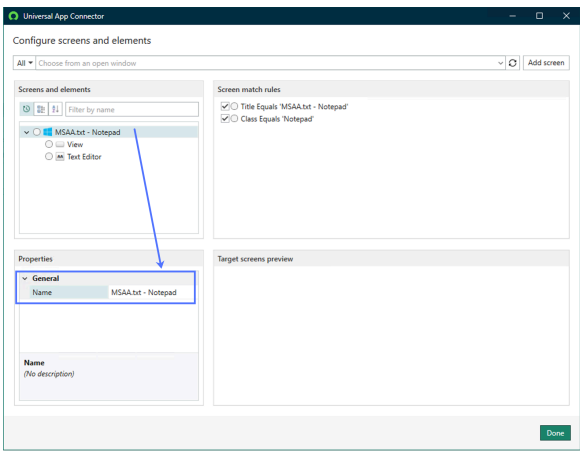
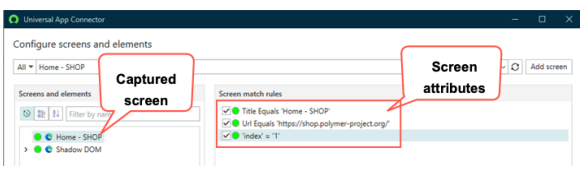
Option	Action
To change the name of the screen while con figuring the screens and elements	**a.** Select the name of the application screen under the Screens and elements pane. The information of the selected application screen appears under the Properties pane. **b.** Update the name of the application screen in the **Name** field and press **Enter**. The name of the application is updated in the Screens and elements pane. **Update the application screen name** 
To identify the screen uniquely	Use the screen match rules to identify and lo cate the screen. During the execution, the plugin must identi fy the target screen uniquely to automate ac tions on the screen. Examples of attributes are the title or URL of the application screen. The attributes appear under the **Screen match rules** pane on the **Configure screens and elements** window. The UAC uses the screen match rules to identify the screen first, and uses the element match rule to identify the element, and then, perform actions on ele ments such as Click or Get Text.  The image below shows an example of mul tiple elements that match the same criteria given in the Match Attributes section. A multi ple number of instances, if any, appears when you refresh the captured element, is indicat ed within the brackets in red. In such cases, you must tweak the attributes to select exact

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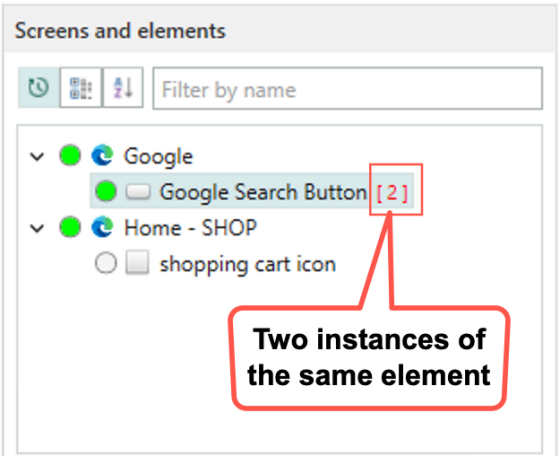
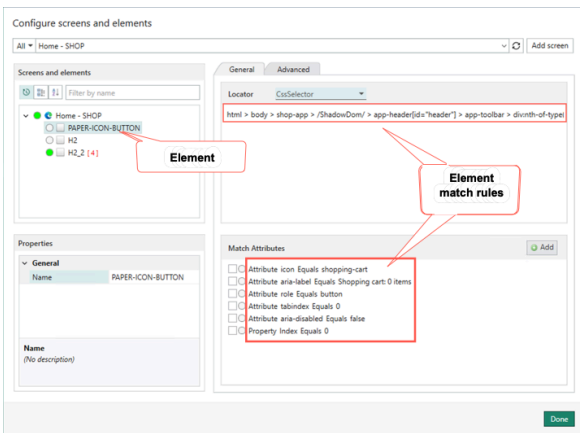
Option	Action
	ly the element that needs to be automated. The user can refresh to check if the selected criteria match exactly one element. 
To identify an element uniquely	Use the element match rules to edit the val ues in the provided **Locator** and the **Match Attributes** sections. During the execution, the plugin must identi fy the target element uniquely to automate ac tions on the element. The attributes appear under the **Match Attributes** pane on the **Con figure screens and elements** window. The UAC uses the screen match rules to identify the screen first, and uses the element match rule to identify the element, and then, perform actions on elements such as Click or Get Text. The image shows the match rules of an ele ment captured. 
To find the elements on the application screen	Use the locators of the captured elements. For more information, see Find the elements on the application screen.

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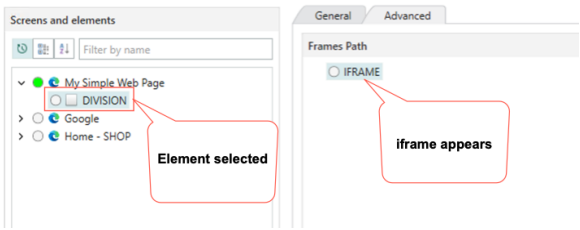
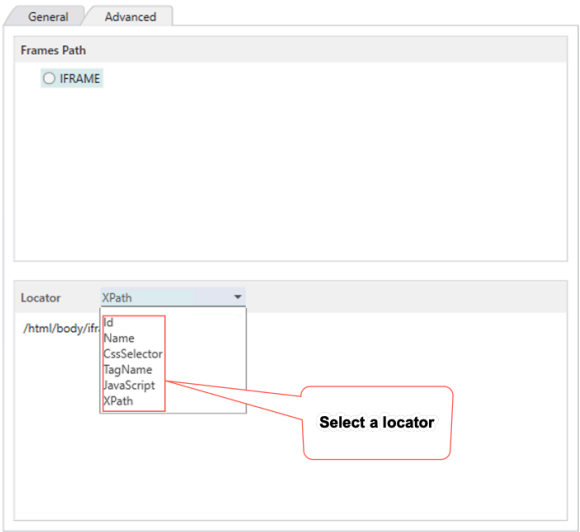
Option	Action
To view the path to an iframe, if any, in a captured element	**a.** In the **Screens and elements** pane, select the element. **b.** Select the **Advanced** tab. The iframe appears.  **c.** From the **Locator** list, select a locator to find the path to the iframe. 

5. **Optional:** Right-click the application screen or element to perform any additional operations such as **Refresh**, **Refresh screen and elements**, **Focus**, **Add custom element**, **Show Elements**, **Delete**, and more.
   For information on the various additional operations that are available for the application screens and elements, see Additional options for application screens and elements in Universal App Connector.
6. Select **Done** after you finish configuring your application screens or elements.
   The application screens and their elements appear under the UAC object in **Global Objects**.
7. Double-click the required application screen or element and the Object Explorer pane is displayed listing the related methods.
   For example, if you select a Java application screen or element, the Java connector methods are displayed in Object Explorer.
   - For more information on Java connector methods, see Java connector methods.
   - For more information on Google Chrome and Microsoft Edge connector methods, see Chromium connector methods.

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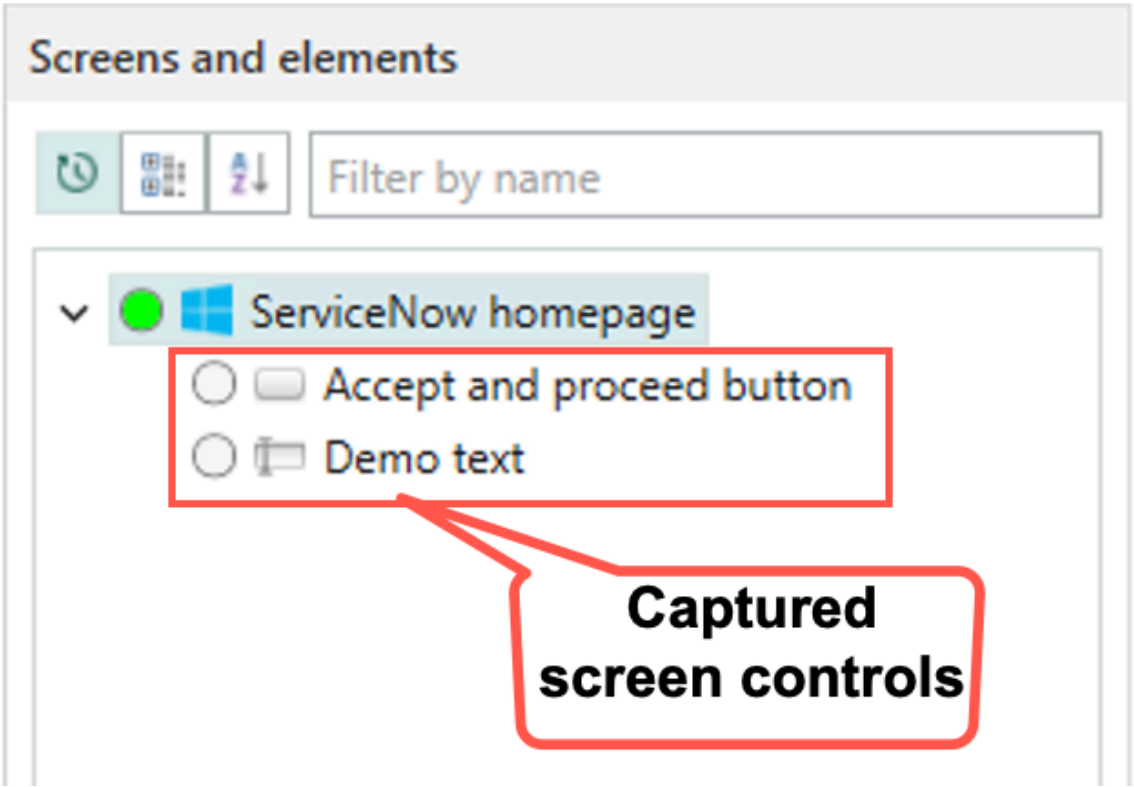
- For more information on Windows connector methods, see Windows Connector methods.
- If you have captured a web application screen and you want to execute a custom JavaScript on it, you can use the ExecuteJavascript method.

8. Capture as many screen elements as you need by using the Capture element dialog.

   To learn to use the Capture element dialog, see Use the Capture element dialog.

   The captured screen elements appear under the captured application screen as elements.



9. Drag the required method from the Object Explorer pane to the Design surface.

   The method is displayed with the application screen or element name in the Design surface.

What to do next

Design the automation by using the different methods for the application screens and elements, and save the automation.

Use the Click method for Universal App Connector

Use the Click method to perform a click action on an element.

Before you begin

Verify that you have open or active applications, for example, where you want to capture elements.

Role required: None

About this task

For information on the various additional operations that are available for the application screens and elements, see Additional options for application screens and elements in Universal App Connector.

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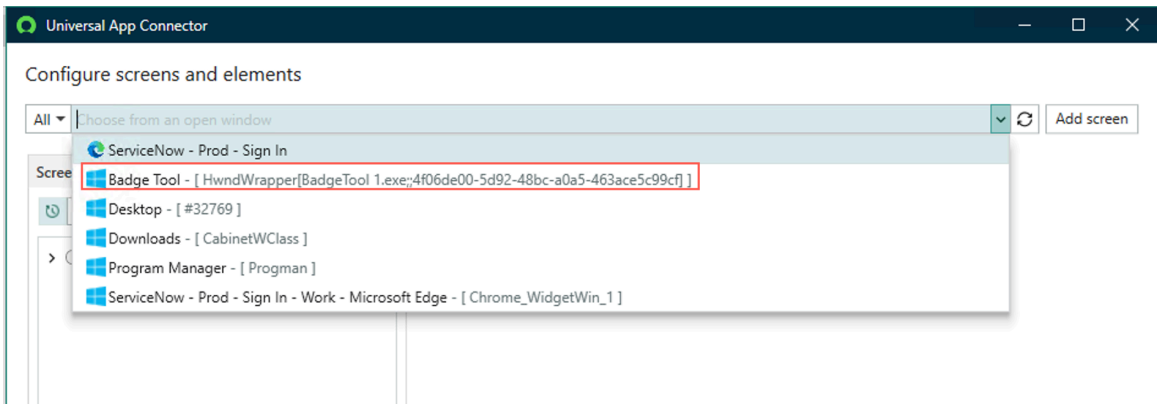
Procedure

1. Configure Universal App Connector.
   To learn more about configuring the application screens and child elements, see Use the Universal App Connector.
2. Under Global Objects, double-click the **UniversalApplication** object.
   The Click method appears in the Object Explorer pane.
3. Drag the Click method to the Design surface.
4. Double-click the Click method to configure the screens and elements in Universal App Connector.
5. On the Configure screens and elements window, select the Choose from an open window drop-down ( ) and select an application screen.

   For example, select the Badge Tool application.



Note:

- If no supported applications are open, the `App window not found message` is displayed.
- To display newly opened application screens on the list, select the Click to refresh windows icon ( ).

6. To add the selected application screen, for example, Badge Tool application, select **Add screen**.
   After you do this step, you can capture the screen elements to perform actions.
   The application screen appears under the Screens and elements pane.



7. To capture the elements from the screen, right-click the added screen and select **Capture Element**.
   The focus is set on the application screen that you had captured and the Capture Element dialog appears.

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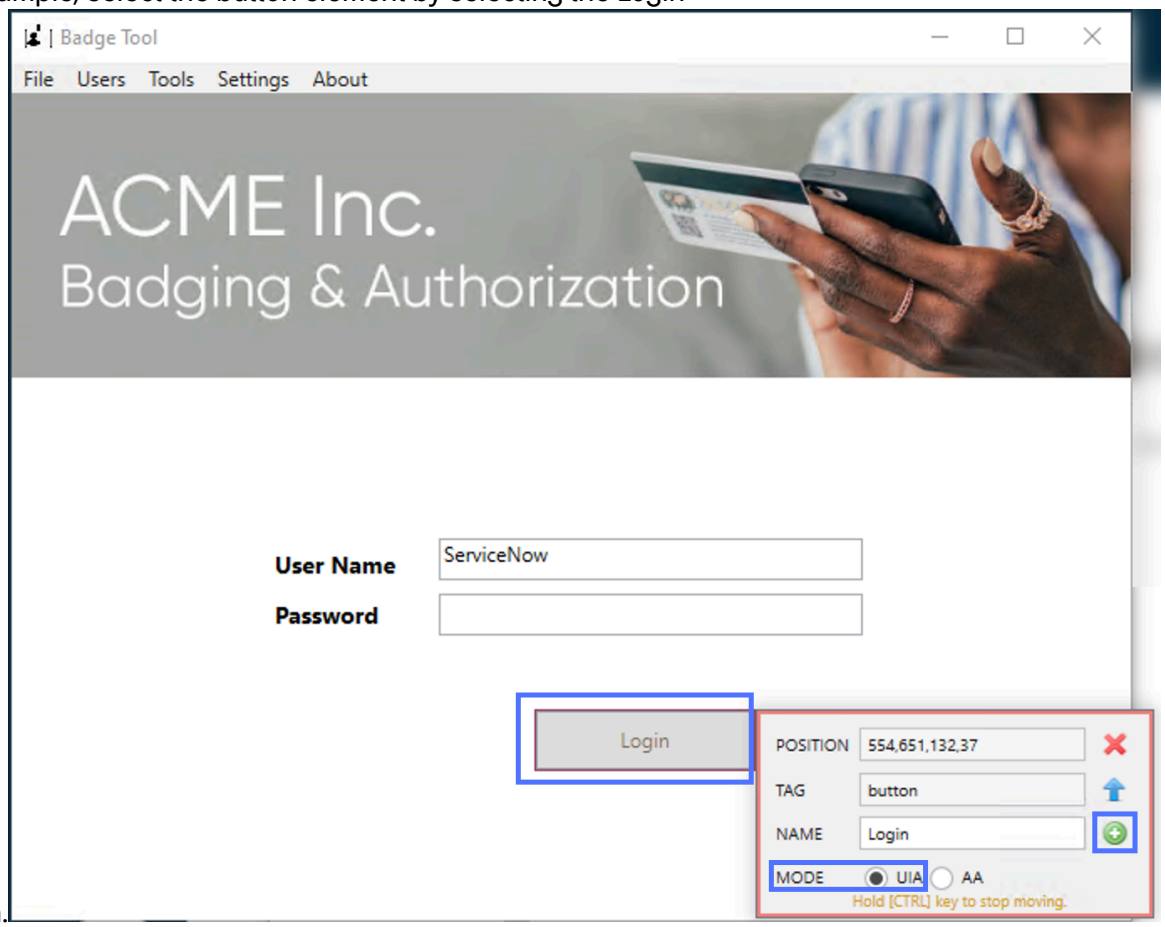
8. After selecting the required element, select the Add Element icon ( ) and select the mode as **UIA**, to capture the element

   Note: You must add at least one element to continue.

   For example, select the button element by selecting the Login button.



9. In the Configure screens and elements window, right-click the captured element, choose **Select** and select **Done**.

   Note: Select at least one element to perform the action. If none are selected, the action won't be executed. To proceed without selecting, select **OK**.

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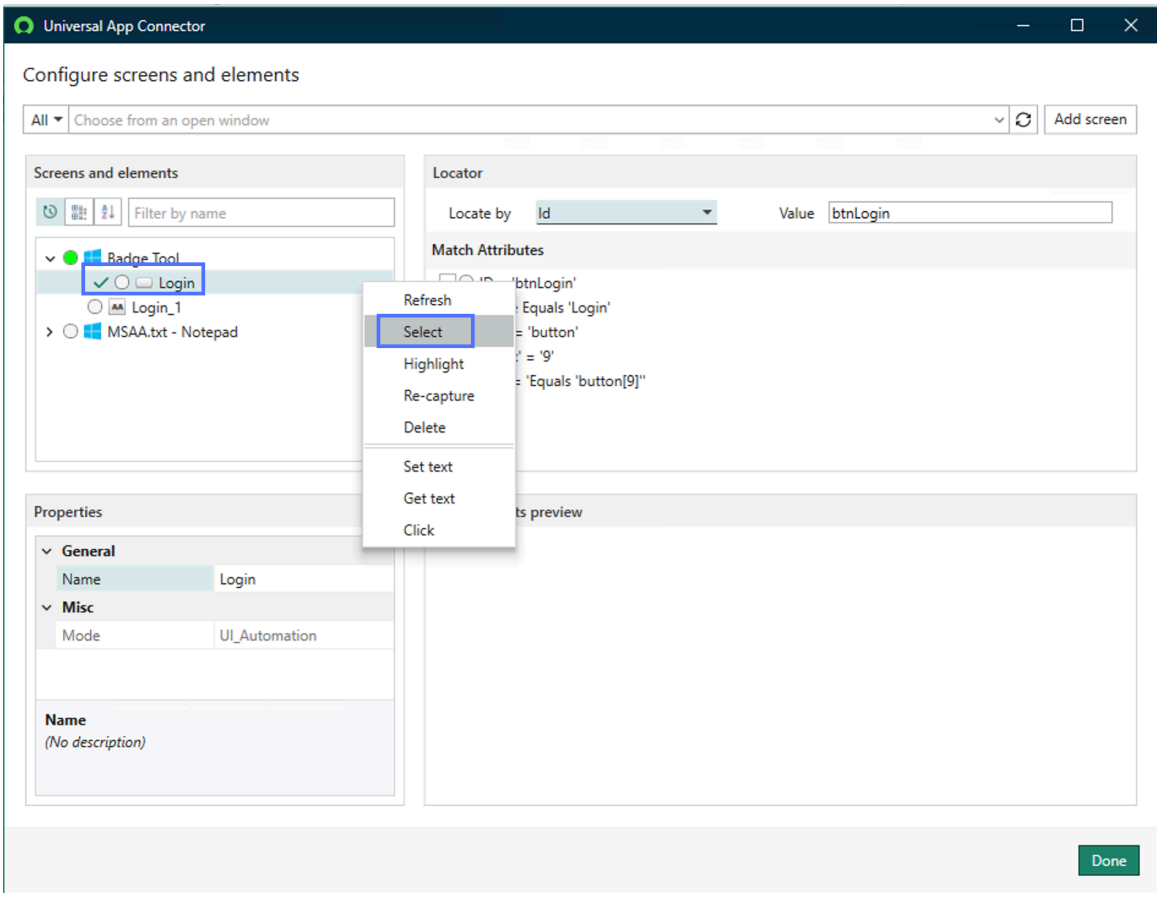
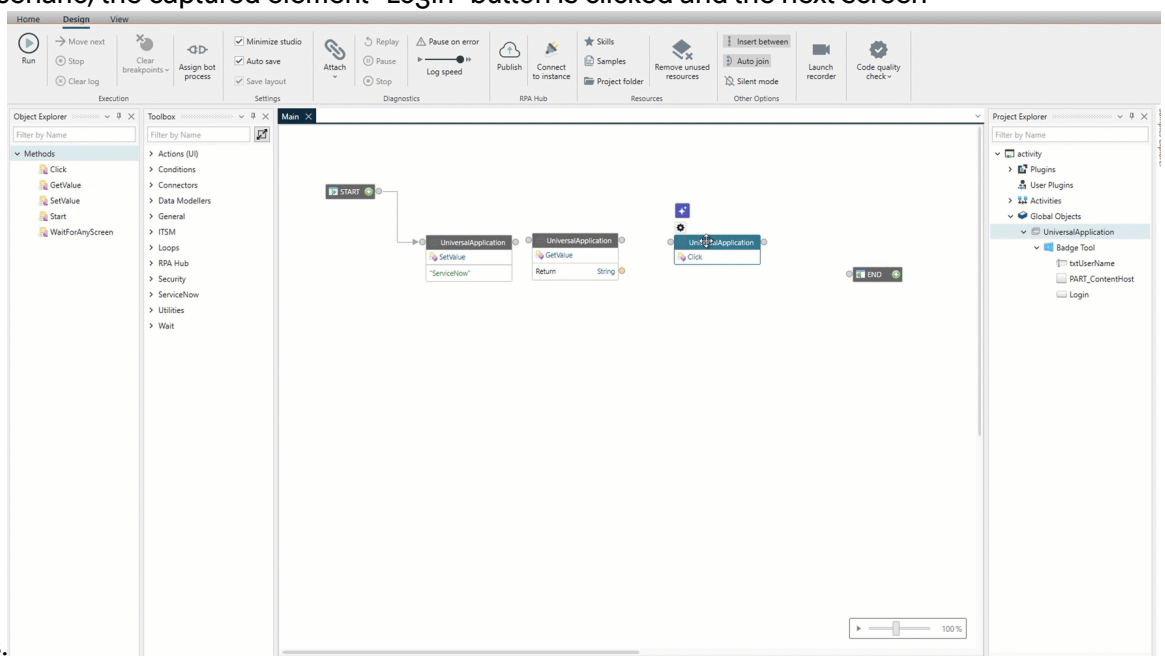


10. Right-click the Click method and select either **Run From Here** or **Run This**.
    In this scenario, the captured element "Login" button is clicked and the next screen appears.



11. Double-click the required application screen or element and the Object Explorer pane is displayed listing the related methods.
    For example, if you select a Java application screen or element, the Java connector methods are displayed in Object Explorer.

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- For more information on Java connector methods, see Java connector methods.
- For more information on Google Chrome and Microsoft Edge connector methods, see Chromium connector methods.
- For more information on Windows connector methods, see Windows Connector methods.
- If you have captured a web application screen and you want to execute a custom JavaScript on it, you can use the ExecuteJavascript method.

Use the GetValue method for Universal App Connector

Use the GetValue method to retrieve a value from an element.

Before you begin

Verify that you have open or active applications, for example, where you want to capture elements.

Role required: None

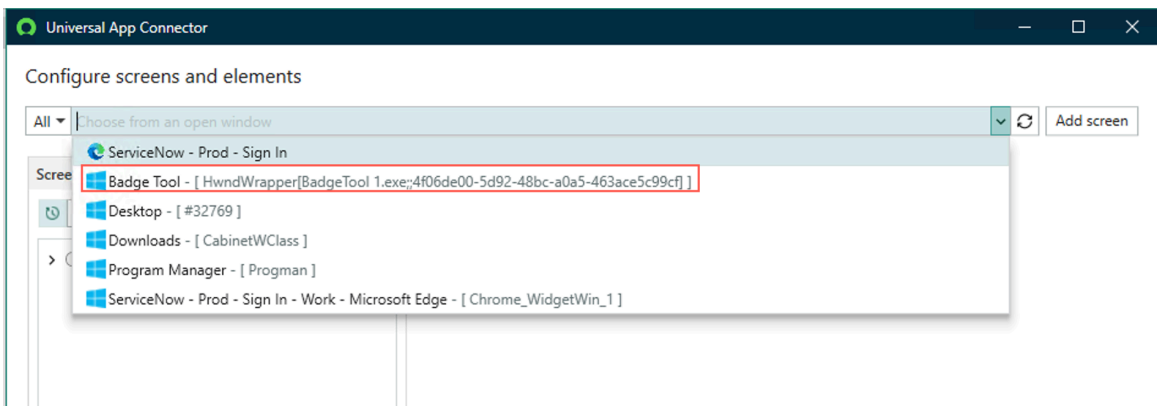
About this task

For information on the various additional operations that are available for the application screens and elements, see Additional options for application screens and elements in Universal App Connector.

Procedure

1. Configure Universal App Connector.
   To learn more about configuring the application screens and child elements, see Use the Universal App Connector.
2. Under Global Objects, double-click the **UniversalApplication** object.
   The GetValue method appears in the Object Explorer pane.
3. Drag the GetValue method to the Design surface.
4. Double-click the GetValue method to configure the screens and elements in Universal App Connector.
5. On the Configure screens and elements window, select the Choose from an open window drop-down ( ) and select an application screen.

   For example, select the Badge Tool application.



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Note:

- If no supported applications are open, the `App window not found message` is displayed.
- To display newly opened application screens on the list, select the Click to refresh windows icon ( ).

6. To add the selected application screen, for example, Badge Tool application, select **Add screen**.
   After you do this step, you can capture the screen elements to perform actions.
   The application screen appears under the Screens and elements pane.



7. To capture the elements from the screen, right-click the added screen and select **Capture Element**.
   The focus is set on the application screen that you had captured and the capture elements dialog appears.

8. After selecting the required element, select the Add Element icon ( ) and select the mode as **UIA**, to capture the element.

Note: You must add at least one element to continue.

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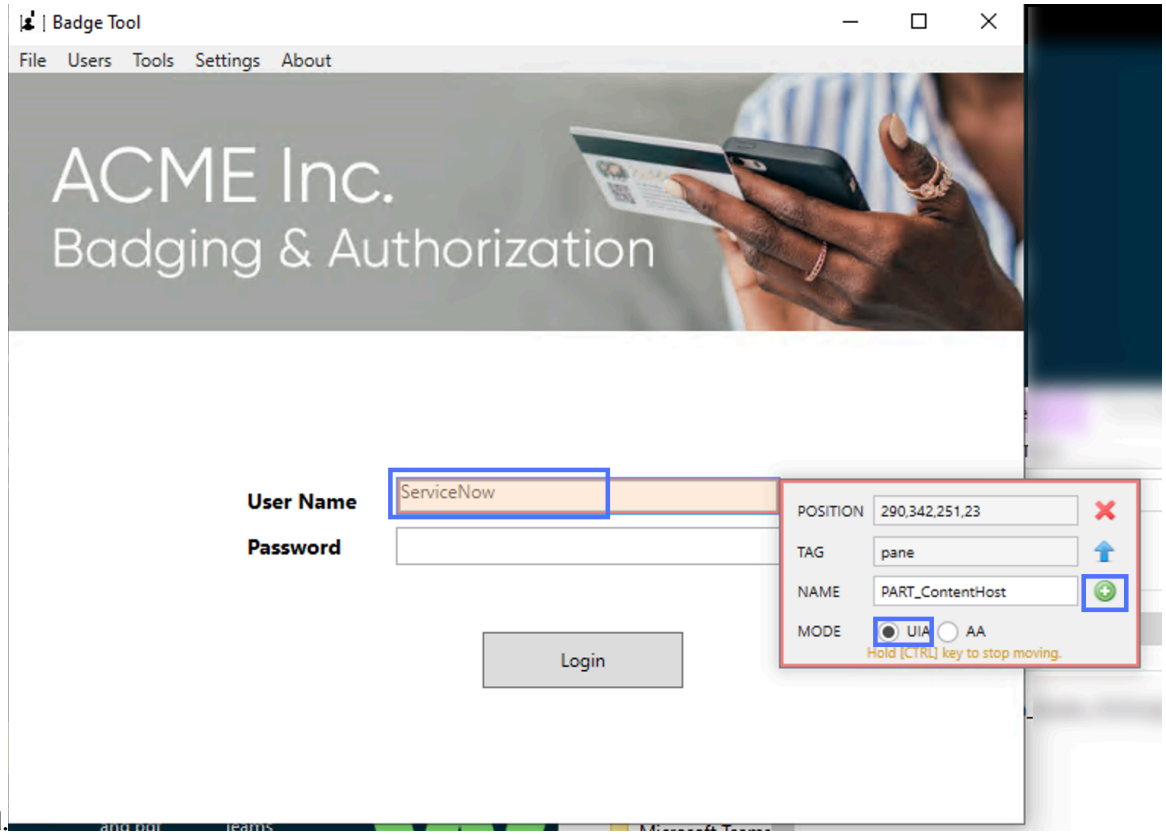
For example, select the textbox element tagged as edit by selecting the text box next to User Name



field.

9. In the Configure screens and elements window, right-click the captured element, choose **Select** and select **Done**.

> **Note:** Select at least one element to perform the action. If none are selected, the action won't be executed. To proceed without selecting, select **OK**.

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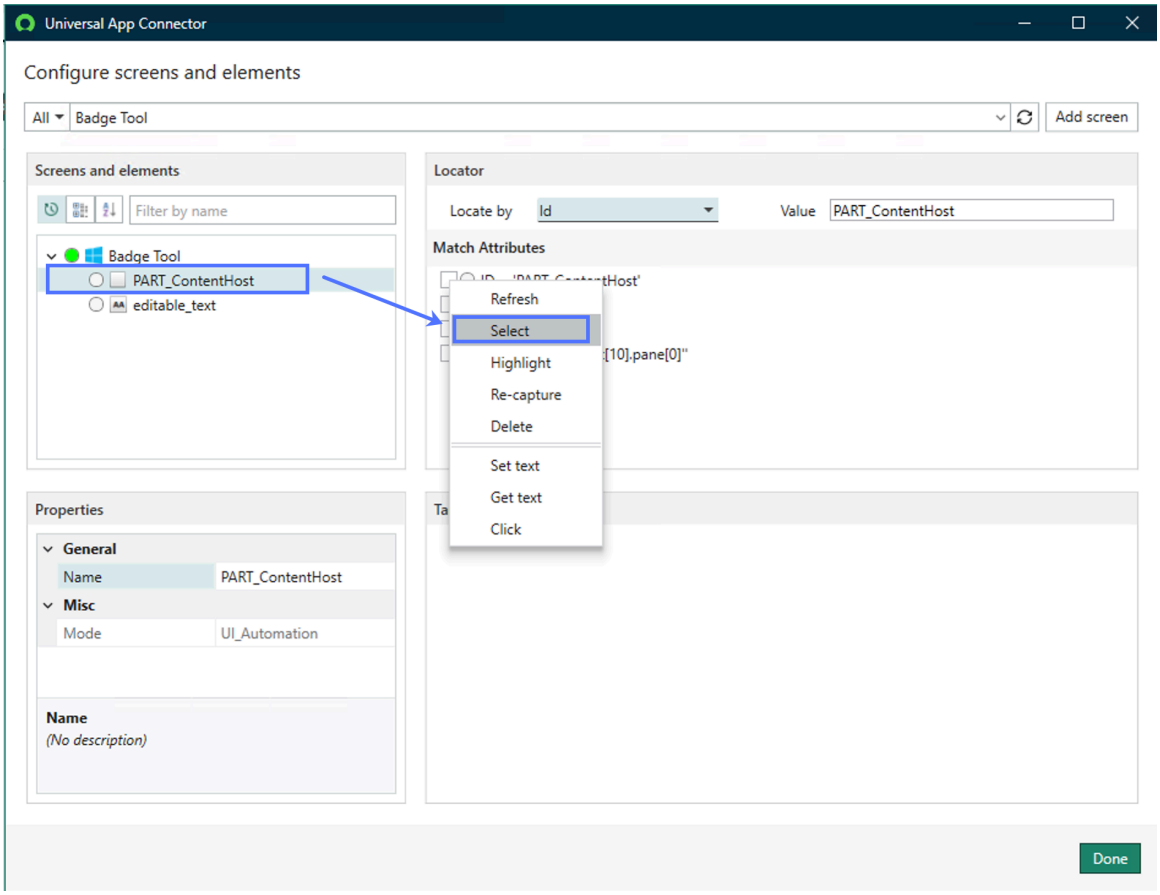

10. Right-click the GetValue method and select either **Run From Here** or **Run This**.

Parameters of the GetValue method

Parameter name	Parameter description	Port Type	Data Type
Return	Retrieves a value from the captured element.	Data Out	String

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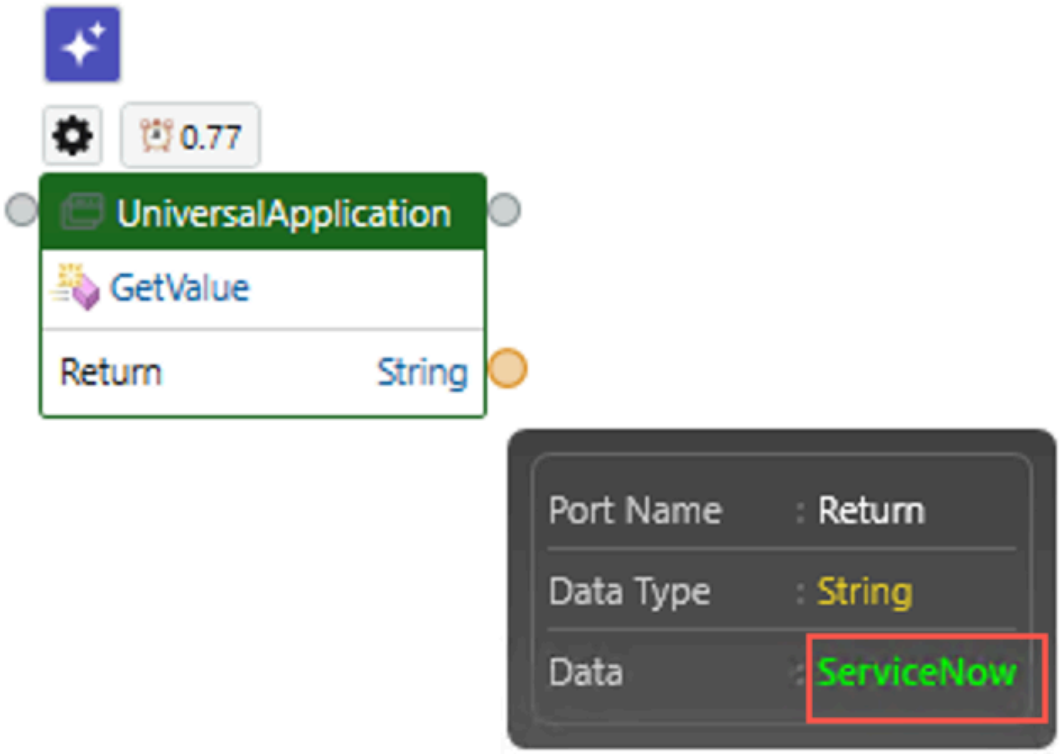
The input value in the captured element is retrieved and displayed in the Data Out port of the GetValue method. In this scenario, ServiceNow is



retrieved.

11. Double-click the required application screen or element and the Object Explorer pane is displayed listing the related methods.
For example, if you select a Java application screen or element, the Java connector methods are displayed in Object Explorer.
    - For more information on Java connector methods, see Java connector methods.
    - For more information on Google Chrome and Microsoft Edge connector methods, see Chromium connector methods.
    - For more information on Windows connector methods, see Windows Connector methods.
    - If you have captured a web application screen and you want to execute a custom JavaScript on it, you can use the ExecuteJavascript method.

Use the SetValue method for Universal App Connector

Use the SetValue method to assign a specified value into an element.

Before you begin

Verify that you have open or active applications, for example, where you want to capture elements.

Role required: None

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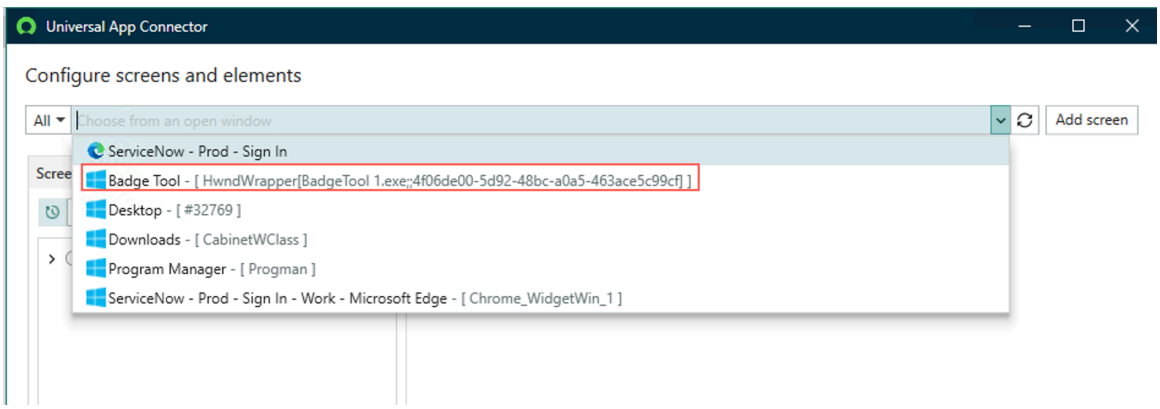
About this task

For information on the various additional operations that are available for the application screens and elements, see Additional options for application screens and elements in Universal App Connector.

Procedure

1. Configure Universal App Connector.
   To learn more about configuring the application screens and child elements, see Use the Universal App Connector.
2. Under Global Objects, double-click the **UniversalApplication** object.
   The SetValue method appears in the Object Explorer pane.
3. Drag the SetValue method to the Design surface.
4. Double-click the SetValue method to configure the screens and elements in Universal App Connector.
5. On the Configure screens and elements window, select the Choose from an open window drop-down ( ) and select an application screen.

   For example, select the Badge Tool application.



Note:

- If no supported applications are open, the `App window not found message` is displayed.
- To display newly opened application screens on the list, select the Click to refresh windows icon ( ).

6. To add the selected application screen, for example, Badge Tool application, select **Add screen**.
   After you do this step, you can capture the screen elements to perform actions.
   The application screen appears under the Screens and elements pane.



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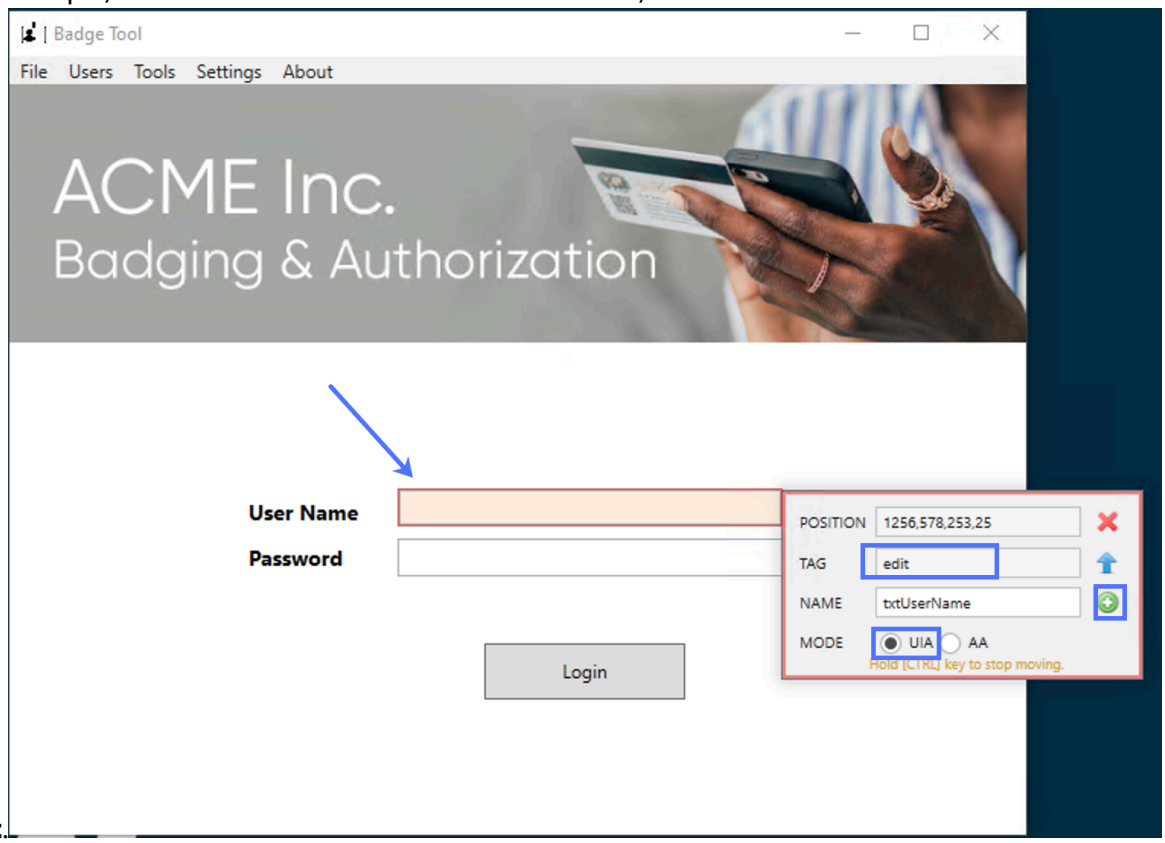
7. To capture the elements from the screen, right-click the added screen and select **Capture Element**.
   The focus is set on the application screen that you had captured and the capture elements dialog appears.

8. After selecting the required element, select the Add Element icon ( ) and select the mode as **UIA**, to capture the element.

   Note: You must add at least one element to continue.

   For example, select the text box next to User Name field, select the **TAG** as **edit**.



9. In the Configure screens and elements window, right-click the captured element, choose **Select** and select **Done**.

   Note: Select at least one element to perform the action. If none are selected, the action won't be executed. To proceed without selecting, select **OK**.

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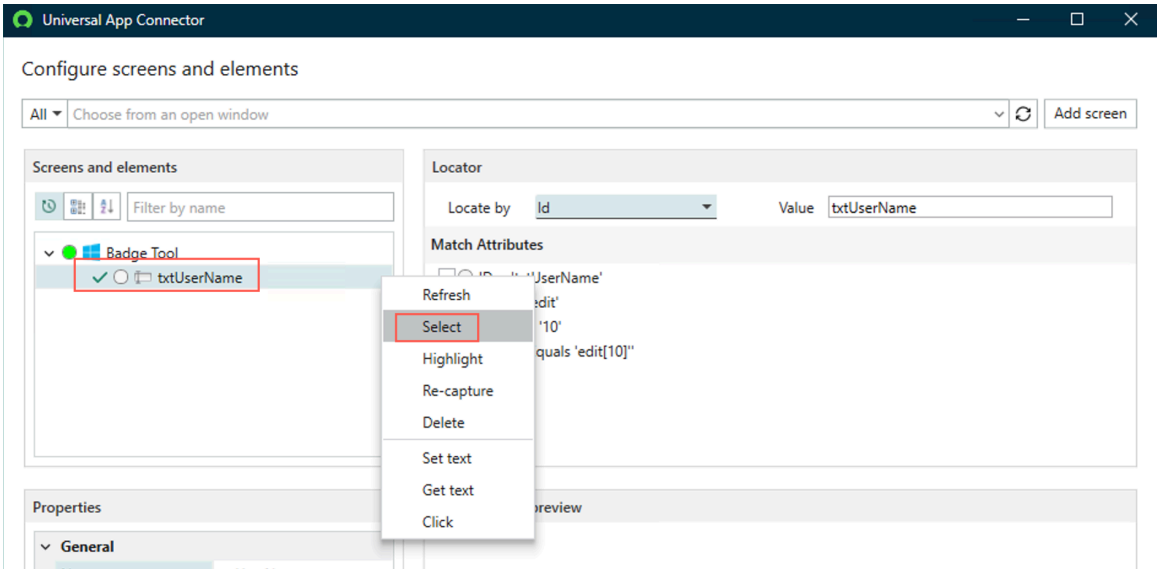

10. Complete the following parameters in the SetValue method:

Parameters of the SetValue method

Parameter name	Parameter description	Port Type	Data Type
Value	Enter the value that you want to assign in the element. For example, `ServiceNow`.	Data In	String

11. Right-click the SetValue method and select either **Run From Here** or **Run This**.

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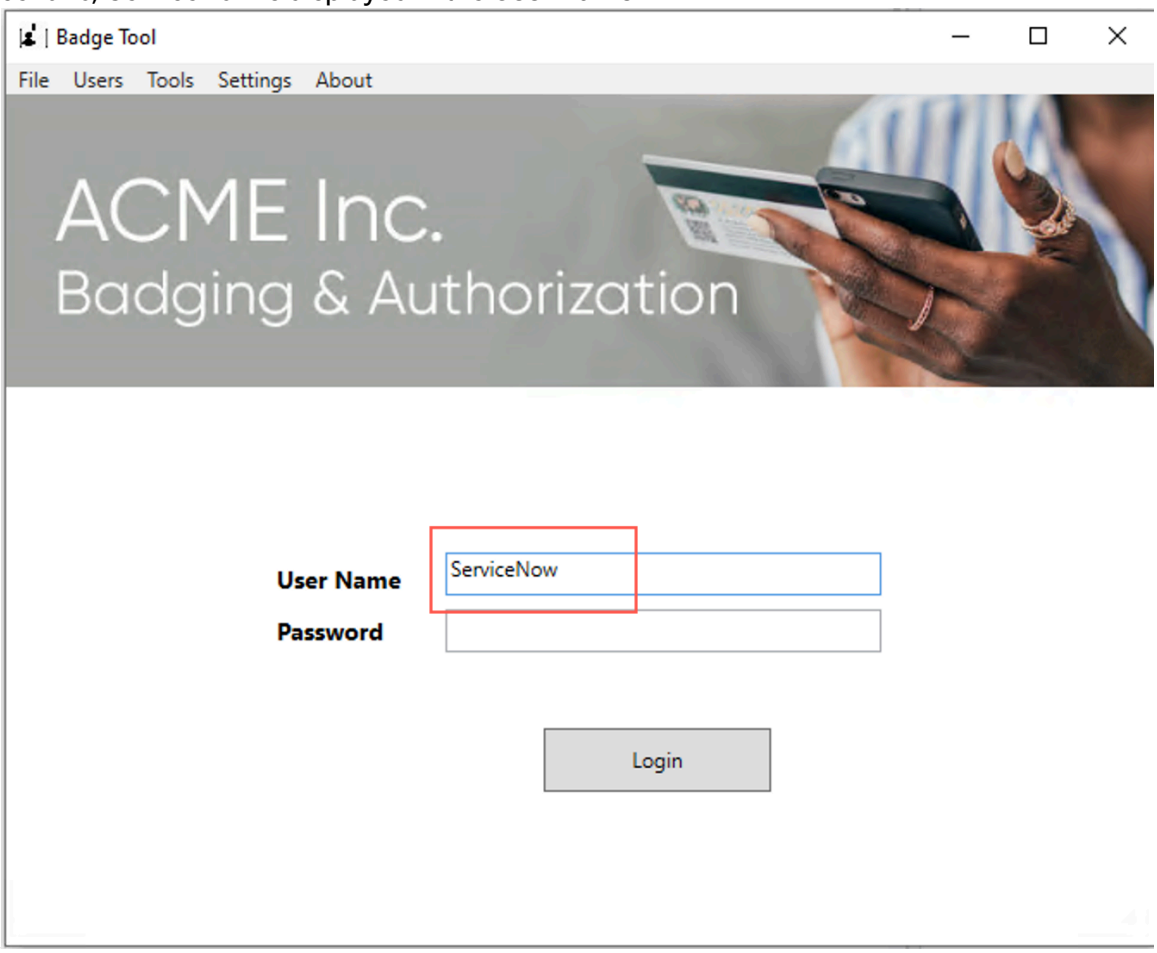
The input value is displayed in the captured element. In this scenario, ServiceNow is displayed in the **User Name** Field.



12. Double-click the required application screen or element and the Object Explorer pane is displayed listing the related methods.
For example, if you select a Java application screen or element, the Java connector methods are displayed in Object Explorer.
    - For more information on Java connector methods, see Java connector methods.
    - For more information on Google Chrome and Microsoft Edge connector methods, see Chromium connector methods.
    - For more information on Windows connector methods, see Windows Connector methods.
    - If you have captured a web application screen and you want to execute a custom JavaScript on it, you can use the ExecuteJavascript method.

Use the Start method for Universal App Connector

Use the Start method to launch a browser or an application for the Universal App Connector (UAC) object. You can use this method if you want a browser or application to start before interacting with any application screens or elements.

Before you begin
Role required: None

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About this task

Note: If the application type that you select for the Start method is Google Chrome or Microsoft Edge browser, then the same browser must be selected from the **Browser** list in the Configure screen and elements window of UAC.

Procedure

1. In the Toolbox pane, navigate to **Connectors** and drag **Universal App Connector** to **Global Objects** in Project Explorer.
   The connector is added as a **Universal Application** object in Global Objects. You can rename this UAC object from here.
2. Double-click the UAC object and drag the **Start** method from the Object Explorer to the Design surface.
3. Complete the following parameters in the Start component:

Parameters of the Start method

Parameter name	Parameter description	Required?
AppType	Opens the Port Properties dialog. The options available are **Chrome**, **Edge**, and **Application**. If you select **Chrome** or **Edge** from the **Static Value** list, the selected browser opens in a new tab. For more information on how to configure port properties, see Configure port properties. If you select **Application** from the **Static Value** list, you must provide the full path of the application in the **Path** parameter of the Start method.	Yes
Path	Full navigation path of the application that you want to open. The path is entered in string format. For example, `D:\TestApps\JavaTest.jar`	No
StartParams	Arguments for the launch application. For example, if you select Google Chrome as the application and provide `google.com` as the argument, the Google web page is opened when the browser is launched.	No

4. Double-click the required application screen or element and the Object Explorer pane is displayed listing the related methods.
   For example, if you select a Java application screen or element, the Java connector methods are displayed in Object Explorer.
   - For more information on Java connector methods, see Java connector methods.
   - For more information on Google Chrome and Microsoft Edge connector methods, see Chromium connector methods.
   - For more information on Windows connector methods, see Windows Connector methods.
   - If you have captured a web application screen and you want to execute a custom JavaScript on it, you can use the ExecuteJavascript method.

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Example: Start method for Universal App Connector

You have a list of employee salary records in an Excel sheet, and you want your RPA robot to automatically calculate taxes using a public web-based tax calculator. Before the bot can interact with the calculator's UI, it needs to launch the browser and open the specific tax calculator page.

1. Use the Data Table connector to import rows from the Excel file.
2. Drag a For Each component onto the design surface to iterate over the list of employee salary records.
3. Inside the loop:
   - Extract fields from the current record.
   - Set up the Universal App Connector to open the Chrome browser.
   - Use the Start method to launch the browser and navigate to the tax calculator URL:

     ```
     https://example.com/tax-calculator
     ```

   - Use WaitForAnyScreen or a Wait component to ensure the tax calculator interface is fully loaded and ready.
4. Use other UAC methods or UI automation to:
   - Enter salary and deduction values from the Excel row.
   - Trigger the calculation.
   - Capture the calculated tax amount.

Use the WaitForAnyScreen method for Universal App Connector

Find one or more application screens and optionally, their child elements within a time period that you specify and then perform actions that you specify.

Before you begin

Role required: None

About this task

When you use the WaitForAnyScreen method, it tries to find a screen by matching the screen match rules within a specified duration. If it fails to find the screen within that duration, you may optionally enable it to perform an action by passing the control to another component through the ELSE port. Else, the WaitForAnyScreen method completes its execution. For the WaitForAnyScreen method to find a screen, the screen must be in an opened state.

Procedure

1. Configure the UAC.
   To learn to configure the application screens and child elements, see Use the Universal App Connector.
2. Under Global Objects, double-click the **UniversalApplication** object.
   The WaitForAnyScreen method appears in the Object Explorer pane.
3. Drag the WaitForAnyScreen method to the Design surface.
4. Configure the WaitForAnyScreen method.

   a. Select the settings icon ( ).

   b. On the CHOOSE SCREENS window, select one or more application screens.

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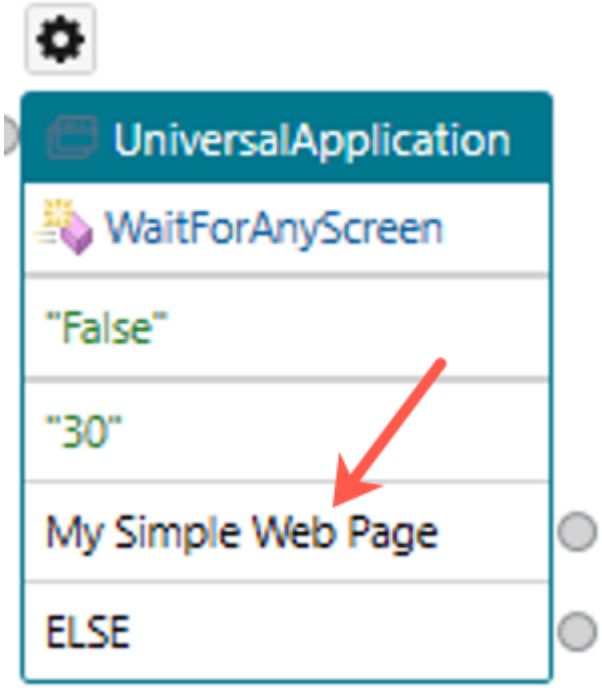
c. Select **OK**.
The application screen that you selected appears in the WaitForAnyScreen method.



d. Configure the parameters on the WaitForAnyScreen method.

WaitForAnyScreen method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
MatchAllChildren	If set to `True`, the method also finds the child elements of the parent screen that you had captured by matching the attributes of the child elements.	Data In	Boolean	False	No	**⚠ Warning:** Setting this parameter to `True` may slow down the execution of the component.
Timeout	Duration in seconds within which the WaitForAnyScreen method	Data In	Integer	30 seconds	Yes	

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Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
	tries to find the screen and, optionally, its child elements.					
Application screen	Title of the application screen that you've selected in the CHOOSE SCREENS window. The component allows multiple window entries depending on the number of screens you had selected in the CHOOSE SCREENS window.	Data Out	Not applicable	Not applicable	Not applicable	If the WaitForAnyScreen method finds the first screen that is listed, the execution of the WaitForAnyScreen method completes.
ELSE	Executes another component or method if the WaitForAnyScreen method fails to find any screen within the duration specified in the Timeout port.	Data Out	Not applicable	Not applicable	No	

5. Double-click the required application screen or element and the Object Explorer pane is displayed listing the related methods.
   For example, if you select a Java application screen or element, the Java connector methods are displayed in Object Explorer.

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- For more information on Java connector methods, see Java connector methods.
- For more information on Google Chrome and Microsoft Edge connector methods, see Chromium connector methods.
- For more information on Windows connector methods, see Windows Connector methods.
- If you have captured a web application screen and you want to execute a custom JavaScript on it, you can use the ExecuteJavascript method.

Find the elements on the application screen

Use the locators of the captured elements to find the elements on the application screen while using the Universal App Connector (UAC) in the RPA Desktop Design Studio.

Before you begin

Familiarize yourself with UAC concepts. For more information, see Universal app connector.

Configure the UAC. For more information, see Use the Universal App Connector.

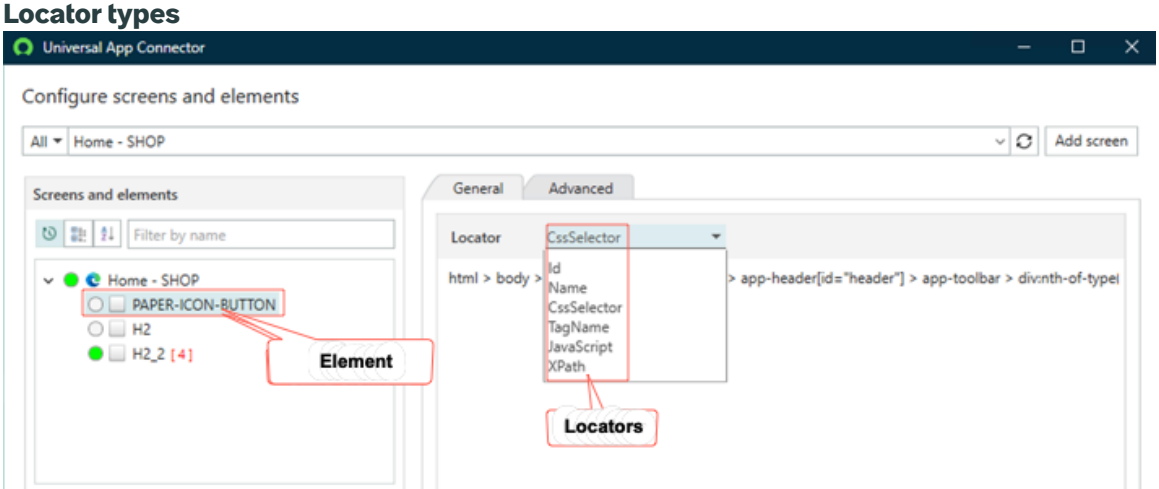
Verify that you have open or active Windows, Java, Google Chrome, or Edge applications.

Role required: None

About this task

The UAC provides multiple locator types. For example, the XPath locator provides the XPath to the element.

Locator types



Procedure

1. In the Toolbox pane, navigate to **Connectors**, and drag **Universal App Connector** to **Global Objects** in the Project Explorer pane.
   The connector is added as a **UniversalApplication** object under **Global Objects**.
2. Configure Universal App Connector and add a screen.
   For more information, see Use the Universal App Connector.
3. Under the Screens and elements pane, select an element under a screen.
4. From the **Locator** list, select one of the element locators.

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Screen element locators

Locator type	Application type	Description
Id	Web, Java, and Windows	Unique identifier of the element if its defined in the target application.
Name	Web, Java, and Windows	Unique name of the element if its defined in the target application.
CssSelector	Web	The CSS selector that locates the captured web element. For example, `div#navbarNav > ul > li > a`. If a web application supports Shadow DOM, the CSS Selector shows the path with the shadow DOM elements. For example, `html > body > shop-app > /ShadowDom/ > app-header[id="header"] > app-toolbar > div:nth-of-type(3) > a > paper-icon-button > /ShadowDom/ > iron-icon[id="icon"]`
TagName	Web	Unique tag name of the web element.
JavaScript	Web	Allows the user to define a custom JavaScript code to locate an element.
XPath	Web	XPath to locate the web element. If a web application supports Shadow DOM, this locator shows the full XPath with the Shadow DOM elements. For example, `html > body > shop-app > /ShadowDom/ > iron-pages > shop-home > /ShadowDom/ > div > h2`.
Type	Java and Windows	Enables you to locate a screen element by its type. For example, button or text box. When you select the `Type` locator, the UAC connector

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Locator type	Application type	Description
		populates the **Value** field with the type of the element.
Path	Java and Windows	Enables you to locate a screen element by specifying its position in the hierarchy of screen elements. When you select the `Path` locator, the UAC connector populates the **Value** field with the path of the element.
CustomPath	Windows	Enables you to fine-tune or trim the path to an element.

Additional options for application screens and elements in Universal App Connector

Validate and perform additional operations for the added application screens and their captured elements. The additional options for the application screens are categorized based on the application type.

Type of application screens, their additional options, and descriptions

In the Screens and elements pane, right-click the application screen to perform the following additional operations.

Type of application screens and their additional options

Type of application	Additional options
Java	• Refresh screen • Refresh screen and elements • Focus • Capture element • Delete
Windows	• Refresh screen • Refresh screen and elements • Focus • Capture element • Show elements • Delete
Google Chrome or Microsoft Edge	• Refresh screen • Refresh screen and elements • Focus • Capture element

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Type of application screens and their additional options (continued)

Type of application	Additional options
	• Add custom element • Delete

Description of additional options for the application screens

Additional action	Description
Refresh screen	Rematches the selected screen based on the screen match rules or locators that you defined.
Refresh screen and elements	Rematches the selected screen and its child elements based on the screen match rules or locators that you defined.
Focus	Sets the targeted application screen into focus.
Capture element	Captures elements from the application screen. For more information, see Use the Universal App Connector.
Add custom element	Adds a custom element to the application screen. For example, you can interact with hidden elements that you cannot directly capture from the web page.
Show elements	Displays the Windows Elements dialog that displays all the existing elements in the target application screen in a tree view. You can select the required element from here and add it to the application screen. For Windows application screens, the elements are displayed in two modes. They are **UI Automation** and **Active Accessibility**. **UI Automation** is the default mode. For example, when you capture a notepad windows screen and right-click and select **Show Elements**, the following modes are displayed.

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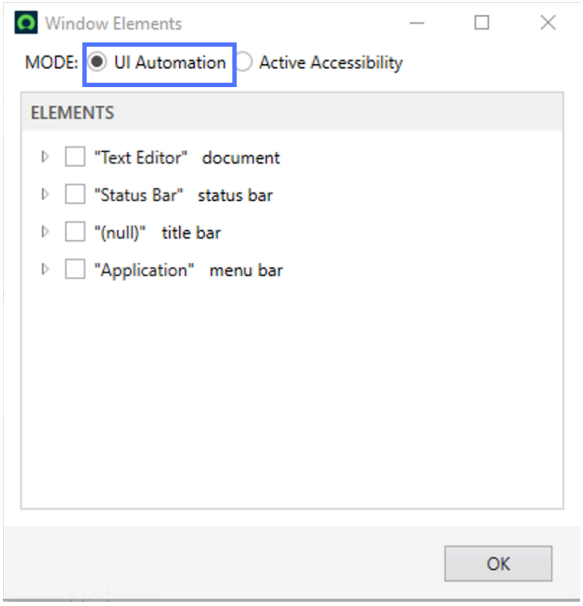
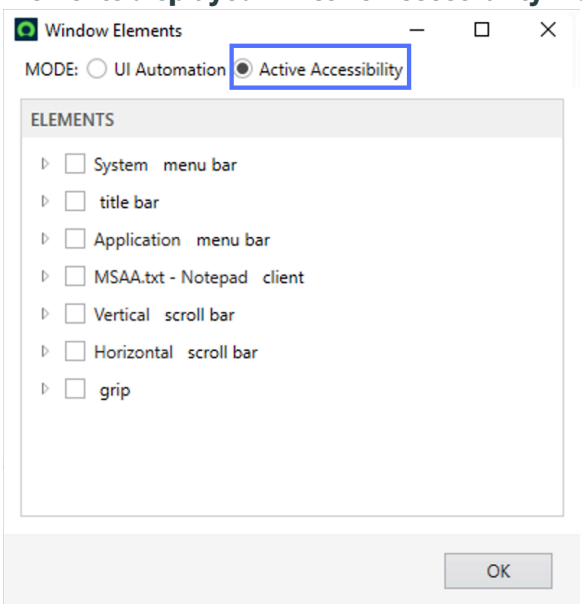
Description of additional options for the application screens (continued)

Additional action	Description
	Elements displayed in UI Automation mode for a Notepad  **Elements displayed in Active Accessibility mode for a Notepad** 
Delete	Deletes the application screen.

Additional options for elements and their descriptions

In the Screens and elements pane, right-click the application element to perform the following additional operations. For example, for a Windows screen.

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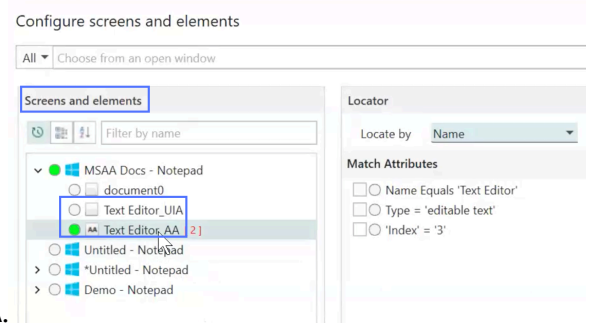
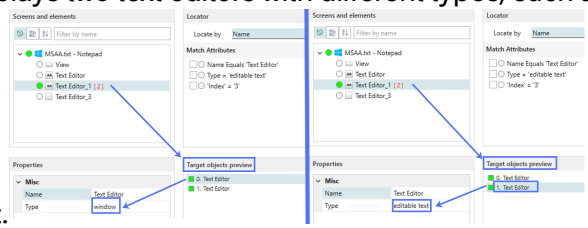
Additional options for elements, for example, for a Windows screen

Additional options for elements and their description

Additional option	Description
Refresh	Rematches the selected element based on the element match attributes or locators that you defined. When you capture an element in both UIA and AA modes of a Windows application screen, you view both elements in the Screens and elements pane. For example, Text Editor_UIA and Text Editor_AA.  When you capture a Text Editor element in Active Accessibility mode and perform the **Refresh** action on that element, the Target objects preview pane displays two text editors with different types, such as window and editable text. 
Highlight	Highlights the element on the target application screen.
Re-capture	Recaptures an element from the application screen retaining the same name.
Delete	Deletes the element.
Do Default Action	Executes the default action of the target object. This the same action you perform by clicking, pressing Enter, or using another common method of activation. The default actions are listed for the following UI elements. • Button: Clicks the button • Check box: Toggles the check (select/clear) • Link: Opens the link (navigate) • Combo Box: Opens the drop-down • List Item: Selects the item • Tree View Node: Expands or collapses the node
Get Value	Retrieves the value of the target object, which typically represents the data the object holds or displays (not the label or name).
Set Value	Sets the value property of the target object.

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Additional options for elements and their description (continued)

Additional option	Description
Set text	Sets text to the element if applicable.
Get text	Retrieves text from the element if applicable.
Click	Clicks the elements if applicable.

Methods of UI Automation mode and Active Accessibility mode

The Universal app connector provides multiple methods that perform various actions when screens are captured in Windows applications, for UI Automation mode and Active Accessibility mode.

Methods of UI Automation mode

If the screens are captured in Windows applications, for UI Automation mode, double-click the **UniversalApplication** object under Global Objects. The following methods for different element types appear in the Object Explorer pane.

Methods of UI Automation mode

UI Automation Element Type	UI Automation Method Name
Common	Click
Common	Focus
Common	GetInstanceCount
Common	GetProperty
Common	IsCreated
Common	MouseAction
Common	ScrollIntoView
Common	SendKeys
Common	SetElementIndex
Common	SetLocatorValue
Common	SetLocatorValueArgs
Common	SetMatchRuleValue
Common	WaitForCreate
Edit	GetText
Edit	SetText
ComboBox	SetComboBoxItem
ComboBox	GetComboBoxItem
ComboBox	GetComboBoxItems
ComboBox	SelectNextItem
ComboBox	SelectFirstItem

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Methods of UI Automation mode (continued)

UI Automation Element Type	UI Automation Method Name
ComboBox	ExpandComboBox
ComboBox	CollapseComboBox
Label	GetText
CheckBox	IsChecked
CheckBox	Check
CheckBox	UnCheck
Image	GetImage
ListBox	GetTable
ListBox	SelectListItem
ListBox	SelectNextItem
ListBox	SelectFirstItem
ListBox	SelectListItemByIndex
ListBox	ClickCell
ListItem	SelectItem
ListItem	AddToSelection
ListItem	IsSelected
Password	SetText
Password	GetText
Password	GetProperty
Password	SetPassword
RadioButton	IsChecked
RadioButton	Check
Table	GetTable
TreeView	ExpandAll
TreeView	CollapseAll
TreeView	SelectNextItem
TreeView	SelectFirstItem
TreeView	SelectItemByText

Methods of Active Accessibility mode

If the screens are captured in Windows applications, for Active Accessibility mode, double-click the **UniversalApplication** object under Global Objects. The following methods for Common element type appear in the Object Explorer pane.

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Methods of Active Accessibility mode

Element type	Active Accessibility Method Name
Common	DoDefaultAction
Common	SetValue
Common	GetValue
Common	Select
Common	Focus
Common	GetInstanceCount
Common	GetProperty
Common	IsCreated
Common	MouseAction
Common	SendKeys
Common	SetElementIndex
Common	SetLocatorValue
Common	SetLocatorValueArgs
Common	SetMatchRuleValue
Common	WaitForCreate

VB.Net

The VB.Net connector enables you to write and execute VB.Net scripts as part of a Workflow in RPA Desktop Design Studio.

You must first use and then expose the methods in the VB.Net connector to use its methods.

- To use the connector, see Use a connector in RPA Desktop Design Studio.
- To configure the VB.Net connector, see Configure the VB.Net connector.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Configure the VB.Net connector

Write and validate a custom VB.Net script before executing it as part of a Workflow in the RPA Desktop Design Studio.

Before you begin

Ensure you have installed the Scripting plugin on the RPA Desktop Design Studio. To install, see Manage plugins in RPA Desktop Design Studio.

Role required: Developer

Procedure

1. In the Toolbox pane, navigate to **Connectors** > **VB.NET**.
2. Drag the VB.NET connector to **Global Objects** in the Project Explorer pane.
3. Right-click the **JavaScript**connector in Global Objects and select **Configure**.
   The Script Editor window is displayed.

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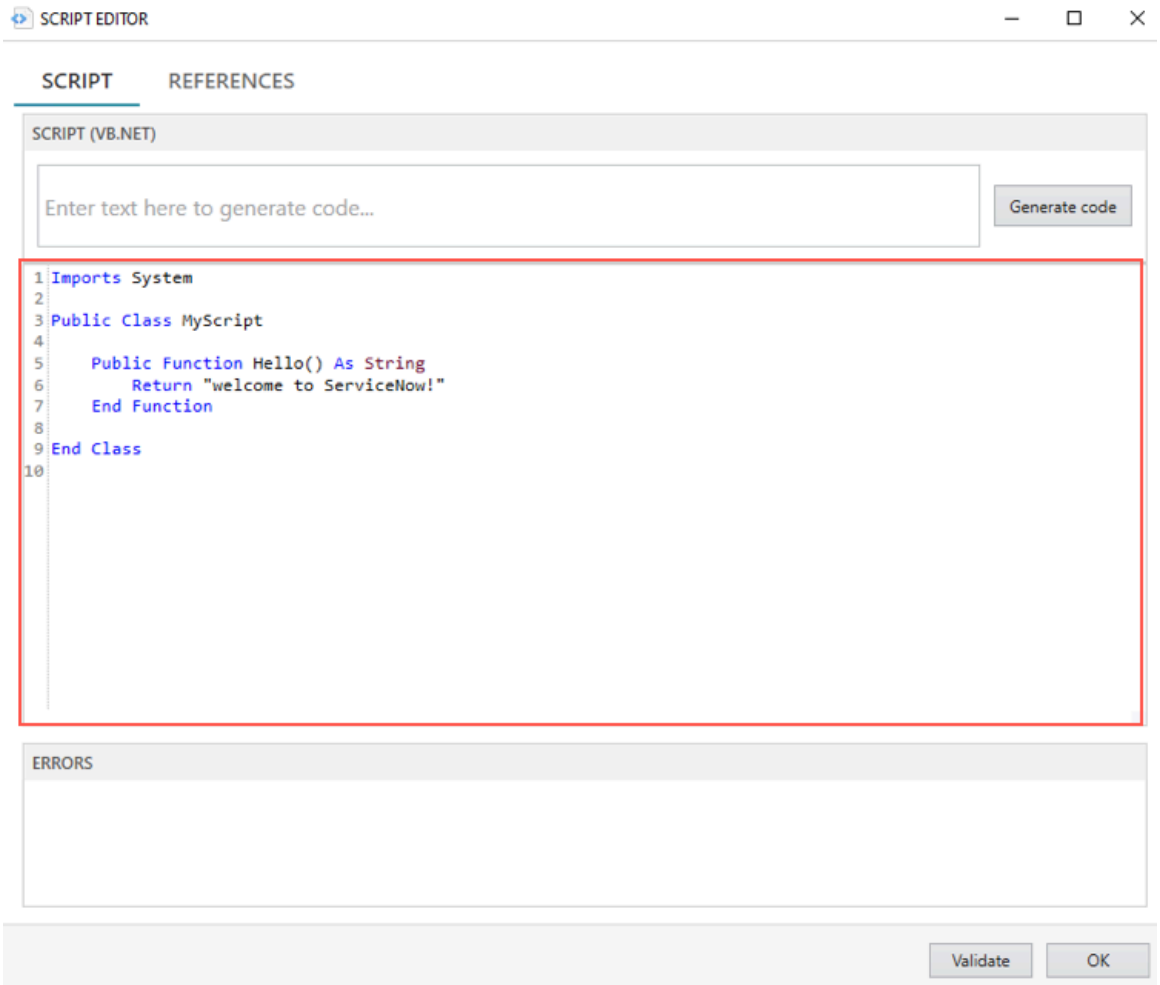
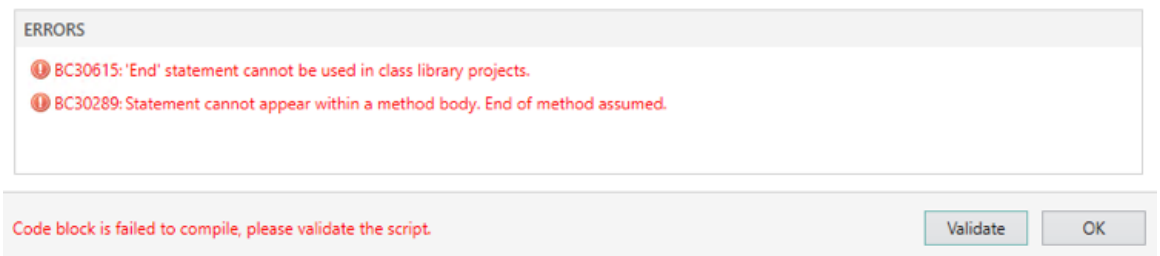
4. Enter the custom VB.NET script in the Script pane.

Script pane in Script Editor



5. **Optional:** Select **Add Reference** from the **References** tab section if you want to add Dynamic-link library (DLL) references to your custom script.
   You can select the references from the Reference Manager window and also from your computer.
6. Select **Validate**.
   If your custom script has any errors, it is displayed in the Errors pane. Resolve the errors and select **Validate** to check for errors again.

Error pane for Script Editor



7. Click **OK**.
   If you want to save the changes, select **Yes**. An error validation is performed again and the changes are saved. If you want to discard the changes, select **No**.

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What to do next

The custom script you created by using the VB.net connector is now ready to be used in your automation.

VB connector methods

The VB connector method executes the VB.Net script you had written as part of the VB.NET connector configuration.

Execute

Executes VB scripts configured during the configuration of the VB.NET connector.

You must configure the method before using it. To configure, do the following steps.

1. Click the method settings icon ( ).
2. Select the class created during the configuration of the VB.NET connector from the **CLASSES** list.
3. Select the method created during the configuration of the VB.NET connector from the **METHODS** list.
4. Click **OK**.

Output

Result (String)

Execute method output description

Parameter	Description	Mandatory?
Result (String)	Returns the output of the Execute method execution.	Not applicable

Windows connector

The Windows connector enables you to perform various actions on the Windows applications, and their user interface elements. These actions are performed through the methods provided by the Windows connector. You must configure the connector to expose its methods.

You must first use, configure, and then expose the methods in the Windows connector to use its methods.

- To use the Windows connector, see Use a connector in RPA Desktop Design Studio.
- To configure the Windows connector, see Configure Windows connector.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Windows connector methods are available at the following levels:

- Connector
- Screen
- Element

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Types of Windows connector methods

Method level	Description
Connector	These methods enable you to perform actions on the connector to set a working directory, get the Windows handle, and more.
Screen	These methods perform various actions on the screens you have configured. For example, click a button.
Element	These methods perform various tasks on the various elements on the screen.

Important: Windows connector uses Microsoft UI Automation Framework internally to interact with applications built for Windows desktop such as Win32, WPF platforms. Any known issue or limitation published by Microsoft for this framework are applicable.

Configure Windows connector

Configure the Windows connector to access its methods and build automation on a Windows application. It provides methods at different levels and you must first configure it to expose methods at all levels.

Before you begin

Add the Windows plugin from the Plugins Manager before using the connector. For more information about adding the SSH plugin, see Manage plugins in RPA Desktop Design Studio.

Ensure at least one Windows application is open or active.

Role required: none

Procedure

1. In the Toolbox pane, navigate to **Connectors** > **Windows Connector**.
2. Drag the Windows connector under Global Objects in the Project Explorer.
3. Under the Global Objects node, right-click the connector.
4. Click **Configure**.
5. In the **AVAILABLE WINDOWS** list, select the required application window.

   Tip: If the window doesn't appear in the list, click the refresh icon ( ).

6. Click **Add Window**.
7. Under the WINDOWS section, right-click the name of the window.
8. Click **Add Element**.
9. Use the context dialog to capture elements.
   To use the context dialog, see Use the Capture element dialog.

Important: If the language of your Microsoft Windows machine is non-english, then an unhandled exception error message is displayed when you click the Target Objects Preview pane. Click **Ok** on the error message box to proceed configuring the connector.

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Windows Connector methods

The Windows methods in RPA Desktop Design Studio interact with the Windows applications to perform various tasks. The connector provides methods at different levels of the Windows applications.

Windows connector method levels

Connector level methods

Window level methods

Element level methods

Connector level methods

CloseMainWindow

Closes the active window of the application.

GetMainWindowHandle

Retrieves the handle ID of the active window of the application.

GetMainWindowTitle

Retrieves the title of the active window of the application.

SetWorkingDirectory

Sets the working directory of the application for all file operations through the application to be performed in the specified directory.

Input

Path

Start

Starts the application.

Input

Path Args

Terminate

Terminates the application.

Window level methods

Focus

Sets the focus on a window that is inactive, minimized, or in the background.

GetFields

Returns the data in the form fields of the screen. You must configure the method before using.

To configure, do the following steps.

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1. Click the method settings icon ( ).
2. Select the form elements.
3. Update the form element data type.
4. Click **OK**.

Output

Form element data

GetScreenShot

Captures the screenshot of the screen.

Output

Return (Bitmap)

IsCreated

Returns the Boolean response depending on whether a specific window matches the rules set in the MATCH CHILDREN section of the configuration window.

Inputs

MatchAllChildren

Outputs

Return (Boolean)

Maximize

Maximizes the window.

Minimize

Minimizes the window.

SendKeys

Simulates keystrokes on web pages and windows.

Inputs

Keys

ClearExistingValue (Boolean)

TypeDelay

SetFields

Sets data in form field types. To set the form fields, you must first configure the method. To configure, do the following steps.

1. Click the method settings icon ( ).
2. Select the form elements.
3. Update the form element data type.
4. Click **OK**.

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Input

Form data field

WaitForCreate

Sets delay before a web page or a window loads.

Inputs

timeoutInSeconds

MatchAllChildren

Outputs

Return (Boolean)

Element level methods

These methods are exposed when you double-click an application element under the Global Objects in the Project Explorer.

Click

Performs a click operation.

IsCreated

Checks whether an element matches the rules set in the MATCH CHILDREN window.

Outputs

Return (Boolean)

SendKeys

Simulates keystrokes on web pages and windows.

Inputs

Keys (String)

ClearExistingValue

TypeDelay (Double)

SetPassword

Automate entering password securely in the password field of a Windows application.

To provide inputs to the fields see Configure port properties.

SetPassword method parameters

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
Password	Accepts the password as a secured string.	Data In	Secured string	None	Yes	Since it accepts the password as a secured

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SetPassword method parameters (continued)

Parameter	Description	Data Port type	Data type	Default value	Mandatory?	Notes
						string, it only shows the length of the string when you right-click on the parameter and then click **Preview Data**.
UseSendKeys	SendKeys is a method used to send keyboard inputs such as characters, numbers, and symbols to text boxes inside an application.	Data In	Boolean	False	Yes	**Tip:** If the **SetPassword** method fails to input the password in the password field, set the value to **True** and execute the method again.

Parameters of the Windows connector methods

Learn about the parameters of the Windows connector methods in RPA Desktop Design Studio.

Parameters of the Windows connector methods

Parameter Name	Description	Mandatory?
Args	Arguments to pass as the initial values to start an application.	No
Form data field	Data to set in the form fields of the element.	Yes
Return (Bitmap)	Returns the screenshot image of the screen in the Bitmap format.	Not applicable
Path	Directory path where the initial files to start the application are stored.	Yes

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Parameters of the Windows connector methods (continued)

Parameter Name	Description	Mandatory?
Form element data	Returns the captured form element data.	Not applicable

Enter inputs for parameters

To enter inputs, see Configure port properties.

Application level method parameters

These parameters pass custom specifications to the various applications such as Java, Google Chrome , Windows , and Mainframe. Based on the specifications, the applications return an output. The process is a part of a Robotic Process Automation .

Application level method parameters

Parameter	Description	Mandatory?
Return (Boolean)	Returns the Boolean response to the request of setting an inactive window active. Successful operation returns True.	Not applicable
Form data	Returns the captured form element data.	Not applicable
MatchAllChildren	Option to indicate whether the method will match all elements of the application while the terminal session executes.	No
Action (MouseAction)	Action the mouse device will perform on the Java application.	No
Keys	Accepts keys, combination of keys, or special keys to trigger their specific actions. For example, **CTRL+A** selects all text.	Yes
Return (Integer)	Returns the integer value of the number of open Java application instances.	Not applicable
ClearExistingValue	Clears or retains existing value in a field after accepting a Boolean response of True or False.	No
Keys (String)	Shortcut keys that perform specific actions.	Yes
ClearExistingValues	Option to indicate whether the method will clear any existing	No

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Application level method parameters (continued)

Parameter	Description	Mandatory?
	value on the field in the Java application.	
TypeDelay	Option to set any delay before the method operates.	No
xPos	Position of the Java application along the X-axis.	No
yPos	Position of the Java application along the Y-axis.	No
Width	Width of the Java application along the X-axis.	No
Height	Height of the Java application along the X-axis.	No
TypeDelay	Delays the execution of the SendKeys method in terms of seconds. Specify the seconds.	No
timeoutInSeconds	Time until which the method waits for the terminal session to execute. The method times out if the terminal session doesn't execute after the specified time.	No
Return (Boolean)	Returns the Boolean response to the WaitforCreate request. If the terminal session executes before the set timeout, the value is **True**.	Not applicable
Return (Boolean)	Boolean response to indicate whether a window or web page is ready to accept requests.	No
Timeout	Time after which the wait for elements to load will time out.	No
Return (Boolean)	Boolean response to indicate whether the method waited for the elements to load.	Not applicable
Return (Boolean)	Returns the Boolean response on whether all children elements matched.	Not applicable
Return (Integer)	Returns the integer value of the Microsoft Windows handle.	Not applicable
MatchAllChildren	Option to indicate whether the request will match all parameters of the window	No

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Application level method parameters (continued)

Parameter	Description	Mandatory?
	while it waits for the window to load.	
Parameter	Parameter value for the JavaScript.	Yes
Return (Bitmap)	Returns the captured screenshot of the active Java application window in Bitmap format.	Not applicable
Return (Boolean)	Returns the boolean response to whether a Java application is active or available.	Not applicable
Field (String)	Returns the data in the form or text field.	Not applicable
MatchAllChildren	Option to indicate whether the method will match all elements of the application while the terminal session executes.	No

Element level method parameters

These parameters pass custom specifications to the elements in various applications such as Java, Google Chrome , Windows , and Mainframe. Based on the specifications, the applications return an output. The process is a part of a Robotic Process Automation .

Element level method parameters

Parameter	Description	Mandatory?
Return (Boolean)	Returns the Boolean response to whether the rules in the MATCH RULES section matched. The responses are True or False.	Not applicable
ClearExistingValue	Clears or retains existing value in a field after accepting a Boolean response of True or False.	No
TypeDelay	Delays the execution of the SendKeys method in terms of seconds. Specify the seconds.	No
Value (String)	Accepts keys, combination of keys, or special keys to trigger their specific actions. For example, **CTRL+A** selects all text.	Yes
Return (String)	Returns a list of actions you can perform on an element.	Not applicable

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Element level method parameters (continued)

Parameter	Description	Mandatory?
Return	Returns the Boolean response on whether the action was successful.	Not applicable
Action (String)	Option to indicate the action to be performed on the method.	Yes
Keys (String)	Accepts keys, combination of keys, or special keys to trigger their specific actions. For example, **CTRL+A** selects all text.	No
Return (Boolean)	Boolean response to whether the Click method was successful.	Not applicable

Data Modellers

The Data Modeller creates templates by adding fields or data to PDF and XML documents. It also provides methods to classify the templates and use the fields or data created.

- To use the Data Modeller, see Use the XmlTemplate component.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Use the XmlTemplate component

Create templates from existing XML or PDF documents by adding custom data or fields to the documents.

Before you begin

Role required: none

About this task

The XmlTemplate component also provides methods to work with the templates. To expose the methods, see View the XmlTemplate methods.

Procedure

1. In the Toolbox pane, navigate to **Data Modellers** > **XMLTemplate**.
2. Drag the XmlTemplate component under Global Objects in the Project Explorer.
3. Click to expand the Global Objects node.
4. Right-click XmlTemplate.
5. Click **Configure**.
6. Under the **TEMPLATES** section, click the add templates icon ( ).
7. Click the template added.
   A new template is by default named in the `Template<number>` format. You can rename it from the Name field in the PROPERTIES section on the XML TEMPLATE DESIGNER window.

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8. To select an existing PDF or XML document, in the **XML/PDF File** field, click the Load XML or PDF File icon ( ).
9. Select the XML or PDF file from the local drive.
   The preview displays the document data under corresponding XML tags.
10. To add a field to the file, right-click the required XML tag.
11. Click one of the following field options.
    - Text
    - Text Array
    - Table
    - XPath

    You've successfully updated the template by adding fields.
12. **Optional:** In the Name field of the PROPERTIES section, provide a custom name to the template you added.
13. **Optional:** Repeat the steps to add more fields.
14. Close the XML TEMPLATE DESIGNER window.

View the XmlTemplate methods

After configuring the XmlTemplate connector, you can expose its methods.

Before you begin
Role required: none

Procedure

1. Navigate to **Data Modellers > XMLTemplate**.
2. Drag the XmlTemplate connector under Global Objects in Project Explorer.
3. Expand the Global Objects node.
4. Double-click the XmlTemplate connector.
   The methods appear under the Object Explorer pane.

XmlTemplate connector methods

The XMLTemplate methods classify the templates and get the fields added to the templates.

Clasify

Classifies the template created. To see the steps to create templates, see Use the XmlTemplate component.

You must first configure the method before executing it. To configure, do the following steps.

1. Click the method settings icon ( ).
2. Select the required template.
3. Click **OK**.

Input

FilePath

Status

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Template

GetFields

Returns the fields that were added to the template. You must configure the method before using it. To configure, do the following steps.

1. Click the method settings icon ( ).
2. Select the required template.
3. Select the corresponding field.

   A Data Out field is added with each field you select.

4. Click **OK**.

Parameters of the XmlTemplate connector methods

Learn about the various parameters of the XmlTemplate connector methods in RPA Desktop Design Studio.

Parameters of the XmlTemplate connector methods

Parameter name	Description	Mandatory?
FilePath	Path to the PDF or XML document that is used to create templates.	Yes
Status	Boolean response to whether the template was loaded correctly.	Not applicable
Template	Template name as configured in the XmlTemplate connector.	Yes

Properties of the XmlTemplate methods

Learn about the properties of the XmlTemplate methods in RPA Desktop Design Studio.

Properties of the XmlTemplate methods

Property name	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

General

The RPA Desktop Design Studio General components automate diverse use cases. Examples range from execute a database query to passing a variable.

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Use the Confirm component

Set a confirmation message that is shown in a dialog box requiring user inputs by using the Confirm component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

The Confirm component is used as part of an Attended Robot automation. Use this component to request a confirmation from the user as a response to a user action. For example, request user inputs on whether the user wants to save a file.

To configure the properties, see Properties of Confirm components.

Procedure

1. In the Toolbox pane, navigate to **General** > **MessageBox**.
2. Drag the Confirm component to the Design surface.
3. To provide inputs to the parameters, see Configure port properties.
4. Connect the data and control ports of the Confirm component to the corresponding ports of the other components as described in the following table.

Confirm component port parameters

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Data in	Message	String	Takes the confirmation message from another component.	No default value	Yes
Data out	Return	Boolean	Returns the Boolean value based on the user input. If True, the user has clicked **Ok**. Else, if False, the user has clicked **False**.	Not applicable	Not applicable

5. **Optional:** To test the component, right-click the component bar and click **Run From Here**.

Use the Input component

Set up a user input dialog with by using the Input component in RPA Desktop Design Studio.

Before you begin

Role required: none

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About this task
The input component is used in the Attended Robot automation.

To configure the properties, see Properties of Confirm components.

Procedure
1. In the Toolbox pane, navigate to **General** > **MessageBox**.
2. Drag the Input component to the Design surface.
3. To provide inputs to the parameters, see Configure port properties.
4. **Optional:** Connect the data and control ports of the Input component to the corresponding ports of the other component as described in the following table.

Input component data port parameters

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Data in	Message	String	Takes the heading of the user input dialog from another component.	No default value	No
Data out	Return	String	Returns the input entered in the form.	Not applicable	Not applicable

5. **Optional:** To test the component, right-click the component bar and click **Run From Here**.

Use the Input Password component

Set up a password input form by using the Input Password component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
The Input Password component is used in Attended Robot automations.

To configure the properties for the Input Password component, see Properties of Confirm components.

Procedure
1. In the Toolbox pane, navigate to **General** > **MessageBox**.
2. Drag the Input Password component to the Design surface.
3. To provide inputs to the parameters, see Configure port properties.
4. Connect the data and control ports of the Input Password component to the corresponding ports of the other components as described in the following table.

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Input Password component data port parameters

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Data in	Message	String	Takes the heading of the password from a previously executed component.	No default value	No
Data out	Return	Secured String	Returns the password entered in the form as a secured string.	Not applicable	Not applicable

5. **Optional:** To test the component, right-click the component bar and click **Run From Here**.

Use the Show component

Display custom messages as part of a Attended Robot automation by using the Show component in the RPA Desktop Design Studio

Before you begin

Role required: none

About this task

For example, in an assisted automation, a component could evaluate a user input and show a message `Incorrect Date of Birth` through the Show component.

You can configure the properties for the Show component. For more information about these properties, see Properties of the General components.

Procedure

1. In the Toolbox pane, navigate to **General** > **MessageBox**.
2. Drag the Show component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the Show component to the corresponding ports of the other components as described in the following table.

Confirm component port parameters

Port type	Port name	Data type	Purpose of connection	Mandatory?
Data in	Message	String	Takes the custom message that the	Yes

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Port type	Port name	Data type	Purpose of connection	Mandatory?
			component shows.	

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Variable component

Create a variable in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Variable component. For more information about these properties, see Properties of the General components.

Procedure

To use the Variable component, see Create and use a variable in RPA Desktop Design Studio.

Use the Try Catch component

Catch an error or exception that occurs in a component in an automation and transfer control to the other components within the automation.

Before you begin
Role required: none

About this task
To configure the properties for the Try Catch component, see Properties of the Try Catch component.

For details on the issues related to the Try Catch component, see KB article KB1123551, KB article KB1123552, and KB article KB1123556.

The Try Catch component enables you to define which components run within the exception-handling scope and which run outside it. When an error occurs in a component within the Try scope, the component captures the exception and stops execution of the remaining components in that path. You can connect an alternative flow to the On Error port to handle the exception. Components that must run outside the exception-handling scope can be connected to the Finally port.

You can use multiple instances of the Try Catch component in an automation to handle errors from other components along the same execution path. If an activity that contains a Try Catch component calls another activity that doesn't include the Try Catch component, the Try Catch component in the calling activity can still catch errors from the called activity.

Procedure

1. In the Toolbox pane, navigate to **General** > **Try Catch**.
2. Drag the Try Catch component to the Design surface.
3. Connect the ports of the Try Catch component to the corresponding ports of the other components or activities as described in the following table.

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Try Catch component port parameters

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Control Out	Control-Out	Not applicable	When there is no error, passes the control to another component or an activity.	Not applicable	Yes
Control Out	On Error	Not applicable	Passes the control to another component or activity after the Try Catch component catches an error. Use this port after the Try Catch component catches an error or exception and you want to execute another component in the current or another activity.	Not applicable	No. Connecting the port is optional.
Data Out	Error Message	String	Returns the error message.	Not applicable	No. Connecting the port is optional.
Data Out	Finally	Not applicable	Enables you to execute component or activity after Try and Catch, regardless of whether an exception occurs or not.	Not applicable	No. Connecting the port is optional.

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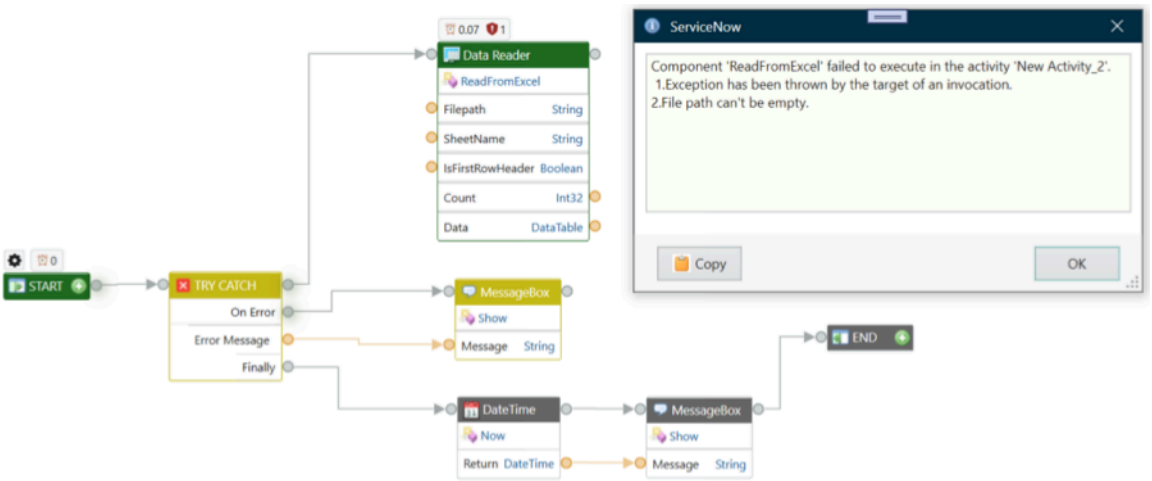
4. **Optional:** To test the component, right-click the component bar and then select **Run From Here**.

Note: The Try Catch component may not work as expected with the Parallel component.

Example: Handling errors while processing an Excel file

An automation uses a **Try Catch** component when reading data from Excel. If the ReadFromExcel component fails because the file path is empty, the **Try Catch** component captures the error and displays the error message using a MessageBox. The **Finally** path then runs and displays the current date and time before the automation ends.



Use the Expression component

Perform mathematical and logical operations with various operands and operators using the Expression component in RPA Desktop Design Studio. The Expression component supports multiple operators and functions for you to use.

Before you begin

Role required: none

About this task

You can combine Expressions with operators with each operator having a priority. The priorities of the operators are given.

1. Primary
2. Unary
3. Power
4. Multiplicative
5. Additive
6. Relational
7. Logical

The Expression component supports multiple functions. See Supported functions for the Expression components.

You can configure the properties for the Expression component.

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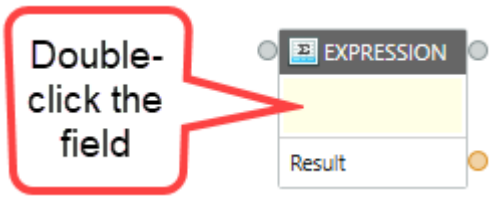
Properties of the Expression component

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Procedure

1. In the Toolbox pane, navigate to **General** > **Expression**.
2. Drag the Expression component to the Design surface.
3. Double-click the light-yellow colored field and enter the expression.



A Data In port is dynamically added for each operand. For example, if you enter the expression X+Y, then two Data In ports are added for "X" and "Y". The Data In ports accept values for the operands.

4. To configure the input fields, see Configure port properties.
5. Connect the data and control ports of the Expression component to the corresponding ports of the other components as described in the following table.

Expression component port parameters

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Data in	The name of the port is the same as the name of the operand. For example, if X is the operand, then the port name is "X".	String	Takes the value of the operand.	No default value.	Yes
Data out	Result	Object	Returns the result of the expression.	Not applicable	Not applicable

6. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

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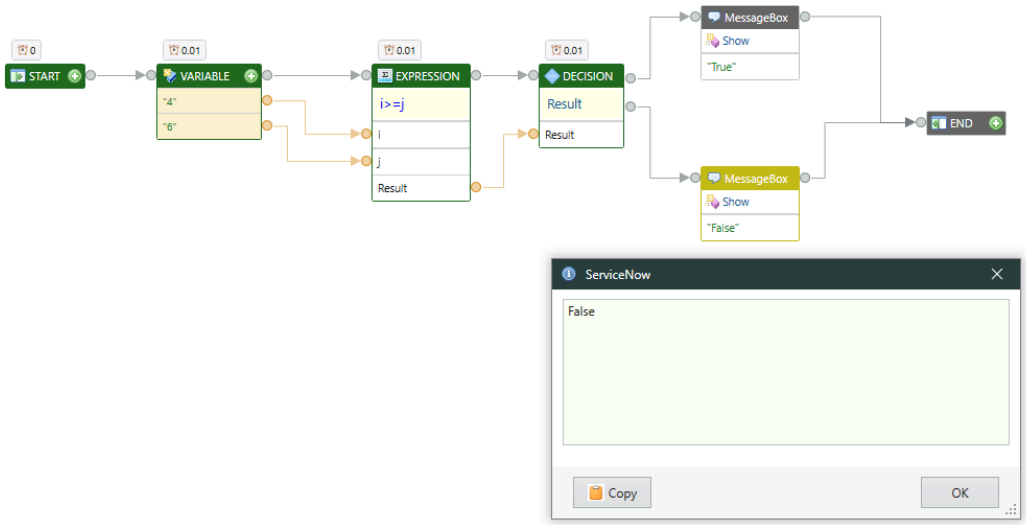
Example: Expression component performs a mathematical operation between two operands



In the example, the Variable component passes the integer values for the two operands "i" and "j" set in the Expression component. The Expression component takes the values and finds whether the value of i>=j. The result is passed to the Decision component. The Decision component passes the result to the Show component. In the example, since the value of "i" is lesser than "j", the Show component shows "False" in a message box.

Use the Find Window component

Set the focus back on various windows that are inactive or running in the background as part of a Robotic Process Automation workflow in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

The Find Window component identifies one or more rules associated with a Window and later uses the rules to set the focus back on the window. The component also returns the window handle of the window.

You can configure the properties for the Find Window component. For more information about these properties, see Properties of the General components.

Procedure

1. In the Toolbox pane, navigate to **General** > **Find Window**.
2. Drag the Find Window component to the Design surface.
3. Click the component settings icon ( ).
4. Click and drag the capture window icon ( ) and drop it on the window that you want to find.

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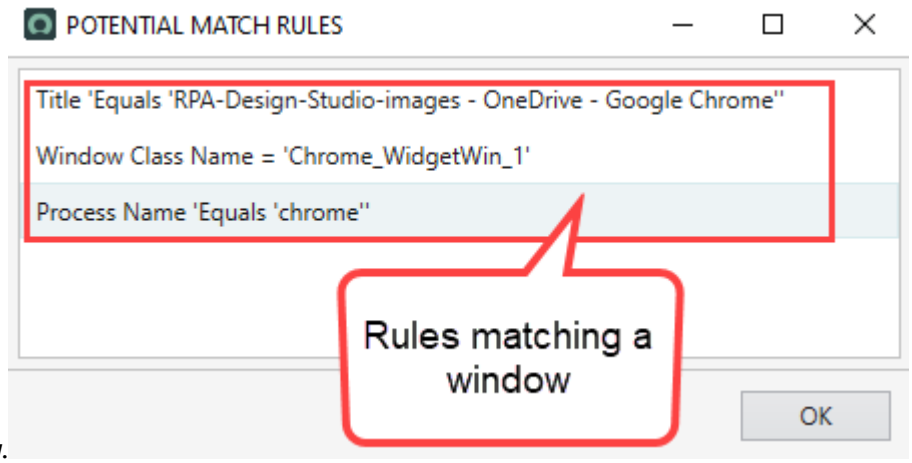
The POTENTIAL MATCH RULES window shows the rules matching the window.



5. Select a rule by clicking the rule.

   Tip: To select more than one rule, press Shift and click the rules.

6. In the POTENTIAL MATCH RULES window, click **OK**.
   The FIND WINDOW MATCH RULES window displays the rules matching the captured windows.
7. In the FIND WINDOW MATCH RULES window, click **OK**.
8. Connect the data and control ports of the Find Window component to the corresponding ports of the other components.

Find Window component port parameters

Port type	Port name	Data type	Purpose of connection	Mandatory?
Data in	Set Focus	Boolean	If True, the focus is set on the window else, the window continues to run in the background.	Yes
Control out	Fail	Not applicable	If the component fails to execute, passes the control to the next component.	No
Data out	Window Handle	Integer	Returns the window handle.	Not applicable.

9. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Parallel component

Execute multiple components in a sequence to perform multiple actions. The Parallel component exposes multiple threads that can execute multiple components as part of a Robotic Process Automation in the RPA Desktop Design Studio.

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Before you begin
Role required: none

About this task
For example, you can set two threads. In thread 1, the component launches the Google Chrome window with the START APP component and in thread 2, the component uses the Send Keys component to enter a URL.

You can configure the properties for the Parallel component. For more information about these properties, see Properties of the General components.

Procedure
1. In the Toolbox pane, navigate to **General** > **Parallel**.
2. Drag the Parallel component to the Design surface.
3. Click the add thread icon ( ).
   The Control Out port of the thread passes the control and executes the next component.
4. Repeat the step to add more threads.
5. Create multiple workflows by connecting one or more components with the threads.
6. Connect the data and control ports of the Parallel component to the corresponding ports of the other component as described in the following table.

Find Window component port parameters

Port type	Port name	Data type	Purpose of connection	Mandatory?
Control Out	Thread	Not applicable	Passes the control to the next component from the thread.	Yes

When you use the parallel component to run tasks across multiple threads, do not share the same global object instance across threads. This can cause the following issues such as:

- Race conditions: Concurrent access and modifications to the same object can lead to inconsistent or unpredictable results.
- Data corruption: Multiple threads changing shared data can overwrite or corrupt the object's state, resulting in incorrect behavior.
- Unexpected behavior: Without proper synchronization, actions by one thread may interfere with or conflict with those of another, causing errors or system instability.

To ensure thread safety, create a separate instance of the object for each thread. This prevents threads from modifying shared state and ensures that each thread operates on its own independent object.

7. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Note: The Send Keys and the Mouse components under the Utilities category don't work with the Parallel component.

Use the Script component

Write and execute custom Visual Basic (VB) scripts by using the Script component in RPA Desktop Design Studio.

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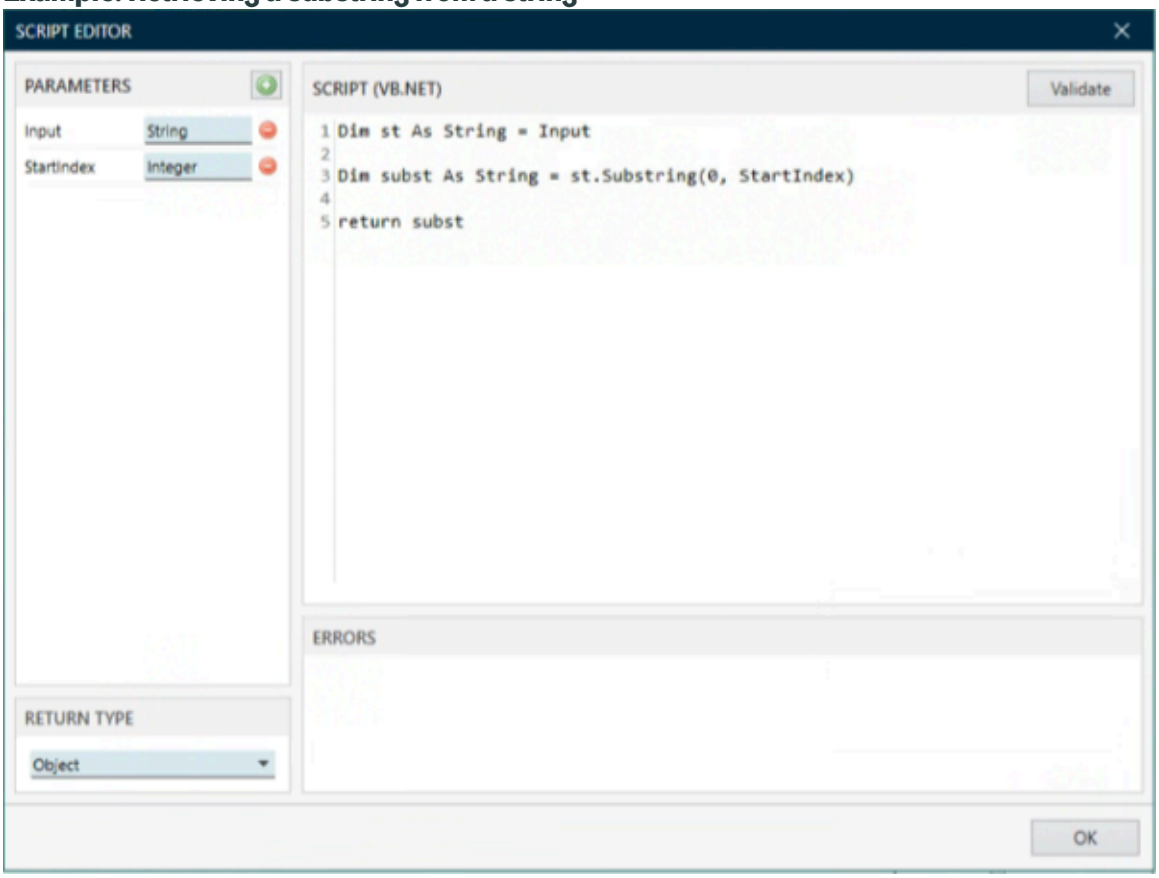
Before you begin
Role required: none

About this task
You can configure the properties for the Script component. For more information about these properties, see Properties of the General components.

You can use this component to perform actions that are not covered by existing RPA components or combine actions of multiple components.

For example, you can retrieve a substring from a string by using the VB script in the Script component. You can specify the string and the start character position.

Example: Retrieving a substring from a string



Procedure
1. In the Toolbox pane, navigate to **General** > **Script**.
2. Drag the Script component to the Design surface.
3. Click the component settings icon ( ).
4. Under the SCRIPT (VB.NET) heading, enter the custom VB script.
5. **Optional:** To add parameters to the script, do the following steps.
   a. Click the add parameter icon ( ).
   b. Update the data type of the parameter.
   c. Repeat the steps to add more parameters.
   A Data In Port is added with each parameter you add.
6. **Optional:** To set the output data type, under the RETURN TYPE heading, select the data type.

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7. To validate the script, click **Validate**.
   Errors, if any, are shown in the ERRORS section. You must fix all errors before proceeding.
8. Click **OK** to close the SCRIPT EDITOR window.
9. Connect the data and control ports of the Script component to the corresponding ports of the other component as described in the following table.

Port name	Description	Port type	Mandatory?
Parameter	Enter a value for the parameter or use the value from a previously executed component.	Data In	No. Connecting this port is optional.
Return	Returns the output of the script and passes to the next component.	Data Out	Yes. To view the output, right-click the **Return** field and click **Preview Data**.

10. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SQL component

Write custom SQL queries to perform various operations by using the SQL component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the SQL component. For more information about these properties, see Properties of the General components.

Procedure
1. In the Toolbox pane, navigate to **General** > **SQL**.
2. Drag the SQL component to the Design surface.
3. Click the component settings icon ( ).
4. Under the SCRIPT (SQL) heading, write the custom SQL query.
5. **Optional:** To add a parameter to the query, do the following.
   a. Click the add parameter icon ( ).
   b. Update the data type of the parameter.
   c. Repeat the steps to add more parameters.
   A Data In Port is added with each parameter you add.
6. Click **OK**.
7. To configure the input fields, see Configure port properties.
8. To close the PORT PROPERTIES dialog, click **OK**.

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9. Connect the data and control ports of the SQL component to the corresponding ports of the other component as described in the following table.

Parameter	Description	Data Port type
Connection Provider	Takes the data table connection provider that enables an application to communicate with a database. **Example:** SqlClient, MySqlClient	Data In

Connection String	Connection string helps in connecting to the required data source using the details, such as server name, username, and password. In the following connection strings for each authentication type, replace the placeholder parameter values (for example, <myUser> and <myPassword>) with actual values:
	Example:
	For SQL authentication:
	`Server=<MY_SERVER>;Database=<MyDatabase>;User Id=<myUser>;Password=<myPassword>;`
	For Windows authentication:
	`Server=MY_SERVER;Database=MyDatabase;Trusted_Connection=True;`
	For Oracle database:
		Data In

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Parameter	Description	Data Port type

	`Data Source=MyTnsName;User Id=myUsername;Password=myPassword;`
	
	For MySQL database:
	`Server=MY_SERVER;Database=MyDatabase;User Id=myUsername;Password=myPassword;`
	
	For ODBC database:
	`Driver={SQL Server};Server=MY_SERVER;Database=MyDatabase;Uid=myUsername;Pwd=myPassword;`
	
	For OLEDB database:
	`Provider=SQLOLEDB;Data Source=MY_SERVER;Initial Catalog=MyDatabase;User Id=myUsername;Password=myPassword;`	

Parameter	Takes the value of the parameter from a previously executed component.	Data In

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Parameter	Description	Data Port type
DataTable	Returns the data table and passes to the next component.	Data Out

10. To view the output, right-click the **Return** field and click **Preview Data**.
11. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Start App component

Start or launch an application or file by using the START APP component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Start App component.

Properties of the START APP component

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Height	Specifies the height of the application window that is launched.
Left	Specifies the location of the application that is launched along the left edge of the screen.
Top	Specifies the location of the application that is launched along the top edge of the screen.
Width	Specifies the width of the application window that is launched.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.
Max Wait Time in Seconds	Maximum time, in seconds, to wait for the image or application to appear on the screen. The default value is 30 seconds.
Wait For Start	Specifies the wait time (in seconds) before the action is executed.
State	Specifies the state in which the Windows based or web-based application is launched. The states are normal, maximized, minimized, hidden, or custom location.

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Procedure

1. In the Toolbox pane, navigate to **General** > **START APP**.
2. Drag the START APP component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Start App component to the corresponding ports of the other component as described in the following table.

START APP component port parameters

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Data In	File Path	String	Takes the path to the file or the application in the local disk.	No default value	Yes
Data In	Args	String	Takes the arguments for the path. For example, if you provide the local path to the Google Chrome browser, the argument can be https://servicenow.com	No default value	No. Connecting the port is optional.
Data Out	Window Handle	Integer	Returns the window handle of the file or application.	Not applicable	Not applicable

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Format Text component

Format the text by using variable placeholders and line and tab variables with the Format Text component in RPA Desktop Design Studio. You can update the text and their positions easily by just updating the variable placeholders and the line and tab variables.

Before you begin

Role required: none

About this task

Essential tips to remember when using the Format Text Component to avoid the following exceptions.

Missing Arguments

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This issue occurs when the format string contains more placeholders than the number of arguments provided.

For example,

- Format string: {0} {1}
- Arguments provided: "Hello"

The error message displayed for this issue is "An error occurred during execution. Component 'Format Text' failed to execute in the activity 'New Activity'."

Index (zero based) must be greater than or equal to zero and less than the size of the argument list.

The solution is to ensure the number of arguments matches the number of placeholders in the format string:

"Hello"

"World"

Correct Argument Placement

The index (zero-based) must be greater than or equal to zero and less than the size of the argument list.

Solution:

The solution is to ensure the number of arguments matches the number of placeholders in the format string. For example:

- Format String: `"Hello"`
- Argument: `"World"`

In this case, the format string does not contain any placeholders, so no arguments are needed. If you have a format string like `"Hello, {0}! Welcome to {1}."`, you would need to provide two arguments, such as `"World"` and `"ServiceNow"`.

Using Literal Curly Braces in Format Strings

Issue: Curly braces {} have special meaning in string formatting and must be escaped when used as literal characters.

Example of Incorrect Usage:

Format String:

```
{
{0}
{1}
},
```

Error Message: An error occurred during execution. Component 'Format Text' failed to execute in the activity 'New Activity'.

Input string was not in a correct format

The solution is to use double braces to represent literal curly braces:

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```
{{
{0}
{1}
}},
```

Rule to remember:

- `{{` represents a literal `{`
- `}}` represents a literal `}`

You can configure the properties for the Format Text component. For more information about these properties, see Properties of the General components.

Procedure

1. In the Toolbox pane, navigate to **General** > **Format Text**.
2. Drag the Format Text component to the Design surface.
3. To set the text placeholder variable, do the following steps.

   a. Click the add variable icon ( ).
   A Data In port is added for each variable you add.

   b. To configure the variable value, see Configure port properties.

   c. **Optional:** Repeat the steps to add more variables and values.

4. Click the component settings icon ( ).
5. Insert the text in the TEXT FORMAT EDITOR.
6. Insert the text.
7. **Optional:** Insert the line separator \n or tab separator \t variable at appropriate places within the text.
8. Insert the text variable placeholders within the text body, wherever appropriate.

   Tip: To update the text, update the placeholder value.

9. Connect the data and control ports of the Format Text component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Variable)	Takes the variable value from a previously executed component.	Yes
Data Out (Formatted Output)	Returns the formatted text and passes to the next component.	Yes. To view the output, right-click the **Return** field and click **Preview Data**.

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Port type	Purpose of connection	Mandatory?
Control In	Passes the control from the previously executed component.	Yes
Control Out	Passes the control to the next component.	No. Connecting the port is optional.

10. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Terminate component

Abort an automation by using the Terminate component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Terminate component. For more information about these properties, see Properties of the General components.

Use the Terminate component in attended automations to complete the automation execution. For more information about the embedded task automation, Embedded Task Automation (ETA) in RPA Hub.

Procedure
1. In the Toolbox pane, navigate to **General** > **Terminate**.
2. Drag the Terminate component to the Design surface.
3. To configure the input field, see Configure port properties.
4. **Optional:** Connect the data and control ports of the Terminate component to the corresponding ports of the other components as described in the following table.

Port name	Purpose of connection	Port type	Data type	Mandatory?	Notes
Message	Takes the message when an automation is terminated. (Optional) This message is also shown in the process job.	Data In	String	No. Connecting the port is optional.	If the Boolean input in the Mark As Error port is True, then you must provide a message.
Mark As Error	Takes the Boolean value that indicates the status of the process job. If True, the	Data In	Boolean	No. Connecting the port is optional.	You can view the status of the process job under the **Process Jobs** tab of the respective

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Port name	Purpose of connection	Port type	Data type	Mandatory?	Notes
	state of the process job is Failed. If False, the status of the process job is a success.				process in the instance.
Capture Screen	Takes the Boolean value that indicates whether the component captures the screenshot when an automation fails to execute. If True, the screen is captured at that point in time. If False, the screen is not captured.	Data In	Boolean	No. Connecting the port is optional.	To view the screenshot, do the following actions: **a.** On the **Design** tab, click **Attach > Remote log**. **b.** Select the required process job and click **Fetch Logs**. **c.** Click **Play log**. The Execution

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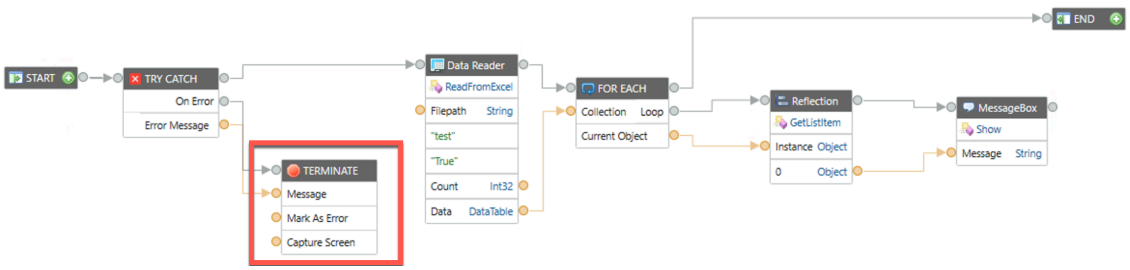
Port name	Purpose of connection	Port type	Data type	Mandatory?	Notes
	Note: Ensure that the **Track Execution Logs** setting is enabled in your bot process record in RPA Hub. If Flat file is selected as an output type, then the screenshots are not captured.				log window shows the screenshot.

5. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Example:
For example, in the automation workflow that requires to read data from an Excel, For Each loop and GetListItem components are used to extract data from the DataTable and display in a message box. If any error occurs while reading the data from the Excel, you can use the Try Catch component to handle the exception and the Terminate component to end the automation. The error message is also shown in process job.



Use the Throw Error component

Raise an exception during the automation process to indicate something incorrect has occurred by using the Throw Error component in RPA Desktop Design Studio.

Before you begin
Role required: none

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About this task

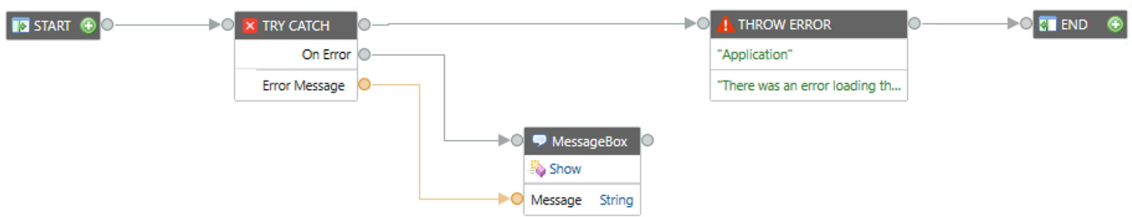
You can configure the properties for the Throw Error component. For more information about these properties, see Properties of the General components.

Procedure

1. In the Toolbox pane, navigate to **General** > **Throw Error**.
2. Drag the Throw Error component to the Design surface.
3. In the Toolbox pane, navigate to **General** > **Try Catch**.
4. Drag the Try Catch component to the Design surface.
5. In the Toolbox pane, navigate to **General** > **MessageBox** > **Show**.
6. Drag the Show component to the Design surface.
7. **Optional:** Connect the data and control ports of the Throw Error component to the corresponding ports of the other components as described in the following table and image.

Port name	Purpose of connection	Port type	Data type
Exception Type	Specify the category of the occurred error. (Optional) For example, Application.	Data In	String
Message	Provide a detailed description of the error, explaining the issue and the suggestion solution. (Optional) For example, "There was an error loading the application. Please try again."	Data In	String

Throw Error component



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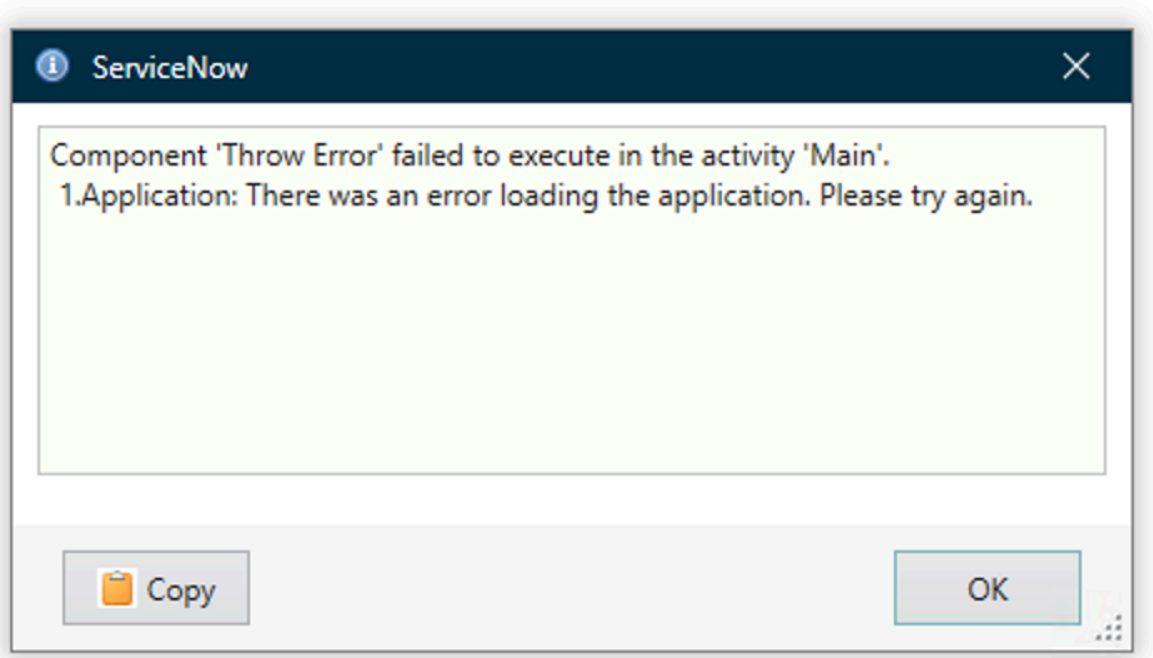
8. **Optional:** To test the component, click **Run** from the Design tab.

Throw Error component result



Use the Wait For Time component

Set a wait time by using the Wait For Time component in RPA Desktop Design Studio.

Watch this video to learn how to use the Wait For Time component.

https://player.vimeo.com/video/1081541198?h=84930f80a1&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

Role required: none

About this task

You can use the Wait For Time component anywhere in an automation. Depending on the wait time that you have configured, the automation waits after the component previous to the Wait For Time component is executed.

To configure the properties for the Wait For Time component, see Properties of the Wait components.

Procedure

1. In the Toolbox pane, navigate to **General**.
2. Drag the Wait For Time component to the Design surface.
3. To set the wait time, see Configure port properties.
4. **Optional:** Connect the data and control ports of the Wait For Time component to the corresponding ports of the other components as described in the following table.

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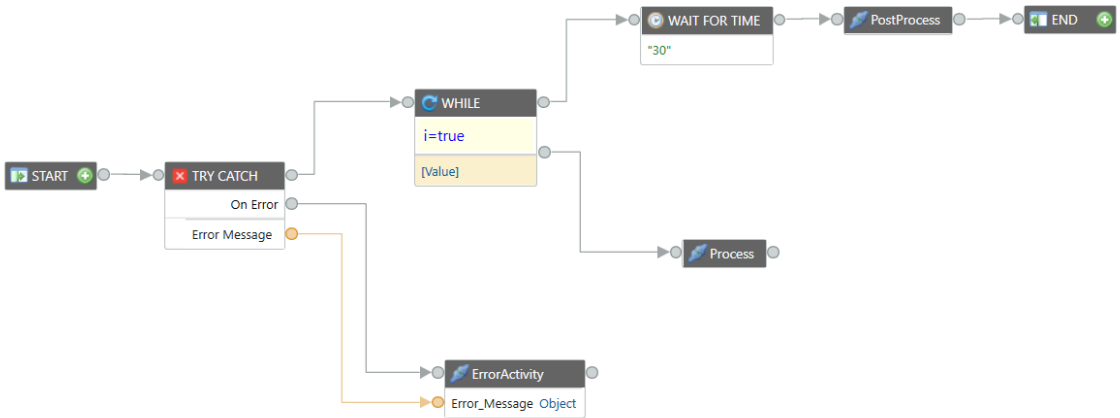
Port Type	Port name	Data type	Purpose	Mandatory?	Notes
Data In	Wait Time (Seconds)	Integer	Takes the wait time.	Yes	

5. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Example: Set a wait time in an automation



In the example, the WHILE component executes while the value of "i" is true. The Wait For Time component is placed between the While component and the Post Process component. The Wait For Time component puts a waiting time of 30 seconds before the Post Process component executes.

Supported functions for the Expression components

Learn about the various functions for the Expression components in RPA Desktop Design Studio.

Supported functions for the Expression components

Name	Description	Usage	Result
Abs	Returns the absolute value of a specified number.	Abs	1
Acos	Returns the angle whose cosine is the specified number.	Acos	(1)
Asin	Returns the angle whose sine is the specified number.	Asin(0)	0
Atan	Returns the angle whose tangent is the specified number.	Atan(0)	0
Ceiling	Returns the smallest integer that is greater than or equal to the specified number.	Ceiling(1.5)	2

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Supported functions for the Expression components (continued)

Name	Description	Usage	Result
Cos	Returns the cosine of the specified angle.	Cos(0)	1
Exp	Returns raised to the specified power.	Exp(0)	1
Floor	Returns the largest integer less than or equal to the specified number.	Floor(1.5)	1
IEEERemainder	Returns the remainder resulting from the division of a specified number by another specified number.	IEEERemainder(3, 2)	-1
Log	Returns the logarithm of a specified number.	Log(1, 10)	0
Log10	Returns the base 10 logarithm of a specified number.	Log10(1)	0
Max	Returns the larger of two specified numbers.	Max(1, 2)	2
Min	Returns the smaller of two numbers.	Min(1, 2)	1
Pow	Returns a specified number raised to the specified power.	Pow(3, 2)	9
Round	Rounds a value to the nearest integer or specified number of decimal places. The mid number behavior can be changed by using EvaluateOption.RoundAwayFromZero during the construction of the Expression object.	Round(3.222, 2)	3.22
Sign	Returns a value indicating the sign of a number.	Sign(-10)	-1
Sin	Returns the sine of the specified angle.	Sin(0)	0
Sqrt	Returns the square root of a specified number.	Sqrt(4)	2

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Supported functions for the Expression components (continued)

Name	Description	Usage	Result
Tan	Returns the tangent of the specified angle.	Tan(0)	0
Truncate	Calculates the integral part of a number.	Truncate(1.7)	1
NCalc	The NCalc is a mathematical expressions evaluator in .NET. With this function, you can parse any expression and evaluate its result. This includes static or dynamic parameters, or custom functions.	For more information, see https://github.com/ncalc/ncalc/wiki	

Properties of the General components

Learn about the properties of the General components in RPA Desktop Design Studio.

Properties of the Confirm components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Properties of the Try Catch component

Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

ITSM connector

The ITSM connector comprises two connectors: the Windows Management Instrumentation (WMI) and PowerShell. The WMI connector enables you to interact with the Windows Operating

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System to get important information and the PowerShell connector enables you to perform various actions on IT services.

- To use the ITSM connectors, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

PowerShell connector methods

The PowerShell connector methods act as interfaces with the Microsoft PowerShell to send requests and get responses in the RPA Desktop Design Studio.

CreateShell

Acts as an interface to pass your inputs in the form of commands and scripts. The CreateShell method is the first method you must use.

InvokeCommand

Runs commands and block of scripts on local or remote computers and gets the output including errors, if any.

Note: You must execute the CreateShell method before executing this method.

Input

Command (String)

Output

Return

InvokeScript

Runs a script on local or remote computers and gets the output.

Note: You must execute the CreateShell method before executing this method.

Input

Script

Output

Return

PSObjectToString

Accepts PowerShell objects from other methods or components and converts them to a string.

Inputs

PSObject

GetValuesByProperty

Accepts a PowerShell object and gets the values of the various properties.

Inputs

PSObject

Output

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Return (String)

Disconnect

Disconnects the connection to the PowerShell.

Serialize

Accepts a PowerShell object and returns the object as a string.

Input

PSObject

Output

Return (String)

Parameters of the PowerShell connector methods

Learn about the various parameters of the Microsoft PowerShell connector methods in RPA Desktop Design Studio.

Parameters of the PowerShell connector methods

Parameter name	Description	Mandatory?
Command (String)	Command to run on local or remote computers.	Yes
Return	Output of the command as a collection.	Not Applicable
Script	Script to run on local or remote computers.	Yes
Return	Output of the script that is returned.	Not Applicable
PSObject	Takes the PowerShell object from a previously executed method.	Yes
Return (String)	Returns the values of the properties in the PowerShell Object.	Not applicable
PSObject	Data in the form of a PowerShell object.	Yes
Return (String)	Returns the PowerShell object as a string.	No

Input parameter values

To input the parameter values, see Configure port properties.

WMI connector methods

The Windows Management Instrumentation (WMI) connector methods act as interfaces with the WMI to send various requests and get responses in the RPA Desktop Design Studio.

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Connect

Establishes a connection with the WMI. You must execute this method first before executing any other method.

Input

Hostname

Username

Password

GetDiskDetails

Returns the disk details such as the name, manufacturer, model, and media type of a local or remote computer.

Output

Hashtable

GetEnvironmentValue

Returns the environment variable values in the local or remote computers.

Input

Var

Output

Return

GetProcessesByCpuUsage

Returns the CPU usage by all processes in the remote or local computer.

Output

Return (Sorted Dictionary)

GetProcessesByMemUsage

Gets the memory usage by all processes in the remote or local computer.

Output

Return (Sorted Dictionary)

PageFaultsPerSecond

Gets the total page exceptions per second. It returns the page exceptions as objects.

Output

Return

PageFilePercentUsage

Gets the usage of page files by the local or remote computers as percentages. It returns the page percentages as objects.

Output

Return

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PercentMemoryUsage

Returns the percentage of the total memory that is used in the local or remote computers. It returns the percentages as objects.

Output

Return

PercentProcessorUsage

Gets the percentage of the total processes that are used in the local or remote computers. It returns the percentages as objects.

Output

Return

Query

Queries a local or remote computer by specifying the class and filter.

Input

Class

Filter

Output

Return

TotalPhysicalMemory

Provides the total available physical memory. It returns the output as an object.

AvailableMBytes

Provides the total available megabytes.

Output

Return

Parameters for WMI connector methods

The parameters for the Windows Management Instrumentation (WMI) connector methods enable you to send custom inputs to the WMI to perform different actions such as get disk details, environment value, CPU usage, and more as part of an automation Workflow in RPA Desktop Design Studio.

Parameters for WMI connector methods

Parameter name	Description	Mandatory?
Hostname	Hostname of the local or remote computer.	Yes
Username	Username of the host.	Yes
Password	Password to connect to the local or remote host.	Yes

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Parameters for WMI connector methods (continued)

Parameter name	Description	Mandatory?
Hashtable	Disk details in the local or remote computer in the form of a hash table.	Not applicable
Var	Environment variable name.	Yes
Return	Environment variable value.	Not applicable
Class	Class as input.	Yes
Filter	Filter as input.	Yes
Return (Sorted Dictionary)	Returns the memory usage values as key-value pairs in a sorted dictionary.	Not applicable
Return (Sorted Dictionary)	Returns the CPU usage values as key-value pairs in a sorted dictionary.	Not applicable
Return	Returns the usage values of system files in Windows as objects.	Not applicable
Return	Returns the page fault values per second as an object.	Not applicable
Return (Object)	Returns the usage of memory in percentage terms as an object.	Not applicable
Return	Returns the usage values of the processor in percentage terms as objects.	Not applicable
Return	Returns the available memory in bytes as integers.	Not applicable
Return	Query result as an object.	Not applicable

Input parameter values

To input the parameter values, see Configure port properties.

Loops

The Loops provide a set of components that implement the concepts of loops, for each, and while as part of an automation Workflow in the RPA Desktop Design Studio.

Use the Break component

Break a loop at any time with the Break component in the RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Break component.

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Properties of the Break component

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Message	Custom message for the user.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Procedure

1. In the Toolbox pane, navigate to **Loops** > **Break**.
2. Drag the Break component to the Design surface.
3. Connect the control port of the Break component to the corresponding port of the another component as described in the following table.

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Control In	Control In	Not applicable	Takes the input from another component when the defined condition is fulfilled.	Not applicable	Yes

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the For Each component

Traverse each item in a collection in the order of first to last using the For Each component in the RPA Desktop Design Studio. The collection can be an array, list, or a table.

Before you begin

Role required: none

About this task

You can configure the properties for the For Each component.

Properties of the For Each component

Property	Description
Delay After Execution	The number of seconds to pause after running.

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Properties of the For Each component (continued)

Property	Description
Delay Before Execution	The number of seconds to pause before running.
Delay for each execution (Seconds)	Specified delay before an item in the object, array, or a list is executed.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Procedure

1. In the Toolbox pane, navigate to **Loops** > **For Each**.
2. Drag the For Each component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the For Each component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Data In	Collection	Object	Takes the collection as an input.	No default value	Yes
Data Out	Current Object	Object	Returns each item from the collection.	Not applicable	Not applicable

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Example: For Each loop component

Use a For Each loop component to automate user account provisioning. In this scenario, a robot reads an Excel file containing user account requests. Each row in the file includes information such as user name, email, role, and department. The robot processes each request by creating the user account, assigning the appropriate role, and sending a notification to the department manager.

1. Use the **Data Table** connector to import rows from the Excel file.
2. Drag a **For Each** component onto the design surface to iterate over the list of request records.
3. Inside the loop:
   - Extract fields from the current record.
   - Navigate to the user management interface and fill in the details.
   - Submit the form to create the user account.
   - Send an email notification to the relevant department manager with the account details.

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Use the For Loop component

Execute a code recurrently to perform tasks of repetitive nature with the For Loop component in the RPA Desktop Design Studio. The For Loop is a control flow component for specifying iterations.

Before you begin

Role required: none

About this task

You can configure the properties for the For Loop component.

Properties of the For Loop component

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Delay for each execution (Seconds)	Specified delay before each execution.
Increment By	Specified number by which the component increments the values. For example, if the number is 2 and the loop is from 1 through 10, then the numbers are 1, 3, 5, and so on.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Procedure

1. In the Toolbox pane, navigate to **Loops** > **For Loop**.
2. Drag the For Loop component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the For Loop component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Data In	From	Integer	Takes the starting value of the For Loop counter.	Not applicable	Yes
Data In	To	Integer	Takes the end value of the For Loop counter.	Not applicable	Yes
Data Out	Index	Integer	Passes the current value of the For	Not applicable	Yes

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Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
			Loop counter to the next component.		
Control Out	Loop	Not applicable	Passes the iteration to the next component.	Not applicable	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the While component

Execute a code until a specified condition is true using the While component in RPA Desktop Design Studio.

Watch this video to learn how to use the While component.

https://player.vimeo.com/video/1074330129?h=89bb9706ed&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin
Role required: none

About this task
You can configure the properties for the While component.

Properties of the While component

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Delay for each execution (Seconds)	Specified delay before each execution of the code while the condition is true.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Procedure

1. In the Toolbox pane, navigate to **Loops** > **While**.
2. Drag the While component to the Design surface.
3. Double-click the light-yellow colored field ( ) under the WHILE component bar.
4. Enter the condition.
   A Data In port is dynamically added for the parameter that contains the While condition.
5. Connect the data and control ports of the While component to the corresponding ports of the other components as described in the following table.

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Port name	Purpose of connection	Port type	Data type
The name of the port is the same as the name of the parameter that defines the condition.	Takes the value of the parameter. The component matches the value with the condition. For example, `i<=10`.	Data In	Object
ControlOut	Use the port at the end of the While Loop to continue to the next action flows.	Control Out	
LoopPort	Use the port to perform actions inside the While Loop (such as calculating expressions, logging values, and so on).	Control Out	

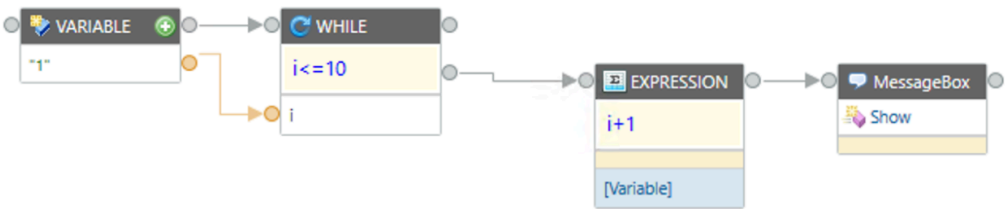
6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Example: While component

Drag Variable component before the While component. Add Expression component and MessageBox components after the While component. In the Variable component, enter `1`. In the Expression component, enter `i+1`. Set a Breakpoint at the Expression component. In the While component, enter `i<=10`.

When you run this automation, the value 1 is incremented to 2 and shows in the output, MessageBox, as 2. When you select **Move next** on the Design tab, the value is incremented until 11. Since the condition matches at this point, i<=10, the loop ends and automation is ended.

While component



Properties of the Loops components

Learn about the properties of the Loops components in RPA Desktop Design Studio.

Properties of the Loops components

Property	Description
Search	Option to enable a search for a property.

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Properties of the Loops components (continued)

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Message	Custom message for the user.
Enable Timeout	Component times out after the specified time period.
Timeout	Custom time in seconds before the component times out. The default time is 60 seconds.
Delay for each execution (Seconds)	Custom delay in seconds before execution of each item in the object.
Delay for each Execution	Waiting time, in seconds, for each step performed until the ForLoop ends.
Increment By	Number, which increments, in the From and To boxes in the component.

RPA Hub

The components under RPA Hub enable interactions with the RPA Hub and ServiceNow platforms. The robots designed in RPA Desktop Design Studio can interact with various ServiceNow platform-related features. You can find components to do the same under this category.

Common

The common components enable you to connect to a RPA Hub instance and impersonate a robot under a bot process.

Use the GetProcessJobSysID component

Retrieves the process job SysID of a process job record when an automation gets executed by a robot. By using the GetProcessJobSysID component in the RPA Desktop Design Studio application, you can identify when the robot is in a free state to execute a process or you can identify the state of the process job.

Before you begin

Role required: none

About this task

If a robot is working on an automation, a process job record for the execution is created in RPA Hub. The robot is then moved to the Busy state. For more information on the different states of a robot, see Robot states form. If you try to execute another automation in the Busy state against this robot, the automation doesn't execute and a process job record is created in the Skipped state. Use the process job SysID to identify when the robot is free and to assign the skipped process jobs to the robot for execution.

The process job SysID can be a passed as an input parameter to a subflow when the subflow is used to check the completion of a process job. When the process job is completed, you can start a new process on the same robot.

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Important:

You can't retrieve the process job SysID by running the GetProcessJobSysID component from RPA Desktop Design Studio. The component can retrieve the process job SysID only during the execution of an automation by a robot. If you run the component from RPA Desktop Design Studio, an error is displayed.

Procedure

1. In the Toolbox pane, navigate to **RPA Hub** > **Common**.
2. Drag the **GetProcessJobSysID** component to the Design surface to add it as part of your automation.
3. Connect the data and control ports of the GetProcessJobSysID component to the other components as described in the following table.

Ports for GetProcessJobSysID component

Port name	Port type	Port description
SysID	Data out	Process job system ID of the execution when the automation gets executed by a robot in a Windows machine. Returns a string value.
Control In	Not applicable	Connects to the Control Out port of one or more components.
Control Out	Not applicable	Connects to the Control In port of another component or the default end component.

4. **Optional:** To test the component, right-click the component and select **Run From Here**. You can also run the automation by selecting **Run** from the **Design** tab.

Use the GracefulStop component

Verify that an automation from RPA Hub doesn't stop abruptly by using the GracefulStop component in RPA Desktop Design Studio. With this component, you can define a secure termination point within an automation process and automate housekeeping activities such as closing in-use applications or performing clean-up operations.

Before you begin

Make sure that you analyze the automation for scenarios where you can stop the automation gracefully and perform the clean-up tasks such as closing in-use applications.

Role required: None

About this task

Previously, when you selected the **Stop Process** button on a bot process in RPA Hub, the robots exited the automation abruptly. This process may have caused data inconsistencies. You can now exit the automation smoothly by using the GracefulStop component. For more information on how the GracefuStop component works for an automation in RPA Hub, see Using Graceful Stop functionality in RPA Hub.

Note: The GracefulStop component is available only for unattended automations.

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Procedure

1. In the Toolbox pane, navigate to **RPA hub** > **Common**.
2. Drag the GracefulStop component to the Design surface to add it as part of your automation.
3. Connect the component to the sequence that stops the automation gracefully by using the Control-In port.
4. Use the Return data port to connect to the steps that the user performs to initiate a graceful stop from RPA Hub.
   For example, let's consider a scenario where automation copies the employee details from a Microsoft Excel sheet to an Oracle application. By using the Return data port, the current transaction completes and successfully terminates the automation.

> **Important:** Make sure that the GracefulStop component meets the following conditions:
>
> - The Control-In port must have a connection.
> - The Return data port must have a connection or it must be mapped to a variable.
>
> The Graceful stop option is available in RPA Hub to only those automations that satisfy these conditions.

When you use the GracefulStop component from RPA Desktop Design Studio, the component returns a false value. By selecting the GracefulStop toggle for the **Stop process** option in a bot process in RPA Hub, the component returns a true value. You can then stop the automation. If the automation path leads to a safe termination point, the automation is gracefully exited. For more information about stopping a bot process in RPA Hub, see Stop an unattended bot process in RPA Hub.

What to do next

Publish the automation project. For more information on how to publish an automation project, see Publish an automation project in RPA Desktop Design Studio.

Properties of the Common components

Learn about the properties of the Common components in RPA Desktop Design Studio.

Properties of the Common components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Credentials

The Credentials components retrieve or update the login credentials in the RPA Hub applications.

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Use the GetApplicationCredential component

When login credentials for an RPA Hub application are already set in RPA Hub, retrieve the credentials by using the GetApplicationCredential component.

Before you begin

In RPA Desktop Design Studio, assign your automation to a bot process by selecting **Assign bot process** option from the **Design** tab. For more information, see Assign bot process to an automation project.

Role required: none

About this task

The GetApplicationCredential component can be used when the automation involves an application that requires user authentication. When a user name and password for the application are stored in RPA Hub, GetApplicationCredential retrieves them.

You can configure the properties for the GetApplicationCredential component. For more information about these properties, see Properties of the Credentials components.

Procedure

1. In the Toolbox pane, navigate to **RPA Hub** > **Credentials**.
2. Drag the GetApplicationCredential component to the Design surface.
3. Confirm the configuration of the component's input fields.
   For more information, see Configure port properties.
4. Connect the data and control ports of the GetApplicationCredential component to the corresponding ports of the other components as described in the following table.

Port	Description	Port type	Data type	Required
Name	Receives the name of the business application that is associated with the bot process	Data In	String	Yes
UserName	Returns the user name that is needed to log in to the business application	Data Out	String	Yes
Password	Returns the password needed to log in to the business application	Data Out	SecureString	Yes

5. To test the component, on the **Design** tab, select **Run**.

Use the SetApplicationCredential component

Set or update the login credentials in RPA Hub applications by using the SetApplicationCredential component.

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Before you begin

In RPA Desktop Design Studio, assign your automation to a bot process by selecting **Assign bot process** option from the **Design** tab. For more information, see Assign bot process to an automation project.

Role required: none

About this task

The SetApplicationCredential component can be used when the automation involves an application that requires the login credentials to be periodically updated, or when the login credentials must be changed for any other reason. This component updates the credentials in RPA Hub.

You can configure the properties for the SetApplicationCredential component. For more information about these properties, see Properties of the Credentials components.

If the application credential record has the **External Credential** check box enabled, then this SetApplicationCredential component does not set the credentials and displays an error. For more information about the application credential settings, see Create an application credential in RPA Hub.

Procedure

1. In the Toolbox pane, navigate to **RPA Hub** > **Credentials**.
2. Drag the SetApplicationCredential component to the Design surface.
3. Confirm the configuration of the component's input fields.
   For more information, see Configure port properties.
4. Connect the data and control ports of the SetApplicationCredential component to the corresponding ports of the other components as described in the following table.

Port	Description	Port type	Data type	Required
Name	Receives the name of the business application that is associated with the bot process	Data In	String	Yes
Password	Receives the password that is needed to log in to the business application	Data In	String	Yes
Return	Returns True if the credentials are set successfully or False if setting the credentials failed	Data Out	Boolean	Yes

5. To test the component, on the **Design** tab, select **Run**.

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Properties of the Credentials components

To set the properties of a Credentials component, double-click a component and enter the values in the Properties pane.

Properties of the Credentials components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Process Parameters

The Process parameters components enable you to get or update the values of the process parameters you had set for bot processes in the RPA Hub.

Use the GetProcessParameter component

Get the value of a specific process parameter you had set for a bot process in RPA Hub with the GetProcessParameter component in the RPA Desktop Design Studio.

Before you begin

Set at least one process parameter as part of a bot process on the RPA Hub. See Create a process parameter within a bot process in RPA Hub.

Assign the automation to the bot process by using the **Assign bot process** option in the Toolbar of RPA Desktop Design Studio . You must set the same bot process and robot associated with the process parameter.

Role required: none

About this task

You can configure the properties for the GetProcessParameter component. For more information about these properties, see Properties of the Process Parameters components.

Procedure

1. In the Toolbox pane, navigate to **RPA Hub** > **Process Parameters**.
2. Drag the GetProcessParameter component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the GetProcessParameter component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Name)	Takes the name of the process parameter you had set as part of the bot process	Yes

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Port type	Purpose of connection	Mandatory?
	on RPA Hub from a previously executed component.	
Data Out (Value)	Returns the value of the process parameter and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetProcessParameters component

Get the values of a process parameter you had set for a bot process in RPA Hub with the GetProcessParameters component in the RPA Desktop Design Studio. The component returns both the individual values of the parameters and all values as an object.

Before you begin

Set at least two process parameters as part of a bot process on the RPA Hub. See Create a process parameter within a bot process in RPA Hub.

Assign the automation to the bot process by using the **Assign bot process** option from the **Design** tab of RPA Desktop Design Studio. You must set the same bot process and robot associated with the process parameter. For more information, see Assign bot process to an automation project.

Role required: none

About this task

You can configure the properties for the GetProcessParameters component. For more information about these properties, see Properties of the Process Parameters components.

Procedure

1. In the Toolbox pane, navigate to **RPA Hub** > **Process Parameters**.
2. Drag the GetProcessParameters component to the Design surface.
3. Click the component settings icon ( ).
4. Click the add key icon ( ).
5. Enter the name of one of the process parameters.
   A Data In port is created.
6. **Optional:** Update the process parameter data type.
7. Repeat the steps to add more parameters.
8. Click **OK**.
9. Connect the data and control ports of the GetProcessParameters component to the corresponding ports of other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data Out (Parameter)	Returns the value of an individual process parameter and passes to the next component.	Yes
Data Out (Object)	Returns the values of process parameters you had set in the component as an object and passes to the next component.	Yes
Control In	Connect to the Control Out port of one or more components.	Yes
Control Out	Connect to the Control In port of another component or the default end component.	Yes

10. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SetProcessParameter component

Update the value of an existing process parameter you had set for a bot process in the RPA Hub with the SetProcessParameter component in the RPA Desktop Design Studio.

Before you begin

Set at least one process parameter as part of a bot process on the RPA Hub. See Create a process parameter within a bot process in RPA Hub.

Assign the automation to the bot process by using the **Assign bot process** option from the **Design** tab of RPA Desktop Design Studio. You must set the same bot process and robot associated with the process parameter. For more information, see Assign bot process to an automation project.

Role required: none

About this task

You can configure the properties for the SetProcessParameter component. For more information about these properties, see Properties of the Process Parameters components.

Procedure

1. In the Toolbox, navigate to **RPA Hub** > **Process Parameters**.
2. Drag the SetProcessParameter component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the SetProcessParameter component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Name)	Takes the name of the process parameter you had	Yes

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Port type	Purpose of connection	Mandatory?
	set as part of the bot process on RPA Hub from a previously executed component.	
Data In (Value)	Takes the new value of the process parameter you had set as part of the bot process on RPA Hub from a previously executed component.	Yes
Data Out	Returns the Boolean response to whether the process parameter value was updated and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Process Parameters components

Learn about the properties of the Process Parameters components in RPA Desktop Design Studio.

Properties of the Process Parameters components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Queue

The Queue connector enables you to create and manage work items on a queue created in the RPA Hub.

The Queue connector provides multiple methods to create and manage work items on a queue created in the RPA Hub. These methods can create, update, pick, or get work items from the specified queue in the RPA Hub.

After you create a queue in the RPA Hub and assign a bot process to it, you must associate the Queue connector with the queue name. Then, assign the bot process to the automation project

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by using the **Assign bot process** option from the **Design** tab of RPA Desktop Design Studio to access the work items. For more information, see Assign bot process to an automation project.

To create a queue, see Create a queue in RPA Hub.

To assign a bot process to a queue, see Assign a bot process to a queue from Queues menu in RPA Hub.

You must first use, configure, and then expose the methods in the Queue connector to use its methods.

- To use the Queue connector, see Use a connector in RPA Desktop Design Studio.
- To expose the methods, see Use connector method.
- To use the methods, see Use a component in RPA Desktop Design Studio.

Queue connector methods

The Queue connector methods enable you to create and manage work items for queues in the RPA Hub.

Prerequisites

1. Assign the bot process to the automation project by using the **Assign bot process** option from the **Design** tab of RPA Desktop Design Studio to access the work items. For more information, see Assign bot process to an automation project.
2. Set the QueueName property by doing the following steps:
   a. In the RPA Desktop Design Studio, navigate to **Toolbox** > **RPA Hub** > **Queue**.
   b. Drag the Queue connector under Global Objects in the Project Explorer.
   c. Double-click the Queue connector.
   d. Under the Properties pane, in the QueueName property, enter the name of the Queue.

> **Note:** The name of the Queue must be the same as that defined in RPA Hub.

CreateJSONWorkItem

Creates a work item for the queue in the JSON format.

Input

Name

Priority

Output

WorkItemId

IsNameExists

To create the key-value pairs in a JSON object, do the following actions:

1. On the CreateJSONWorkItem method bar, click the method settings icon ( ).
2. Enter the criteria as given in the table.

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CREATE ITEM CONFIGURATION

Field	Description
CONFIGURATION	
INPUT FIELDS	
Type	The type of the work item. For example, for an accounting system queue, savings and current are types of accounts. To configure the input field, see Configure port properties.
Stage	Updates the stage of the work item. Custom field to maintain different stages of the transaction.
SLA	Service Level Agreement (SLA) of the work item completion.
JSON PROPERTIES	
JSON PATH NOTATIONS	
Name	Key-value pair (JSON content) for the request content. To add a key, do the following: **a.** Click the add key icon ( ). **b.** Enter the key name in the field. **c.** To add more keys, repeat the previous steps. **d.** To pass the value to these fields, see Configure port properties.
Sensitive	Sensitive content that is passed when the work item is created. Select this option as sensitive, then the data is encrypted and stored in the **Sensitive Request Content** field in the new work item in RPA Hub. For more information about the work item form, see Work item form in RPA Hub. With this functionality, you can pass sensitive information through queues. For example, if you want customer data to be encrypted in the queue, you must use the

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Field	Description
	Sensitive field to store customer details such as credit card number, address, and so on.

3. Click **OK**.

CreateStringWorkItem

Creates a work item in a queue in the RPA Hub by accepting a string.

Input

RequestContent

Name

Output

WorkItemId

IsNameExists

To specify additional criteria for creating string work items, do the following steps.

1. On the CreateStringWorkItem method bar, click the method settings icon ( ).
2. Enter the criteria as given in the table.

CREATE ITEM CONFIGURATION

Field	Description
INPUT FIELDS	
SensitiveRequestContent	Stores sensitive content in encrypted format in the new work item. To configure the input field, see Configure port properties. With this functionality, you can pass sensitive information through queues. For example, if you want customer data to be encrypted in the queue, you must use the **SensitiveRequestContent** field to store customer details such as credit card number, address, and so on.
Stage	Updates the stage of the work item. Custom field to maintain different stages of the transaction.
Type	The type of the work item. For example, for an accounting system queue, savings and current are types of accounts.

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Field	Description
	To configure the input field, see Configure port properties.
SLA	Service Level Agreement (SLA) of the work item completion.

3. Click **OK**.

GetWorkItems

Returns the count and the details of the work items created under the queue based on the criteria you specify. The method provides a default criterion already but you can specify additional criteria.

Input

Limit

Output

TotalCount

To specify additional criteria for identifying and getting work items, do the following steps.

1. Click the method settings icon ( ).
2. Configure the filters, as required. No filter is mandatory.

WORKITEM CONFIGURATION

Field	Description
INPUT FILTERS	
Name	Name of the work item. You can specify one of the following filters: ○ **Equals**: Name of the work item is exactly equal to the criteria you specify. ○ **Contains**: Name of the work item contains characters you specify. ○ **StartsWith**: The name of the work item starts with the characters you specify. ○ **EndsWith**: The name of the work item starts with the characters you specify.
Type	Type of the work item in string format. You can specify one of the following filters: ○ **Equals**: Type of the work item is exactly equal to the criteria you specify. ○ **Contains**: Type of the work item contains characters you specify.

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Field	Description
	○ **StartsWith**: The type of the work item starts with the characters you specify. ○ **EndsWith**: The type of the work item starts with the characters you specify.
Status	Status of the work item.
Stage	Updates the stage of the work item. Custom field to maintain different stages of the transaction.
Priority	Priority of execution: ○ **Critical** ○ **High** ○ **Medium** ○ **Low** The assigned robot executes the bot process as per the defined priority in the work queue. The default priority is always **High**.
DateType	Date type of the work item. If you provide inputs to this field, you must also provide inputs to the **FromData** and **ToDate** fields also.
FromDate	If the method is picking work items within a date range, starting date in the range.
ToDate	If the method is picking work items within a date range, ending date in the range.
Offset	Number of work items that will be retrieved after the set limit. For example, if the limit is 20, the next picked work item starts from 21.
OUT FIELDS	
OutRecords	Returns the details of the work items in an object form.

3. Click **OK**.

Note: A Data In port is created with each field you configure.

PickWorkItem

Enables a robot to pick a work item based on the given criteria. You can also configure additional criteria for the work item to be picked.

queryConditions included in the PickWorkItem component are considered for calculating the number of robots required to complete the work allocated, if the bot process is enabled with robot pool. For more information about calculating the number of robots, see Calculate the number of robots in RPA Hub. For more information about robot pool concepts, see Robot pool in RPA Hub.

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Input

Priority

Output

WorkItemId

RequestContent

To specify additional criteria for picking work items, do the following steps.

1. Click the method settings icon ( ).
2. Enter the criteria as given in the table.

PICK ITEM CONFIGURATION

Field	Description
CONFIGURATION	
INPUT FILTERS	
Name	Name of the work item based on the following filters. ○ **Equals**: Name of the work item is exactly equal to the criteria you specify. ○ **Contains**: Name of the work item contains characters you specify. ○ **StartsWith**: The name of the work item starts with the characters you specify. ○ **EndsWith**: The name of the work item starts with the characters you specify. Selection exposes a Data In port.
Type	Type of the work item based on the following filters. ○ **Equals**: Type of the work item is exactly equal to the criteria you specify. ○ **Contains**: Type of the work item contains characters you specify. ○ **StartsWith**: The type of the work item starts with the characters you specify. ○ **EndsWith**: The type of the work item starts with the characters you specify. Selection exposes a Data In port.
Stage	Stage of the work item work item based on the following filters. ○ **Equals**: Stage of the work item is exactly equal to the criteria you specify. ○ **Contains**: Stage of the work item contains characters you specify.

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Field	Description
	○ **StartsWith**: Stage of the work item starts with the characters you specify. ○ **EndsWith**: Stage of the work item starts with the characters you specify. Selection exposes a Data In port.
Status	Status of the work item for the robot to select.
OUT FIELDS	
Name	Data out port that returns the name of the work item.
Type	Data out port that returns the type of the work item.
Remarks	Data out port that returns remarks on the work item.
Stage	Data out port that returns the stage of the work item.
RequestContent	String content for the work item. Picks the stored content when the work item is created.
SensitiveRequestContent	The sensitive content from this field is picked, decrypted and passed to the RPA Desktop Design Studio or robots.
JSON PROPERTIES	
JSON PATH NOTATIONS	Data out port that returns the JSON path notation of a work item. Click the add key icon () to add a key name. JSON can be passed in both **RequestContent** and **SensitiveRequestContent** fields. While picking work item, the JSON data is picked from a work item. For example, if a key-value pair "City: Mumbai" (City is key and Mumbai is value) is in the **RequestContent** field and "City: Delhi" (City is key and Delhi is value) is created in **SensitiveRequestContent** field. When you try to pick the same work item, since the key is same for both fields, the **SensitiveRequestContent** field is given precedence and that output is retrieved from this field.

3. Click **OK**.

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ReleaseWorkItem

Releases a work item that has been accepted and executed by a bot. You must execute PickWorkItem method before executing this method.

Input

WorkItemId

Output

Return

UpdateWorkItem

Enables a robot to update a work item after picking it with the PickWorkItem method based on specified criteria. You can configure additional criteria for the work item to be updated. You must execute PickWorkItem method before executing this method.

Inputs

WorkItemId

RequestContent

ReleaseMode

Priority

Status

Exception Type

To specify additional criteria for updating work items, do the following steps.

1. Click the method settings icon ( ).
2. Enter the criteria as given in the table.

UPDATE ITEM CONFIGURATION

Field	Description
CONFIGURATION	
INPUT FIELDS	
Stage	Updates the stage of the work item. Custom field to maintain different stages of the transaction.
DeferredTill	Option to specify a time duration during which the same work item will not be picked. For example, 5 minutes.
Name	Name of the work item.
Type	The type of the work item. For example, for an accounting system queue, savings and current are types of accounts.

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Field	Description
	To configure the input field, see Configure port properties.
Remarks	Supporting remarks on the work item.
SLA	Service Level Agreement (SLA) of the work item completion.
ResponseContent	String content for the work item. Updates the stored content of a work item.
SensitiveRequestContent	Updates the sensitive content of a work item.
JSON PROPERTIES	
JSON PATH NOTATIONS	
Name	Key-value pair (JSON content) for the request content. To add a key, do the following: **a.** Click the add key icon ( ). **b.** Enter the key name in the field. **c.** To add more keys, repeat the previous steps. **d.** To pass the value to these fields, see Configure port properties.
Sensitive	Sensitive content is updated for a work item. With this functionality, you can pass sensitive information through queues. For example, if you want customer data to be encrypted in the queue, you must use the **Sensitive** field to store customer details such as credit card number, address, and so on. When you add a key-value pair "City: Mumbai" in **SensitiveRequestContent** field and add another key-value pair "Country: India" in JSON Path Notation and the UpdateWorkItem is executed. Then, in the **SensitiveRequestContent** field, the output is combined to "City: Mumbai" and "Country: India".

Parameters for the Queue connector methods

Learn about the various parameters for the Queue connector methods in RPA Desktop Design Studio.

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Parameters for the Queue connector methods

Parameter name	Description
Name	Name of the work item. The name is recorded under the Name column in the Work Items tab in the RPA Hub. By default, all queue item names are unique. However, you can create duplicates by clearing the **Is Work Item Name Unique** check box on the Queue form. For more information, see, Queue form in RPA Hub. After creation, you can find the work item under the **Work Items** tab of the queue, in RPA Hub.
Type	The type of the work item. For example, for an accounting system queue, savings and current are types of accounts. To configure the input field, see Configure port properties.
Priority	Priority of execution: • **Critical** • **High** • **Medium** • **Low** The assigned robot executes the bot process as per the defined priority in the work queue. The default priority is always **High**.
Stage	Stage of the work item. Custom field to maintain different stages of the transaction.
SLA	Service Level Agreement (SLA) of the work item completion.
WorkItemId	Unique work item ID generated by the system.
IsNameExists	Boolean response to whether a duplicate work item exists.
RequestContent	String content for the work item.
Limit	The maximum number of items the method will get. By default, the method gets 20 work items which you can increase up to 100.
TotalCount	Total count of the work items retrieved from the queue.
Status	Status of the work item for the robot to select.

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Parameters for the Queue connector methods (continued)

Parameter name	Description
	By default, the status of the work item is always **Pending**.
ReleaseMode	Whether the work item is released or still locked for the robot after execution. Types of release modes: • Release • Lock
Return	Boolean response on whether the work item is released.
Exception Type	Type of the exception: • **Application** - For example, if an issue persists with an associated application such as SAP. • **Business** - For example, if an issue requires a manual intervention to fix it. The auto retry functionality retries the work items based on the exception type. If the **Exception Type** field is **Application**, then the work item is auto retried.

Enter inputs for parameters

To enter inputs for the parameters, see Configure port properties.

Shared Parameters

You can set parameters and their values that are shared across bot processes in the RPA Hub. The Shared Parameters components enable you to get the values of one or more such parameters.

Use the GetSharedParameters component

Get the values of multiple shared parameters set up for multiple bot processes on the RPA Hub using the GetSharedParameters component.

Before you begin

Set multiple shared parameters and associate multiple bot processes on the RPA Hub. For more information, see Create a shared parameter in RPA Hub and Assign a bot process to a shared parameter in RPA Hub.

Assign the automation to the bot process by using the **Assign bot process** option in the **Design** tab of RPA Desktop Design Studio. For more information, see Assign bot process to an automation project.

Role required: none

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About this task

You can configure the properties for the GetSharedParameters component. For more information about these properties, see Properties of the shared parameters.

Procedure

1. In the Toolbox pane, navigate to **RPA Hub** > **Shared Parameters**.
2. Drag the GetSharedParameters component to the Design surface.
3. Click the component settings icon ( ).
4. Click the add key icon ( ).
5. Enter the shared parameter name.
6. **Optional:** Update the shared parameter data type.
7. Repeat the steps to set more shared parameters.
8. Click **OK**.
9. Connect the data and control ports of the GetSharedParameters component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (Shared Parameter)	Returns the value of the shared parameter and passes to the next component.	No. Connecting the port is optional. To view the output, right-click the **Return** field and click **Preview Data** .
Data In (Return)	Returns the values of multiple shared parameters as an object and passes to the next component.	Yes To view the output, right-click the **Return** field and click **Preview Data**
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	Yes

10. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SetSharedParameter component

Update the value of a specific shared parameter that you had set for multiple bot processes on the RPA Hub by using the SetSharedParameter component in the RPA Desktop Design Studio.

Before you begin

Set at least one shared parameter and associate multiple bot processes on the RPA Hub. For more information, see Create a shared parameter in RPA Hub and Assign a bot process to a shared parameter in RPA Hub.

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Assign the automation to the bot process by using the **Assign bot process** option in the **Design** tab of RPA Desktop Design Studio. For more information, see Assign bot process to an automation project.

Role required: none

About this task

You can configure the properties for the SetSharedParameter component. For more information about these properties, see Properties of the shared parameters.

Procedure

1. In the Toolbox pane, navigate to **RPA Hub** > **Shared Parameters**.
2. Drag the SetSharedParameter component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the SetSharedParameter component to the corresponding ports of the other components.

Port type	Purpose of connection	Mandatory?
Data In (Name)	Takes the name of the shared parameter that you had set for bot processes in the RPA Hub from a previously executed component.	Yes. To pass the variable name, double-click the **Name** field and enter the variable name.
Data In (Value)	Takes the new value of the shared parameter that you had set for bot processes in the RPA Hub from a previously executed component.	Yes. To pass the variable value, double-click the **Value** field and enter the value.
Data Out (Return)	Returns the Boolean response to whether the existing shared parameter value was replaced and passes to the next component.	Yes. To view the output, right-click the **Return** field and select **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the shared parameters

Learn about the properties of the shared parameters in RPA Desktop Design Studio.

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Properties of shared parameters

Property	Description
Delay Before Execution	The number of seconds to pause before running.
Delay After Execution	The number of seconds to pause after running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Use the Log component

Capture custom messages as automation logs by using the Log component in an automation in RPA Desktop Design Studio. With this component, you can write custom messages as automation logs and view them from a unified space so that you can track the progress of an automation.

Before you begin

Make sure that you enable the **Track Execution Automation Logs** option from a bot process. For more information on how to enable Track Execution Logs, see Bot Process form in RPA Hub.

Role required: none

About this task

Previously, the messages from the Log component were updated to the product error log files in the machine where the automation was executed.

Starting from the Vancouver release, the log messages from the automations that execute on the RPA Desktop Design Studio, the attended robots, and the unattended robots are written to the **Message** field in the Automation logs table of a process job in RPA Hub.

You aren't required to upgrade the plugin version of the older automations. For more information about the list components that are upgraded with RPA Desktop Design Studio, Attended Robot, and Unattended Robot, see List of components compatible with latest version.

Procedure

1. In the Toolbox pane, navigate to **RPA Hub** > **Log**.
2. Drag the **Log** component to the Design surface.
3. Configure the **Message** (string) field by entering a message or capturing the output string from a previous component or method.
   For example, if the automation is successful, you can enter the string *Success* or capture the string result from a previously executed component or method.
4. **Optional:** If you want to classify the message, configure the **Log level** property from the Properties explorer.
   You can classify the message as one of the following types:
   - Info
   - Warning
   - Error

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- Exception

> **Important:** In the previous version of RPA Desktop Design Studio, the **Error image** and **Verbose** options were available. If you open an older automation project in the Vancouver release of RPA Desktop Design Studio, these options are converted to the type **Error**.

For more information on how to configure the remaining properties of the Log component, see Properties of the General components.

5. **Optional:** To test the component, under the **DESIGN** tab, select **Run**.

> **Note:** When you run the Log component from RPA Desktop Design Studio, no message updates to RPA Hub because no process job is associated to it.

Security

The Security components in the RPA Desktop Design Studio perform data security operations such as Microsoft Data Protection API and data encryption.

DPAPI

The DPAPI components in the RPA Desktop Design Studio secure data by applying the Microsoft DPAPI.

Use the Protect component

Encrypt a string with the DPAPI algorithm from the Microsoft by using the Protect component in RPA Desktop Design Studio. The component returns the encrypted form of the data you provide.

Before you begin

Role required: none

About this task

You can configure the properties for the Protect component. For more information about these properties, see Properties of the DPAPI components

Procedure

1. In the Toolbox pane, navigate to **Security** > **DPAPI**.
2. Drag the Protect component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Protect component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (ClearText)	Passes the string that you want to encrypt from a previously executed component.	Yes
Data In (Optional Entropy)	The optional entropy provides additional security to the encrypted data from risks that make applications running under the same user vulnerable. Passes the	No. Connecting the port is optional.

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Port type	Purpose of connection	Mandatory?
	entropy from a previously executed component.	
Data In (Scope)	Passes the scope of protection from a previously executed component.	Yes
Data Out (String)	Returns the encrypted string.	No. Connecting the port is optional. To view the output, right-click the **Return** field and click **Preview Data**.
Control In	Passes the control from a from a previously executed component.	Yes
Control Out	Passes the control to the next component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ProtectData component

Encrypt and save string data to a file with the ProtectData component in the RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the ProtectData component. For more information about these properties, see Properties of the DPAPI components.

Procedure
1. In the Toolbox pane, navigate to **Security** > **DPAPI**.
2. Drag the ProtectData component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ProtectData component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Filename)	Passes the name of the file to which the encrypted string is saved from a previously executed component.	Yes
Data In (Data)	Passes the data to be encrypted from a previously executed component.	Yes
Data In (Optional Entropy)	The optional entropy provides additional security	No. Connecting the port is optional.

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Port type	Purpose of connection	Mandatory?
	to the encrypted data from risks that make applications running under the same user vulnerable. Passes the entropy from a previously executed component.	
Data In (Scope)	Passes the scope of protection from a previously executed component.	Yes
Data Out (String)	Returns the encrypted string.	No. Connecting the port is optional. To execute the component, right-click the ProtectData component bar and click **Run From Here**. To view the output, right-click the **Return** field and click **Preview Data**.
Control In	Passes the control from a from a previously executed component.	Yes
Control Out	Passes the control to the next component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Unprotect component

Decrypt an encrypted string using the Unprotect component in the RPA Desktop Design Studio. You can use the component on strings encrypted by the ProtectData or any other application as part of a Workflow. The Unprotect component returns the decrypted string or data.

Before you begin

Role required: none

About this task

You can configure the properties for the Unprotect component. For more information about these properties, see Properties of the DPAPI components.

Procedure

1. In the Toolbox pane, navigate to **Security** > **DPAPI**.
2. Drag the Unprotect component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Unprotect component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (EncryptedText)	Passes the encrypted string from a previously executed component.	Yes
Data In (Optional Entropy)	If the string is protected by entropy, you need to enter the entropy details to enable the component to access the data. Passes the entropy details from a previously executed component.	No. Connecting the port is optional.
Data In (Scope)	Passes the scope of protection from a previously executed component.	Yes
Data Out (String)	Returns the decrypted string.	Yes To view the output, right-click the **Return** field and click **Preview Data**.
Control In	Passes the control from a from a previously executed component.	Yes
Control Out	Passes the control to the next component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the UnProtectData component

Decrypt an encrypted string that is saved in a file with the UnProtectData component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the UnProtectData component. For more information about these properties, see Properties of the DPAPI components.

Procedure

1. In the Toolbox pane, navigate to **Security** > **DPAPI**.
2. Drag the UnProtectData component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the UnprotectData component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (Filename)	Passes the name of the file that saves the encrypted string from a previously executed component.	Yes
Data In (Optional Entropy)	If the string is protected by entropy, you need to enter the entropy details to enable the component to access the data. Passes the entropy details from a previously executed component.	No. Connecting the port is optional.
Data In (Scope)	Passes the scope of protection from a previously executed component.	Yes
Data Out (String)	Returns the decrypted string.	No. Connecting the port is optional. To execute the component, right-click the ProtectData component bar and click **Run From Here**. To view the output, right-click the **Return** field and click **Preview Data**.
Control In	Passes the control from a from a previously executed component.	Yes
Control Out	Passes the control to the next component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the DPAPI components

Learn about the properties of the DPAPI components in RPA Desktop Design Studio.

Properties of DPAPI components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.

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Properties of DPAPI components (continued)

Property	Description
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Encryption components

The RPA Desktop Design Studio secures data through encryption, file hashes, and encoding. This feature of RPA Desktop Design Studio can be the part of a workflow.

Use the DecryptString component

Decrypt an encrypted string by providing the encryption key using the Decrypt String component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Decrypt String component. For more information about these properties, see Properties of the Encryption components.

Procedure

1. In the Toolbox pane, navigate to **Security** > **Encryption**.
2. Drag the Decrypt String component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Decrypt String component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Passes the encrypted string that you want to decrypt from a previously executed component.	Yes
Data In (encryptionKey)	Passes the encryption key used to encrypt the string you want to decrypt from a previously executed component.	Yes
Data Out	Returns the decrypted string.	No. Connecting the port is optional. To view the output, right-click the **Return** field and click **Preview Data**.
Control In	Passes the control from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Passes the control to the next component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the EncryptString component

Encrypt a string by providing the encryption key with the EncryptString component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Encrypt String component. For more information about these properties, see Properties of the Encryption components.

Procedure

1. In the Toolbox pane, navigate to **Security** > **Encryption**.
2. Drag the Encrypt String component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Encrypt String component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Passes the string that you want to encrypt from a previously executed component.	Yes
Data In (EncryptionKey)	Passes the encryption key from a previously executed component.	Yes
Data Out	Returns the encrypted string.	No. Connecting the port is optional. To view the output, right-click the **Return** field and click **Preview Data**.
Control In	Passes the control from a from a previously executed component.	Yes
Control Out	Passes the control to the next component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the GenerateFileHash component

Generate the file HashCode for any file using the GenerateFileHash component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Generate File Hash component. For more information about these properties, see Properties of the Encryption components.

Procedure

1. In the Toolbox pane, navigate to **Security** > **Encryption**.
2. Drag the Generate File Hash component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the Generate File Hash component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (FilePath)	Passes the path of the file for which the HashCode will be generated from a previously executed component.	Yes
Data Out	Returns the file HashCode and updated HashCodes for each update to the file.	No. Connecting this port is optional. To view the output, right-click the **Return** field and click **Preview Data**.
Control In	Passes the control from a previously executed component.	Yes
Control Out	Passes the control to the next component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SecureStringDecode component

Decode a secure string by using the SecureStringDecode component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Secure String Decode component. For more information about these properties, see Properties of the Encryption components.

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Procedure

1. In the Toolbox pane, navigate to **Security** > **Encryption**.
2. Drag the Secure String Decode component to the Design surface.
3. To configure the input field, see Configure port properties.
4. **Optional:** Connect the data and control ports of the SecureStringDecode component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (SecureString)	Passes the string that you want to decode from a previously executed component.	Yes
Data Out	Returns the decoded string.	Yes (Optional) To view the output, right-click the **Return** field and click **Preview Data**.
Control In	Passes the control from a previously executed component.	Yes
Control Out	Passes the control to the next component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SecureStringEncode component

Encode a string to secure it by using the Secure String Encode component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Secure String Encode component. For more information about these properties, see Properties of the Encryption components.

Procedure

1. In the Toolbox pane, navigate to **Security** > **Encryption**.
2. Drag the Secure String Encode component to the Design surface.
3. To configure the input field, see Configure port properties.
4. In the Secure String Encode component, enter the string that you want to encode in the **Text** field or pass the string through the Data In port.
5. Connect the data and control ports of the Secure String Encode component to the corresponding ports of the other components.

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Port type	Purpose of connection	Mandatory?
Data In (Text)	Passes the string that you want to encode from a previously executed component.	Yes
Data Out	Returns the encoded, secure string.	Yes
Control In	Passes the control from a previously executed component.	Yes
Control Out	Passes the control to the next component.	No

6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Encryption components

Learn about the properties of the Encryption components in RPA Desktop Design Studio.

Properties of encryption components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

ServiceNow

The ServiceNow components enable you to interact with ServiceNow platform features such as the Flow Designer, manage attachments from table records, and trigger embedded task automations.

For more information about Embedded Task Automation, see Embedded Task Automation (ETA) in RPA Hub.

Flow Designer components

The Flow Designer components let you invoke flows, subflows, and actions from Workflow Studio and use them as part of a workflow. You can also use these components to determine a flow's output or execution status.

Use the InvokeFlow component

Invoke or call a flow that is available in Workflow Studio by using the InvokeFlow component of RPA Desktop Design Studio. Generate the context ID of the flow and use the ID in other flow designer components to get the execution status and output.

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Before you begin

To understand more about flows in Workflow Studio, see Building flows.

Before you use any Flow Designer component, use the Connection Manager to make sure that you're connected to the instance. For more information about how to connect to an instance, Connect to an RPA Hub instance from RPA Desktop Design Studio.

Enable the client callable option on an RPA Hub flow or subflow. For more information, see Enable the client callable option on a flow or subflow in RPA Hub.

Role required: fd_read role. For more information on this role, see User access to Workflow Studio flows.

About this task

The InvokeFlow component returns the context ID of a flow in Workflow Studio so you can use it in other components. For example, you can use the context ID to get the execution status or the output of a flow.

Add the InvokeFlow component to get the context ID of a flow so other Flow Designer components can check its status or obtain its output. To get the context ID of a subflow, use the InvokeSubFlow component.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Flow Designer**.
2. Drag the InvokeFlow component to the Design surface.
3. On the Design surface, select the Configure button  of the InvokeFlow component to show the InvokeFlow dialog box.
4. In the **Flow name** field, enter a minimum of three characters to search and select Enter.

   A list of flows that start with the entered characters is shown from the connected ServiceNow instance.

   > **Important:** You can view and select only those flows that have the application scope set to **All application scopes**. The application scope is set in the **Accessible From** field in your Workflow Studio instance. When the application scope of the flow is set as **This application scope only**, the flow isn't available in the drop-down list of the **Flow name** field.

5. Select the required flow from the search list.
6. Verify the input fields, and select **OK**.
7. **Optional:** Configure the properties of the InvokeFlow component.
   For more information, see Properties of the Flow Designer components.

   You can now connect the **Context ID** port to another Flow Designer component such as GetExecutionStatus or GetOutputs.
8. **Optional:** To test the component, in the **Design** tab, click **Run**.

Use the GetExecutionStatus component

Use the GetExecutionStatus component to determine the execution status of a flow or a subflow in Workflow Studio.

Before you begin

To understand more about flows in Workflow Studio, see Building flows.

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Before you use any Flow Designer component, use the Connection Manager to make sure that you're connected to the instance. For more information about how to connect to an instance, see Connect to an RPA Hub instance from RPA Desktop Design Studio.

Role required: none

About this task

Before you use the GetOutputs component to get the output of a flow, you may want to check the flow's status. When a flow has executed successfully, the execution status is COMPLETE. When the execution status is other than COMPLETE, the GetOutputs component may not obtain a helpful result.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Flow Designer**.
2. Drag the GetExecutionStatus component to the Design surface.
3. **Optional:** Configure the component properties by using the Properties pane.
   For example, you can configure the component to include a timeout or a delay before the component executes. For more information about these properties, see Properties of the Flow Designer components.
4. Connect the data and control ports of the GetExecutionStatus component to the corresponding ports of other components as described in the following table.

Parameter	Description	Data port type	Data type	Required?
ContextID	Receives a context ID from the InvokeFlow, InvokeSubFlow, or InvokeAction component	Data In	String	Yes
Status	Returns the execution status and passes it to the next component	Data Out	String	Yes

   To view the execution status in RPA Desktop Design Studio, right-click the **Status** field and select **Preview Data**.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetOutputs component

Use the GetOutputs component to get the output of a flow or a subflow in Workflow Studio.

Before you begin

To understand more about flows in Workflow Studio, see Building flows.

Before you use any Flow Designer component, use the Connection Manager to make sure that you're connected to the instance. For more information about how to connect to an instance, see Connect to an RPA Hub instance from RPA Desktop Design Studio.

Use the GetExecutionStatus component to know the execution status of the flow or subflow. To use the component, see Use the GetExecutionStatus component.

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Role required: none

About this task

There are many reasons why you might want to receive the output of a flow. For example, suppose you have an automation that includes an incident number, and you want to obtain the incident's description. You can use Workflow Studio to create a flow that takes the incident number as input and returns the description. Then, in RPA Desktop Design Studio, you can invoke the flow using the InvokeFlow component and send its context ID to the GetOutputs component to get the output, including the incident description.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Flow Designer**.
2. Drag the GetOutputs component to the Design surface.
3. **Optional:** Configure the component properties by using the Properties pane.
   For example, you can configure the component to include a timeout or a delay before the component executes. For more information about these properties, see Properties of the Flow Designer components.
4. Connect the data and control ports of the GetOutputs component to the corresponding ports of the other components as described in the following table.

GetOutputs - Ports

Port type	Purpose of connection	Mandatory?
Data In (Context ID)	Receives a context ID from the InvokeFlow, InvokeSubFlow, or InvokeAction component	Yes
Data Out (Return)	Returns the output of the flow, subflow, or action and passes it to the next component	Yes. To view the output, right-click the **Return** field and click **Preview Data**.
Control In	Passes the control from the previously executed component.	Yes
Control Out	Passes the control to the next component to be executed.	No. Connecting this port is optional.

   To view the output in RPA Desktop Design Studio, right-click the **Return** field and select **Preview Data**.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the InvokeSubFlow component

The InvokeSubFlow component returns the context ID of a subflow in Workflow Studio so you can use it in other components. For example, you can use the context ID to get the execution status or the output of a subflow.

Before you begin

To understand more about flows in Workflow Studio, see Building flows.

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Before you use any Flow Designer component, use the Connection Manager to make sure that you're connected to the instance. For more information about how to connect to an instance, see Connect to an RPA Hub instance from RPA Desktop Design Studio.

Enable the client callable option on an RPA Hub flow or subflow. For more information, see Enable the client callable option on a flow or subflow in RPA Hub.

Role required: fd_read role. For more information on this role, see User access to Workflow Studio flows.

About this task

Add the InvokeSubFlow component to get the context ID of a subflow so other Flow Designer components can check its status or obtain its output. To get the context ID of a flow, use the InvokeFlow component.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Flow Designer**.
2. Drag the InvokeSubFlow component to the Design surface.
3. On the Design surface, select the Configure button of the InvokeSubFlow component to show the InvokeSubFlow dialog box.
4. In the **Subflow name** field, enter a minimum of three characters to search and select Enter.

   A list of subflows that start with the entered characters is shown from the connected ServiceNow instance.

   Important: You can view and select only those subflows that have the application scope set to **All application scopes**. The application scope is set in the **Accessible From** field in your Workflow Studio instance. When the application scope of the subflow is set as **This application scope only**, the subflow isn't available in the drop-down list of the **Subflow name** field.

5. Select the required subflow from the search list.
6. Verify the input fields, and select **OK**.
7. **Optional:** Configure the properties of the InvokeSubFlow component.
   For more information, see Properties of the Flow Designer components.

   You can now connect the **Context ID** parameter with other Flow Designer components such as GetExecutionStatus or GetOutputs
8. **Optional:** To test the component, in the **Design** tab, select **Run**.

Use the InvokeAction component

The InvokeAction component returns the context ID of an action in Workflow Studio so you can use it in other components. For example, you can use the context ID to get the execution status or the output of an action.

Before you begin

To understand more about flows in Workflow Studio, see Building flows.

Before you use any Flow Designer component, use the Connection Manager to make sure that you're connected to the instance. For more information about how to connect to an instance, see Connect to an RPA Hub instance from RPA Desktop Design Studio.

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Enable the client callable option on an RPA Hub flow or subflow. For more information, see Enable the client callable option on a flow or subflow in RPA Hub.

Role required: fd_read role. For more information on this role, see User access to Workflow Studio flows.

About this task

Add the InvokeAction component to get the context ID of an action so other Flow Designer components can check its status or obtain its output. To get the context ID of a flow or a subflow, use the InvokeFlow component or the InvokeSubFlow component.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Flow Designer**.
2. Drag the InvokeAction component to the Design surface.
3. On the Design surface, select the Configure button of the InvokeAction component to show the InvokeAction dialog box.
4. In the **Action name** field, enter a minimum of three characters to search and select Enter.

   A list of actions that start with the entered characters is shown from the connected ServiceNow instance.

   Important: You can view and select only those actions that have the application scope set to **All application scopes**. The application scope is set in the **Accessible From** field in your Workflow Studio instance. When the application scope of the action is set as **This application scope only**, the action isn't available in the drop-down list from the **Action name** field.

5. Select the required action from the search list.
6. Verify the input fields, and select **OK**.
7. **Optional:** Configure the properties of the InvokeSubFlow component.
   For more information, see Properties of the Flow Designer components.

   You can now connect the **Context ID** port to another Flow Designer component such as GetExecutionStatus or GetOutputs.
8. **Optional:** To test the component, in the **Design** tab, select **Run**.

Properties of the Flow Designer components

To set the properties of a Flow Designer component, double-click the component and enter the values in the Properties pane.

Properties of the Flow Designer components

Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.

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Properties of the Flow Designer components (continued)

Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Attachments

The Attachment components enable you to upload or download attachments from table records in the RPA Hub and get the metadata of the attachments.

In the Attachment component, all file types supported by ServiceNow tables are included.

Use the DownloadAttachment component

Download the attachments from the ServiceNow table record to the local drive by using the DownloadAttachment component in the RPA Desktop Design Studio.

Before you begin

You must have access to the ServiceNow table record.

Role required: none

About this task

The maximum size of the attachments is 1024 MB.

You can configure the properties for the DownloadAttachment component. For more information about these properties, see Properties of the Attachment components.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Attachments**.
2. Drag the DownloadAttachment component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the DownloadAttachment component to the corresponding ports of the other components.

Port name	Purpose of connection	Data Port type	Data type
attachmentSysID	The sys ID of the record that has the attachment. You can pass this value from a previously executed component. You can get the sys ID of a record following these steps: **a.** Select the record in the connected ServiceNow instance and right-click the header bar.	Data In	String

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Port name	Purpose of connection	Data Port type	Data type
	b. Select Copy URL. **c.** In the URL, you can find the sys ID after the parameter sys_id=. For example, 9d385017c611228701d22104cc95c371.		
folderPath	The path in the local drive where the attachment will be downloaded.	Data In	String
Overwrite	Returns a true or false value that indicates whether the file was successfully downloaded. If the download location already has a file with the same name, the operation fails.	Data In	Boolean
Return	Returns the details of the downloaded file as an object and passes it to another component.	Data Out	Boolean

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetAttachmentsMetadata component

Get the metadata of all attachments that are associated with a ServiceNow table record by using the GetAttachmentsMetadata component in the RPA Desktop Design Studio.

Before you begin

You must have access to the ServiceNow table that contains attachments.

Role required: none

About this task

The maximum size of the attachments is 1024 MB.

You can configure the properties for the GetAttachmentsMetadata component. For more information about these properties, see Properties of the Attachment components.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Attachments**.
2. Drag the GetAttachmentsMetadata component to the Design surface.
3. To configure the input fields, see Configure port properties.

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4. Connect the data and control ports of the GetAttachmentsMetadata component to the corresponding ports of the other components.

Port name	Purpose of connection	Data Port type	Data type
SysID	The sys ID of the record that has the attachment. You can pass this value from a previously executed component. You can get the sys ID of a record following these steps: **a.** Select the record in the connected ServiceNow instance and right-click the header bar. **b.** Select Copy URL. **c.** In the URL, you can find the sys ID after the parameter sys_id=. For example, 9d385017c611228701d22104cc95c371.	Data In	String
tableName	The name of the table that has the record with the attachments. You can pass this value from a previously executed component.	Data In	String
Return	Returns the metadata of the attachments and passes to the next component.	Data Out	Object

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the UploadAttachment component

Attach documents to a table record in the RPA Hub by using the UploadAttachment component in the RPA Desktop Design Studio.

Before you begin

You must have access to the required ServiceNow table to upload attachments.

Role required: none

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About this task

A table in the RPA Hub contains one or more records and each record provides certain information. Attachments can provide additional, useful information about the record. The maximum size of the attachments is 1024 MB.

You can configure the properties for the UploadAttachment component. For more information about these properties, see Properties of the Attachment components.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Attachments**.
2. Drag the UploadAttachment component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the UploadAttachment component to the corresponding ports of the other components.

Port name	Description	Data Port type	Data type
filePath	The path to the file that must be uploaded to the record from a previously executed component.	Data In	String
SysId	The sys ID of the record to upload the attachment to. You can also pass this value from a previously executed component. You can get the sys ID of a record following these steps: **a.** Select the record in the connected ServiceNow instance and right-click the header bar. **b.** Select Copy URL. **c.** In the URL, you can find the sys ID after the parameter sys_id=. For example, 9d385017c611228701d22104cc95c371.	Data In	String
tableName	Takes the table name that comprises the record from a previously executed component.	Data In	String

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Port name	Description	Data Port type	Data type
Return	Returns the Boolean response on whether the file was successfully uploaded and passes to the next component.	Data Out	Boolean

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Attachment components

Learn about the various properties of the Attachment components.

Properties of the Attachment components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Forms

The Forms components help you to trigger attended automations that are enabled with the Embedded Task Automation.

Ensure you are familiar with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Use the AttendedConfigurations component

When you use the AttendedConfigurations component, it shows a list of attended configurations associated to the selected same bot process. To select and give control out port for each configuration that routes the automation logic.

Before you begin

If you are running an automation from RPA Desktop Design Studio, then assign the automation to the bot process by using the **Assign bot process** option from the **Design** tab of RPA Desktop Design Studio. In the **Bot Process** field, ensure to select an attended bot process that is enabled with Embedded Task Automation. In the **Attended Config** field, ensure to select an associated attended configuration. In the **Record Context** field, ensure to enter the Sys ID or URL of the ServiceNow form record. For more information, see Assign bot process to an automation project.

Ensure you are familiar with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Role required:

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- sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin, if you are running the automation from RPA Desktop Design Studio
- sn_rpa_fdn.rpa_assisted_user, if you are running the automation from the Attended Robot application.

About this task

The AttendedConfigurations component segregates the execution of the automations in a single automation project and calls the respective logic according to the action invoked.

If you are triggering the automation from the ServiceNow form's UI action (button) and it executes using the Attended Robot application, then the AttendedConfigurations component routes the automation flow from the associated attended configuration.

You can configure the properties for the AttendedConfigurations component. For more information about these properties, see Properties of the Forms components.

For example, if an automation requires two UI actions, create two attended configurations in RPA Hub, that are associated to the same bot process and table. Define the automation logics separately for these UI actions, under different activities.

Let's consider a currency price retrieval use case, where one automation is built with two automation logics for UI actions such as Get Prices and Update Price. These UI actions are associated to two attended configurations, Get Prices and Update Price. The attended configurations are associated to the same bot process and table. The following steps provide guidance of how to use the AttendedConfigurations component in this use case.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Forms**.
2. Drag the AttendedConfigurations component to the Design surface.
3. Click the component settings icon ( ).
4. Select one or more applicable attended configurations.

   In this example, select both the attended configurations (Get Prices and Update Price).

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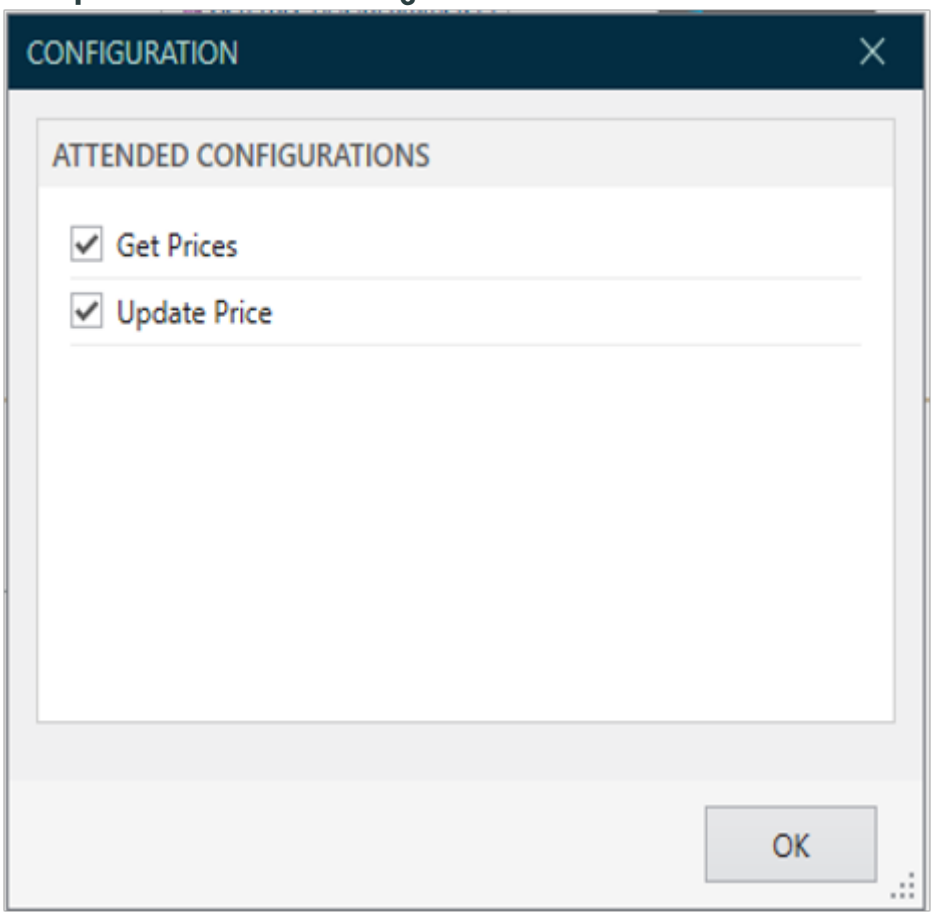
Example: Select attended configurations



5. Click **OK**.
   You will view more than one control out port.
6. Connect the data and control ports of the AttendedConfigurations component to the corresponding ports of other components as described in the following table.

   In this example, map the Get Prices Control Out port to the corresponding activity. Similarly, map the Update Price Control Out port to the corresponding activity. After you select the Get Prices UI action, the corresponding logic is executed. Similarly, after you select the Update Price UI action, the corresponding logic is executed.

Port type	Purpose of connection	Mandatory?
Control In	Connect to the Control Out port of one or more components.	Yes
Control Out	[Multiple] For each selected attended configuration, a control out is created. Connect to the Control In port of another component	No

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Port type	Purpose of connection	Mandatory?
	or activity as per the required automation logic.	

7. **Optional:** To test the component, right-click the title bar of the component and select **Run From Here**.

Use the GetProcessFieldParameters component

Gets the values of the associated **Table** fields mapped to the process field parameter, that you had configured in an attended configuration record of a bot process. The component returns both the individual values of the parameters and all values as an object. This component reads the value of the associated **Table** field in the ServiceNow form record.

Before you begin

If you are running an automation from RPA Desktop Design Studio, then assign the automation to the bot process by using the **Assign bot process** option from the **Design** tab of RPA Desktop Design Studio. In the **Bot Process** field, ensure to select an attended bot process that is enabled with Embedded Task Automation. In the **Attended Config** field, ensure to select an associated attended configuration. In the **Record Context** field, ensure to enter the Sys ID or URL of the ServiceNow form record. For more information, see Assign bot process to an automation project.

Create a process field parameters as part of a bot process on the RPA Hub. See Create a process field parameter in RPA Hub.

Ensure you are familiar with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Role required:

- sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin, if you are running the automation from RPA Desktop Design Studio
- sn_rpa_fdn.rpa_assisted_user, if you are running the automation from the Attended Robot application.

About this task

You can configure the properties for the GetProcessFieldParameters component. For more information about these properties, see Properties of the Forms components.

Let's consider an employee badge creation use case. The following steps provide guidance of how to use the GetProcessFieldParameters component in this use case. For more information about the use case, see Embedded Task Automation (ETA) in RPA Hub.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Forms**.
2. Drag the GetProcessFieldParameters component to the Design surface.
3. Click the component settings icon ( ).
4. Click the add key icon ( ).
5. Enter the name of one of the process field parameters.
   For example, Title, FirstName, LastName, Location, as shown in the following image.

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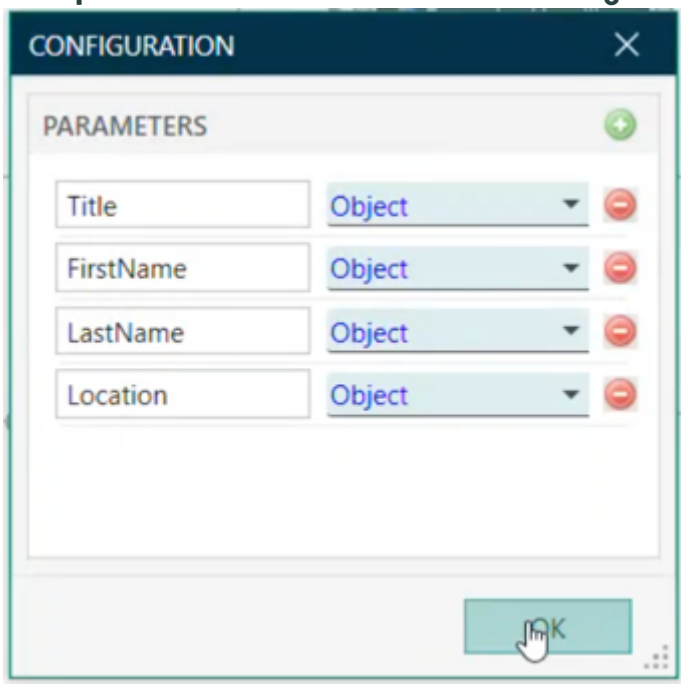
Example of the Process Field Parameters Configuration



6. **Optional:** Update the process field parameter data type.
   You can define multiple parameters with primitive data type.
7. Repeat the steps to add more parameters.
8. Click **OK**.
9. Connect the data and control ports of the GetProcessFieldParameters component to the corresponding ports of other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (Parameter)	Returns the value of an individual process field parameter and can be used in the next components.	No
Data Out (Return, Object)	Returns the process field parameters in key value pair format that are configured in the attended configuration. This value can be used in the next components.	No
Control In	Connect to the Control Out port of one or more components.	Yes
Control Out	Connect to the Control In port of another component as per the required automation logic.	No

10. **Optional:** To test the component, right-click the title bar of the component and select **Run From Here**.

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Use the GetRecordContextID component

Get the Sys ID of the ServiceNow form record that is associated to an attended configuration with the GetRecordContextID component in the RPA Desktop Design Studio. Sys ID is the output of the component. For example, Sys ID is used to fetch the attachments in a record.

Before you begin

If you are running an automation from RPA Desktop Design Studio, then assign the automation to the bot process by using the **Assign bot process** option from the **Design** tab of RPA Desktop Design Studio. In the **Bot Process** field, ensure to select an attended bot process that is enabled with Embedded Task Automation. In the **Attended Config** field, ensure to select an associated attended configuration. In the **Record Context** field, ensure to enter the Sys ID or URL of the ServiceNow form record. This is the output of your component. For more information, see Assign bot process to an automation project.

Ensure you are familiar with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Role required: none

About this task

Use the GetRecordContextID component to fetch the Sys ID of the ServiceNow form record, from where the automation is triggered. Use the GetAttachmentsMetadata component to get the metadata of the attachments of this record. After getting the attachment Sys ID, use the DownloadAttachment component to download the attachment. For more information about these components, see Use the DownloadAttachment component and Use the GetAttachmentsMetadata component.

If you are triggering the automation from the ServiceNow form's UI action (button) and it executes using the Attended Robot application, then the GetRecordContextID component returns the Sys ID of the ServiceNow form record.

You can configure the properties for the GetRecordContextID component. For more information about these properties, see Properties of the Forms components.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Forms**.
2. Drag the GetRecordContextID component to the Design surface.
3. Connect the data and control ports of the GetRecordContextID component to the corresponding ports of other components as described in the following table.

Port Name	Purpose of connection	Mandatory?
SysID [Data Out]	Returns the Sys ID of the ServiceNow form record.	No
Control In	Connect to the Control Out port of one or more components.	Yes
Control Out	Connect to the Control In port of another component	No

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Port Name	Purpose of connection	Mandatory?
	or activity as per the required automation logic.	

4. **Optional:** To test the component, right-click the title bar of the component and select **Run From Here**.

Use the SetProcessFieldParameters component

Sets the values of the associated **Table** fields mapped to the process field parameter, that you had configured in an attended configuration record of a bot process. This component updates the values of the configured field parameters associated to the **Table** field in the ServiceNow form record.

Before you begin

If you are running an automation from RPA Desktop Design Studio, then assign the automation to the bot process by using the **Assign bot process** option from the **Design** tab of RPA Desktop Design Studio. In the **Bot Process** field, ensure to select an attended bot process that is enabled with Embedded Task Automation. In the **Attended Config** field, ensure to select an associated attended configuration. In the **Record Context** field, ensure to enter the Sys ID or URL of the ServiceNow form record. For more information, see Assign bot process to an automation project.

Create process field parameters as part of a bot process on the RPA Hub. See Create a process field parameter in RPA Hub.

Ensure you are familiar with Embedded Task Automation concepts. For more information, see Embedded Task Automation (ETA) in RPA Hub.

Role required:

- sn_rpa_fdn.rpa_developer or sn_rpa_fdn.rpa_admin, if you are running the automation from RPA Desktop Design Studio
- sn_rpa_fdn.rpa_assisted_user, if you are running the automation from the Attended Robot application.

About this task

You can configure the properties for the SetProcessFieldParameters component. For more information about these properties, see Properties of the Forms components.

Let's consider an employee badge creation use case. The following steps provide guidance of how to use the SetProcessFieldParameters component in this use case. For more information about the use case, see Embedded Task Automation (ETA) in RPA Hub.

Procedure

1. In the Toolbox pane, navigate to **ServiceNow** > **Forms**.
2. Drag the SetProcessFieldParameters component to the Design surface.
3. Click the component settings icon ( ).
4. Click the add key icon ( ).
5. Enter the name of one of the process field parameters.
   For example, BadgeID, RequestState.

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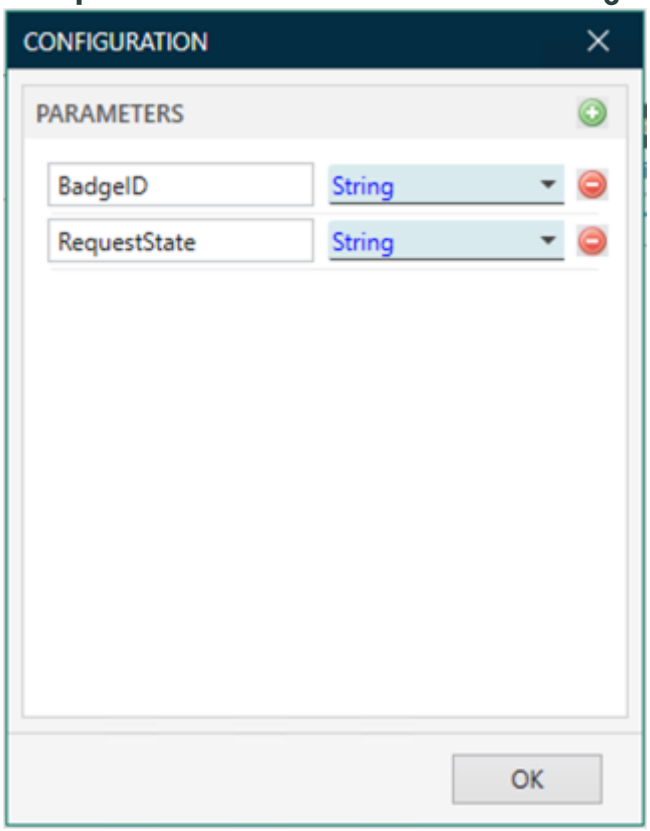
Example of the Process Field Parameters Configuration



A Data In port is created.

6. **Optional:** Update the process field parameter data type.
   You can define multiple parameters with primitive data type.
7. Repeat the steps to add more parameters.
8. Click **OK**.
9. Connect the data and control ports of the SetProcessFieldParameters component to the corresponding ports of other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In	Pass the data of the field parameter.	Yes
Is Success [Data Out]	Boolean response to whether the update operation on the end form is successful or not.	Not Applicable
Control In	Connect to the Control Out port of one or more components.	Yes
Control Out	Connect to the Control In port of another component as per the required flow.	Not Applicable

10. **Optional:** To test the component, right-click the title bar of the component and select **Run From Here**.

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Properties of the Forms components

Learn about the properties of the Forms components in RPA Desktop Design Studio.

Properties of the Forms components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Utilities

The Utilities components in the RPA Desktop Design Studio enable diverse and wide-range useful operations. The utilities range from changing screen resolution to extracting zipped files.

Barcode

The Barcode components in RPA Desktop Design Studio accept an image file that contains one or more barcodes and return the barcode values.

Add the Barcode Reader plugin from the Plugins Manager before using the connector. For more information about adding the SSH plugin, see Manage plugins in RPA Desktop Design Studio.

Use the ReadBarcode component

Read a single barcode and return its contents by using the ReadBarcode component in RPA Desktop Design Studio.

Before you begin

Add the Barcode Reader plugin from the Plugins Manager before using the connector. For more information about adding the SSH plugin, see Manage plugins in RPA Desktop Design Studio.

Role required: none

About this task

The ReadBarcode component reads a single barcode from an image file that it receives from another component.

The ReadBarcode component can return both the value and the encoding type (format) of the barcode. The encoding value that the Type parameter returns may be one of the following supported formats:

- AZTEC
- CODABAR
- CODE_39
- CODE_93
- CODE_128
- DATA_MATRIX
- EAN_8

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- EAN_13
- ITF
- MAXICODE
- PDF_417
- QR_CODE
- RSS_14
- RSS_EXPANDED
- UPC_A
- UPC_E
- All_1D
- UPC_EAN_EXTENSION
- MSI
- PLESSEY
- IMB
- PHARMA_CODE

If the component can't read the barcode, it returns an error.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Barcode**.
2. Drag the ReadBarcode component to the Design surface.
3. Confirm the configuration of the component's input fields.
   For more information, see Configure port properties.
4. Connect the data and control ports of the ReadBarcode component to the corresponding ports of the other components as described in the following table.

Port	Description	Port type	Data type	Required
Image	Receives an image that contains a barcode	Data In	Bitmap	Yes
Type	Returns the barcode type	Data Out	String	Yes
Result	Returns the encoded value of the barcode	Data Out	String	Yes

To test the component, on the **Design** tab, select **Run**.

Use the ReadBarcodes component

Read multiple barcodes and return their contents by using the ReadBarcode component in RPA Desktop Design Studio.

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Before you begin

Add the Barcode Reader plugin from the Plugins Manager before using the connector. For more information about adding the SSH plugin, see Manage plugins in RPA Desktop Design Studio.

Role required: none

About this task

The ReadBarcodes component reads multiple barcodes from an image file that it receives from another component.

The ReadBarcodes component returns a single output that contains concatenated text, with each item on a new line.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Barcode**.
2. Drag the ReadBarcodes component to the Design surface.
3. Confirm the configuration of the component's input fields.
   For more information, see Configure port properties.
4. Connect the data and control ports of the ReadBarcodes component to the corresponding ports of the other components as described in the following table.

Port	Description	Port type	Data type	Required
Image	Receives an image that contains barcodes	Data In	Bitmap	Yes
Return	Returns a value that includes concatenated information from each barcode	Data Out	String	Yes

To test the component, on the **Design** tab, select **Run**.

Properties of the Barcode components

Use the properties of the Barcode components to set a delay before or after a component executes, or to set a timeout that stops execution when the component doesn't finish within a period that you set.

Properties of the Barcode components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.

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Properties of the Barcode components (continued)

Property	Description
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Screen

The screen components in the RPA Desktop Design Studio enable capturing program windows and changing screen resolution.

Use the Capture component

Capture a screen or a window in the desktop or an application as part of an automation Workflow using the Capture component in the RPA Desktop Design Studio .

Before you begin

Role required: none

About this task

You can configure the properties for the Capture component. For more information about these properties, see Properties of the Screen components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Screen**.
2. Drag the Capture component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Capture component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Purpose of connection	Mandatory?
Data in	Mode	Not applicable	Takes the input on whether the component captures a screen or a window.	Yes
Data out	Return	Bitmap	Returns the image of the screen or window.	Not applicable

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the CaptureWindow component

Capture the image of an application window as part of an automation Workflow by using the CaptureWindow component in RPA Desktop Design Studio.

Before you begin

Role required: none

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About this task
You can configure the properties for the CaptureWindow component. For more information about these properties, see Properties of the Screen components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Screen**.
2. Drag the CaptureWindow component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the CaptureWindow component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Purpose of connection	Mandatory?
Data in	Handle	Integer	Takes the handle of the window that the component captures.	Yes
Data out	Return	Bitmap	Returns the image of the window the component has captured.	Not applicable

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ChangeResolution component

Change the resolution of a user's system screen as part of an automation Workflow by using the ChangeResolution component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the ChangeResolution component. For more information about these properties, see Properties of the Screen components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Screen**.
2. Drag the ChangeResolution component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the ChangeResolution component to the corresponding ports of the other components as described in the following table.

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Port name	Data type	Purpose of connection	Mandatory?
Resolution	String	Takes the resolution of the user's system screen.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetResolution component

Get the resolution of the current screen by using the GetResolution component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

The properties of the GetResolution component are common with the properties of the other Screen components. To configure these properties, see Properties of the Screen components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Screen**.
2. Drag the GetResolution component to the Design surface.
3. **Optional:** Connect the data and control ports of the GetResolution component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Purpose of connection	Mandatory?
Data In	Return	String	Returns the resolution of the current screen.	Not applicable

4. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

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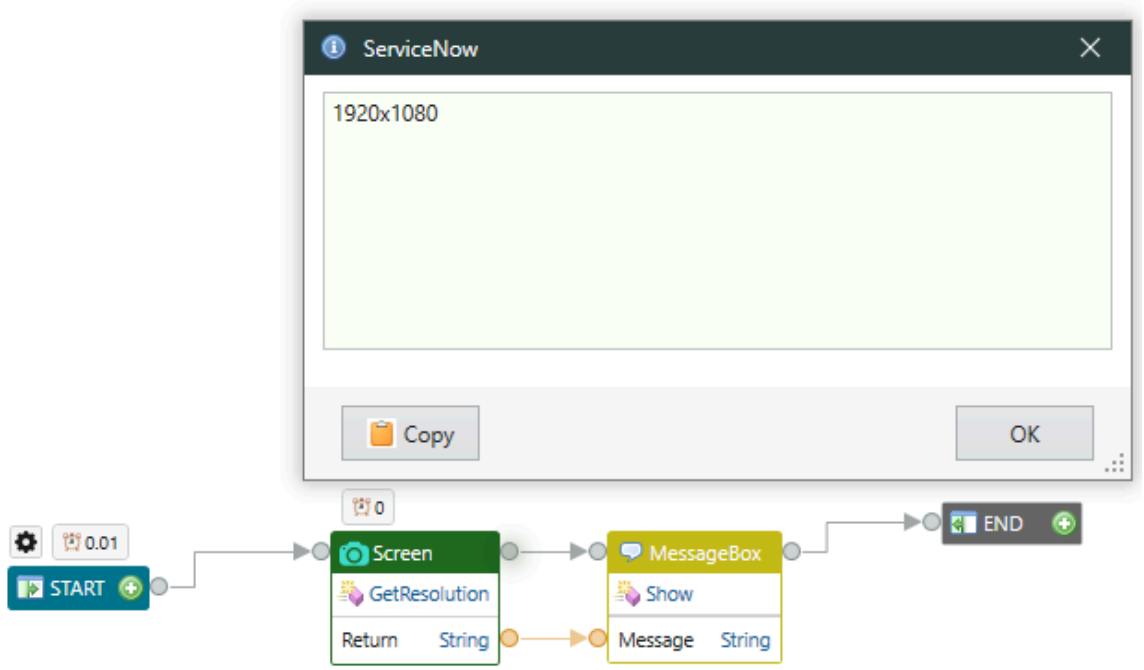
Example: Display the current screen resolution in a message box



The GetResolution component passes the current screen resolution through the Return Data Out port to the Show component. The Show component takes the resolution through its Message Data In port and is displayed in a message box.

Properties of the Screen components

Learn about the properties of the Screen components in RPA Desktop Design Studio.

Properties of the Screen components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Clipboard

The Clipboard components in the RPA Desktop Design Studio enables the clipboard, copy, and extraction operations on files.

Use the Clear component

Clear the contents of the clipboard as part of an automation Workflow using the Clear component in RPA Desktop Design Studio.

Before you begin
Role required: none

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About this task
The Clear component can work with other components or methods to execute an automation Workflow.

You can configure the properties for the Clear component. For more information about these properties, see Properties of the Clipboard components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Clipboard**.
2. Drag the Clear component to the Design surface.
3. Connect the control ports of the Clear component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Control In	Passes the control from another component.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetAsTable component

Get the content of the clipboard as a data table as part of an automation Workflow by using the GetAsTable component in the RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetAsTable component. For more information about these properties, see Properties of the Clipboard components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Clipboard**.
2. Drag the GetAsTable component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetAsTable component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (ColumnSeperator)	Passes the column separator for the table columns from the Data Out port of another component.	Yes
Data In (LineSeperator)	Passes the data separator for the table columns from the Data Out port of another component.	Yes

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Port type	Purpose of connection	Mandatory?
Data Out	Returns the clipboard content as a data table.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetFileDropList component

Get a list of file names as a string array from the Windows clipboard by using the GetFileDropList component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

A file drop list is a collection of strings that contain the path information for files on the Windows clipboard.

You can configure the properties for the GetFileDropList component. For more information about these properties, see Properties of the Clipboard components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Clipboard**.
2. Drag the GetFileDropList component to the Design surface.
3. Connect the control ports of the GetFileDropList component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out	Returns a file drop list from the Windows clipboard as a String array.	Yes. To preview the capture, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the GetImage component

Get an image from the clipboard by using the GetImage component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetImage component. For more information about these properties, see Properties of the Data Writer components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Clipboard**.
2. Drag the GetImage component to the Design surface.
3. Connect the data and control ports of the GetImage component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (Bitmap)	Returns the image from the clipboard.	Yes. To preview the image, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	No. Connecting the port is optional.
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetText component

Get text from the clipboard and return as a string by using the GetText component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetText component. For more information about these properties, see Properties of the Clipboard components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Clipboard**.
2. Drag the GetText component to the Design surface.
3. Connect the data and control ports of the GetText component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data Out	Returns the text from the clipboard as a string.	Yes. To preview the text, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SetFileDropList component

Clear the clipboard and then add a collection of file names by using the SetFileDropList component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

A file drop list is a collection of strings that contain the file paths and is stored on the Windows clipboard as a String array.

You can configure the properties for the SetFileDropList component. For more information about these properties, see Properties of the Clipboard components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Clipboard**.
2. Drag the SetFileDropList component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the control ports of the SetFileDropList component to the corresponding ports of the other components.

Port type	Purpose of connection	Mandatory?
Data In (Filenames)	Passes the file names as string array from the Data Out component of another component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the SetImage component

Copy an image to the clipboard by using the SetImage component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the SetImage component. For more information about these properties, see Properties of the Data Writer components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Clipboard**.
2. Drag the SetImage component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the SetImage component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (img)	Passes the image through the Data Out port of another component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SetText component

Copy a text string to the Windows clipboard as part of an automation Workflow by using the SetText component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the SetText component. For more information about these properties, see Properties of the Clipboard components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Clipboard**.
2. Drag the SetText component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the SetText component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (strText)	Passes the string through the Data Out port of another component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Clipboard components

Learn about the properties of the Clipboard components in RPA Desktop Design Studio Clipboard utility.

Properties of the Clipboard components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Data Reader

The Data Reader components in the RPA Desktop Design Studio enable reading of data from different programs such as MS Excel and CSV.

Note: OLEDB 32 bit is not supported for the Data Reader components.

For details on the issues related to the Data Reader component, see KB article KB1123553 and KB article KB1123554.

Use the GetExcelSheetNames component

Get the names of the sheets in an Excel file as part of an automation Workflow by using the GetExcelSheetNames component in RPA Desktop Design Studio.

Before you begin

To use the ReadFromExcel component, install Microsoft Access Database Engine.

Role required: none

About this task

The GetExcelSheetNames component can work with other components or methods in an automation Workflow.

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You can configure the properties for the GetExcelSheetNames component. For more information about these properties, see Properties of the Data Reader components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Data Reader**.
2. Drag the GetExcelSheetNames component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetExcelSheetNames component to the corresponding ports of the other components as described in the following table.

Parameter	Description	Data Port type	Data type
Filepath	The path to the Excel file to get the sheet names.	Data In	String
Return	Returns sheet names as array of strings.	Data Out	String[]

5. To preview the data, right-click the **Return** field and click **Preview Data**.
6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the QueryExcel component

Query data from a Microsoft Excel file with the QueryExcel component in RPA Desktop Design Studio.

Before you begin

To use the ReadFromExcel component, install Microsoft Access Database Engine.

Role required: none

About this task

You can configure the properties for the QueryExcel component. For more information about these properties, see Properties of the Data Reader components.

Real-world scenario: Extracting specific sales data

A company stores monthly sales data in an Excel file. Using the QueryExcel component, an RPA bot filters sales records for a specific product category and extracts only the relevant data for analysis and reporting.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Data Reader**.
2. Drag the QueryExcel component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the QueryExcel component to the corresponding ports of the other components as described in the following table.

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Parameter	Description	Data Port type	Data type
Filepath	The path to the Excel file from a previously executed component.	Data In	String
CommandText	The query from a previously executed component.	Data In	String
IsFirstRowHeader	True or false value that indicates whether the first row of the Excel sheet is a header from a previously executed component.	Data In	Boolean
Count	Returns the total number of rows containing data.	Data Out	Integer
DataTable	Returns the extracted data from the Excel file in a DataTable.	Data Out	DataTable

5. To preview the data, right-click the **Return** field and click **Preview Data**.
6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ReadFromCSV component

Read data from a CSV file by using the ReadFromCSV component in RPA Desktop Design Studio.

Watch this video to learn how to use the ReadFromCSV component.

https://player.vimeo.com/video/1069664680?h=60cb93843a&badge=0&autopause=0&player_id=0&app_id=58479

Before you begin

Role required: none

About this task

You can configure the properties for the ReadFromCSV component. For more information about these properties, see Properties of the Data Reader components.

Real-world scenario: Extracting product inventory data

An e-commerce company maintains stock details in a CSV file. The RPA bot uses the ReadFromCSV component to read the file and update inventory levels in the company's database, ensuring real-time stock availability.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Data Reader**.
2. Drag the ReadFromCSV component to the Design surface.
3. To configure the input fields, see Use the ReadFromCSV component.

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4. Connect the data and control ports of the ReadFromCSV component to the corresponding ports of the other components as described in the following table.

Parameter	Description	Data Port type	Data type
FilePath	The file path of the CSV file.	Data In	String
StartRow	The number of the row that will be first queried in the CSV file.	Data In	Integer
Delimiter	A character that separates values in a row of the CSV file. For example, comma, tab, semicolon, pipe, or space.	Data In	String
IsFirstRowHeader	True or false value that indicates whether the first row of the CSV file is a header.	Data In	Boolean
Count	Returns the total number of rows containing data.	Data Out	Integer
DataTable	Returns the extracted data from the CSV file in a DataTable.	Data Out	DataTable

5. To preview the data, right-click the **Return** field and click **Preview Data**.
6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ReadFromExcel component

Extract data from a Microsoft Excel file as a DataTable by using the ReadFromExcel component in RPA Desktop Design Studio.

Before you begin

To use the ReadFromExcel component, install Microsoft Access Database Engine.

Role required: none

About this task

You can configure the properties for the ReadFromExcel component. For more information about these properties, see Properties of the Data Reader components.

Real-world scenario: Importing employee records

An HR department maintains employee details in an Excel file. The ReadFromExcel component extracts this data into a DataTable, which is then used to update an HR management system.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Data Reader**.
2. Drag the ReadFromExcel component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ReadFromExcel component to the corresponding ports of the other components as described in the following table.

Parameter	Description	Data Port type	Data type
Filepath	Path to the Excel file that you can pass from the previously executed component.	Data In	String
Sheetname	Name of the sheet in the Excel file that you can pass from a previously executed component.	Data In	String
IsFirstRowHeader	Specifies true or false value that indicates the first row of the Excel sheet is a header or not.	Data In	Boolean
Count	Returns the total number of rows containing data.	Data Out	Integer
Data	Returns the extracted data from the Excel file in a DataTable.	Data Out	DataTable

5. To preview the data, right-click the **Return** field and click **Preview Data**.
6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ReadFromXPS component

Read the data from an XPS file by using the ReadFromXPS component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the ReadFromXPS component. For more information about these properties, see Properties of the Data Reader components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Data Reader**.
2. Drag the ReadFromXPS component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ReadFromXPS component to the corresponding ports of the other components as described in the following table.

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Parameter	Description	Data Port type	Data type
Filepath	The file path of the XPS file.	Data In	String
PageNumber	The page number from the XPS file to read the data from.	Data In	Integer
Data	Returns the extracted data from the XPS file.	Data Out	String

5. To preview the data, right-click the **Return** field and click **Preview Data**.
6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Data Reader components

Learn about the properties of the Data Reader components in RPA Desktop Design Studio.

Properties of the Data Reader components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Data Writer

The Data Writer components in the RPA Desktop Design Studio writes data to different programs such as MS Excel and CSV.

Note: OLEDB 32 bit is not supported for the Data Writer components.

For details on the issues related to the Data Writer component, see KB article KB1123553 and KB article KB1123554.

Use the WriteToCSV component

Write the data to a CSV file by using the WriteToCSV component in RPA Desktop Design Studio as part of a Workflow.

Before you begin

Role required: none

About this task

You can configure the properties for the WriteToCSV component. For more information about these properties, see Properties of the Data Writer components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Data Writer**.
2. Drag the WriteToCSV component to the Design surface.
3. Connect the data and control ports of the WriteToCSV component to the corresponding ports of the other components as described in the following table.

Port Name	Port type	Purpose of connection	Data Type
FilePath	Data In	Passes the path to the CSV file.	String
Data Table	Data In	Passes the data to be written to the CSV file from a previously executed component. The port accepts data in the Data Table format.	Table
Delimiter	Data In	Passes the delimiter from a previously executed component. You can specify a custom delimiter, such as, comma.	String
Append	Data In	Indicate whether the data passed appends or replaces existing data in the CSV file (True or False). Double click to configure the port properties. For more information, see Configure port properties.	Boolean

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the WriteToExcel component

Write the data to a worksheet of a Microsoft Excel file as part of an automation Workflow by using the WriteToExcel component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the WriteToExcel component. For more information about these properties, see Properties of the Data Writer components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Data Writer**.
2. Drag the WriteToExcel component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the WriteToExcel component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Filepath)	Passes the path to the Excel file from a previously executed component.	Yes
Data In (SheetName)	Passes the name of the sheet in the Excel file to which data will be written from a previously executed component.	Yes
Data In (Data)	Passes the data that will be written from a previously executed component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the WriteText component

Write the data to a text document as part of an automation Workflow by using the WriteText component in RPA Desktop Design Studio. You can add the data in string format to existing string on the text file or replace the existing data with new data.

Before you begin

Role required: none

About this task

You can configure the properties for the WriteText component. For more information about these properties, see Properties of the Data Writer components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Data Writer**.
2. Drag the WriteText component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the WriteText component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (Filepath)	Passes the path to the text file from a previously executed component.	Yes
Data In (Data)	Passes the string to be written to the text file from a previously executed component.	Yes
Data In (Append)	Passes the Boolean value to indicate whether the string passed appends or replaces existing data in the text file. The values are: ○ True: Appends to the existing string. ○ False: Replaces the existing string.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Data Writer components

Learn about the properties of the Data Writer components in RPA Desktop Design Studio.

Properties of the Data Writer components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

DateTime

The DateTime components in the RPA Desktop Design Studio enables different useful operations with date and time.

Use the Add component

Increase or decrease the time or date by the value you specify as part of a Workflow with the Add component in RPA Desktop Design Studio.

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Before you begin
Role required: none

About this task
You can configure the properties for the Add component. For more information about these properties, see Properties of the DateTime components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **DateTime**.
2. Drag the Add component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Add component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (SourceDate)	Passes the source date, which is the date or time that the Add component increases or decreases by the value you specify, from a previously executed component.	Yes
Data In (Type)	Passes the unit of time from a previously executed component. You can provide the following values: ○ Year ○ Month ○ Day ○ Hour ○ Minute ○ Second ○ Millisecond ○ Tick	Yes
Data In (Value)	Passes the numeric value by which you want to change the source date, from a previously executed component. For example, if you provide 5 and the source date 10/8/2019, then the new source date will be 10/13/2019.	Yes
Data Out	Returns the updated date and time.	Yes.

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Port type	Purpose of connection	Mandatory?
		To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Compare component

Compare two dates and time to find out whether the dates are the same by using the Compare component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Compare component. For more information about these properties, see Properties of the DateTime components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **DateTime**.
2. Drag the Compare component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Compare component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (date1)	Passes the first date of the two dates to be compared, from a previously executed component.	Yes
Data In (date2)	Passes the second date of the two dates to be compared, from a previously executed component.	Yes
Data Out	Returns one of the values based on the comparison result:	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.

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Port type	Purpose of connection	Mandatory?
	○ **-1** if the first date is earlier than the second. ○ **0** if the first and second dates are the same. ○ **1** if the first date is later the second date.	
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Format component

Change the format of a date by using the Format component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Format component. For more information about these properties, see Properties of the DateTime components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **DateTime**.
2. Drag the Format component to the Design surface.
3. Click the component settings icon ( ).
4. Do the following:
   a. In the From field, specify the date format you want to change.
   b. In the To field, specify the destination date format.
   c. Click **OK**.
5. To configure the input field, see Configure port properties.
6. Connect the data and control ports of the Format component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (DateObject)	Passes the date object through the Data Out port of another component. For example, 03-25-2009.	Yes
Data Out	Returns the date object in the destination date format.	Yes.

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Port type	Purpose of connection	Mandatory?
		To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

7. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetPart component

Get the value of a part of the date format by using the GetPart component in RPA Desktop Design Studio. For example, you might want to get the value of the month in the MM/DD/YYYY format.

Before you begin

Role required: none

About this task

You can configure the properties for the GetPart component. For more information about these properties, see Properties of the DateTime components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **DateTime**.
2. Drag the GetPart component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetPart component to the corresponding ports of the other components as described in the following table.

Port name	Purpose of connection	Port type	Data type
SourceDate	Passes the date and time for which you want to view the part, from a previously executed component. Drag the Now component from DateTime to get today's date as the source date. For example, if the source date is 01-Feb-2025.	Data In	DateTime
Format	Passes the part of the date and format that the value of which is returned, from a	Data In	String

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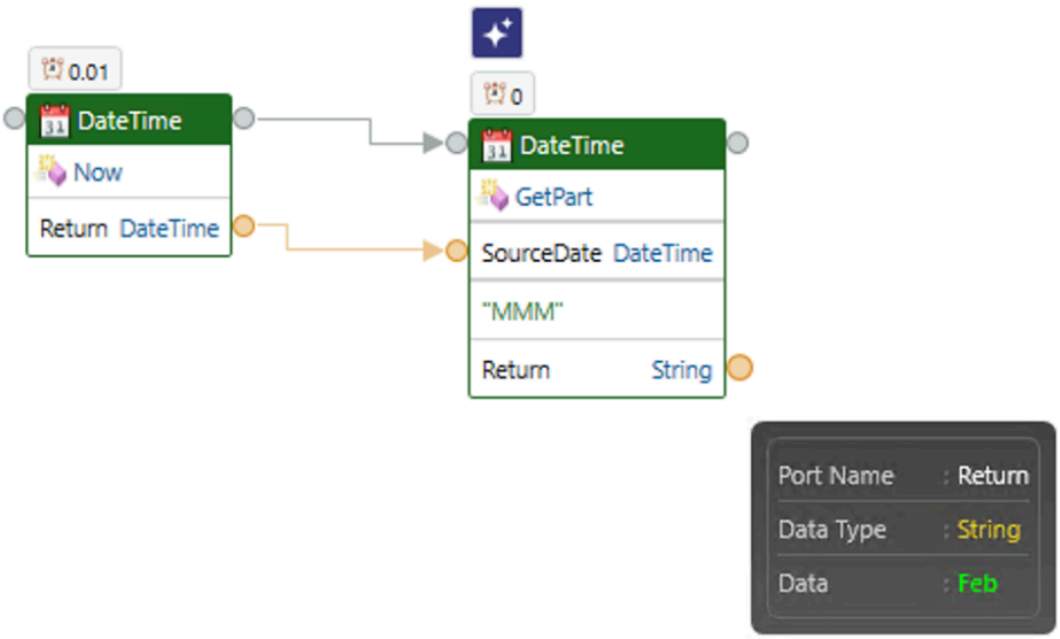
Port name	Purpose of connection	Port type	Data type
	previously executed component. For example, enter `MMM`.		
Return	Returns the value of the part of the date format. If the format is MMM, the output is Feb.	Data Out	String

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Example: GetPart component with Now component

GetPart component



Use the IsLeapYear component

Specify a year to find out whether it's a leap year by using the IsLeapYear component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the IsLeapYear component. For more information about these properties, see Properties of the DateTime components.

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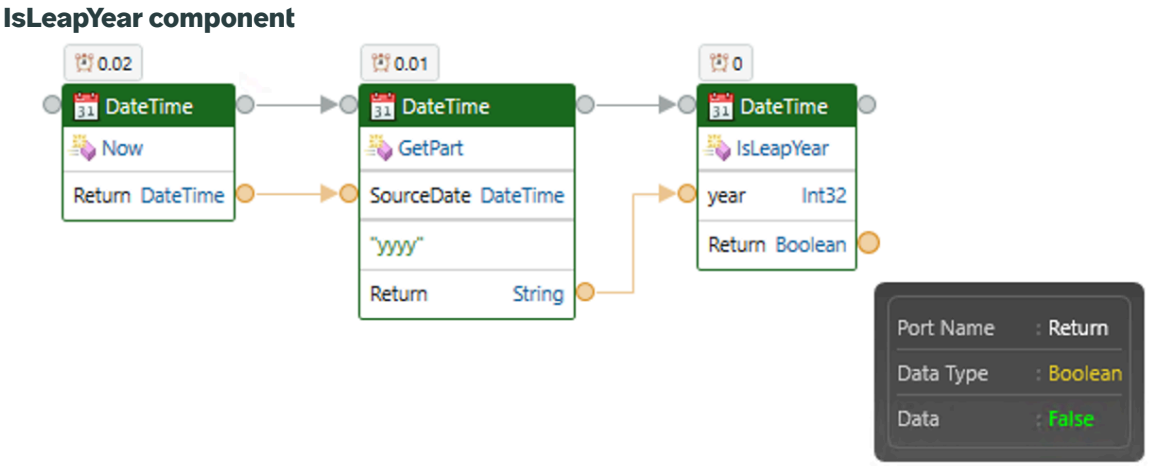
Procedure

1. In the Toolbox pane, navigate to **Utilities** > **DateTime**.
2. Drag the IsLeapYear component to the Design surface.
3. Drag the Now component to the Design surface.
4. Drag the GetPart component to the Design surface.
5. To configure the input field, see Configure port properties.
6. Connect the data and control ports of the IsLeapYear component to the corresponding ports of the other components as described in the following table and image.

Port Name	Port type	Data type	Purpose of connection
Year	Data In		Passes the year that you specify from a previously executed component.
Return	Data Out		Returns **True** if the specified year is a leap year. Otherwise, it returns **False**.

7. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.
   GetPart component extracts a date part from the Now component, and IsLeapYear determines if the year is a leap year.

Example: IsLeapYear component with GetPart and Now component



Use the Now component

Get the current date and time of the system as part of an automation Workflow by using the component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the component. For more information about these properties, see Properties of the DateTime components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **DateTime**.
2. Drag the Now component to the Design surface.
3. Connect the data and control ports of the component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (DateTime)	Passes the current date and time of the system to another component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Today component

Get the current date of the system by using the Today component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Today component. For more information about these properties, see Properties of the DateTime components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **DateTime**.
2. Drag the Today component to the Design surface.
3. Connect the data and control ports of the Today component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out	Passes the current date to another component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the UtcNow component

Get the current date and time of the system in the Coordinated Universal Time (UTC) format by using the UtcNow component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the UtcNow component. For more information about these properties, see Properties of the DateTime components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **DateTime**.
2. Drag the UtcNow component to the Design surface.
3. Connect the data and control ports of the UtcNow component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out	Passes the current date in the UTC format.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the DateTime components

Learn about the properties of the DateTime components in RPA Desktop Design Studio.

Properties of the DateTime components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.

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Properties of the DateTime components (continued)

Property	Description
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Debug

The Debug components in the RPA Desktop Design Studio enable writing logs to the console log and verify whether a project is running from the RPA Desktop Design Studio or a robot.

Use the ConsoleLog component

Write a message to view the console log of RPA Desktop Design Studio by using the ConsoleLog component.

Before you begin

Role required: none

About this task

You can configure the properties for the ConsoleLog component. For more information about these properties, see Properties of the Debug components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Debug**.
2. Drag the ConsoleLog component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ConsoleLog component to the corresponding ports of the other components as described in the following table.

ConsoleLog component parameters

Port type	Description	Data port type	Data Type
Message	Provide a message that must to be written to the console log. For example, `started first activity` or `completed the first activity`.	Data In	String

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Result

Open the console log to check the messages.

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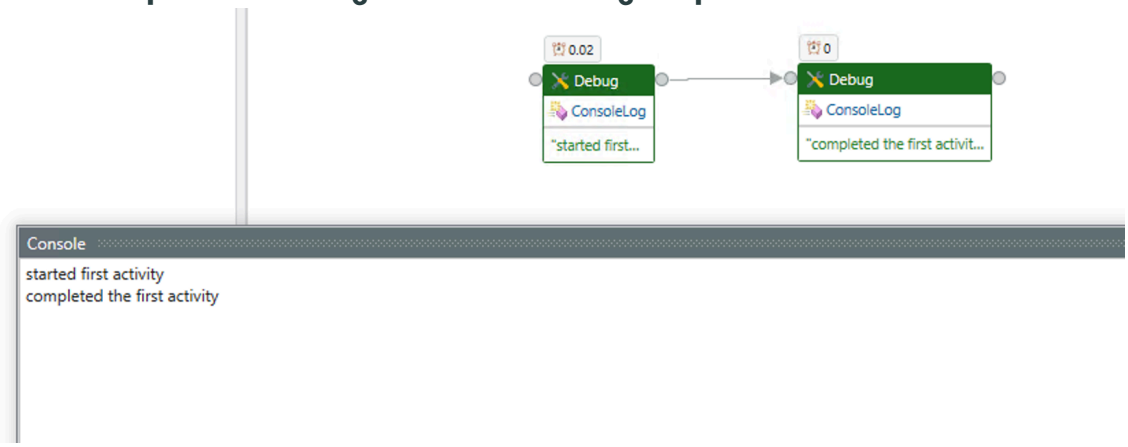
Console with provided messages in the ConsoleLog component



Use the IsRunningFromStudio component

Determine whether a project is run by studio as part of an automation Workflow using the IsRunningFromStudio component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the IsRunningFromStudio component. For more information about these properties, see Properties of the Debug components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Debug**.
2. Drag the IsRunningFromStudio component to the Design surface.
3. Connect the data and control ports of the IsRunningFromStudio component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out	Returns **True** if a project is being run from the RPA Desktop Design Studio. Otherwise, it returns **False**.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the IsRunningInBotsession component

Determine if a project is running in a Bot session as part of an automation Workflow by using the IsRunningInBotsession component in RPA Desktop Design Studio.

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Before you begin
Role required: none

About this task
You can configure the properties for the IsRunningInBotsession component. For more information about these properties, see Properties of the Debug components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Debug**.
2. Drag the IsRunningInBotsession component to the Design surface.
3. Connect the data and control ports of the IsRunningInBotsession component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out	Returns **True** if a project is running in a Bot session. Otherwise, it returns **False**.	Yes To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	No. Connecting the port is optional.
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Debug components
Learn about the properties of the Debug components in RPA Desktop Design Studio.

Properties of the Debug components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Dialogs
The Dialogs group of components performs basic operations on file and folder dialogs as part of an attended automation.

The components can do the following operations:

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- Open a file dialog to open a file based on the criteria you specify.
- Open a folder dialog and then open a folder.
- Save a file to a location.

Use the OpenFileDialog component

Open a file dialog from where you can open a file using the OpenFileDialog component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

By default, the OpenFileDialog component opens the last file dialog you had opened. You can change the file dialog location and the type of file you want to open by specifying the location and the file type.

There are properties that you configure for the OpenFileDialog component. For more information, see Dialog component properties.

Procedure

1. In the Toolbox pane, navigate to **Utilities>Dialogs**.
2. Drag the OpenFileDialog component onto the Design surface.
3. To open the last file dialog you had opened, right-click the OpenFileDialog component bar.
4. Click **Run From Here**.
5. In the Save As file dialog, select the required file and click **Open**.
   The Result (Boolean) and FileName (String) returns the Boolean response to whether you had opened a file and the file name and path respectively.
6. **Optional:** To configure the input ports, see Configure port properties.
7. Connect the data and control ports of OpenFileDialog to the corresponding ports of other components.

OpenFileDialog - Ports

Port type	Purpose of connection	Mandatory?
Data In (Filter)	Takes the format of the file that you want to open from a previously executed component.	No. Connecting the port is optional.
Data In (InitialDirectory)	Takes the path to the directory that contains the file you want to open from a previously executed component.	No. Connecting the port is optional.
Data Out (Result)	Passes the Boolean response to whether you had opened a file to the next component.	Yes
Data Out (FileName)	Passes the name of the file you had opened and its path to the next component.	Yes

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Port type	Purpose of connection	Mandatory?
Control In	Passes the control from the previously executed component.	Yes
Control Out	Passes the control from the Get Text component to the next component to be executed.	Yes

8. **Optional:** To test the component, click **Run** under the **DESIGN** tab.

Use the LockUIDialog component

Provide additional authentication to any step of your attended automation by using the LockUIDialog component in the RPA Desktop Design Studio application.

Before you begin

Ensure that you are in an attended automation project to use the LockUIDialog component.

Role required: RPA developer

About this task

Consider the scenario where you want to provide additional security to a step in your attended automation. For example, the automation is trying to access the employee database. This database has sensitive information. When you use the LockUIDialog component, the automation proceeds to the next step only if the user is authenticated by using the machine user name and password. You can also provide a message to be displayed during the authentication.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Dialogs** in an attended automation project.
2. Drag the LockUIDialog component to the Design surface.
3. Connect the data and control ports of the LockUIDialog component to the corresponding ports of the other components as described in the following table:

Ports of the LockUIDialog component

Port name	Port type	Port description	Required?
DisplayText	Data In	Text that you want to display during the authentication. The text can be used to convey why an authentication is required for the automation step. For example, you can use the following text if the automation step is trying to access the employee database: `Enter the user name and password to access the employee database.` The text is displayed in the authentication dialog box that is used to enter the machine user name and password.	No
Result	Data Out	True or false value of the authentication. If the authentication is successful, the result is true. If the authentication is unsuccessful, the result is false.	No

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Port name	Port type	Port description	Required?
		The true or false value of the result can be further used to connect to any condition. For more information on how to use the condition components, see Conditions.	
Not applicable	Control In	Passes the control from the previously executed component.	No
Not applicable	Control Out	Passes the control from the LockUIDialog component to the next component to be executed.	No

4. **Optional:** To test the component, right-click the component and select **Run From Here**. You can also run the automation by selecting **Run** from the **Design** tab.

Use the OpenFolderDialog component

Open a folder dialog so you can open a folder from there with the OpenFolderDialog component. After opening the folder dialog, you can create a folder.

Before you begin

Role required: none

About this task

There are properties that you configure for the OpenFolderDialog component. For more information, see Dialog component properties.

Procedure

1. In the Toolbox pane, navigate to **Utilities>Dialogs**.
2. Drag the OpenFolderDialog component onto the Design surface.
3. To open the folder dialog, right-click the OpenFolderDialog component bar.
4. In the Browse For Folder dialog, select the required folder and click **Open**.
5. To configure the outputs from the data ports, see Configure output port properties. The Result (Boolean) and Path (String) returns the Boolean response to whether you had opened a folder and the folder name and path respectively.
6. Connect the data and control ports of OpenFolderDialog to the corresponding ports of other components.

OpenFolderDialog - Ports

Port type	Purpose of connection	Mandatory?
Data Out (Result)	Passes the boolean response to whether you had opened a folder to the next component.	Yes
Data Out (Path)	Passes the path to the folder you have opened from the folder dialog to the next component.	Yes
Control In	Passes the control from the previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Passes the control from the Get Text component to the next component to be executed.	Yes

7. **Optional:** To test the component, click **Run** under the **DESIGN** tab.

Use the SaveFileDialog component

Save a file to a folder using the SaveFileDialog component in the RPA Desktop Design Studio. By default, the component opens the last file dialog you had opened.

Before you begin

Role required: none

About this task

There are properties that you configure for the SaveFileDialog component. For more information, see Dialog component properties.

Procedure

1. In the Toolbox pane, navigate to **Utilities>Dialogs**.
2. Drag the SaveFileDialog component onto the Design surface.
3. To open the last file dialog you had opened, right-click the SaveFileDialog component bar.
4. Click **Run From Here**.
5. In the Save As dialog, enter the name of the file in the File name field.
6. Click **Save**.
   The Result (Boolean) and FileName (String) returns the Boolean response to whether you had opened a file and the file name and path respectively.
7. Connect the data and control ports of SaveFileDialog to the corresponding ports of other components.

SaveFileDialog - Ports

Port type	Purpose of connection	Mandatory?
Data Out (Result)	Passes the boolean response to whether the file was saved to the next component.	Yes
Data Out (Filename)	Passes the name of the file that you saved and the path to the file to the next component.	Yes
Control In	Passes the control from the previously executed component.	Yes
Control Out	Passes the control from the Get Text component to	Yes

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Port type	Purpose of connection	Mandatory?
	the next component to be executed.	

8. **Optional:** To test the component, click **Run** under the **DESIGN** tab.

Dialog component properties

Refer to the descriptions of the properties of the Dialog components. You can update the properties, if required.

Dialog component properties

Property	Description
Delay Before Execution	The number of seconds to pause before running.
Delay After Execution	The number of seconds to pause after running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Environment

The Environment components in the RPA Desktop Design Studio retrieve information and perform specific operations on the Windows environment.

Use the CurrentDirectory component

Find out the current working directory and its path by using the CurrentDirectory component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the CurrentDirectory component. For more information about these properties, see Properties of the Environment components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the CurrentDirectory component to the Design surface.
3. Connect the data and control ports of the CurrentDirectory component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (Return)	Returns the path to the current working directory. Passes the path to the next component.	Yes.

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Port type	Purpose of connection	Mandatory?
		To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetEnvironmentVariable component

Retrieve the value of an environment variable by using the GetEnvironmentVariable component in RPA Desktop Design Studio. For example, you can get the value of the TEMP variable.

Before you begin

Role required: none

About this task

You can configure the properties for the GetEnvironmentVariable component. For more information about these properties, see Properties of the Environment components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the GetEnvironmentVariable component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the GetEnvironmentVariable component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (variable)	Takes the environment variable through the Data Out port of another component.	Yes
Data Out	Returns the value of the specified environment variable and passes to another component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Example: GetEnvironmentVariable component

You want your robot to process files and save logs to different folders depending on whether it's running in Development or Production mode.

1. At the start of the automation, use SetEnvironmentVariable to define the following variables:
   - `ENV_MODE = Development`
   - `LOG_PATH = C:\RPA\Dev\Logs`

   This variable defines if robot is running in the development mode, where to store the log files.



2. Later in the workflow, when saving log files, use **GetEnvironmentVariable** to retrieve the value of `LOG_PATH`.

   The robot dynamically stores the log files as per the value in the `LOG_PATH` variable.

3. In production, simply update the environment variable setup to:
   - `ENV_MODE = Production`
   - `LOG_PATH = C:\RPA\Prod\Logs`

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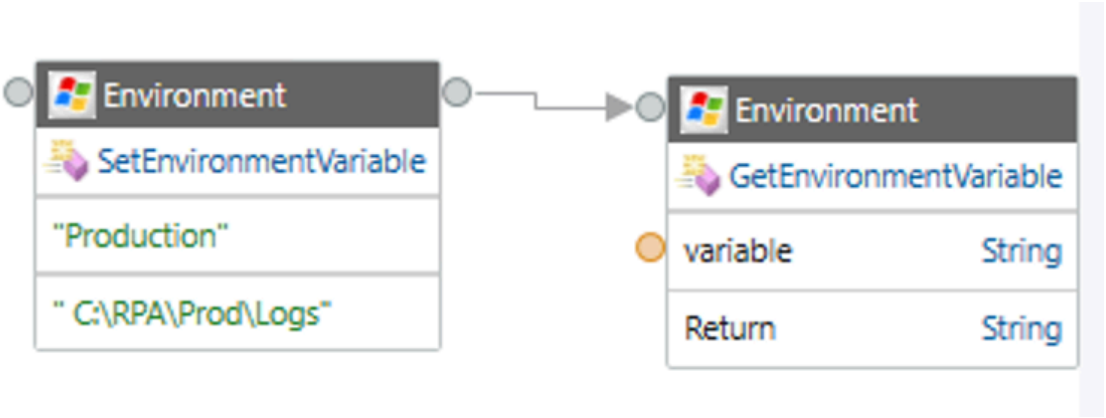

The robot now logs to the production folder automatically, because it reads the `LOG_PATH` value from the environment variable.

Use the Is64BitOperatingSystem component

Determine if an operating system is 64 bits as part of an automation Workflow by using the Is64BitOperatingSystem component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Is64BitOperatingSystem component. For more information about these properties, see Properties of the Environment components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the Is64BitOperatingSystem component to the Design surface.
3. Connect the data and control ports of the Is64BitOperatingSystem component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out	Returns **True** if the current operating system is a 64-bit operating system. Otherwise, it returns **False** and passes the output to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the MachineName component

Retrieve the name of your computer as part of an automation Workflow by using the MachineName component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the MachineName component. For more information about these properties, see Properties of the Environment components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the MachineName component to the Design surface.
3. Connect the data and control ports of the MachineName component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out	Returns the name of the computer and passes to the next component.	No. Connecting the port is optional. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	No. Connecting the port is optional.
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ResolvePath component

Find the path of your current automation project as part of an automation Workflow by using the ResolvePath component in RPA Desktop Design Studio. You must specify the parameter, for example, %projectpath% to get the path.

Before you begin
Role required: none

About this task
You can configure the properties for the ResolvePath component. For more information about these properties, see Properties of the Environment components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the ResolvePath component to the Design surface.
3. To configure the input field, see Configure port properties.

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4. Connect the data and control ports of the ResolvePath component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Path)	Takes the project path through the Data Out port of another component.	Yes
Data Out	Returns the automation project path and passes to another component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SetEnvironmentVariable component

Create or update an environment variable as part of an automation Workflow by using the SetEnvironmentVariable component in RPA Desktop Design Studio. These variables persist across activities and can be retrieved later using GetEnvironmentVariable.

Before you begin
Role required: none

About this task
You can configure the properties for the SetEnvironmentVariable component. For more information about these properties, see Properties of the Environment components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the SetEnvironmentVariable component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the SetEnvironmentVariable component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (variable)	Takes the environment variable name from a previously executed component.	Yes
Data In (value)	Takes the environment variable value from a	Yes

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Port type	Purpose of connection	Mandatory?
	previously executed component.	
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Example: GetEnvironmentVariable component

You want your robot to process files and save logs to different folders depending on whether it's running in Development or Production mode.

1. At the start of the automation, use SetEnvironmentVariable to define the following variables:
   - `ENV_MODE = Development`
   - `LOG_PATH = C:\RPA\Dev\Logs`

   This variable defines if robot is running in the development mode, where to store the log files.



2. Later in the workflow, when saving log files, use **GetEnvironmentVariable** to retrieve the value of `LOG_PATH`.

   The robot dynamically stores the log files as per the value in the `LOG_PATH` variable.

3. In production, simply update the environment variable setup to:
   - `ENV_MODE = Production`
   - `LOG_PATH = C:\RPA\Prod\Logs`

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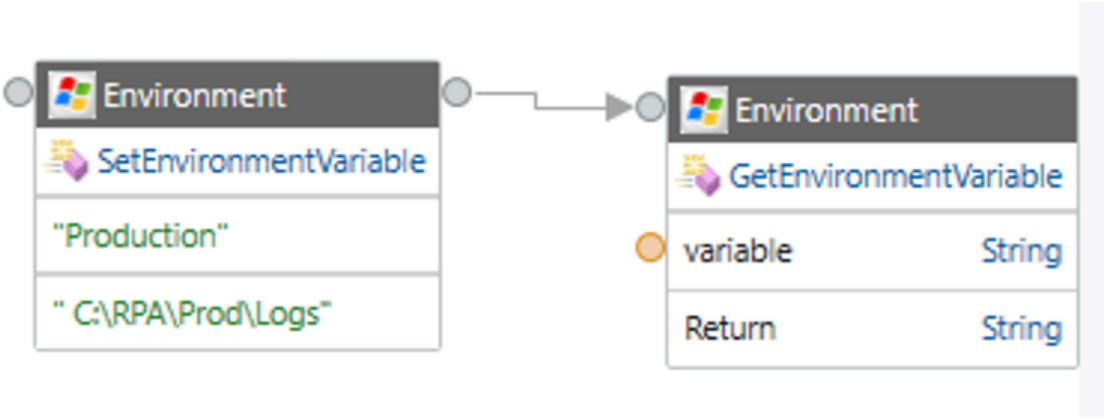

The robot now logs to the production folder automatically, because it reads the `LOG_PATH` value from the environment variable.

Use the SpecialFolderPath component

Retrieve the path to a special folder In Windows based on the name you specify by using the SpecialFolderPath component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the SpecialFolderPath component. For more information about these properties, see Properties of the Environment components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the SpecialFolderPath component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the SpecialFolderPath component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (folder)	Takes the name of the special folder from a previously executed component.	Yes
Data Out (Return)	Returns the path to the specified system special folder and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SystemDirectory component

Retrieve the path to the system directory as part of an automation Workflow by using the SystemDirectory component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the SystemDirectory component. For more information about these properties, see Properties of the Environment components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the SystemDirectory component to the Design surface.
3. Connect the data and control ports of the SystemDirectory component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (Return)	Returns the path to the system directory and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the UserDomain component

Retrieve the user domain name that is associated with a current user as part of an automation Workflow by using the UserDomain component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the UserDomain component. For more information about these properties, see Properties of the Environment components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the UserDomain component to the Design surface.
3. Connect the data and control ports of the UserDomain component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (Return)	Returns the domain name for the current user and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the UserName component

Retrieve the user name of the user who is currently logged on to the Windows machine as part of an automation Workflow by using the UserName component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the UserName component. For more information about these properties, see Properties of the Environment components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Environment**.
2. Drag the UserName component to the Design surface.
3. Connect the data and control ports of the UserName component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out	Returns the name of the user who is currently logged on to the Windows machine and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes.

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Environment components

Learn about the properties of the Environment components in RPA Desktop Design Studio.

Properties of the Environment components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

File

The File components in the RPA Desktop Design Studio perform standard operations on the Windows files and directories. For example, copying files or retrieving temporary file names.

Use the AppendBytes component

Append bytes to a file as part of an automation Workflow by using the AppendBytes component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the AppendBytes component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the AppendBytes component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the AppendBytes to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (filePath)	Takes the path to the file to which the bytes are	Yes

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Port type	Purpose of connection	Mandatory?
	appended from a previously executed component.	
Data In (bytes)	Takes the bytes you want to append to the file from a previously executed component.	Yes
Data Out	Returns the status of the Append Bytes operation. Returns **True** if successful or **False** if an error occurred.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the AppendText component

Add text to an existing text of a file as part of an automation Workflow by using the AppendText component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the AppendText component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the AppendText component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the AppendText component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (filePath)	Takes the path to the file to which the method appends text from a previously executed component.	Yes
Data In (text)	Takes the text that the method appends text from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Data Out (text)	Returns **True** if the specified text is successfully added to the file. Otherwise, it returns **False**.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ChangeExtension component

Change the extension of a file by using the ChangeExtension component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the ChangeExtension component. For more information about these properties, see Properties of the File components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the ChangeExtension component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ChangeExtension component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Path)	Takes the path to the file for which the method changes the extension from a previously executed component.	Yes
Data In (Extension)	Takes the new extension that the method changes from a previously executed component.	Yes
Data Out	Returns the path with the changed extension and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.

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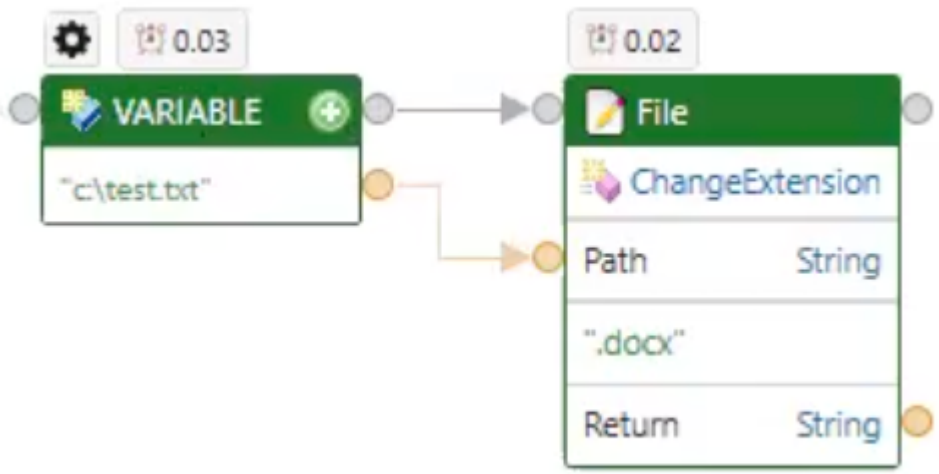
Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Example: ChangeExtension component

Your RPA robot processes a batch of report files downloaded with `.txt` extension. To ensure consistency and compatibility with downstream systems, you need to rename these files to the `.doc` extension, after processing.

1. Enter a variable component on the design canvas that stores the file path with extension.
2. Add the ChangeExtension action after the variable component.
3. Set the target extension to `.pdf`.



Use the Combine component

Combine two paths to create a single path with the Combine component in RPA Desktop Design Studio. For example, C:\Users could be the first path and \Data\TestFolder could be the second path and both could be combined to create the path C:\Users\Data\TestFolder.

Before you begin
Role required: none

About this task
You can configure the properties for the Combine component. For more information about these properties, see Properties of the File components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the Combine component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Combine component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Path 1)	Takes the first part of the combined path from a previously executed component.	Yes
Data In (Path 2)	Takes the last part of the combined path from a previously executed component.	Yes
Data Out (String)	Returns the combined path and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the CopyFile component

Copy an existing file to a new location by using the CopyFile component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the CopyFile component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the CopyFile component to the Design surface.
3. To configure the input fields, see by doing the following steps.

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a. Right-click the field.

b. Click **Override**.

c. Enter details for the following fields, Configure port properties.

4. Connect the data and control ports of the CopyFile component to the corresponding ports of the other components as described in the following table.

CopyFile method parameters

Parameter	Description	Data port type	Data type
sourcefilePath	Provide a file path to be copied, along with the file name. For example, `C:\Users\ABC\Desktop\ Folders\Txt Files\Scripts.txt`	Data In	String
destFilePath	Provide a destination file path (along with the file name), where the file should be copied. For example, `C:\Users\ABC\Desktop\Scripts.txt`	Data In	String
overwrite	Provide a True or False value. Set to True to overwrite existing files.	Data In	Boolean

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the DeleteFile component

Delete a file from the location you specify as part of an automation Workflow by using the DeleteFile component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the DeleteFile component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the DeleteFile component to the Design surface.

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3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the DeleteFile component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (filePath)	Takes the path to the file and the name of the file from a previously executed component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the FileExists component

Find out whether the file you specify exists as part of an automation Workflow by using the FileExists component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the FileExists component. For more information about these properties, see Properties of the File components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the FileExists component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the FileExists component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (filePath)	Takes the path to the file and the name of the file from a previously executed component.	Yes
Data Out (Return)	Returns **True** if the specified file exists. Otherwise, it returns **False** and passes the output to another component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetDirectoryName component

Get the directory name of the specified path as part of an automation Workflow by using the GetDirectoryName component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the GetDirectoryName component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the GetDirectoryName component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the GetDirectoryName component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Path)	Takes the path to the directory from a previously executed component.	Yes
Data Out (Return)	Returns the directory name of the path and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	No. Connecting the port is optional.
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the GetExtension component

Get the extension of a file and know its type as part of an automation Workflow by using the GetExtension component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetExtension component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the GetExtension component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetExtension component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Path)	Takes the path to the file and the name of the file from a previously executed component.	Yes
Data Out (Return)	Returns the file extension and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	No. Connecting the port is optional.
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetFileName component

Get the name of a file as part of an automation Workflow by using the GetFileName component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetFileName component. For more information about these properties, see Properties of the File components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the GetFileName component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the GetFileName component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Filepath)	Takes the path to the file from a previously executed component.	Yes
Data Out	Returns the file name and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetFileNameWithoutExtension component

Get the name of a file without its extension as part of an automation Workflow by using the GetFileNameWithoutExtension component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetFileNameWithoutExtension component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the GetFileNameWithoutExtension component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the GetFileNameWithoutExtension component to the corresponding ports of the other component as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (Path)	Takes the path to the file from a previously executed component.	Yes
Data Out (Return)	Returns the file name and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetLastModifiedFile component

Get the name and path to the last modified file in a directory by using the GetLastModifiedFile component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetLastModifiedFile component. For more information about these properties, see Properties of the File components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the GetLastModifiedFile component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetLastModifiedFile component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Folderpath)	Takes the path to the directory from a previously executed component.	Yes
Data In (searchSubDirectories)	Takes the Boolean response to indicate whether the method searches subdirectories inside the target directory from a previously executed component.	No. Connecting the port is optional.

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Port type	Purpose of connection	Mandatory?
Data In (fileExtension)	If you want to find files by their extensions, then use this option. Takes the extension of a file type from a previously executed component.	No. Connecting the port is optional.
Data Out (Return)	Returns the path to the file and its name that were modified last.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetPathRoot component

Get the name of the root folder or directory of a path by using the GetPathRoot component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetPathRoot component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the GetPathRoot component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the GetPathRoot component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Path)	Takes the path from a previously executed component.	Yes
Data Out (Return)	Returns the name of the root folder in the path taken through the Data In port and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetRandomFileName component

Get randomly generated file names and their extensions by using the GetRandomFileName component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetRandomFileName component. For more information about these properties, see Properties of the File components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the GetRandomFileName component to the Design surface.
3. Connect the data and control ports of the GetRandomFileName component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (Return)	Returns the random file name and extension and passes to the next component	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Passes the file names from a previously executed component.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetTempFileName component

Get the names of temporary Windows files by using the GetTempFileName component in RPA Desktop Design Studio.

Before you begin
Role required: none

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About this task
You can configure the properties for the GetTempFileName component. For more information about these properties, see Properties of the File components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the GetTempFileName component to the Design surface.
3. Connect the data and control ports of the GetTempFileName component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (Return)	Returns the new temporary file name and path on the disk and passes to the next component to be executed.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the HasExtension component

Find out whether a file has an extension by using the HasExtension component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the HasExtension component. For more information about these properties, see Properties of the File components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the HasExtension component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the HasExtension component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Path)	Takes the path to the file and the name of the file	Yes

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Port type	Purpose of connection	Mandatory?
	from a previously executed component.	
Data Out (Return)	Returns the Boolean value based on whether the file has an extension and passes the value to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the IsPathRooted component

Find out if the path you specify has a root folder by using the IsPathRooted component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the IsPathRooted component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the IsPathRooted component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the IsPathRooted component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Path)	Takes the path to the file from a previously executed component.	Yes
Data Out (Return)	Returns the Boolean value indicating whether the path has a root folder and passes the value to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the MoveFile component

Move a file from an existing location to a new location as part of an automation Workflow by using the MoveFile component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the MoveFile component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the MoveFile component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the MoveFilecomponent to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (sourcefilePath)	Takes the path to the source file from a previously executed component.	Yes
Data IN (destFilePath)	Takes the path to the destination directory from a previously executed component.	Yes
Data In (Overwrite)	Takes the Boolean value to indicate whether the method overwrites the same file in the destination directory from a previously executed component.	No
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the ReadBytes component

Read the specified number of bytes as part of an automation Workflow by using the ReadBytes component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the ReadBytes component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the ReadBytes component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the ReadBytes component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (filePath)	Takes the path to a file from a previously executed component.	Yes
Data Out (Return)	Returns the bytes as a string array and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ReadText component

Return all text in a file as output by using the ReadText component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the ReadText component. For more information about these properties, see Properties of the File components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the ReadText component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the ReadText component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (filePath)	Takes the path to the file from a previously executed component.	Yes
Data Out (Return)	Returns the read text from the file and passes the output to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the RenameFile component

Rename a file and change the file type by using the RenameFile component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the RenameFile component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the RenameFile component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the RenameFile component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (filePath)	Takes the path to the file and its name from a previously executed component.	Yes
Data In (newName)	Takes the new name of the file from a previously executed component. **Note:** You must provide the extension of the file. By providing a new extension, you can change the file type.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the WriteBytes component

Write the specified byte array to a file as part of an automation Workflow by using the WriteBytes component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the WriteBytes component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the WriteBytes component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the WriteBytes component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (filePath)	Takes the path to the file from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Data In (bytes)	Takes the bytes as byte array from a previously executed component.	Yes
Data Out	Returns **True** if the operation is successful and **False** if the write operation failed and passes the Boolean value to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the WriteText component

Append or overwrite existing text to an existing file or create a file and write text to it with the WriteText component in the RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the WriteText component. For more information about these properties, see Properties of the File components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **File**.
2. Drag the WriteText component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the WriteText component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (filePath)	Takes the path to an existing or a new file and the file name from a previously executed component.	Yes
Data In (text)	Takes the text to be written to the exiting file or new file from a previously executed component.	Yes
Data Out	Returns **True** if the text is written to the file. Otherwise, it returns **False** and passes	Yes

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Port type	Purpose of connection	Mandatory?
	the Boolean output to the next component.	
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the File components

Learn about the properties of the File components in RPA Desktop Design Studio.

Properties of the File components

Property	Description
Search	Option to enable a search for a property.
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.

Directory

The Directory components in the RPA Desktop Design Studio perform standard operations on Windows directories. For example, rename a directory or get the list of files in a directory.

Use the CopyDirectory component

Copy a directory to another location by using the CopyDirectory component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the CopyDirectory component. For more information about these properties, see Properties of the Directory components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the CopyDirectory component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the CopyDirectory component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (SourceDirPath)	Takes the path to the source directory from a previously executed component.	Yes
Data In (destDirPath)	Takes the path to the destination directory from a previously executed component.	Yes
Data In (overwrite)	Takes the Boolean value to indicate whether the method overwrites the directory in the destination folder from a previously executed component.	No
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the CreateDirectory component

Create a directory by using the CreateDirectory component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the CreateDirectory component. For more information about these properties, see Properties of the Directory components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the CreateDirectory component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the CreateDirectory component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (directoryPath)	Takes the path where the directory will be created and the directory name from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the CurrentDirectory component

Get the current working directory path and name by using the CurrentDirectory component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the CurrentDirectory component. For more information about these properties, see Properties of the Directory components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the CurrentDirectory component to the Design surface.
3. Connect the data and control ports of the CurrentDirectory component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data Out (directoryPath)	Returns the path to the current working directory and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the DeleteDirectory component

Delete a directory by using the DeleteDirectory component in RPA Desktop Design Studio.

Before you begin
Role required: none

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About this task
You can configure the properties for the DeleteDirectory component. For more information about these properties, see Properties of the Directory components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the DeleteDirectory component to the Design surface.
3. Connect the data and control ports of the DeleteDirectory component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (directoryPath)	Takes the path to the directory from a previously executed component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the DirectoryExists component

Find out if a directory exists by using the DirectoryExists component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the DirectoryExists component. For more information about these properties, see Properties of the Directory components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the DirectoryExists component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the DirectoryExists component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (directoryPath)	Takes the path to the directory and its name from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Data Out (Return)	Returns **True** if the specified directory exists. Otherwise, it returns **False** and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetFiles component

Get the names of the files in the directory and subdirectories by using the GetFiles component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetFiles component. For more information about these properties, see Properties of the Directory components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the GetFiles component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the GetFiles component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (directoryPath)	Takes the path to the directory from a previously executed component.	Yes
Data In (searchSubDirectories)	Takes the Boolean value to indicate whether the method searches the subdirectories from a previously executed component.	No
Data In (fileExtension)	Takes the extension of a file from a previously executed component. You can use this field if you want to search for files with a particular extension.	No

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Port type	Purpose of connection	Mandatory?
Data Out (Return)	Returns the names of all the subdirectories and files in the specified directory and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetLastModifiedFolder component

Get the name of the last modified folder by using the GetLastModifiedFolder component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetLastModifiedFolder component. For more information about these properties, see Properties of the Directory components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the GetLastModifiedFolder component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetLastModifiedFolder component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (directoryPath)	Takes the path to the directory from a previously executed component.	Yes
Data In (searchSubDirectories)	Takes the Boolean value to indicate whether the method searches the subdirectories for changes from a previously executed component.	Yes
Data Out (Return)	Returns the name of the last modified folder and the file name and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetSubFolders component

Get the names of all subfolders under a directory by using the GetSubFolders component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the GetSubFolders component. For more information about these properties, see Properties of the Directory components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the GetSubFolders component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetSubFolders component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (directoryPath)	Takes the path to the folder from a previously executed component.	Yes
Data In (searchSubDirectories)	Takes the Boolean value to indicate whether the method gets the subfolder names from the subdirectories from a previously executed component.	No
Data Out (Return)	Returns the names of all the subdirectories and files in a specified directory as an ArrayList and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the MoveDirectory component

Move a directory and its contents to a new location by using the MoveDirectory component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the MoveDirectory component. For more information about these properties, see Properties of the Directory components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the MoveDirectory component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the MoveDirectory component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (sourceDirPath)	Takes the path to the source directory from a previously executed component.	Yes
Data IN (destDirPath)	Takes the path to the destination directory from a previously executed component.	Yes
Data In (overwrite)	Takes the Boolean response on whether the method should overwrite the same directory in the destination folder from a previously executed component.	No
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the RenameDirectory component

Change the name of a directory by using the RenameDirectory component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the RenameDirectory component. For more information about these properties, see Properties of the Directory components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Directory**.
2. Drag the RenameDirectory component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the RenameDirectory component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (directoryPath)	Takes the path to the directory from a previously executed component.	Yes
Data In (newname)	Takes the new directory name from a previously executed component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Directory components

Learn about the properties of the Directory components in RPA Desktop Design Studio.

Properties of Directory components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.

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Properties of Directory components (continued)

Property	Description
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

HTTP

The HTTP components enable you to interact with servers over the HTTP protocol. You can download files or post content to the server using the components.

Use the DownloadFile component

Download a file over the HTTP protocol using the DownloadFile component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the DownloadFile component. For more information about these properties, see Properties of the HTTP components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **HTTP**.
2. Drag the DownloadFile component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the DownloadFile component to the corresponding ports of the other components as described in the following table:

Port name	Port type	Data type	Purpose of connection	Mandatory?
URL	Data In	String	Takes the URL from a previously executed component.	Yes
FilePath	Data In	String	Takes the path to the file the method downloads from a previously executed component.	Yes
UserName	Data In	String	Takes the user name to log in to the server from a previously executed component.	Yes
Password	Data In	String	Takes the password to log	Yes

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Port name	Port type	Data type	Purpose of connection	Mandatory?
			in to the server from a previously executed component.	
RequestTimeout	Data In	Integer	Time value in seconds to timeout the download request. If the download request does not happen after the timeout value that you set, the download request fails and a connection timeout exception is displayed. The default value of timeout is 100 seconds.	Optional
NA	Control In	NA	Passes the control through the Control In port of the next component.	Optional
NA	Control Out	NA	Passes the control through the Control In port of the next component.	Optional

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Post component

Perform a POST request to a server by providing the request using the Post component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Post component. For more information about these properties, see Properties of the HTTP components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **HTTP**.
2. Drag the Post component to the Design surface.

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3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Post component to the corresponding ports of the other components as described in the following table:

Port Name	Port type	Data type	Purpose of connection	Mandatory
URL	Data In	String	Takes the URL where the content will be posted from a previously executed component.	Yes
Data	Data In	Object	Takes the data the component posts from a previously executed component.	Yes
ContentType	Data In	String	Takes the content type such as JSON or XML from a previously executed component.	Yes
RequestTimeout	Data In	Integer	Time value in seconds to timeout the request. If the post request does not work after the timeout value that you set, the request fails and a connection timeout exception is displayed. The default timeout value is 100 seconds.	Optional
Status	Data In	String	Takes status of the content from a previously executed component.	Yes
Response	Data Out	Object	Returns the status of the POST operation.	Yes. To preview the data, right-

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Port Name	Port type	Data type	Purpose of connection	Mandatory
				click the **Status** and **Response** fields and click **Preview Data**.
NA	Control In		Connects to the Control Out port of one or more components.	Yes
NA	Control Out		Connects to the Control In port of another component or the default end component.	Optional

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the HTTP components

Learn about the properties of the HTTP components in RPA Desktop Design Studio.

Properties of the HTTP components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Image Utilities

The Image utility components in the RPA Desktop Design Studio perform various useful operations on images. For example, adjust brightness or contrast or resize images.

Use the AdjustBrightness component

Adjust the brightness of an image as part of an automation Workflow by using the AdjustBrightness component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the AdjustBrightness component. For more information about these properties, see Properties of the Image Utilities components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the AdjustBrightness component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the AdjustBrightness component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image from a previously executed component.	Yes
Data In (Value)	Takes the value to adjust the brightness from a previously executed component.	Yes
Data Out	Returns the image with the specified brightness.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the AdjustContrast component

Adjust the contrast of an image as part of an automation Workflow by using the AdjustContrast component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the AdjustContrast component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the AdjustContrast component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the AdjustContrast component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image from a previously executed component.	Yes
Data In (Value)	Takes the value to adjust the contrast from a previously executed component.	Yes
Data Out	Returns the image with the specified contrast.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Convert component

Convert the format of an image to a different format by using the Convert component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Convert component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the Convert component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Convert component to the corresponding ports of the other components as described in the following table.

Convert component parameters

Name	Purpose of connection	Port type	Data Type
Image	Takes the path to the current image from a previously executed component. For example, provide a file path of the	Data In	Bitmap

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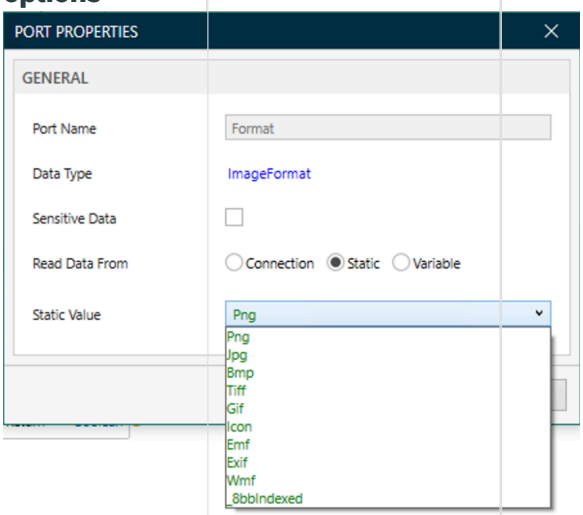
Name	Purpose of connection	Port type	Data Type
	image using the ReadFromFile component from Image Utilities.		
Format	Takes the new image format from a previously executed component. Double click this option to select the format type from the Static Value field and select **OK**. For example, select Png. **Image format options** 	Data In	ImageFormat
Return	Returns the image that is converted to the specified format. You can additionally add the Save component from Image Utilities to save the converted image to a different filepath.	Data Out	Bitmap

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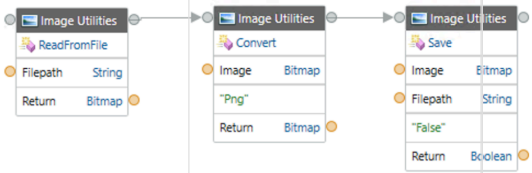
Name	Purpose of connection	Port type	Data Type
	Convert component using other components 		

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the DrawBorder component

Create a border around an image as part of an automation Workflow by using the DrawBorder component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the DrawBorder component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the DrawBorder component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the DrawBorder component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image from a previously executed component.	Yes
Data In (BorderSize)	Takes the value that determines the border size from a previously executed component.	Yes
Data Out (Return)	Returns the image with the specified border and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the DrawRectangle component

Draw a rectangle on an image and specify its dimensions as part of an automation Workflow by using the DrawRectangle component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the DrawRectangle component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the DrawRectangle component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the DrawRectangle component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image on which the method draws a rectangle from a previously executed component.	Yes
Data In (Top)	Takes the top measurement from a previously executed component.	No
Data In (Left)	Takes the left measurement from a previously executed component.	No
Data In (Height)	Takes the height of the rectangle from a previously executed component.	No
Data In (Width)	Takes the width of the rectangle from a previously executed component.	No
Data In (Color)	Takes the color of the rectangle in hex values from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Data In (Thickness)	Takes the border thickness of the rectangle from a previously executed component.	Yes
Data Out	Returns the image after drawing a rectangle with the specified dimensions.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the DrawString component

Draw a string on an image at a specific location and set the string's color, font style, and size as part of an automation Workflow by using the DrawString component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the DrawString component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the DrawString component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the DrawString component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image on which the method draws a string from a previously executed component.	Yes
Data In (Text)	Takes the text string from a previously executed component.	Yes
Data In (Top)	Takes the top measurement from a previously executed component.	No

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Port type	Purpose of connection	Mandatory?
Data In (Left)	Takes the left measurement from a previously executed component.	No
Data In (Color)	Takes the color of the string in hex values from a previously executed component.	Yes
Data In (Font)	Takes the font of the string in from a previously executed component.	No
Data In (FontSize)	Takes the font size of the string from a previously executed component.	No
Data Out	Returns the image after drawing a rectangle with the specified dimensions.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetPart component

Crop and retrieve part of an image as part of an automation Workflow by using the GetPart component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the GetPart component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the GetPart component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetPart component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Data In (Top)	Takes the top measurement from a previously executed component.	No
Data In (Left)	Takes the left measurement from a previously executed component.	No
Data In (Height)	Takes the height of the rectangle from a previously executed component.	No
Data Out	Returns the image with the specified dimensions.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Grayscale component

Convert a color image to grayscale as part of an automation Workflow by using the Grayscale component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure properties for the Grayscale component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the Grayscale component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Grayscale component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Required?
Data In	Takes the color image from a previously executed component.	Yes
Data Out	Returns the image after converting it to grayscale.	Yes.

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Port type	Purpose of connection	Required?
		To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	No. Connecting the port is optional.
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ImageToString component

Extract text from an image and return the text as output by using the ImageToString component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the ImageToString component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the ImageToString component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ImageToString component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image from a previously executed component.	Yes
Data Out (Return)	Returns the input image as string.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the Invert component

Invert the colors of an image as part of an automation Workflow by using the Invert component in RPA Desktop Design Studio. The component takes the original colors of the image you input and applies the exact opposite of the colors.

Before you begin
Role required: none

About this task
You can configure the properties for the Invert component. For more information about these properties, see Properties of the Image Utilities components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the Invert component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the Invert component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image the method inverts from a previously executed component.	Yes
Data Out (Return)	Returns the image with the inverted colors.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Median component

Apply the median filter to an image as part of an automation Workflow by using the Median component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure properties for the Median component. For more information about these properties, see Properties of the Image Utilities components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the Median component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Median component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image from a previously executed component.	Yes
Data In (SquareSize)	Takes the square size of each pixel from a previously executed component.	No
Data Out (Return)	Returns an image with the median filter applied.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ReadFromFile component

Read an image file from its path and name and return the image as an output by using the ReadFromFile component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the ReadFromFile component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the ReadFromFile component to the Design surface.
3. Configure the input field, see Configure port properties.
4. Connect the data and control ports of the ReadFromFile component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (Filepath)	Takes the path to the image file and its name from a previously executed component.	No. Connecting the port is optional.
Data Out	Returns the image as a bitmap and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	No. Connecting the port is optional.
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Resize component

Resize an image by specifying the dimensions as part of an automation Workflow by using the Resize component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Resize component. For more information about these properties, see Properties of the Image Utilities components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the Resize component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Resize component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image the method resizes from a previously executed component.	Yes
Data In (Width)	Takes the new width from a previously executed component.	Yes
Data In (Height)	Takes the new height from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Data Out	Returns the resized image.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Save component

Save an image to a specific location as part of an automation Workflow by using the Save component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Save component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the Save component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Save component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image from a previously executed component.	Yes
Data In (Filepath)	Takes the new path to the location where the method saves the image from a previously executed component.	Yes
Data In (Overwrite)	Takes the Boolean response to whether the method should overwrite the same file at the new location from a previously executed component.	No

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Port type	Purpose of connection	Mandatory?
Data Out (Return)	Returns the Boolean response to whether the operation was successful and passes to the next component.	Next. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ScaleImage component

Scale the size or dimensions of an image as part of an automation Workflow by using the ScaleImage component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the ScaleImage component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the ScaleImage component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ScaleImage component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image that the method scales from a previously executed component.	Yes
Data In (Scale)	Takes the value to scale the image accordingly from a previously executed component. Negative values are not allowed.	Yes
Data Out (Return)	Returns the scaled image and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Sharpen component

Sharpen an image to enhance its appearance as part of an automation Workflow by using the Sharpen component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Sharpen component. For more information about these properties, see Properties of the Image Utilities components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the Sharpen component to the Design surface.
3. Connect the data and control ports of the Sharpen component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image to sharpen from a previously executed component.	Yes
Data Out (Return)	Returns the sharpened image and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the StringToImage component

Create an image from an input string as part of an automation Workflow by using the StringToImage component in RPA Desktop Design Studio.

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Before you begin
Role required: none

About this task
You can configure the properties for the StringToImage component. For more information about these properties, see Properties of the Image Utilities components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the StringToImage component to the Design surface.
3. To configure the inputs, see Configure port properties.
4. Connect the data and control ports of the StringToImage component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (strimage)	Takes the image from a previously executed component.	Yes
Data Out (Return)	Returns the input string as image.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Threshold component

Apply the threshold filter to an image as part of an automation Workflow by using the Threshold component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Threshold component. For more information about these properties, see Properties of the Image Utilities components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the Threshold component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Threshold component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image from a previously executed component.	Yes
Data Out (Range)	Takes the threshold value for the image from a previously executed component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Trim component

Remove the transparent pixels from the borders of an image as part of an automation Workflow by using the Trim component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Trim component. For more information about these properties, see Properties of the Image Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Image Utilities**.
2. Drag the Trim component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the Trim component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Image)	Takes the image that the method trims from a previously executed component.	Yes
Data Out (Return)	Returns the trimmed image and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Image Utilities components

Learn about the properties of the Image Utilities components in RPA Desktop Design Studio.

Properties of Image Utilities components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

JSON

The JSON components in the RPA Desktop Design Studio perform different operations on JSON objects. For example, serialize a JSON object or get JSON object properties.

Use the DeserializeObject component

Convert a string containing JSON data to a JSON object by using the DeserializeObject component in RPA Desktop Design Studio. You can also extract specific properties from the JSON object.

Before you begin

Role required: none

About this task

To configure the properties for the DeserializeObject component, see Properties of the JSON utilities.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **JSON**.
2. Drag the DeserializeObject component to the Design surface.
3. **Optional:** To specify the required property name in the JSON object that you want to extract, do the following steps.

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a. Click the component settings icon ( ).

b. Click the add property icon ( ).

c. Enter a property name.

d. Repeat the steps to add multiple properties.
A Data Out port is added with each key that you provide.

e. Click **OK**.

4. To configure the input field, see Configure port properties.
5. **Optional:** Connect the data and control ports of the DeserializeObject component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Description
Data In	JSON	String	The string containing JSON data to be converted to a JSON object.
Data Out	Object	Object	The output parameter to store the converted JSON object.
Data Out	Name of the port is the same as the name of the key that you add.	Object	Returns the value of the key from the string. (Optional) This appears when additional properties are added to the component settings.

6. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

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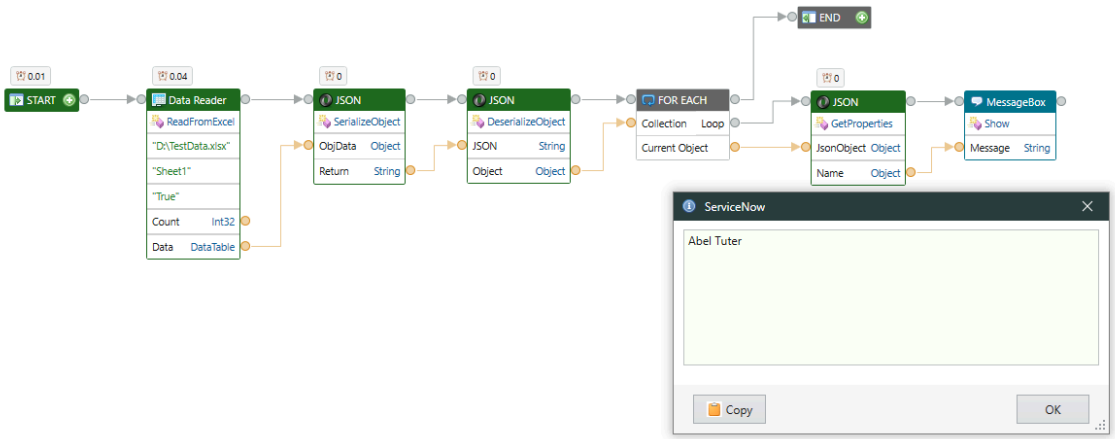
Example: Convert a string to a JSON object



In this example, the ReadFromExcel component reads data from an Excel document and passes to the SerializeObject component. The SerializeObject component converts the data to string and passes to the DeserializeObject component. The DeserializeObject component converts the string to the JSON object. The items in the Excel document traverses from first to last in the For Each component and passes the item to the GetProperties component. The GetProperties component returns the name of the component and passes the name of the item to the Show component. The item is shown in a message box.

Use the GetProperties component

Get the values of multiple properties from a JSON object by using the GetProperties component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

To configure the properties of the GetProperties component, see Properties of the JSON utilities.

Procedure

1. In the Toolbox pane, navigate to **General** and drag the Variable component to the Design surface.
2. Double-click the variable and enter a code as a variable.

```
{
  "name": "Abel Tutor",
  "age": 30,
  "email": "abletutor@example.com",
}
```

3. In the Toolbox pane, navigate to **Utilities** > **JSON**.
4. Drag the GetProperties component to the Design surface.
5. Click the component settings icon ( ).
6. Click the Add property icon ( ).
7. Enter a property name.
8. **Optional:** Repeat the steps to add multiple property names.
   A Data In port is added with each property that you add.

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9. Click **OK**.
10. To configure the input fields, see Configure port properties.
11. **Optional:** Connect the data and control ports of the GetProperties component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Description
Data In	JsonObject	Object	The JSON object from which to extract property values. (Optional) JSON object to be passed from the previous component. Serialize the JSON and pass it from the previous component to get properties. Example of JSON object: `{ "name": "Abel Tutor", "age": 30, "email": "abletutor@example.com", "address": { "street": "123 Main St", "city": "New York", "state": "NY", "zip": "10001" }, "phoneNumbers": [ { "type": "home", "number": "555-1234" }, {`

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Port type	Port name	Data type	Description
			<pre>"type": "work", "number": "555-5678" }], "isActive": true }</pre>
Data Out	Name of the port is the same as the name of the properties that you added.	Object	Returns the values of the properties. (Optional) If no property value is found, the port return an error.

12. **Optional:** To test the component, right-click the component bar and click **Run From Here**.

Use the GetProperty component

Get the value of a property from a JSON object by using the GetProperty component in the RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
To configure the properties for the GetProperty component, see Properties of the JSON utilities.

Procedure
1. In the Toolbox pane, navigate to **General** and drag the Variable component to the Design surface.
2. Double-click the variable and enter a code as a variable.
   For example,

```
{
  "name": "Abel Tutor",
  "age": 30,
  "email": "abletutor@example.com",
}
```

3. In the Toolbox pane, navigate to **Utilities** > **JSON**.
4. Drag the DeserializeObject component to the Design surface to convert a string containing JSON data to a JSON object.
5. In the Toolbox pane, navigate to **Utilities** > **JSON**.
6. Drag the GetProperty component to the Design surface.
7. To configure the input fields, see Configure port properties.
8. **Optional:** Connect the ports as described in the following table.

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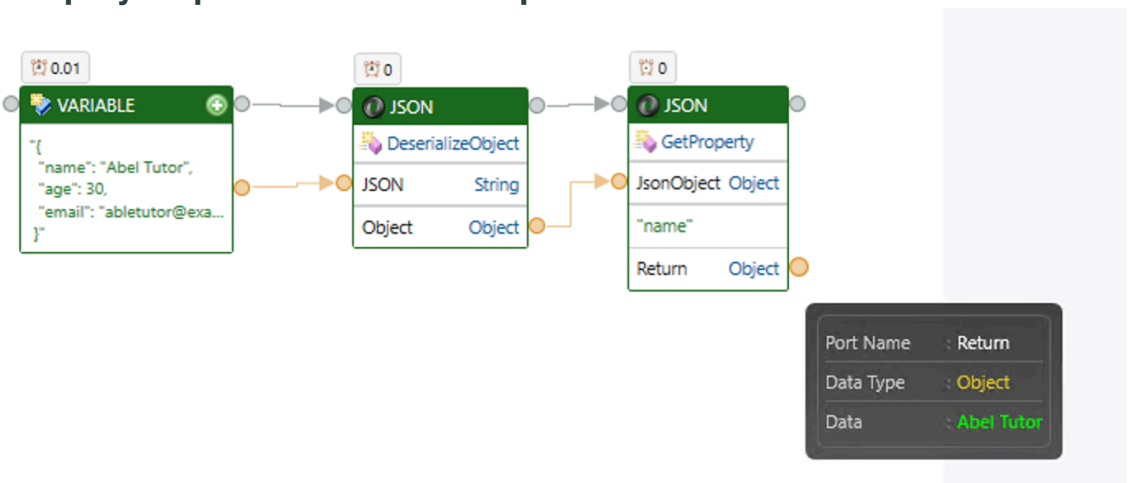
Port type	Port name	Data type	Description
Data In	JsonObject	Object	The JSON object from which to extract a property value.
Data In	PropertyName	String	The name of the property whose value is to be retrieved. (Optional) For example, `name`.
Data Out	Return	Object	Returns the value of the property. (Optional) If no property value is found, the port return an error.

9. **Optional:** To test the component, right-click the component bar and click **Run From Here**. The name is displayed as Abel Tutor when you right-click the GetProperty Data Out port.

GetProperty component Automation Example



Use the JsonArrayToArray component

Convert a JSON object to an array of objects using the JsonArrayToArray component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

To configure the properties for the JsonArrayToArray component, see Properties of the JSON utilities.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **JSON**.
2. Drag the JsonArrayToArray component to the Design surface.
3. In the Toolbox pane, navigate to **General** > **Variable**.
4. Drag the Variable component to the Design surface.
5. Double-click the variable and enter a script.

   An example of a script.

```
[{
  "name": "Abel Tutor",
  "age": 30,
  "email": "abletutor@example.com",
},
{
  "name": "Alex Tutor",
  "age": 32,
  "email": "alextutor@example.com",
}]
```

6. To configure the input field, see Configure port properties.
7. **Optional:** Connect the data and control ports of the JsonArrayToArray component to the corresponding ports of the other components as described in the following table and image.

Port type	Port name	Data type	Description
Data In	JsonObject	Object	The JSON object to be converted to an array of objects.
Data Out	Return	Object[]	Used to return an array of JObjects. Each JObject has the same set of properties with different values for each property. (Optional) To modify the details of a JObject, iterate over the JObjects in the

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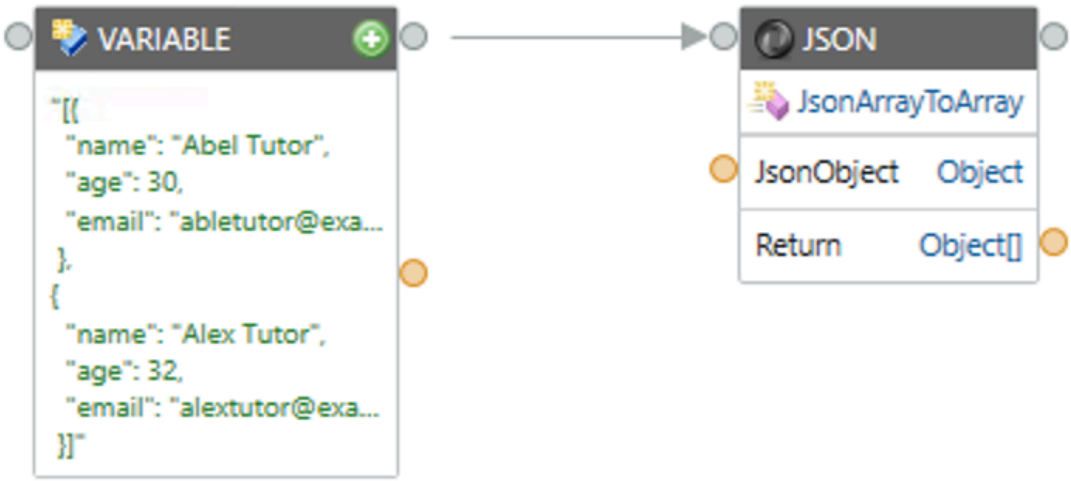
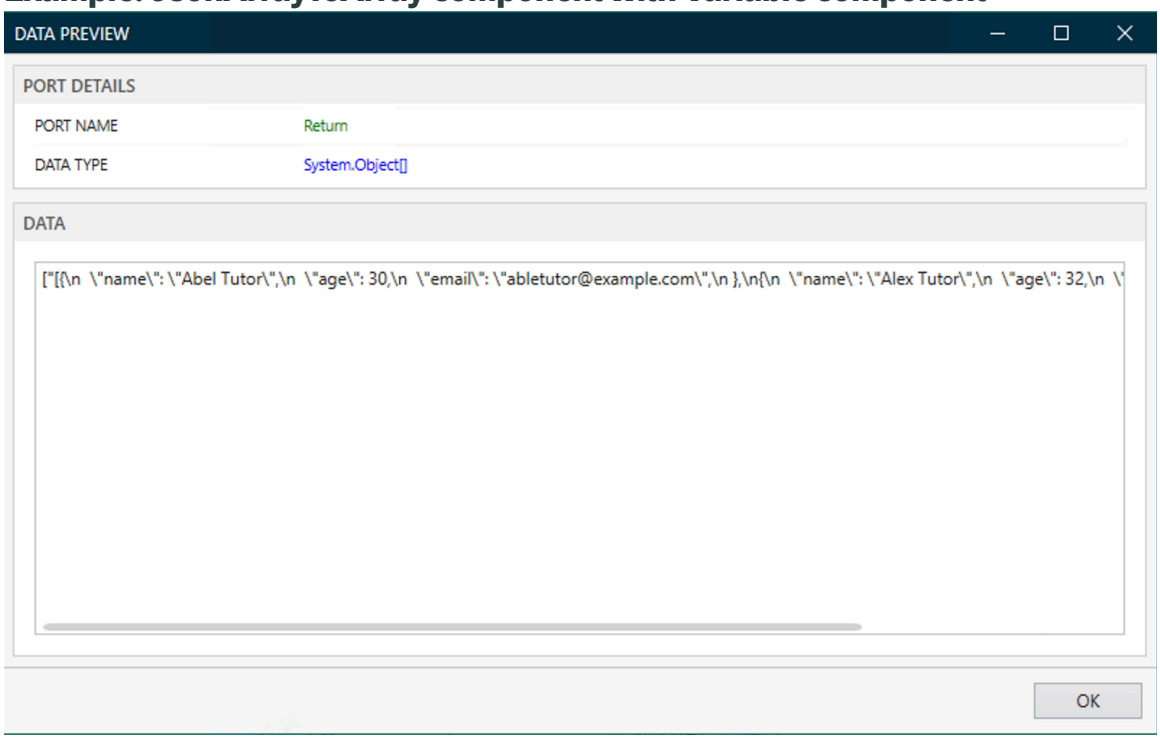
Port type	Port name	Data type	Description
			array returned until the criteria is met.

JsonArrayToArray component with Variable component



8. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.
9. To view the complete data output, right-click the Data port of JsonArrayToArray component and select **Preview Data**.

Example: JsonArrayToArray component with Variable component



Use the SerializeObject component

Convert a JSON object to a string by using the SerializeObject component in RPA Desktop Design Studio.

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Before you begin
Role required: none

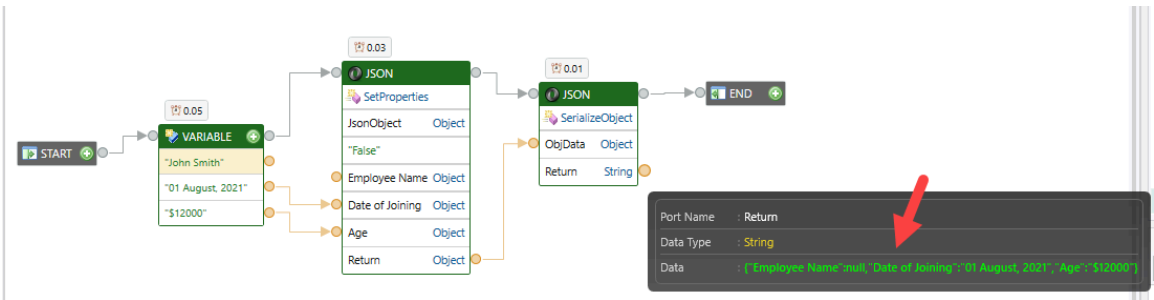
About this task
To configure the properties for the SerializeObject component, see Properties of the JSON utilities.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **JSON**.
2. Drag the SerializeObject component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. **Optional:** Connect the data and control ports of the SerializeObject component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Description
Data In	ObjData	Object	The JSON object to be converted to a string.
Data Out	Return	String	Returns a JSON string which is representation of given object.

5. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Example: Convert employee data from JSON object format to string



In this example, a JSON object contains the name, date of joining, and the salary of an employee. The JSON object is created by using the SetProperties component. To convert the JSON object to string, we use the SerializeObject component. After you run the automation, point the mouse device over the **Return** Data Out port of the SerializeObject component. The component displays the data as a string.

Use the SetProperties component

Set multiple properties within a JSON object by using the SetProperties component in the RPA Desktop Design Studio. You can also override a property within the JSON object.

Before you begin
Role required: none

About this task
To configure the properties of the SetProperties component, see Properties of the JSON utilities.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **JSON**.
2. Drag the SetProperties component to the Design surface.
3. Click the component settings icon ( ).
4. Click the add property icon ( ).
5. Enter the property name.
6. Repeat the steps to add more property names.
7. Click **OK**.
8. To provide the values for the property names, see Configure port properties.
9. **Optional:** Connect the data and control ports of the SetProperties component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Description
Data In	JsonObject	Object	The JSON object in which the properties are to be set. (Optional) The properties that you set in this component are added to the JSON object.
Data In	Override	Boolean	Indicates whether to override properties, if they already exist. (Optional) If True, the component overrides an existing property in the JSON object with the property that you specify. Else, if False, it doesn't override any property.
Data In	Name of the port is the same as the name of the property that you added in the component settings.	Object	Takes the value of the property name.
Data Out	Return	Object	Returns a JSON object with updated or new values for multiple properties.

10. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

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Use the SetProperty component

Set a property within a JSON object by using the SetProperty component in the RPA Desktop Design Studio. You can also override a property within the JSON object.

Before you begin

Role required: none

About this task

To configure the properties of the SetProperty component, see Properties of the JSON utilities.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **JSON**.
2. Drag the SetProperty component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. **Optional:** Connect the data and control ports of the SetProperty component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Description
Data In	JsonObject	Object	The JSON object in which the property is to be set. (Optional) The property that you set in this component is added to the JSON object.
Data In	PropertyName	String	The name of the property to set in the JSON object.
Data In	PropertyValue	String	The value to set for the specified property in the JSON object.
Data In	Override	Boolean	Indicates whether to override the property if it already exists. (Optional) If True, the component overrides an existing property in the JSON object with the property that you specify. Else, if False, it doesn't override any property.
Data Out	Return	Object	Returns the JSON object with the

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Port type	Port name	Data type	Description
			updated or new property value.

5. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Properties of the JSON utilities

Learn about the properties of the JSON utilities in RPA Desktop Design Studio.

Properties for the JSON utilities

Property name	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Keyboard

The Keyboard component in the RPA Desktop Design Studio simulate keyboard strokes and shortcuts to perform various day-to-day actions on various applications and programs.

Use the SendKeys component

Simulate the actions of the standard Microsoft Windows supported keys on various applications and programs with the SendKeys component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

The standard Microsoft Windows keyboard provides many keyboard functions to perform various day-to-day tasks quickly and efficiently. For example, **[Alt+A]** can select all content on a file.

Note: You must specify the keyboard shortcuts within the square brackets []. For example, [Ctrl+A].

To see the various supported keys, see Supported keys and functions.

You can configure the properties for the SendKeys component. For more information about these properties, see Properties of keyboard components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Keyboard**.
2. Drag the SendKeys component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the SendKeys component to the corresponding ports of the other components as described in the following table.

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Port type	Port name	Data type	Purpose of connection	Mandatory?
Data In	keys	String	Takes keys that perform an action on the application.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of keyboard components

Learn about the properties of the keyboard components in RPA Desktop Design Studio.

Properties of the keyboard components

Property name	Description
Delay Before Execution	The number of seconds to pause before running.
Delay After Execution	The number of seconds to pause after running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Math

The Math components in the RPA Desktop Design Studio perform simple mathematical operations. For example, find the highest integer or round off a decimal.

Use the Max component

Take two integers and find which one is larger as part of an automation Workflow by using the Max component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Max component. For more information about these properties, see Properties of the Math components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Math**.
2. Drag the Max component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Max component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (Value1)	Takes the first of the two integers that the method compares from a previously executed component.	Yes
Data In (Value2)	Takes the last of the two integers that the method compares from a previously executed component.	Yes
Data Out (Return)	Returns the larger of the two integers entered and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Min component

Take two integers and find which one is smaller as part of an automation Workflow by using the Min component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Min component. For more information about these properties, see Properties of the Math components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Math**.
2. Drag the Min component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Min component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Value1)	Takes the first of the two integers that the method compares from a previously executed component.	Yes
Data In (Value2)	Takes the last of the two integers that the method	Yes

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Port type	Purpose of connection	Mandatory?
	compares from a previously executed component.	
Data Out	Returns the smaller of the two integers entered and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Round component

Round a decimal to the closest integer as part of an automation Workflow by using the Round component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Round component. For more information about these properties, see Properties of the Math components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Math**.
2. Drag the Round component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Round component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Value)	Takes the fraction number from a previously executed component.	Yes
Data In (Decimals)	Takes the integer value that defines the decimal places from a previously executed component.	Yes
Data Out	Returns the rounded off value to the closest integer and passes to the next component.	Yes. To preview the data, right-click the **Return** field and click **Preview Data**.

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Math components

Learn about the properties of the Math components in RPA Desktop Design Studio.

Properties of the Math components

Property	Description
Delay Before Execution	The number of seconds to pause before running.
Delay After Execution	The number of seconds to pause after running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Mouse

The Mouse components enable you to perform various mouse device actions as part of a Workflow on various programs and applications.

Use the Click component

Simulate the click actions of the mouse device on applications and programs with the Click component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Click component. For more information about these properties, see Properties of the Mouse components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Mouse**.
2. Drag the Click component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Click component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (Left)	Takes the exact position from the left of the screen in integer from a previously executed component. The mouse device click will occur at this position.	Yes
Data In (Top)	Takes the exact position from the top of the screen in integer from a previously executed component. The mouse device click will occur at this position.	Yes
Data In (ClickType)	Takes the type of click action the mouse device will perform from a previously executed component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetPosition component

Get the current mouse position on the screen in integer terms by using the GetPosition component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetPosition component. For more information about these properties, see Properties of the Mouse components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Mouse**.
2. Drag the GetPosition component to the Design surface.
3. Connect the data and control ports of the GetPosition component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Date Out (Left)	Takes the current mouse device position relative to the left of the screen from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
		To preview the data, right-click the **Return** field and click **Preview Data**.
Data Out (Top)	Takes the current mouse device position relative to the top of the screen from a previously executed component.	Yes To preview the data, right-click the **Return** field and click **Preview Data**.
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Move component

Move the mouse device to a precise location on the screen by specifying the parameters using the Move component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Move component. For more information about these properties, see Properties of the Mouse components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Mouse**.
2. Drag the Move component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Move component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Left)	Takes the location relative to the left of the screen from a previously executed component.	Yes
Data In (Top)	Takes the location relative to the top of the screen from a previously executed component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of any other component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Scroll component

Simulate the scrolling by the mouse device on applications and programs using the Scroll component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Scroll component. For more information about these properties, see Properties of the Mouse components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Mouse**.
2. Drag the Scroll component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Scroll component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Left)	Takes the position where the scrolling occurs relative to the left of the screen from a previously executed component.	Yes
Data In (Top)	Takes the position where the scrolling occurs relative to the top of the screen from a previously executed component.	Yes
Data In (ScrollType)	Takes the direction of scrolling from a previously executed component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Mouse components

Learn about the properties of the Mouse components in RPA Desktop Design Studio.

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Properties of mouse components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Random

The Random components in the RPA Desktop Design Studio perform random operations on data types. For example, generate a random password or a number within a range of numbers.

Use the Number component

Generate any random number between two integers by using the Number component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Number component. For more information about these properties, see Properties of the Random components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Random**.
2. Drag the Number component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Number component to the corresponding ports of the other components.

Port type	Purpose of connection	Mandatory?
Data In (Min)	Takes the starting integer of the range from a previously executed component.	Yes
Data In (Max)	Takes the ending integer of the range from a previously executed component.	Yes
Data Out (Return)	Returns the random number and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	No. Connecting the port is optional.

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of another component or the default end component.	No. Connecting the port is optional.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Password component

Generate any random password by using the Password component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can define the complexity of the password based on the following rules:

- Define the length of the password. 11 is the default length.
- Number of lowercase characters. The default number is 1.
- Number of uppercase characters. The default number is 1.
- Symbols. The default symbols are "~!@#$%^&*()_-+=;?\/"
- Number of symbols: The default count is 1.
- Numbers. The default number is 1.

To configure the properties for the Password component, see Properties of the Random components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Random**.
2. Drag the Password component to the Design surface.
3. To provide the inputs to the fields, see Configure port properties.
4. **Optional:** Connect the data and control ports of the Password component to the corresponding ports of the other components as described in the following table.

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Data In	Length	Integer	Takes the length of the password.	11	Yes
Data In	Lowercase	Integer	Takes the number of lowercase characters to be included in the password.	1	Yes
Data In	Uppercase	Integer	Takes the number of	1	Yes

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Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
			uppercase characters to be included in the password.		
Data In	Symbols	String	Takes the symbols to be included in the password.	~!@#$ %^&*()_-+=;? \/	Yes
Data In	SymbolsCount	Integer	Takes the count of symbols to be included in the password.	1	Yes
Data In	Numbers	Integer	Takes the total count of numbers to be included in the password.	1	Yes
Data Out	Return	String	Returns the random password.	Not applicable	Not applicable

5. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Use the String component

Generate a random string by using the String component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the String component. For more information about these properties, see Properties of the Random components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Random**.
2. Drag the String component to the Design surface.
3. Connect the data and control ports of the String component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Size)	Takes the length of the string from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Data Out	Returns the random string and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	Yes

4. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Random components

Learn about the properties of the Random components in RPA Desktop Design Studio.

Properties of the Random components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Reflection

The Reflection components in the RPA Desktop Design Studio perform standard Reflection operations on objects and classes. For example, retrieve object properties.

Use the GetListItem component

Return items from a list by using the GetListItem component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the GetListItem component. For more information about these properties, see Properties of the Reflection components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Reflection**.
2. Drag the GetListItem component to the Design surface.
3. To set the field that accepts an item from the list, do the following steps.

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a. Click the component settings icon ( ).

b. Click the add index icon ( ).

c. **Optional:** Update the data type of the index value.
A Data out port is dynamically created with each index that you add.

d. **Optional:** Repeat the steps to add more indexes.

e. Click **OK**.

4. To configure the input field, Configure port properties.
5. **Optional:** Connect the data and control ports of the GetListItem component to the corresponding ports of the other components.

Port type	Port name	Data type	Purpose of connection	Default value	Mandatory?
Data In	Instance	Object	Takes a list item.	No default value	Yes
Data Out	Name of the port is the same as the name of the index value that is created.	Object	Returns the list item.	Not applicable	Not applicable

6. **Optional:** To test the component, right-click the component bar and then click **Run From Here**.

Use the GetProperty component

Access single or multiple properties of a given object at a time by using the GetProperty component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetProperty component. For more information about these properties, see Properties of the Reflection components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Reflection**.
2. Drag the GetProperty component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Click the add icon ( ) on the GetProperty component title bar to add the additional parameters.

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5. Connect the data and control ports of the GetProperty component to the corresponding ports of the other components.

Port type	Purpose of connection	Mandatory?
Data In	Connects to the Data Out port of another component from where the data is to be collected. The For Loop component exposes the From and To Data In ports.	Yes
Dynamic Data Out	Connects to the Data In port of another component where the data is to be displayed. This port is displayed when you add items into the component.	No
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	Yes

6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SetListItem component

Return the specific defined st items by using the SetListItem component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the SetListItem component. For more information about these properties, see Properties of the Reflection components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Reflection**.
2. Drag the SetListItem component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the SetListItem component to the corresponding ports of the other components.

Port type	Purpose of connection	Mandatory?
Data In	Connects to the Data Out port of another component from where the data is to be collected. The For Loop	Yes

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Port type	Purpose of connection	Mandatory?
	component exposes the From and To Data In ports.	
Dynamic Data Out	Connects to the Data In port of another component where the data is to be displayed. This port is displayed when you add items into the component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SetProperty component

Set the properties of an object instance by using the SetProperty component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the SetProperty component. For more information about these properties, see Properties of the Reflection components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Reflection**.
2. Drag the SetProperty component to the Design surface.
3. On the SetProperty component bar, click the component settings icon ( ).
4. To add a property, click the add property icon ( ).
5. In the **Property Name** box, enter the property name.
6. **Optional:** Update the property data type from the list.
7. To configure input fields, see Configure port properties.
8. Connect the data and control ports of the SetProperty component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Instance)	Passes the object from a previously executed component.	No. Connecting the port is optional.
Data Out (Object)	Passes the object properties from a previously executed component.	No. Connecting the port is optional.

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	Yes

9. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Reflection components

Learn about the properties of the Reflection components in RPA Desktop Design Studio.

Properties of the Reflection components

Property	Description
Search	Option to enable a search for a property.
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.

String utilities

The String components in the RPA Desktop Design Studio perform different operations on strings. For example, replace or convert string to upper or lower case.

Use the Base64Decode component

Convert a base64 string to text by using the Base64Decode component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Base64Decode component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Base64Decode component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the Base64Decode component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Data port type	Data type
Base64String	Used to specify Base64 string that converts to a normal string.	Data In	String

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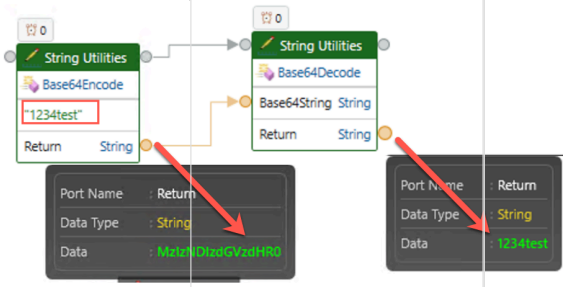
Port type	Purpose of connection	Data port type	Data type
	Takes the encoded Base64 string from a previously executed component, such as Base64Encode component. For example, if you input a value like `1234test` in the Base64Encode component and then connect it to the Base64Decode component, running the components will result in the Base64Encode component encoding the value `1234test` and passing it to the Base64Decode component. The Base64Decode component then decodes the encoded value, such as "MzIzNDIzdGVzdHR0" and retrieves the original output as "1234test". **Base64Encode and Base64Decode components** 		
Return	Returns a string representing plain text.	Data Out	String

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the Base64Encode component

Encode a string with the base64 algorithm by using the Base64Encode component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Base64Encode component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Base64Encode component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Base64Encode component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection
Data In (Text)	Passes the text the component encodes from a previously executed component. Used to specify the string that is converted to a Base64 string. Data type: String
Data Out (Return)	Returns the encoded string and passes to the next component.
Control In	Passes the control from the previously executed component.
Control Out	Passes the control to the next component to be executed.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Compare component

Compare two string objects that are based on their ASCII values by using the Compare component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
Compare method is used to compare given text with provided options. If option is matched, it opens the matching control out port.

You can configure the properties for the Compare component. For more information about these properties, see Properties of the String Utilities components.

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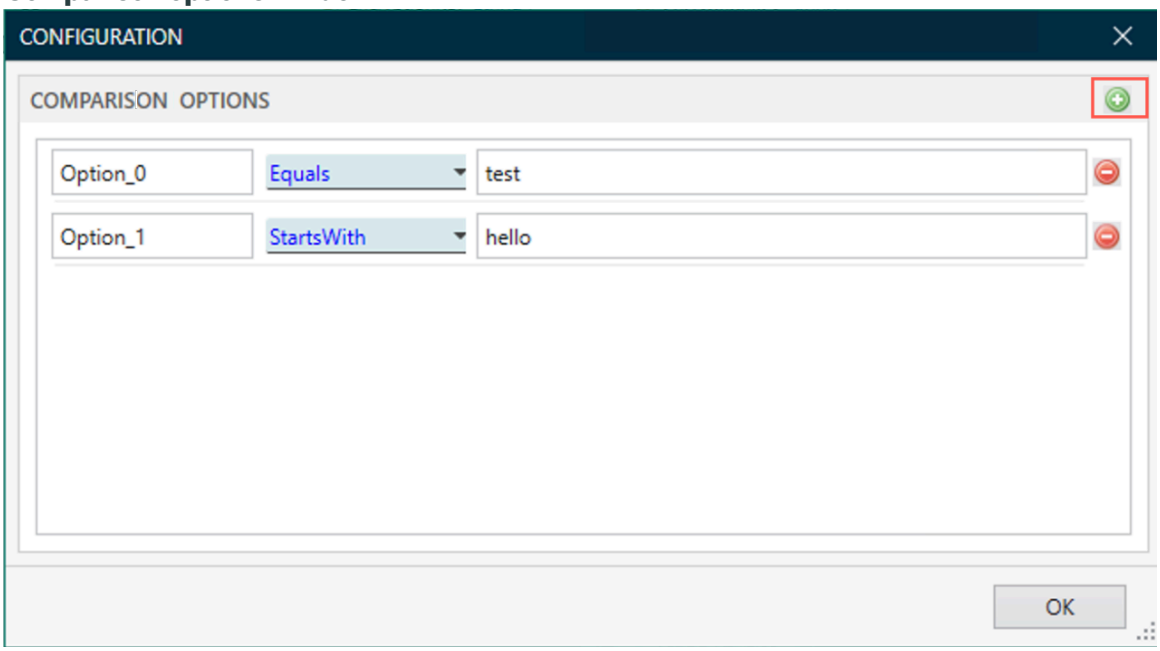
Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Compare component to the Design surface.
3. In the Compare component, double click the title bar to launch the Configuration editor.
4. Select the Add icon ( ) to add the string options from the Comparison Options drop-down list.

   For example, select the following options.

Comparison options window



5. Connect the data and control ports of the Compare component to the corresponding ports of the other components as described in the following table.

Compare component parameters

Name	Purpose of connection	Port type	Data type
Text	Provide text that must be compared with multiple control out ports based on the comparison type. For example, if you provide `hello welcome` as the comparison text, the component compares option 0 and option 1. Since Option 1 starts with hello, it matches with the text provided. Connect this to	Data In	String

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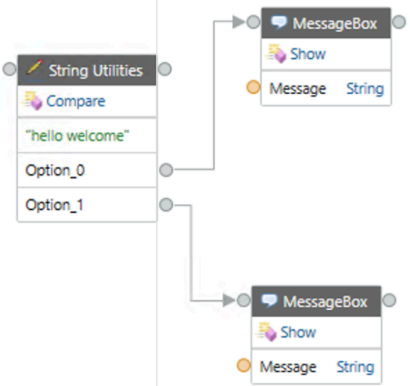
Name	Purpose of connection	Port type	Data type
	a MessageBox component to view the output. **Compare component** 		

6. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Contains component

Check whether a body of text contains a specified text by using the Contains component in the RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Contains component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Contains component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Contains component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection
Data In (Text)	Takes the text that the component searches from a previously executed component. Data type: String
Data In (textToSearch)	Takes the text that the component tries to find from a previously executed component.

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Port type	Purpose of connection
	Used to specify the string that must be checked, whether it is available or not. Data type: String
Data In (IgnoreCase)	Takes the Boolean value to indicate whether the component ignores the case while searching for the text. Used to specify the boolean value. If value is false, it checks the case sensitive, otherwise it ignores the case sensitive. Data type: Boolean
Data Out	Returns the Boolean response to whether the text searched was found and passes to another component. Data type: Boolean
Control In	Connects to the Control Out port of one or more components.
Control Out	Connects to the Control In port of another component or the default end component.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Format component

Provide a placeholder and a value in a body of text by using the Format component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Format component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Format component to the Design surface.
3. To configure the input fields, see Configure port properties.
   You must insert is {0} as the placeholder.
4. Connect the data and control ports of the Format component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection
Data In (_Format)	Passes the text body and the placeholder from a previously executed component.

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Port type	Purpose of connection
	Used to specify the format. Data type: String
Data In (Input)	Used to specify the input string that is replaced in given format. Data type: String
Data Out (Return)	Returns the text body with the placeholder value inserted in the placeholder. This method returns a string that represents formatted text. Data type: String
Control In	Connects to the Control Out port of one or more components.
Control Out	Connects to the Control In port of another component or the default end component.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetLength component

Count the number of characters including spaces and special characters in a string by using the GetLength component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the GetLength component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the GetLength component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetLength component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the characters that the component counts from a previously executed component. Used to specify the string from where the length is retrieved.	Yes

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Port type	Purpose of connection	Mandatory?
	Data type: String	
Data Out (Return)	Returns the number of characters including the spaces and special characters and passes to the next component. Returns an integer that represents the text length. Data type: integer	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetHashCode component

Generate a HashCode from a string by using the GetHashCode component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the GetHashCode component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the GetHashCode component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetHashCode component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection
Data In (Text)	Takes the string from a previously executed component. Used to specify the string from where the hashcode is computed. Data type: String

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Port type	Purpose of connection
Data Out (Return)	Returns the generated HashCode and passes to the next component. Data type: String
Control In	Connects to the Control Out port of one or more components.
Control Out	Connects to the Control In port of another component or the default end component.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetTextAfter component

Find the string characters that are placed after a string by using the GetTextAfter component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the GetTextAfter component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the GetTextAfter component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetTextAfter component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection
Data In (Text)	Takes the text that the component searches from a previously executed component. Used to specify the string from where a substring is extracted, beginning at a specific position identified by a string match, and continuing for a specified length. Data type: String
Data In (findStr)	Takes the string characters that the component finds in the text from a previously executed component. Used to specify the string that determines the starting position based on a string match. Data type: String
Data In (length)	Takes the number of characters that the component finds in the text from a previously executed component.

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Port type	Purpose of connection
	Used to specify the number of characters to be extracted from a given string. Data type: Integer
Data Out	Returns the string the component found and passes to the next component. This method returns a string that represents the text after the search text. Data type: String
Control In	Connects to the Control Out port of one or more components.
Control Out	Connects to the Control In port of another component or the default end component.

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetTextBefore component

Find the string characters that are placed before a string by using the GetTextAfter component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
This method is used to extract text that precedes a specified find string up to a specified length. If the length is 0, it extracts text from the beginning of the string.

You can configure the properties for the GetTextBefore component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the GetTextBefore component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetTextBefore component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection
Data In (Text)	Takes the text that the component searches from a previously executed component. Used to specify the string from where a sub string is extracted, starting at a position determined by a string match minus a specified length, and extending for a specified length. Data type: String

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Port type	Purpose of connection
Data In (findStr)	Takes the string characters that the component finds in the text from a previously executed component. Used to specify the string that determines the starting position based on a string match. Data type: String
Data In (length)	Takes the number of characters that the component finds in the text from a previously executed component. Used to specify the number of characters to be extracted from a given string. Data type: Integer
Date Out (Return)	Returns the specified sub string. This method returns a string that is the text found before search string. Data type: String
Control In	Connects to the Control Out port of one or more components.
Control Out	Connects to the Control In port of another component or the default end component

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetTextBetween component

Find the string characters that are placed between two strings by using the GetTextBetween component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the GetTextBetween component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the GetTextBetween component onto the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetTextBetween component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text that the component searches from	Yes

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Port type	Purpose of connection	Mandatory?
	a previously executed component.	
Data In (findStr1)	Takes the first set of string characters that is placed on one side of the string the component searches from a previously executed component.	Yes
Data In (findStr2)	Takes the first set of string characters that is placed on the other side of the string the component searches from a previously executed component.	Yes
Data Out	Returns the string between strings and passes to the next component. **Note:** The returned value may include spaces. Spaces between characters are also counted as characters.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetValueByRegex component

Specify a regular expression and characters to find characters that match by using the GetValueByRegex component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetValueByRegex component. For more information about these properties, see Properties of the String Utilities components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the GetValueByRegex component to the Design surface.
3. To configure the input fields, see Configure port properties.

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4. Connect the data and control ports of the GetValueByRegex component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text from a previously executed component.	Yes
Data In (RegExpression)	Takes the regular expression from a previously executed component.	Yes
Data Out (Boolean)	Returns the status of the regular expression matching in Boolean and passes to the next component.	Yes
Data Out (List 1)	Returns the matched value.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the IsEqual component

Check whether two string objects have the same value by using the IsEqual component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the IsEqual component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the IsEqual component to the Design surface.
3. To configure the input fields, see Configure port properties.

> **Note:** The component considers the case of the string values as it performs a case-sensitive comparison.

4. Connect the data and control ports of the IsEqual component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (Text1)	Takes the first of the two strings that the component compares from a previously executed component.	Yes
Data In (Text2)	Takes the last of the two strings that the component compares from a previously executed component.	yes
Data Out (Boolean)	Returns the Boolean value indicating whether the strings matched and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the IsNullOrEmpty component

Determine whether the text is null or an empty string by using the IsNullOrEmpty component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the IsNullOrEmpty component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the IsNullOrEmpty component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the IsNullOrEmpty component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text that the component evaluates from a previously executed component.	Yes
Data Out (Boolean)	Returns the Boolean response to whether the	Yes

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Port type	Purpose of connection	Mandatory?
	text is null or empty and passes the value to the next component.	
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the IsNullOrWhiteSpace component

Determine whether the text is null or contains only white-space characters by using the IsNullOrWhiteSpace component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the IsNullOrWhiteSpace component. For more information about these components, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the IsNullOrWhiteSpace component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the IsNullOrWhiteSpace component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text that the component evaluates from a previously executed component.	Yes
Data Out (Boolean)	Returns the Boolean response to whether the text is null or contains whitespaces and passes the value to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Join component

Concatenate the elements of an array into a string by using the Join component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can concatenate the elements of an array into a string by applying a specified separator such as dot, comma, or pipe. For example, if the string is {“Apple”, “Banana”, “Orange”} and separator is dot (.), then the concatenated string would be "Apple.Banana.Orange".

You can configure the properties for the Join component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Join component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Join component to the corresponding ports of the other components as described in the following table.

Parameter name	Description	Data Port type	Data type
StringArray	Specify a string array that you want to concatenate or use the string array from the previously executed component.	Data In	String[]
Separator	The text separator that joins the arrays such as dot (.), comma (,), or pipe (|).	Data In	String
String	Returns concatenated string as an output that you can use in the next component.	Data Out	String

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the Occurrence component

Count how many times a character or word appears in a text body by using the Occurrence component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Occurrence component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Occurrence component to the Design surface.
3. To configure the text fields, see Configure port properties.
4. Connect the data and control ports of the Occurrence component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text that the component searches from a previously executed component.	Yes
Data In (pattern)	Takes the word or character that the component searches for the number of occurrences from a previously executed component.	Yes
Data In (IgnoreCase)	Takes the Boolean value to indicate whether the component ignores the case while searching for occurrences from a previously executed component.	No
Data Out (Return)	Returns the number of occurrences of the character or word as an integer and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the RemoveWhiteSpace component

Remove any white spaces from a string by using the RemoveWhiteSpace component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the RemoveWhiteSpace component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the RemoveWhiteSpace component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the RemoveWhiteSpace component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text from which the component removes whitespace from a previously executed component.	Yes
Data Out	Returns the string after removing the whitespaces and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Replace component

Replace all occurrences of a word in a text with another word by using the Replace component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Replace component. For more information about these properties, see Properties of the String Utilities components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Replace component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Replace component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text where the component replaces a word or character from a previously executed component.	Yes
Data In (oldValue)	Takes the text or character that the component replaces from a previously executed component.	Yes
Data In (newValue)	Takes the text or character that the component replace the old text with from a previously executed component.	Yes
Data Out (String)	Returns the text after replacing the specified word and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the Split component

Divide a string into substrings by applying a specified separator. You can do this task by using the Split component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Split component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Split component to the Design surface.

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3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Split component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text that the component will be separating with the separator from a previously executed component.	Yes
Data In (separator)	Takes the separator that the component uses to separate the string from a previously executed component.	Yes
Data Out	Returns the substring of the string and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the SubString component

Retrieve a substring from a string by using the SubString component in RPA Desktop Design Studio. You can specify the start character position and length of the substring.

Before you begin

Role required: none

About this task

You can configure the properties for the SubString component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the SubString component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the SubString component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (String)	Takes the string from which the component creates a	Yes

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Port type	Purpose of connection	Mandatory?
	substring from a previously executed component.	
Data In (startindex)	Takes the index position value of the string characters from a previously executed component. For example, if RPA is the string and 2 is the index value, the substring starts from the character"A" and is A.	Yes
Data Out (String)	Returns the substring and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ToLowerCase component

Convert an uppercase text to lowercase letters by using the ToLowerCase component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the ToLowerCase component. For more information about these properties, see Properties of the String Utilities components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the ToLowerCase component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ToLowerCase component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text that the component converts to lowercase from a previously executed component.	Yes

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Port type	Purpose of connection	Mandatory?
Data Out (String)	Returns the lowercase text and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	In

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ToUpperCase component

Convert a lowercase text to uppercase by using the ToUpperCase component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the ToUpperCase component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the ToUpperCase component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ToUpperCase component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text that the component converts to uppercase from a previously executed component.	Yes
Data Out (String)	Returns the specified text in uppercase letters and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the Trim component

Remove the white-space characters at the beginning and end of a string by using the Trim component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the Trim component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the Trim component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the Trim component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text from which the component trims the whitespace.	Yes
Data Out (String)	Returns the trimmed text and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the TrimEnd component

Remove the white-space characters that you specify at the end of the text by using the TrimEnd component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the TrimEnd component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the TrimEnd component to the Design surface.
3. To configure the input fields, see Configure port properties.

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4. Connect the data and control ports of the TrimEnd component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text that the component trims from a previously executed component.	Yes
Data Out (String)	Returns the text after removing the white-space characters and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the TrimStart component

Remove white-space characters at the beginning of the text that you specify by using the TrimStart component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the TrimStart component. For more information about these properties, see Properties of the String Utilities components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **String Utilities**.
2. Drag the TrimStart component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the TrimStart component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Text)	Takes the text that the component trims from a previously executed component.	Yes
Data Out (String)	Returns the text after removing the white-space characters and passes to the next component.	Yes

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the String Utilities components

Learn about the properties of the String Utilities components in RPA Desktop Design Studio.

Properties of the String Utilities components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

System process

The System components in the RPA Desktop Design Studio perform standard Windows systems operations. For example, get the process ID or terminate a process.

Use the CloseMainWindow component

Closes any Windows application by providing the Process ID as input.

Before you begin

Role required: none

About this task

You can configure the properties for the CloseMainWindow component. For more information about these properties, see Properties of the System Process components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **System Process**.
2. Drag the CloseMainWindow component to the Design surface.
3. To configure the input field, see Configure port properties.
4. Connect the data and control ports of the CloseMainWindow to the corresponding ports of the other component as described in the following table.

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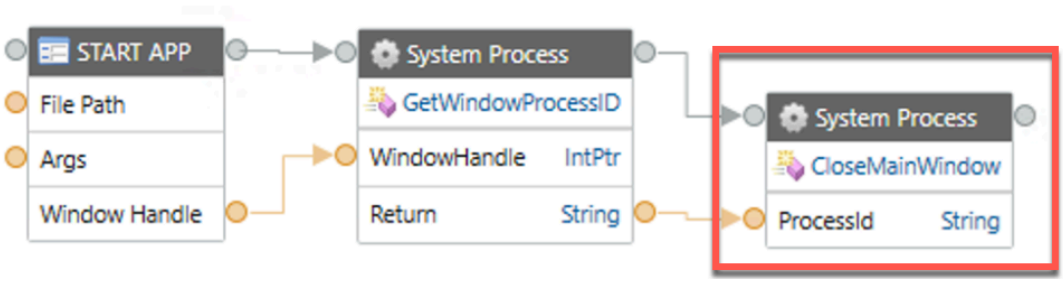
Parameter	Description	Port type	Mandatory?
ProcessId	The process ID of the application to close. You can pass this value from a previously executed component. You can get the ProcessId by opening the Task Manager on your Windows machine. **Example:** ProcessId of Services.exe: 660	Data In	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Example:
As part of your automation workflow, after you have opened an app, such as Windows Terminal and ran a command on it, you can close the app window by providing the process ID in the CloseMainWindow component.

Add the Start App component and GetWindowProcessID component before the CloseMainWindow component and connect the ports as shown in the image.

For more information about these components, see Use the Start App component and Use the GetWindowProcessID component.



Use the GetMainWindowHandle component

Retrieve the window handle of a main window of an active process by using the GetMainWindowHandle component in RPA Desktop Design Studio. This component accepts the Process ID as input and returns the Integer value of the specified process.

Before you begin
Role required: none

About this task
You can configure the properties for the GetMainWindowHandle component. For more information about these properties, see Properties of the System Process components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **System Process**.
2. Drag the GetMainWindowHandle component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetMainMainWindowHandle to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (ProcessId)	Takes the process ID of the window as a string from a previously executed component.	Yes
Data Out (Integer)	Returns the Windows handle of the specified process and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetMainWindowHandleAsInt component

Retrieve the window handle of a main window of an active process as an integer by using the GetMainWindowHandleAsInt component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetMainWindowHandleAsInt component. For more information about these properties, see Properties of the System Process components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **System Process**.
2. Drag the GetMainWindowHandleAsInt component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetMainWindowHandleAsInt to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (String)	Takes the Process ID of the Window from a previously executed component.	Yes
Data Out (Integer)	Returns the IntPtr value of the specified process as an integer and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the GetWindowProcessID component

Retrieve the window handle of a main window of an active process as an integer by using the GetWindowProcessID component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the GetWindowProcessID component. For more information about these properties, see Properties of the System Process components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **System Process**.
2. Drag the GetWindowProcessID component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the GetWindowProcessID component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (WindowHandle)	Takes the Windows handle number as an integer from a previously executed component.	Yes
Data Out ()	Returns the ProcessID value of the specified process as a String and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes

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Port type	Purpose of connection	Mandatory?
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the StartNew component

Start a new process by using the StartNew component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the StartNew component. For more information about these properties, see Properties of the System Process components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **System Process**.
2. Drag the StartNew component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the StartNew component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (Filepath)	Takes the filePath and Params of the process that needs to be started from a previously executed component.	Yes
Data In (Params)	Takes the parameter of the process that needs to be started from a previously executed component.	Yes
Data Out (String)	Returns the Process ID and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the Terminate component

End the specified Windows system process by using the Terminate component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the Terminate component. For more information about these properties, see Properties of the System Process components.

Procedure

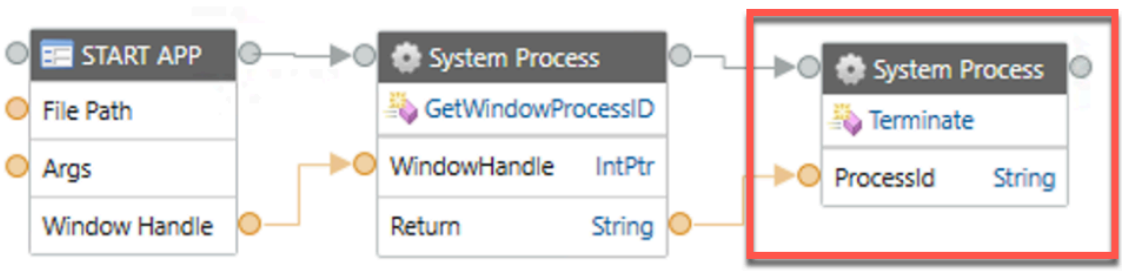
1. In the Toolbox pane, navigate to **Utilities** > **System Process**.
2. Drag the Terminate component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the Terminate component to the corresponding ports of the other component as described in the following table.

Parameter	Description	Port type	Mandatory?
ProcessId	The process ID of the process to terminate. You can pass this value from a previously executed component. You can get the processId by opening the Task Manager on your Windows machine. **Example:** ProcessId of Services.exe: 660	Data In	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Example:

As part of your automation workflow, after you have opened an app, such as Windows Terminal and ran a command on it, you can terminate the app by providing the process ID in the Terminate component.



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Use the TerminateByName component

Use the TerminateByName component to end the specified process or application, for example Chrome browser, Excel, Notepad, by its respective name.

Before you begin
Role required: none

About this task
You can configure the properties for the TerminateByName component. For more information about these properties, see Properties of the System Process components.

During high density robots execution, the TerminateByName component checks and terminates the specified process or application only with in the current user session. When an automation runs on a virtual machine, it queries for the process and terminates it within the same user session of the robot. If the same process is running inside other user sessions on virtual machine, those process instances are not terminated.

Note: Within the current user session, if the robot user does not have permissions to terminate a process, component throws an error.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **System Process**.
2. Drag the TerminateByName component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the TerminateByName component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In	Takes the process name of the process to terminate from a previously executed component. For example, Notepad.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of any other component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the WhoLockedFile component

Provide a file path to find out the user name of the person who locked a file by using the WhoLockedFile component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the WhoLockedFile component. For more information about these properties, see Properties of the System Process components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities > System Process**.
2. Drag the WhoLockedFile component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the WhoLockedFile component to the corresponding ports of the other component as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (FilePath)	Takes the file name from a previously executed component.	Yes
Data Out (Return)	Returns the user name and passes to the next component.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the System Process components

Learn about the properties of the System Process components in RPA Desktop Design Studio.

Properties of the System Process components

Property	Description
Search	Option to enable a search for a property.
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.

Token

The Token utilities in the RPA Desktop Design Studio retrieve the OKTA token to get access to an application.

Use the GetTOTP component

Generate the Time-based One-time Password (TOTP) to access multi-factor authentication (MFA)-enabled applications in an automation by using the GetTOTP component in the RPA Desktop Design Studio application.

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Before you begin

- Create an MFA authenticator record and map the TOTP authenticator to the robot credential. For more information on how to perform these tasks on RPA Hub, see Create an MFA authenticator in RPA Hub and Create a TOTP authenticator in RPA Hub. For more information on TOTP authentication in RPA Hub, see TOTP authentication in RPA Hub.
- Connect to the required instance in RPA Desktop Design Studio and assign the bot process with the TOTP record to the automation. For more information, see Assign bot process to an automation project.

Role required: sn_rpa_fdn.rpa_release_manager or sn_rpa_fdn.rpa_admin

About this task

The TOTP record is created in RPA Hub and the record is associated to the robot credential. The GetTOTP component in RPA Desktop Design Studio has an *AuthenticatorName* parameter. The authenticator name that you provide from the component must be present in the TOTP record. If the authenticator is present, the TOTP is generated.

Procedure

1. Navigate to **Utilities** > **Token** from the Toolbox pane in the **Design** tab.
2. Drag the **GetTOTP** component to the Design surface.
3. In the **AuthenticatorName** field of the component, enter the name of the authenticator. The name that you enter must match with the value in the **Authenticator** field of the TOTP record.
4. To test the component, right-click the component and select **Run From Here**. You can also run the automation by selecting **Run** from the **Design** tab.

   When the component is successfully run, the output ports are populated in the connector as per the following table.

Output ports of the GetTOTP component

Port name	Port type	Port description
TOTP	Data Out	One-time password that is generated at that point of execution.
ValidFor	Data Out	Time in seconds until the password is valid.

5. **Optional:** To test the component, right-click the component and select **Run From Here**. You can also run the automation by selecting **Run** from the **Design** tab.

Properties of the Token components

Learn about the properties of the Token components in RPA Desktop Design Studio.

Properties of the Token components

Property name	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.

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Properties of the Token components (continued)

Property name	Description
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Zip

The Zip components in the RPA Desktop Design Studio perform standard Zip utility operations. For example, extract or remove files.

Use the AddDirectory component

Add the directory contents to an existing zip archive by using the AddDirectory component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the AddDirectory component. For more information about these properties, see Properties of the Zip components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Zip**.
2. Drag the AddDirectory component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the AddDirectory component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (zipFilePath)	Takes the zipFilePath.	Yes
Data In (directoryPath)	Takes the directory path.	Yes
Data Out	Returns **True** if the directory contents are successfully added to the specified zip archive. Otherwise, returns **False**.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

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Use the AddFile component

Add a file to an existing zip archive by using the AddFile component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the AddFile component. For more information about these properties, see Properties of the Zip components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Zip**.
2. Drag the AddFile component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the AddFile component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (zipFilePath)	Takes the zipFilePath from a previously executed component.	Yes
Data In (directoryPath)	Takes the directory path from a previously executed component.	Yes
Data Out	Returns **True** if the file is successfully added to the specified zip archive. Otherwise, returns **False**.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the AddFiles component

Add multiple files to an existing zip archive by using the AddFiles component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the AddFiles component. For more information about these properties, see Properties of the Zip components.

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Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Zip**.
2. Drag the AddFile component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the AddFiles component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (zipFilePath)	Takes the zipFilePath from a previously executed component.	Yes
Data In (directoryPath)	Takes the directory path from a previously executed component.	Yes
Data Out	Returns **True** if the files are successfully added to the specified zip archive. Otherwise, returns **False**.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the CreateFile component

Zip an existing folder or create a zip file by using the CreateFile component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the CreateFile component. For more information about these properties, see Properties of the Zip components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Zip**.
2. Drag the CreateFile component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the CreateFile component to the corresponding ports of the other components as described in the following table.

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Port type	Purpose of connection	Mandatory?
Data In (zipFilePath)	Location of the zip file along with the zip file name that needs to be created. For example, `C:\Users\abel.tutor\Downloads\test.zip`	Yes
Data In (Path)	Location of the source file or folder. For example, for file- `C:\Users\abel.tutor\Downloads\test.txt` For example, for folder- `C:\Users\abel.tutor\Downloads`	Yes
Type	Open port properties and then select either **File** or **Folder** from the **Static Value** field.	Yes
Data Out (Boolean)	Returns **True** if the file is successfully created to the specified location. Otherwise, returns **False**.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ExtractAll component

Extract all the files from a zip archive to a specific location by using the ExtractAll component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the ExtractAll component. For more information about these properties, see Properties of the Zip components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Zip**.
2. Drag the ExtractAll component to the Design surface.

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3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the ExtractAll component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (zipFilePath)	Takes the zipFilePath from a previously executed component.	Yes
Data In (PathToExtract)	Takes the extraction path from a previously executed component.	Yes
Data Out	Returns **True** if the files are successfully extracted to the specified location. Otherwise, returns **False**.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the ExtractFile component

Extract a file from a zip archive to a specified location by using the ExtractFile component in RPA Desktop Design Studio.

Before you begin

Role required: none

About this task

You can configure the properties for the ExtractFile component. For more information about these properties, see Properties of the Zip components.

Procedure

1. In the Toolbox pane, navigate to **Utilities** > **Zip**.
2. Drag the ExtractFile component to the Design surface.
3. To configure the inputs, see Configure port properties.
4. Connect the data and control ports of the ExtractFile component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (zipFilePath)	Provides the zipFilePath and PathtoExtract Data In ports to extract files to a location.	Yes

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Port type	Purpose of connection	Mandatory?
Data In (file)	Takes the file name from a previously executed component.	Yes
Data In (filePath)	Takes the file path from a previously executed component.	Yes
Data Out	Returns **True** if the files are successfully extracted to the specified location. Otherwise, returns **False**.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	No

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Use the RemoveFile component

Delete a specified file in a zip archive by using the RemoveFile component in RPA Desktop Design Studio.

Before you begin
Role required: none

About this task
You can configure the properties for the RemoveFile component. For more information about these properties, see Properties of the Zip components.

Procedure
1. In the Toolbox pane, navigate to **Utilities** > **Zip**.
2. Drag the RemoveFile component to the Design surface.
3. To configure the input fields, see Configure port properties.
4. Connect the data and control ports of the RemoveFile component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Data In (zipFilePath)	Provides the zipFilePath and PathtoExtract Data In ports to extract files to a location.	Yes
Data In (file)	Takes the file name from a previously executed component.	Yes
Data Out	Returns **True** if the files are successfully removed. Otherwise, returns **False**.	Yes

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Port type	Purpose of connection	Mandatory?
Control In	Connects to the Control Out port of one or more components.	Yes
Control Out	Connects to the Control In port of another component or the default end component.	Yes

5. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Zip components

Learn about the properties of the Zip components in RPA Desktop Design Studio.

Properties of the Zip components

Property	Description
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Enable Timeout	Option to set a timeout value.
Timeout	Number of seconds that the operation ends after if not completed. To apply this value, you must set the **Enable Timeout** property.

Wait

The Wait components in the RPA Desktop Design Studio enable you to detain or change the automation execution using the criteria provided in the component.

Use the Wait For Images component

Change the automation execution flow that is based on the image information on the screen by using the Wait For Images component in RPA Desktop Design Studio. You can also identify the state of a business application or an item that is based on an error or status icon.

Before you begin

Role required: none

About this task

You can configure the properties for the Wait For Images component. For more information about these properties, see Properties of the Wait components.

Procedure

1. In the Toolbox pane, navigate to **Wait**.
2. Drag the Wait For Images component to the Design surface.
3. To add images, click the add image icon on the Wait For Images component title bar.
4. To capture the image that you want the component to find first, click the .
5. To select a region, press the **CTRL+SHIFT** keys.
   You can add as many screenshots as you want by clicking the add image icon.

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The selected area is displayed in the Wait For Images component.

6. Connect the data and control ports of the Wait For Images component to the corresponding ports of the other components as described in the following table.

Port type	Purpose of connection	Mandatory?
Else	Connects to the Control In port of any other component. You can define an exception if no images are found.	Yes
Control In	Connects to the Control Out port of one or more components.	Yes
Dynamic Control Out	Connects to the Control In port of any other component. After you add more cases to the component, a control out port for every individual case is displayed.	Yes

7. **Optional:** To test the component, under the **DESIGN** tab, click **Run**.

Properties of the Wait components

Learn about the properties of the Wait components in RPA Desktop Design Studio.

Properties of the Wait components

Property	Description
Search	Option to enable a search for a property.
Delay After Execution	The number of seconds to pause after running.
Delay Before Execution	The number of seconds to pause before running.
Max Wait Time in Seconds	Maximum time, in seconds, to wait for the image or application to appear on the screen. The default value is 30 seconds.
Name	Name to identify the component. Choose a name that corresponds to the application field that you're working with.
Wait Options	Option to wait for all applications or any one of the applications whose screen shots are taken in the component.

RPA Desktop Design Studio reference

Reference topics provide additional information about the lists and forms that you use to configure and administer RPA Desktop Design Studio.

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Methods and events of an attended automation form

Learn about the methods and events of an attended automation form in RPA Desktop Design Studio.

The methods and events of the attended automation form are displayed in the Object Explorer pane.

Methods

Method	Description
GetFields	Gets the text from the selected fields.
Hide	Hides the form.
SetFields	Sets the text for the selected fields.
SetTitle	Sets the title of the designed form.
Show	Displays the designed form.
ShowBusy	Displays the Busy icon. • If True, displays that the designed form is in busy mode with message, if any. • If False, displays that the designed form is in normal mode.
ShowPopup	Displays a message in a pop-up window.
UpdateProgress	Provides visual feedback in the form as a progress bar. Set the percentage of the progress as required.

Events

Method	Description
OnOpen	Occurs when the form is opened.
OnClose	Occurs when the form is closed.

Related topics

Create an attended automation form in RPA Desktop Design Studio

Methods and events of elements

The methods and events for various form designing elements are displayed in the Object Explorer pane.

Methods and events of the Button element

The Button element in RPA Desktop Design Studio enables you to add one or more buttons on the form so that your user can click a button to perform an action.

The methods and events of the Button element are displayed in the Object Explorer pane.

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Methods

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

Click

Occurs when the element is clicked.

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the TextBlock element

The TextBlock element in RPA Desktop Design Studio enables you to add a label on the form so that your user can view that label as read-only information.

The methods and events of the TextBlock element are displayed in the Object Explorer pane.

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Methods

ClearText

Clears the text from the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetText

Gets the text from the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetText

Sets the text data to the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

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Methods and events of the TextBox element

The TextBox element in RPA Desktop Design Studio enables you to add a text box to a form so that your user can provide information within that text box.

The methods and events of the TextBox element are displayed in the Object Explorer pane.

Methods

ClearText

Clears the text from the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetText

Gets the text from the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetText

Sets the text data to the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

TextChanged

Occurs when the text property value changes.

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

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Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the Date element

The Date element in RPA Desktop Design Studio enables you to provide a date picker on the form. It enables the user to select a specific date on the form.

The methods and events of the Date element are displayed in the Object Explorer pane.

Methods

ClearValue

Clears the value from the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetValue

Gets the value from the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetValue

Sets the value to the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

ValueChanged

Occurs when the property value changes.

OnContextMenuClick

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Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the Time element

The Time element in RPA Desktop Design Studio enables you to provide a time picker on the form so that your user can select a specific time on the form.

The methods and events of the Time element are displayed in the Object Explorer pane.

Methods

ClearValue

Clears the value from the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetValue

Gets the value from the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetValue

Sets the value to the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

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- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

ValueChanged

Occurs when the property value changes.

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the DateTime element

The DateTime element in RPA Desktop Design Studio enables you to provide a date and time picker on the form so that your user can select a specific date and time on the form.

The methods and events of the DateTime element are displayed in the Object Explorer pane.

Methods

ClearValue

Clears the value from the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetValue

Gets the value from the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

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Sets the value of the built-in property of the current element.

SetValue

Sets the value to the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

ValueChanged

Occurs when the property value changes.

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the CheckBox element

The CheckBox element in RPA Desktop Design Studio enables you to capture true or false, yes or no, or on or off inputs from users. It helps in decision-making, enabling or disabling features, and controlling workflow execution.

The methods and events of the CheckBox element are displayed in the Object Explorer pane. You can use this element to present yes or no or true or false selections.

Use cases

- User preferences selection - Allows users to enable/disable specific options, such as "Run in background" or "Send email notification".
- Conditional execution - Based on whether the checkbox is checked, the automation can execute or skip certain steps.
- Multi-selection options - You can also use the check box element in groups to display multiple choices in a form. When multiple checkboxes are available, users can select multiple options. For example, selecting multiple file formats for export.
- Validation and confirmation - Ensures that a user has acknowledged terms, agreements, or completed a required step before proceeding.

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Methods

Checked

Sets a value of the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

IsChecked

Returns a Boolean value whether the current element is selected or cleared.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

OnStateChanged

Occurs when a state is changed.

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

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Methods and events of the RadioButton element

The RadioButton element in RPA Desktop Design Studio enables you to select a choice from a group of choices.

The methods and events of the RadioButton element are displayed in the Object Explorer pane.

Methods

Checked

Sets a value of the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

IsChecked

Returns a Boolean value whether the current element is selected or cleared.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

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Occurs when the focus moves out of the current element.

Methods and events of the ComboBox element

The ComboBox element in RPA Desktop Design Studio enables you to display the data in a drop-down combination box.

The methods and events of the ComboBox element are displayed in the Object Explorer pane. By default, the ComboBox element appears in two parts: the top part is a text box that enables you to type a list item. The second part is a list box that displays a list of items from which you can select one.

Methods

ClearItems

Removes all the items from the current element.

ClearSelection

Clears the current selection from the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetItems

Gets an object that represents the collection of the items that are contained in the current element.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetSelectedIndex

Gets the index value that specifies the currently selected item.

GetSelectedItem

Gets the selected item that specifies the currently selected item.

InvokeNativeMethod

Invokes the built-in method of the current element.

SelectItem

Selects the item in the current element.

SelectItemByIndex

Selects the item by using the index value.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetItems

Sets an object that represents the collection of the items that are contained in the current element.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetVisibility

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Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

MouseClick

Occurs when a cell within the table is clicked.

MouseDoubleClick

Occurs when a user double-clicks the selected item.

SelectionChanged

Occurs when a value is selected from the element.

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the ListBox element

The ListBox element in RPA Desktop Design Studio enables you to display a list of items from which you can select one or more Items.

The methods and events of the ListBox element are displayed in the Object Explorer pane.

Methods

ClearItems

Removes all the items from the current element.

ClearSelection

Clears the current selection from the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetItems

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Gets an object that represents the collection of the items that are contained in the current element.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetSelectedIndex

Gets the index value that specifies the currently selected item.

GetSelectedItem

Gets the selected item that specifies the currently selected item.

GetSelectedItems

Gets multiple selected items that specify the currently selected items.

InvokeNativeMethod

Invokes the built-in method of the current element.

SelectAll

Selects all the items in the current element.

SelectItem

Selects the item in the current element.

SelectItemByIndex

Selects the item by using the index value.

SelectItems

Selects multiple items in the current element.

SelectItemsByIndex

Selects multiple items by using the index value.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetItems

Sets an object that represents the collection of the items that are contained in the current element.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

UnselectAll

Clears all the selections in the current element.

Events

OnContextMenuClick

Occurs when an option on the context menu is clicked.

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MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the DataGrid element

The DataGrid element in RPA Desktop Design Studio enables you to display and manipulate tabular data.

The methods and events of the DataGrid element are displayed in the Object Explorer pane.

Methods

ClearData

Clears all the rows in the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetCellValue

Gets the value of a specified cell in the current element.

GetCount

Gets the count of rows and columns of the current element.

GetData

Gets the current element data.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetRow

Gets the row data that is based on the index value.

GetSelectedRow

Gets the index value of the selected row.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetCellColor

Sets the color in a cell that is based on the row value and column value.

SetCellValue

Sets the cell value for a particular row and column.

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SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetData

Sets the data into the current element.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetReadOnly

Sets a value that indicates whether the current element is in read-only mode.

SetRowColor

Sets the row color that is based on the row index.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

MouseClick

Occurs when a cell within the table is clicked.

MouseDoubleClick

Occurs when a user double-clicks the selected item.

SelectionChanged

Occurs when a value is selected from the element.

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the PasswordBox element

The PasswordBox element in RPA Desktop Design Studio is a text box that displays placeholder characters while you type a string.

The methods and events of the PasswordBox element are displayed in the Object Explorer pane.

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Methods

Clear

Clears the password from the current element.

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetPassword

Retrieves the password text data from the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetPassword

Sets the password text data to the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

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Methods and events of the ImageControl element

The ImageControl element in RPA Desktop Design Studio enables you to display images in a form.

The methods and events of the ImageControl element are displayed in the Object Explorer pane.

Methods

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetImage

Retrieves the image from the current element.

GetNativeProperty

Gets the value of the built-in property of the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetImage

Sets the image to the current element.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

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Occurs when the focus moves out of the current element.

Methods and events of the ImageViewer element

The ImageViewer element in RPA Desktop Design Studio enables you to open and view image files including JPEG, GIF, WMF, and other image formats in a form. You can also stretch and shrink images, rotate the images at different angles through all axis, and save them in different formats.

The methods and events of the ImageViewer element are displayed in the Object Explorer pane.

Methods

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

FitToContent

Fits the image into the current element.

GetImage

Retrieves the image from the current element.

GetNativeProperty

Gets the value of the built-in property of the current element.

Highlight

Highlights a specific area of an image in the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetImage

Sets the image to the current element.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

UnHighlight

De-emphasizes the highlighted area of an image in the current element.

ZoomIntoPoint

Zooms into a specific point by inputting the x and y values.

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Events

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the TabControl element

The TabControl element in the RPA Desktop Design Studio enables you to add one or more tabs in your form.

The methods and events of the TabControl element are displayed in the Object Explorer pane.

Methods

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

SelectTabByIndex

Selects the tab with a specific index.

SelectTabByName

Selects the tab with a specific name.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetTabState

Enables or deactivates the tab.

SetTabVisibility

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Gets or sets a value that indicates whether the tab and all its child elements are displayed.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the Web Browser element

The Web Browser element in the RPA Desktop Design Studio enables you to host web pages and provides web browsing capabilities to your application.

The methods and events of the Web Browser element are displayed in the Object Explorer pane.

Methods

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

InvokeNativeMethod

Invokes the built-in method of the current element.

Navigate

Opens the browser with the provided URL.

Refresh

Refreshes the webpage.

SetContextMenu

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Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Methods and events of the Form Renderer element

The Form Renderer element in RPA Desktop Design Studio enables you to build forms quickly with controls such as TextBox, ComboBox, CheckBox, RadioButton, ToggleButton, Date, Time, and PasswordBox.

The methods and events of the Form Renderer element are displayed in the Object Explorer pane.

Methods

Enable

Gets or sets a value indicating whether the element can respond to user interaction.

- If true, the element is enabled
- If false, the element is not enabled.

GetNativeProperty

Gets the value of the built-in property of the current element.

GetData

Gets the current element data.

InvokeNativeMethod

Invokes the built-in method of the current element.

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Reset

Resets the data for the fields defined in the current element.

SetChoices

Sets choices for list controls such as a radio button and ComboBox via a program.

SetContextMenu

Sets the context menu for the UI element. It accepts the input in either a string array or a comma-separated string.

SetData

Sets the data into the current element.

SetHelpContent

Sets the field help content so that you can provide the related data.

SetNativeProperty

Sets the value of the built-in property of the current element.

SetVisibility

Gets or sets a value that indicates whether the current element and all its child elements are displayed.

- If true, the current element and all its child elements are displayed.
- If false, the current element and all its child elements aren't displayed.

Events

OnContextMenuClick

Occurs when an option on the context menu is clicked.

MouseEnter

Occurs when the mouse device enters that element field.

MouseLeave

Occurs when the mouse device leaves that element field.

OnMouseClick

Occurs when the element is clicked.

GotFocus

Occurs when the focus is on the current element.

LostFocus

Occurs when the focus moves out of the current element.

Related topics

Configure the form fields for the Form Renderer element

Zero Copy Connectors

Power your AI agents and enrich workflows on the ServiceNow AI Platform with real-time data from across the enterprise using the ServiceNow® Zero Copy Connectors application.

https://player.vimeo.com/video/1222938791?h=d7b47df8e3&badge=0&autopause=0&player_id=0&...

Watch this short video to learn more about the Zero Copy Connectors application.

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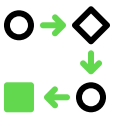
Get started

Explore  Learn about benefits and features of Zero Copy Connectors.	**Configure**  Configure settings for Zero Copy Connectors.	**Manage zero copy connections**  Create and manage zero copy connections.
Manage data fabric tables  Create and manage data fabric tables.	**Access real-time data**  Connect a predefined data fabric table to a data source using a zero copy connection.	**Reference**  Get details about roles and domain separation.

Exploring Zero Copy Connectors

Discover how the Zero Copy Connectors application unifies business and technology data from multiple sources, enabling centralized, real-time access to your enterprise data without copying it to your instance.

Zero Copy Connectors overview

The Zero Copy Connectors application provides a view where you can browse data source connectors, establish connections, and create data fabric tables that provide access to data from external sources.

- Access enterprise data from external data warehouses including Snowflake, Google BigQuery, and Amazon Redshift, data lakes such as Databricks, and databases including Oracle.
- Retrieve data from external sources in real time without copying any data to your instance using zero copy connections.
- Fuel AI agents and workflows on the ServiceNow AI Platform with external data using data fabric tables.
- Provide data to AI-powered features on the ServiceNow AI Platform, expand workflow automation, and enrich metrics and analytics with enterprise data.

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Zero Copy Connectors users

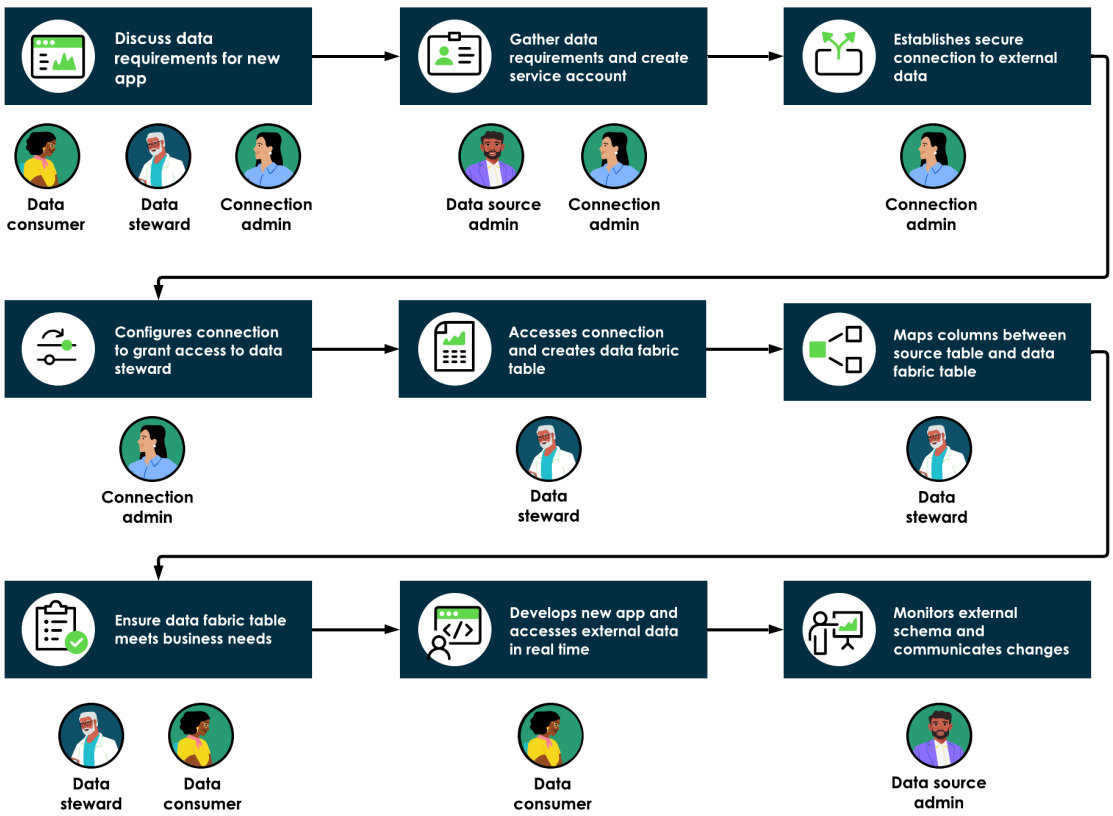
Users

User	Description
Connection admin	Establishes secure connections to external data sources by coordinating with data source administrators, managing connection credentials, and maintaining data access.
Data steward	Creates data fabric tables that provide access to external data, and maintains data quality to meet the business needs of data consumers.
Data consumer	Accesses data fabric tables to develop applications. Defines an application's data requirements and coordinates with the data steward to refine data.

End-to-end workflow

This infographic shows a sample end-to-end workflow of different users working together to gather requirements, establish a zero copy connection, and create a data fabric table in the Zero Copy Connectors application.

Creating zero copy connections and data fabric tables



In this workflow:

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1. A data consumer meets with a data steward and the connection admin to discuss data requirements for a new application on the ServiceNow AI Platform.
2. The connection admin gathers the data requirements and meets with the data source admin to create a service account that can access the schema and tables needed for the new application.
3. The connection admin establishes a secure connection to the external data lake in the Zero Copy Connector Hub using the service account credentials provided by the data source admin.
4. The connection admin configures access controls in the connection details, ensuring the data steward can access the connection to view data assets in the external data lake and create a data fabric table.
5. The data steward selects the established connection in the Zero Copy Connector Hub and creates a data fabric table.
6. The data steward explores the available schema, selects a source table with the required data, and maps columns between the source table and the data fabric table.
7. The data steward works with the data consumer to review the data fabric table and ensure that it meets the business needs of the application.
8. The data consumer begins developing the new application and accesses the data fabric table and its external data in real time just like any table on the ServiceNow AI Platform.
9. The data source admin monitors the external schema for consistency and communicates future schema changes to the connection admin and data steward.

Zero Copy Connectors benefits

Zero Copy Connectors benefits

Benefit	Feature	Users
Access real-time data from external sources directly, without copying any data to your instance.	Zero copy connections	Connection admin
Create a virtual representation of data from an outside source and make it accessible to data consumers on the instance as if it's stored locally.	Data fabric tables	Data steward, data consumer
Map internal or external data to a predefined data fabric table in an application using a zero copy connection.	Data fabric tables included with applications	Instance admin, connection admin, data steward

Differences between Zero Copy Connectors and Integration Hub

Choose whether to use Zero Copy Connectors or Integration Hub to integrate with external systems.

- When you want to retrieve real-time data from external sources without storing it on your instance, use Zero Copy Connectors.
- When you want advanced import and transformation options or customizable integrations, use Integration Hub.

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What to explore next

To learn more about configuring and using Zero Copy Connectors, see:

- Configuring Zero Copy Connectors
- Managing zero copy connections
- Managing data fabric tables
- Accessing real-time data in applications
- Zero Copy Connectors reference

Available connectors

Discover available connectors to use in a zero copy connection.

In the Zero Copy Connector Hub, you can access a variety of data sources that enable you to retrieve real-time data from across your organization using zero copy connections.

Key benefits

- Discover integration opportunities to external data warehouses including Snowflake, Google BigQuery, and Amazon Redshift, data lakes such as Databricks, and databases, including Oracle.
- Access external data using primary connectors developed by ServiceNow or community connectors developed by the open-source community.
- Create a zero copy connection to a data source, enabling data stewards to build data fabric tables.

In the Zero Copy Connector Hub, a connection admin can navigate to the **Available connectors** tab to view primary and community connectors and create a zero copy connection. After the connection is established, the connection admin can grant access to a data steward. The data steward can then access the zero copy connection from the **Established connections** tab to create a data fabric table.

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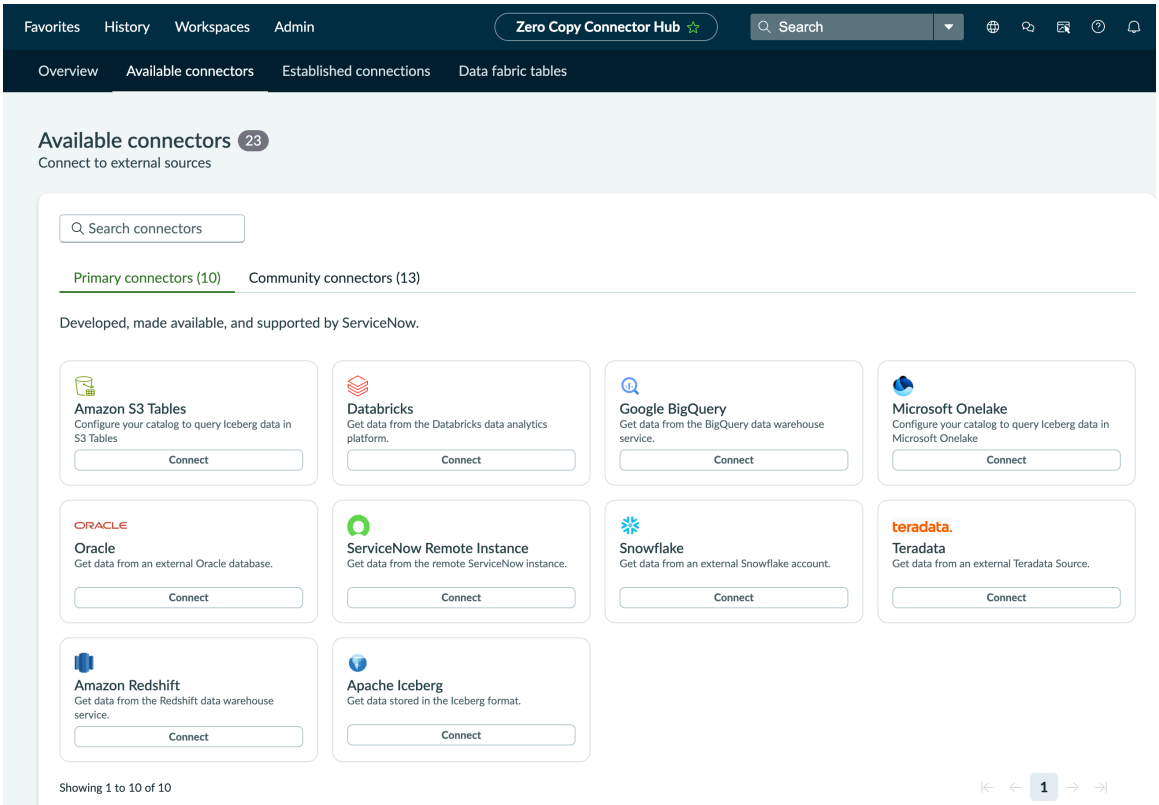
Available connectors



Required ServiceNow AI Platform roles

The df_connection_admin role is required to view available connectors.

Accessing available connectors

View available primary and community connectors on the **Available connectors** tab by navigating to **Admin** > **Zero Copy Connector Hub** > **Available connectors** or **All** > **Zero Copy Connector Hub** > **Available connectors**.

Types of connectors

A connection admin with the df_connection_admin role can create connections to available data sources using primary and community connectors.

Primary connectors

Primary connectors are developed, made available, and supported by ServiceNow. Primary connectors have been enhanced to improve the performance of Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

Community connectors

Community connectors are developed by the open-source community and made available by ServiceNow. These connectors are certified for essential functionality but are not part of the ServiceNow support scope.

For details on creating connections using primary connectors, see Primary connectors.

For details on creating connections using community connectors, see Community connectors.

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Established connections

Access data from external sources directly in the ServiceNow AI Platform, without copying any data to your instance using zero copy connections.

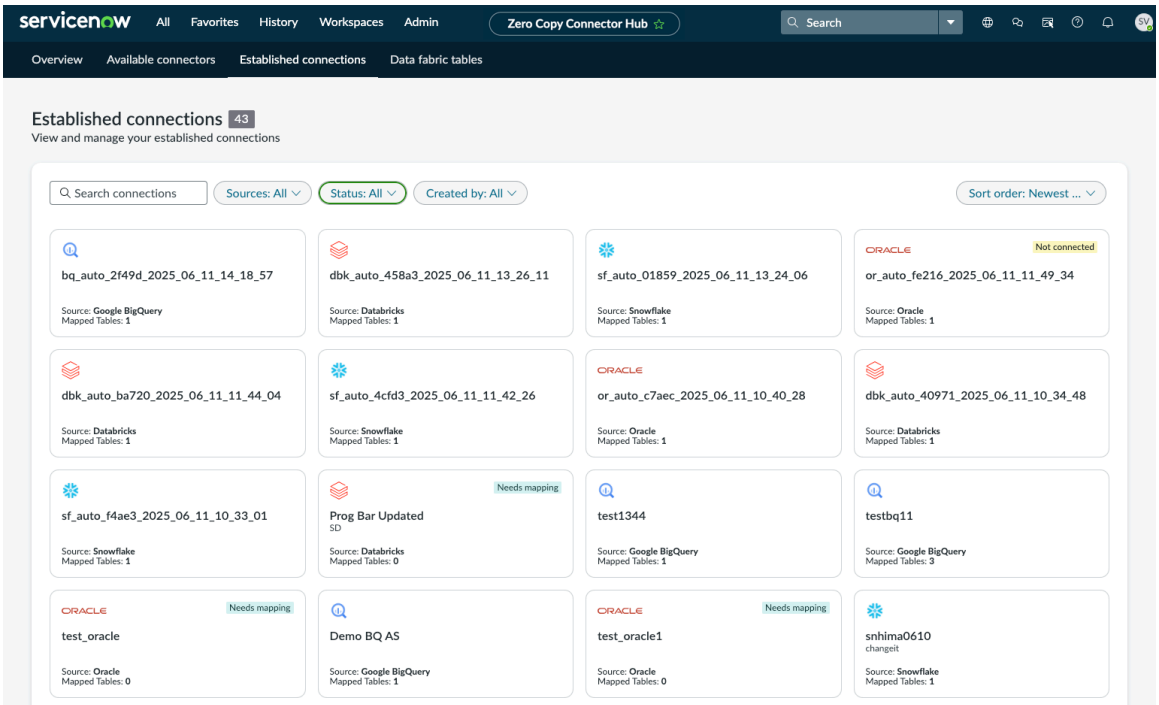
Key benefits

- Access external data without the complexity and maintenance involved with extract, transform, and load (ETL) processes.
- Minimize security risks associated with copying and storing data in multiple locations.
- Maintain data accuracy by avoiding errors associated with data replication.
- View external data assets and create data fabric tables with mapped data.

Zero copy connections enable access to external data locally, while reducing storage consumption and minimizing security risks typically associated with duplicating data across multiple systems.

In the Zero Copy Connector Hub, a connection admin can navigate to the **Available connectors** tab to view primary and community connectors and create a zero copy connection. After the connection is established, the connection admin can grant access to a data steward. The data steward can then access the zero copy connection from the **Established connections** tab to create a data fabric table.

Established connections



Required ServiceNow AI Platform roles

The df_connection_admin role is required to create and manage zero copy connections.

A role containing the df_data_steward role is required to access established connections and create data fabric tables.

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Accessing established connections

View established connections by navigating to **Admin** > **Zero Copy Connector Hub** > **Established connections** or **All** > **Zero Copy Connector Hub** > **Established connections**.

Monitoring connection status

Determine whether a connection requires an update by checking the status on the **Established connections** tab.

Connected

The connection to the data source has been tested and established.

Deactivated

The connection to the data source has been deactivated by the connection admin.

Needs configuration

The connection attributes or authentication information are missing from the connection details.

Needs mapping

The connection has been tested and established, but the data isn't mapped to a data fabric table.

Not connected

The connection details have been added, but the connection to the data source isn't working.

Data steward access

The connection admin determines which data stewards can access a specific connection by granting the df_data_steward role to one or more roles on the **Access Controls** tab in an established connection.

The data steward's primary goal is to provide quality data to consumers to meet their business needs. Additionally, data stewards have the following responsibilities:

- Understanding business applications and the data that users need.
- Communicating data access requirements to integration admins.
- Creating data fabric tables and mapping data from external sources.
- Maintaining the quality and integrity of data.

Use cases

- Access data from an external data source without importing and storing it on your instance. Customer order information is often stored in an external Customer Relationship Management (CRM) system, with the data ultimately residing in an external data lake such as Snowflake. When a customer calls to report a product issue, an agent working on the ServiceNow AI Platform opens a request and accesses the customer's full order history directly from Snowflake. The customer's order history stays in Snowflake, the system of record, but is available to the agent in real time on the ServiceNow AI Platform.
- Provide end-to-end details to agents with real-time data from an outside source. When a customer calls to make a warranty service claim against a vehicle, an agent working on the ServiceNow AI Platform can access extended warranty details from an external data lake in real time using a zero copy connection. The customer service agent can update the service

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request ticket with the latest warranty details directly from the data lake, ensuring the latest warranty information is used in the service ticket.

- Access data across multiple ServiceNow instances without replication. With the ServiceNow Remote Instance connector, you can access records from other instances locally, without moving, duplicating, or setting up complex ETL processes. For example, if you manage several ServiceNow instances and need to consolidate data for reporting or workflow decisions, designate one instance as your central processing instance and create zero copy connections to query tables on your other instances in real time. Data remains in its original location and isn't persisted on the processing instance, so you can maintain compliance with data residency requirements while gaining unified visibility across your organization.

For more information, see Managing zero copy connections.

Data fabric tables

Fuel your AI agents and enrich workflows on the ServiceNow AI Platform with external data using data fabric tables.

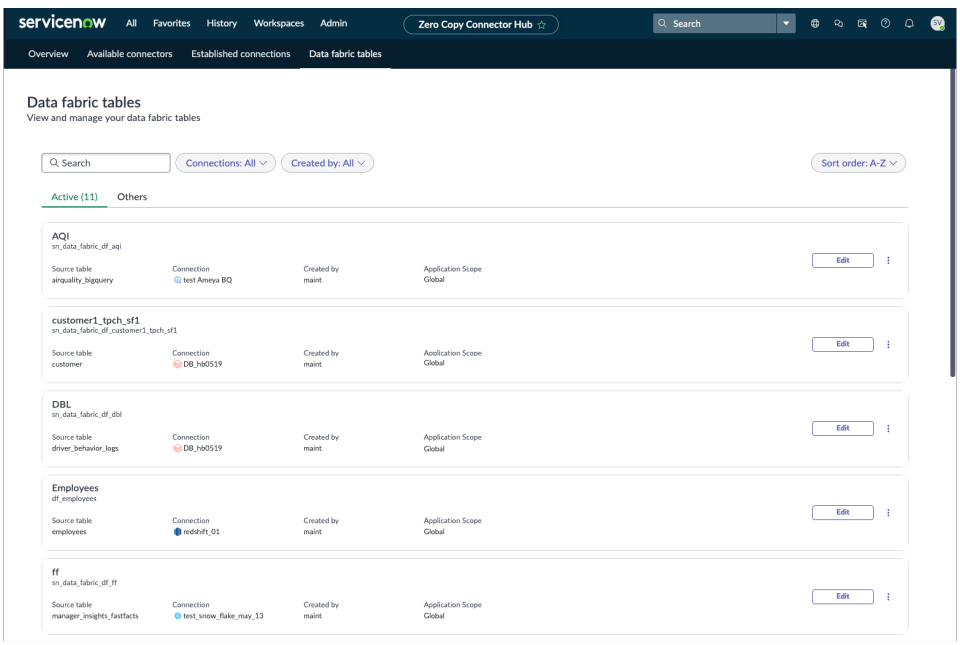
Key benefits

- Fetch external data in real time and view the data in lists and forms as if it's stored in your instance.
- Reduce storage consumption and performance load in your instance.
- Control access to external data so that only authorized users can view the data.

A data fabric table is a virtual representation of data stored in an external source, accessible directly from the ServiceNow AI Platform. The data fabric table definition is stored in the ServiceNow AI Platform, but its external records live in the memory in read-only mode. You can view external records from a data fabric table in lists and forms the same way you view records in a physical table.

Access to a data fabric table is controlled the same way access is controlled to a physical table. Data fabric tables belong to the application scope selected by the data steward during their creation.

Data fabric tables



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Required ServiceNow AI Platform roles

A role containing the df_data_steward role or the connection_admin role is required to create and manage data fabric tables.

Accessing data fabric tables

View and manage data fabric tables on the **Data fabric tables** tab by navigating to **Admin** > **Zero Copy Connector Hub** > **Data fabric tables** or **All** > **Zero Copy Connector Hub** > **Data fabric tables**.

Viewing data fabric tables

View a list of all the data fabric tables that data stewards have created on the **Data fabric tables** tab.

- Search for a data fabric table by label or name.
- Filter the list of tables by data source and connection.
- Filter the list of tables by creator.
- View a list of data fabric tables from active connections in the **Active** tab.
- View a list of data fabric tables from connections that are deactivated or not configured in the **Others** tab.

Use cases

Unifying data from multiple sources

A manufacturer experiences an outage when a key piece of machinery fails, stopping production entirely. Unfortunately, the data needed to help prevent these failures is scattered across multiple systems.

- Asset inventory data in IT Asset Management (ITAM) and maintenance personnel data are stored locally in your instance.
- Historical asset maintenance records and real-time sensor are stored in an external data lake.

To help prevent potential failures and outages, you can provide service technicians with all the necessary data by connecting these systems using data fabric tables. For example:

1. Sensor data is fed to the data lake and analyzed by machine learning, generating a failure score.
2. When the failure score crosses a certain threshold, an alert is generated and sent to your instance.
3. The alert triggers a maintenance request flow, creating a case assigned to a service technician.
4. The technician reviews the case details and accesses inventory data from the instance. They also access maintenance records and real-time sensor data from the external data lake. The technician does all these things in one place using data fabric tables.
5. The technician makes an informed decision and acts to address the issue before another outage occurs.

Retrieving real-time data in an application

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An application can include both a physical table and a data fabric version of the same table. This duality gives the instance admin flexibility when installing the application. Via the data fabric table, the admin can populate the physical table through data import or allow users to access real-time data from an external data source.

Analyzing data and generating AI-guided insights using AI Data Explorer

Create visualizations and analyses of fetched data through a conversational interface in AI Data Explorer. For more information, see Use AI to explore data with AI Data Explorer.

Note: You must first add the relevant data fabric tables to the Semantic Table Configuration [sn_query_gen_table_config] table in Query Generation. See Add a table to the semantic data layer.

Enhancing the performance of AI experiences using the Knowledge Graph

Enhance the performance of Now Assist Virtual Agent, AI agents, and generative AI skills by leveraging data fabric tables in the Knowledge Graph application. For more information, see Knowledge Graph.

Differences between data fabric tables and remote tables

Data fabric tables are similar to remote tables on the ServiceNow AI Platform. However, data fabric tables query external data sources and retrieve data using a zero copy connection instead of a script.

A data fabric table enables you to view external data. However, you can't insert, update, or delete data in an external data source like you can from a remote table.

REST connectors

REST connectors use APIs, instead of JDBC, to retrieve data and metadata from an external source.

Most connectors in the Zero Copy Connector Hub use JDBC to connect directly to a database. REST connectors work differently by retrieving data and metadata through API calls to the external source. A connector that uses this method is identified by a **REST** tag next to its name in the connector list, the connection page, and the Connection Guide panel.

Before you begin

REST connectors aren't available in the connector list by default. To make them available, install *`Data Fabric REST Connectors`*, which is included with your Zero Copy Connector Hub WDF Foundation subscription. After you install this app, the REST connectors appear in the connector list, tagged as **REST**.

API rate limits and consumption

REST connectors retrieve data by calling the external source's API. Running queries against a REST connector consumes API calls against that source system's rate limits and any associated usage costs. For example, if you connect to a Jira instance that has API rate limiting in place, queries you run through the REST connector count against that limit.

Note: Large or frequent queries can consume a significant portion of your source system's API allowance.

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Authentication

Unlike JDBC-based connectors, REST connectors don't expose separate authentication-type options (such as basic authentication or OAuth) on the connection form itself. Authentication is instead configured on the HTTP connection that the **Connection Alias** field references, using the Connections & Credentials (CnC) framework.

The **Connection Alias** can reference an HTTP connection configured with any of the following credential types:

- Basic authentication
- Auth token
- OAuth

Related topics

Acumatica

Configuring Zero Copy Connectors

Set up and configure Zero Copy Connectors.

Configuration overview

The Zero Copy Connector Hub application is free for all production instances and non-production instances.

You can install the Zero Copy Connector Hub in either of the following ways:

- Install the Zero Copy Connector Hub application (sn_data_fabric) from the ServiceNow Store.
- Request the Zero Copy Connectors application (sn_data_fabric_zcc), which includes the Zero Copy Connector Hub application.

With access to the Zero Copy Connector Hub, you can map a data fabric table included with an application to a local table on your instance using the ServiceNow local instance connector.

To create data fabric tables that can retrieve external data using zero copy connections, request the Zero Copy Connectors app (sn_data_fabric_zcc). The Zero Copy Connector Hub is automatically installed when the Zero Copy Connectors plugin (sn_data_fabric_zcc) is activated on your instance.

Activate Zero Copy Connector Hub

Access the Zero Copy Connector Hub on your instance by activating the Zero Copy Connector Hub plugin (sn_data_fabric).

Before you begin
Role required: admin

About this task
Follow the steps below to activate the Zero Copy Connector Hub on your instance. For the full experience, request the Zero Copy Connectors application (sn_data_fabric_zcc). The Zero Copy Connector Hub is automatically activated when the Zero Copy Connectors plugin (sn_data_fabric_zcc) is activated on your instance.

Roles are installed with Zero Copy Connector Hub.

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For more information, see Zero Copy Connectors roles.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Find the Zero Copy Connector Hub plugin (sn_data_fabric) using the filter criteria and search bar.

   You can search for the plugin by its name or ID. If you cannot find a plugin, you might have to request it from ServiceNow personnel.
3. Select **Install** to start the installation process.

   Note: When domain separation and delegated admin are enabled in an instance, the administrative user must be in the **global** domain. Otherwise, the following error appears: `Application installation is unavailable because another operation is running: Plugin Activation for <plugin name>.`

   You will see a message after installation is completed. For information about the components installed with a plugin, see Find components installed with an application.

Request Zero Copy Connectors

Create zero copy connections and data fabric tables after requesting the Zero Copy Connectors app through the Now Support Service Catalog. If it isn't already installed, the app installs the Zero Copy Connector Hub.

Before you begin

The Zero Copy Connectors app requires a separate subscription and must be activated by ServiceNow personnel.

To purchase a subscription, contact your ServiceNow account manager. The account manager can arrange to have the plugin activated on your organization's production and subproduction instances, generally within a few days.

Important: The Zero Copy Connectors app is only supported on production and non-production instances. The Zero Copy Connectors app is not supported on demo instances.

If you don't have an account manager, decide to delay activation after purchase, or want to evaluate the product on a subproduction instance without charge, follow these steps.

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the form, fill in the fields.

Activate Plugin request form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.

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Field	Description
Plugin Name	Enter: `Zero Copy Connectors (sn_data_fabric_zcc)`
Select Maintenance Date and Time	Select the date and time to activate the plugin.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Create a connection administrator

Create a connection admin who can create zero copy connections in Zero Copy Connector Hub.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **User Administration** > **Users**.
2. Select an existing user.
3. Update the user's role assignment by selecting **Edit** in the Roles related list.
4. Add the df_connection_admin role.
5. Select **Update**.

Result

The user is now a connection admin in Zero Copy Connector Hub. As a connection admin, the user can perform the following tasks:

- Browse available primary and community connectors on the **Available connectors** tab.
- Select a connector and create a zero copy connection to an external data source.
- Define who can access the connection and create data fabric tables by assigning the df_data_steward role to an existing role.

See Managing zero copy connections.

Enabling access to a data source

Work with your data source administrator to enable access to your external data source.

To connect to a data source behind a private network using a zero copy connection, there are two general approaches:

IP allowlist

Your data source admin must allow access to a source IP range based on where the zero copy queries are coming from. For help with identifying the correct IP range, contact your account manager or Customer Service and Support and reference KB1706533.

Private connectivity

For data sources hosted behind private Virtual Private Clouds (VPCs) or Virtual Networks (VNets) in the public cloud, connectivity options are available that enable

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query traffic to transit over private IP address space, end to end. This private connectivity is enabled by technologies such as Private Link. Each cloud provider implements this technology differently. To explore private connectivity options for your specific topology, contact your account manager or Customer Service and Support.

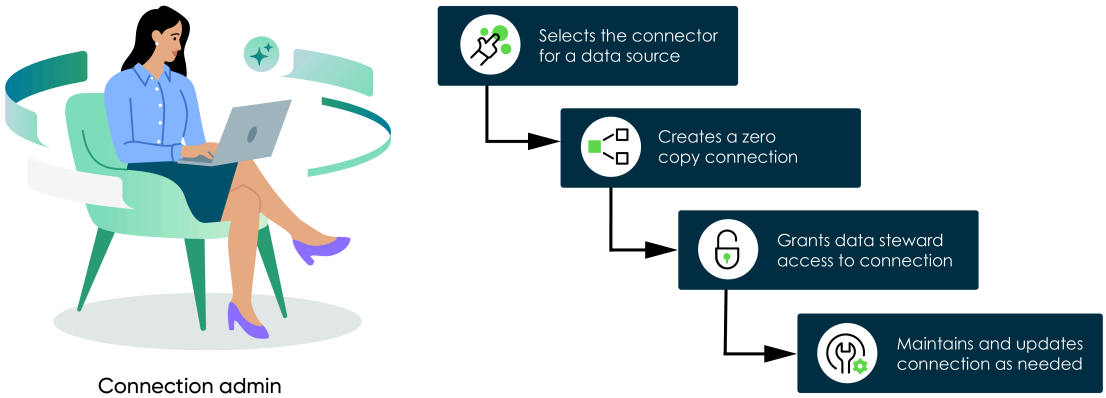
Managing zero copy connections

Securely connect to an external data source and access external data directly from your instance, without the need to copy or store any data locally.

Overview of managing zero copy connections

A zero copy connection provides secure, real-time access to data from outside sources without having to copy data to your local database. The connection admin is responsible for creating and managing zero copy connections as shown in this infographic.

Creating and managing zero copy connections



Types of connectors

A connection admin with the df_connection_admin role can create connections to available data sources using primary and community connectors.

Primary connectors

Primary connectors are developed, made available, and supported by ServiceNow. Primary connectors have been enhanced to improve the performance of Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

Community connectors

Community connectors are developed by the open-source community and made available by ServiceNow. These connectors are certified for essential functionality but are not part of the ServiceNow support scope.

Primary connectors

Connect to external data sources using primary connectors in Zero Copy Connector Hub.

Primary connectors are developed, made available, and supported by ServiceNow.

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Primary connectors and compatibility

Primary connector	Minimum compatibility
Databricks	Yokohama Patch 5, Zurich, Australia
Google BigQuery	Yokohama Patch 5, Zurich, Australia
Oracle	Yokohama Patch 5, Zurich, Australia
Snowflake	Yokohama Patch 5, Zurich, Australia
Amazon Redshift	Yokohama Patch 5, Zurich, Australia
SAP ECC	Yokohama Patch 5, Zurich, Australia
SAP S/4HANA	Yokohama Patch 5, Zurich, Australia
Teradata	Yokohama Patch 5, Zurich, Australia
Amazon S3 Tables	Yokohama Patch 5, Zurich, Australia
Apache Iceberg	Yokohama Patch 5, Zurich, Australia
Cloudera Impala	Yokohama Patch 5, Zurich, Australia
ServiceNow Remote Instance	Yokohama Patch 5, Zurich, Australia
MySQL	Starting with Australia patch 6
PostgreSQL	Starting with Australia patch 6
Acumatica	Starting with Australia patch 6
Oracle HCM (Discovery)	Starting with Australia patch 6
Microsoft SQL Server	Starting with Australia patch 6

For additional information on data types and authentication methods that aren't supported with primary connectors, see KBB0010487.

Primary connectors in preview

Some primary connectors are marked with a Preview label. These connectors are developed and supported by ServiceNow, but are still being enhanced to include all planned functionality. While in preview, a connector may have limitations in platform support or available features.

Primary connectors in preview are fully functional for their documented scope and receive the same ServiceNow support as other primary connectors. For details on specific functionality limitations, see KBB0010487.

Databricks

The Databricks connector provides read-only access to data and metadata from the Databricks data analytics platform.

A connection admin can set up a connection to Databricks in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from Databricks. This allows users to access Databricks data through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

When you configure the connection with an access token, you can choose whether the connection authenticates using a shared, system-level OAuth entity profile or personal authentication.

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Note: With personal authentication, each user's access to Databricks data is authenticated and audited against their own credentials, not a shared account. This supports stricter access control and clearer audit trails.

The connector has been enhanced to improve the performance of the following Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

- Sort
- Limit
- Filter
- GroupBy
- avg()
- count()
- max()
- min()
- sum()
- References

Supported data types

The following table lists supported Databricks data types and the default matching data types in a data fabric table.

Important: Databricks data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Databricks	Data fabric table
bigint	Long Integer String
int	Long Integer String
smallint	Long Integer String
tinyint	Long Integer String
timestamp_ntz	Basic Date/Time
char	Char
timestamp	Basic Date/Time
date	Date
decimal	Decimal
string	String
boolean	True/False
double	Floating Point Number
float	Floating Point Number

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Related topics

Create a Databricks connection

Create a Databricks connection

Establish a zero copy connection to the Databricks data analytics platform in Zero Copy Connector Hub.

Before you begin

You can optimize queries to Databricks by enabling table statistics. Consult your data source admin to confirm whether table statistics are enabled in Databricks before enabling this option in Zero Copy Connector Hub.

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Databricks. For additional information about connecting to Databricks, refer to the Databricks documentation.

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Find the Databricks connector and select **Connect**.
3. On the form, fill in the fields.

Databricks Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Catalog name	Catalog name used for organizing and locating data assets in Databricks.
Connection URL	JDBC URL to establish the connection. For example: `jdbc:databricks://<host>:<port>`
Warehouse or compute path	Databricks warehouse or compute path. For example:

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Field	Description
	`/sql/1.0/warehouses/`
Enable table statistics	Option to enable table statistics. Optimize SQL queries using table statistics by selecting this option. Enabling table statistics allows the system to use estimates of stored data such as row count, distinct values, and data size for enhanced query processing. **Note:** You must ensure that gathering table statistics is enabled in the data source before selecting this option.

4. Configure the authentication method that you want to use with Databricks.

Option	Description
Databricks Service Principal	Option to use Databricks as the OAuth provider. Select this option if you're using a Databricks service principal for authentication. **a.** Enter the client ID issued by Databricks for authentication. **b.** Enter the secret key associated with the client ID.
Azure Service Principal	Option to use Azure Entra ID as the OAuth provider. Select this option if you're using an Azure managed service principal for authentication. This option requires an established a trust re lationship between Databricks and Azure En tra ID. **a.** Enter the client ID issued by Azure for au thentication. **b.** Enter the Azure tenant ID where your Data bricks application is registered. **c.** Enter the secret key associated with the client ID.
Access Token	Option to use a pre-configured OAuth entity profile. Select this option if you created a record in the Application Registries [oauth_entity] table

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Option	Description
	with a Databricks or IdP service principal for authentication. This option keeps credentials within the in stance and uses the ServiceNow AI Platform OAuth framework for token lifecycle man agement. For details on creating an OAuth entity profile, see Use a third-party OAuth When configuring the profile, se lect **Client Credentials** as the grant type. If your OAuth provider requires scopes, add them on the OAuth Entity Scopes tab. Con sult your data source or identity provider docu mentation for the required scope values. Select the OAuth entity profile for your Data bricks or IdP service principal. Select the OAuth integration type that you want to use: ○ **System**: Use the selected OAuth entity pro file for all users of this connection. This is the default option. ○ **Personal**: Require each user to authenti cate individually with their own credentials before they can access Databricks data through this connection. Select **Get OAuth Token** to open the authentication flow in a new browser tab and sign in. **Note:** Each user can view, renew, or revoke their personal access to ken from the Personal Integrations Dashboard in the Zero Copy Connec tor Hub. If a user's token expires or is missing, an alert appears when that user tries to access data assets for this connection, with a link to sign in again.

5. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

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Google BigQuery

The Google BigQuery connector provides read-only access to data and metadata from the Google BigQuery data warehouse service.

A connection admin can set up a connection to Google BigQuery in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from Google BigQuery. This allows users to access Google BigQuery data through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

The connector has been enhanced to improve the performance of the following Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

- Sort
- Limit
- Filter
- GroupBy
- avg()
- count()
- max()
- min()
- sum()
- References

Supported data types

The following table lists supported Google BigQuery data types and the default matching data types in a data fabric table.

Important: Google BigQuery data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Google BigQuery	Data fabric table
date	Date
numeric	Decimal
string	String
int64	Long Integer String
boolean	True/False

Related topics

Create a Google BigQuery connection

Create a Google BigQuery connection

Establish a zero copy connection to the Google BigQuery data warehouse service in Zero Copy Connector Hub.

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Before you begin
Role required: df_connection_admin

About this task
Work with your data source admin to create a connection to Google BigQuery. For additional information about connecting to Google BigQuery, refer to the Google BigQuery documentation.

Procedure
1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Find the Google BigQuery connector and select **Connect**.
3. On the form, fill in the fields.

New Google BigQuery Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.

4. Enter the full Google Cloud service account JSON key used for authentication.
You can obtain the JSON key from the Google Cloud Console when you create a service account.

Option	Description
Upload service account key	**a.** Select **Attach Service Account Key (JSON)**. **b.** Browse and select the file.
Enter service key contents manually	Copy and paste the contents of the file, ensuring the content begins with { and contains fields like `"type"`, `"project_id"`, and `"private_key"`, and ends with }. For example: `{ "type": "service_account", "project_id": "your-project-id", ...`

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Option	Description

	<pre>"private_key":
	"-----BEGIN PRIVATE
	KEY-----\n...\n-----END
	PRIVATE KEY-----\n",
	...
	}</pre>

5. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Oracle

The Oracle connector provides read-only access to data and metadata from an Oracle database.

A connection admin can set up a connection to Oracle in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from Oracle. This allows users to access Oracle data through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

The connector has been enhanced to improve the performance of the following Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

- Sort
- Limit
- Filter
- GroupBy
- avg()
- count()
- max()
- min()
- sum()
- References

Supported data types

The following table lists supported Oracle data types and the default matching data types in a data fabric table.

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Important: Oracle data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Oracle	Data fabric table
number	Decimal
binary_float	Floating Point Number
binary_double	Floating Point Number
char	String
varchar2	String
nchar	String
nvarchar2	String
date	Basic Date/Time
timestamp	Basic Date/Time
timestamptz	Date/Time
bool_sim	String
FLOAT[(p)]	Floating Point Number
TIMESTAMP(p) WITH TIME ZONE	Date/Time

Related topics

Create an Oracle connection

Create an Oracle connection

Establish a zero copy connection to an external Oracle database in Zero Copy Connector Hub.

Before you begin

You can optimize queries to Oracle by enabling table statistics. Consult your data source admin to confirm whether table statistics are enabled in Oracle before enabling this option in Zero Copy Connector Hub.

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Oracle. For additional information about connecting to Oracle, refer to the Oracle documentation.

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Find the Oracle connector and select **Connect**.
3. On the form, fill in the fields.

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New Oracle Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	

Connection URL	JDBC URL from the tnsnames.ora file in the wallet to establish the connection. For example:
	`jdbc:oracle:thin:@(description=(address=(p`
	`(port=<port>)(host=<host>))`
	`(connect_data=(service_name=<service-name>)))`

Enable table statistics	Option to enable table statistics. Optimize SQL queries using table statistics by selecting this option. Enabling table statistics allows the system to use estimates of stored data such as row count, distinct values, and data size for enhanced query processing. **Note:** You must ensure that gathering table statistics is enabled in the data source before selecting this option.

4. Configure the authentication method that you want to use with Oracle.

Option	Description
Username / Password	Option to use basic authentication. a. Enter the database username associated with the source. b. Enter the database password associated with the username.
OAuth	Option to use OAuth authentication. OAuth authentication requires an OAuth en tity profile configured in the Application Reg istries [oauth_entity] table with your Oracle or

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Option	Description
	IdP credentials. Oracle supports only the Access Token credential type. This option keeps credentials within the instance and uses the ServiceNow AI Platform OAuth framework for token lifecycle management. For details on creating an OAuth entity profile, see Use a third-party OAuth [illegible] When configuring the profile, select **Client Credentials** as the grant type. If your OAuth provider requires scopes, add them on the OAuth Entity Scopes tab. Consult your data source or identity provider documentation for the required scope values. Select the OAuth entity profile for your Oracle or IdP service principal.

5. Configure connection security.

Option	Description
Default	Select this option to use Java security CA certificates to establish a secure connection with the data source. This option uses public certificates that are already available in the Java security truststore.
mTLS	Select this option if your data source requires two-way SSL and uses its own certificates.

6. If you selected mTLS, select a keystore type and configure the required certificates.

Option	Description

Keystore - PEM (secure)	**a.** Attach the wallet PEM file from the wallet folder using one of the following options:
	▪ Upload the wallet PEM file by selecting **Attach PEM file** and selecting the file.
	▪ Copy and paste the contents of the PEM file, ensuring the content contains one private key beginning with:
	`-----BEGIN ENCRYPTED PRIVATE KEY-----`
	and ending with:
	`-----END ENCRYPTED PRIVATE KEY-----`
	and two certificates, each beginning with:
	`-----BEGIN CERTIFICATE-----`

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Option	Description
	and ending with: `-----END CERTIFICATE-----` **b.** Enter the PEM file password associated with the wallet.

Keystore - JKS (secure)	**a.** Attach the Base64-encoded truststore.crt file from the wallet folder using one of the following options:
	▪ Upload the truststore file by selecting **Attach TrustStore file** and selecting the file.
	▪ Copy and paste the contents of the trust store file, ensuring the content begins with:
	`-----BEGIN CERTIFICATE-----`
	and ends with:
	`-----END CERTIFICATE-----`
	b. Attach the Base64-encoded keystore.crt file from the wallet folder using one of the following options:
	▪ Upload the keystore file by selecting **Attach KeyStore file** and selecting the file.
	▪ Copy and paste the contents of the key store file.
	c. Enter the truststore password associated with the wallet.
	d. Enter the keystore password associated with the wallet.

7. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Snowflake

The Snowflake connector provides read-only access to data and metadata from an external Snowflake account.

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A connection admin can set up a connection to Snowflake in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from Snowflake. This allows users to access Snowflake data through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

When you configure the connection with an access token, you can choose whether the connection authenticates using a shared, system-level OAuth entity profile or personal authentication.

Note: With personal authentication, each user's access to Snowflake data is authenticated and audited against their own credentials, not a shared account. This supports stricter access control and clearer audit trails.

The connector has been enhanced to improve the performance of the following Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

- Sort
- Limit
- Filter
- GroupBy
- avg()
- count()
- max()
- min()
- sum()
- References

Supported data types

The following table lists supported Snowflake data types and the default matching data types in a data fabric table.

Important: Snowflake data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Snowflake	Data fabric table
int	Decimal
byteint	Decimal
char	String
character	String
varchar	String
varchar_default	String
string	String
text	String

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Data type mapping (continued)

Snowflake	Data fabric table
date	Date
timestamp	Basic Date/Time
timestamp_tz	Date/Time
boolean	True/False
datetime	Date/Time
numeric	Decimal
integer	Decimal
bigint	Decimal
smallint	Decimal
tinyint	Decimal

Related topics

Create a Snowflake connection

Create a Snowflake connection

Establish a zero copy connection to an external Snowflake account in Zero Copy Connector Hub.

Before you begin

You can optimize queries to Snowflake by enabling table statistics. Consult your data source admin to confirm whether table statistics are enabled in Snowflake before enabling this option in Zero Copy Connector Hub.

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Snowflake. For additional information about connecting to Snowflake, refer to the Snowflake documentation.

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Find the Snowflake connector and select **Connect**.
3. On the form, fill in the fields.

New Snowflake Connection form

Field	Description
Name and description	

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Field	Description
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	JDBC URL to establish the connection. For example: `jdbc:snowflake://<account>.snowflakecomputing.com`
Database	Name of the database that you want to connect to.
Warehouse	Name of the warehouse that you want to connect to.
Enable table statistics	Option to enable table statistics. Optimize SQL queries using table statistics by selecting this option. Enabling table statistics allows the system to use estimates of stored data such as row count, distinct values, and data size for enhanced query processing. **Note:** You must ensure that gathering table statistics is enabled in the data source before selecting this option.

4. Configure the authentication method that you want to use with Snowflake.

Option	Description

JWT	Option to use key pair authentication.
	a. Attach the private key using one of the following options:
	▪ Upload the private key file by selecting **Attach PEM file** and selecting the file.
	▪ Copy and paste the contents of the PEM file, ensuring the content begins with:
	`-----BEGIN PRIVATE KEY-----`
	and ends with:
	`-----END PRIVATE KEY-----`

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Option	Description
	b. Enter the connection user to connect to Snowflake. **c.** Enter the passphrase if the private key is se cured with a password. **d.** Enter the role that determines your permis sions within Snowflake.
OAuth	Option to use OAuth authentication. Select the OAuth credential type that you want to use. ○ **Client credentials** Select this option to enter OAuth creden tials directly from your identity provider. **a.** Enter the client ID from your OAuth identi ty provider. **b.** Enter the client secret from your OAuth identity provider. **c.** Enter the token request URL from your OAuth identity provider. **d.** Enter the scope from your OAuth identity provider. ○ **Access Token** Select this option if you created a record in the Application Registries [oauth_entity] ta ble with a Snowflake or IdP service princi pal for authentication. This option keeps credentials within the instance and uses the ServiceNow AI Plat form OAuth framework for token lifecycle management. For details on creating an OAuth entity profile, see Use a third-party When configuring the profile, select **Client Credentials** as the grant type. If your OAuth provider requires scopes, add them on the OAuth Entity Scopes tab. Consult your data source or identity provider documentation for the re quired scope values. Select the OAuth entity profile for your Snowflake or IdP service principal. Select the OAuth integration type that you want to use:

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Option	Description
	▪ **System**: Use the selected OAuth entity profile for all users of this connection. This is the default option. ▪ **Personal**: Require each user to authen ticate individually with their own creden tials before they can access Snowflake data through this connection. Select **Get OAuth Token** to open the authentication flow in a new browser tab and sign in. **Note:** Each user can view, renew, or revoke their personal access to ken from the Personal Integrations Dashboard in the Zero Copy Con nector Hub. If a user's token expires or is missing, an alert appears when that user tries to access data assets for this connection, with a link to sign in again.

5. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Amazon Redshift

The Amazon Redshift connector provides read-only access to data and metadata from the Redshift data warehouse service.

A connection admin can set up a connection to Amazon Redshift in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from Amazon Redshift. This allows users to access Amazon Redshift data through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

The connector has been enhanced to improve the performance of the following Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

- Sort
- Limit
- Filter
- GroupBy

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- avg()
- count()
- max()
- min()
- sum()
- References

Supported data types

The following table lists supported Amazon Redshift data types and the default matching data types in a data fabric table.

Important: Amazon Redshift data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Amazon Redshift	Data fabric table
smallint	Integer
integer	Integer
bigint	Long Integer String
decimal	Decimal
numeric	Decimal
double	Floating Point Number
float4	Floating Point Number
float8	Floating Point Number
char	String
varchar	String
text	String
date	Date
timestamp	Basic Date/Time
timestamptz	Date/Time
boolean	True/False

Related topics

Create an Amazon Redshift connection

Create an Amazon Redshift connection

Establish a zero copy connection to the Redshift data warehouse service in Zero Copy Connector Hub.

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Before you begin

You can optimize queries to Amazon Redshift by enabling table statistics. Consult your data source admin to confirm whether table statistics are enabled in Amazon Redshift before enabling this option in Zero Copy Connector Hub.

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Amazon Redshift. For additional information about connecting to Amazon Redshift, refer to the Amazon Redshift documentation.

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Find the Amazon Redshift connector and select **Connect**.
3. On the form, fill in the fields.

New Amazon Redshift Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	JDBC URL to establish the connection. For example: `jdbc:redshift://<host>:<port>`
Database	Name of the database that you want to connect to.
Enable table statistics	Option to enable table statistics. Optimize SQL queries using table statistics by selecting this option. Enabling table statistics allows the system to use estimates of stored data such as row count, distinct values, and data size for enhanced query processing.

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Field	Description
	Note: You must ensure that gathering table statistics is enabled in the data source before selecting this option.
Authentication method	
Access key ID	Access key ID associated with the source.
Secret access key	Secret access key associated with the access key ID.

4. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

SAP ECC

The SAP ECC connector provides read-only access to data and metadata from an SAP ECC system.

A connection admin can set up a connection to SAP ECC in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from SAP ECC. This allows users to access SAP ECC data through the table list view or by using GlideRecord scripts.

For details on implementation, refer to Zero Copy Connector for ERP.

Related topics

Create an SAP ECC connection

Create an SAP ECC connection

Establish a zero copy connection to an SAP ECC system in Zero Copy Connector Hub.

Before you begin
Role required: df_connection_admin

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
2. Find the SAP ECC connector and select **Connect**.
3. On the form, fill in the fields.

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New SAP ECC Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Instance URL	URL of your local instance.
Authentication methods	
ServiceNow username	Username of the current user accessing your local instance.
ServiceNow user password	Password of the current user accessing your local instance.

4. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See .

If the connection fails, verify the connection details with your data source administrator and try again.

SAP S/4HANA

The SAP S/4HANA connector provides read-only access to data and metadata from an SAP S/4HANA system.

A connection admin can create a connection to SAP S/4HANA and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from SAP S/4HANA. This allows users to retrieve SAP S/4HANA data through the table list view or GlideRecord scripts.

For details on implementation, refer to Zero Copy Connector for ERP.

Related topics

Create an SAP S/4HANA connection

Create an SAP S/4HANA connection

Establish a zero copy connection to an SAP S/4HANA system in Zero Copy Connector Hub.

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Before you begin
Role required: df_connection_admin

About this task

Procedure
1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
2. Find the SAP S/4HANA connector and select **Connect**.
3. On the form, fill in the fields.

New SAP S/4HANA Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Instance URL	URL of your local instance.
Authentication methods	
ServiceNow username	Username of the current user accessing your local instance.
ServiceNow user password	Password of the current user accessing your local instance.

4. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See .

If the connection fails, verify the connection details with your data source administrator and try again.

Teradata

The Teradata connector provides read-only access to data and metadata from a Teradata source.

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A connection admin can set up a connection to Teradata in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from Teradata. This allows users to access Teradata data through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

The connector has been enhanced to improve the performance of the following Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

- Sort
- Limit
- Filter
- GroupBy
- avg()
- count()
- max()
- min()
- sum()
- References

Supported data types

The following table lists supported Teradata data types and the default matching data types in a data fabric table.

Important: Teradata data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Teradata	Data fabric table
TINYINT	Long
SMALLINT	Long
INTEGER	Long
BIGINT	Long
REAL	Decimal
FLOAT	Decimal
DOUBLE	Decimal
NUMERIC	Decimal
DECIMAL	Decimal
NUMBER	Decimal
CHAR	Char
CHARACTER	Char
VARCHAR	String

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Data type mapping (continued)

Teradata	Data fabric table
BINARY	File Attachment
VARBINARY	File Attachment
DATE	Date
TIME	Date/Time
TIMESTAMP	Date/Time
TIME WITH TIME ZONE	Date/Time
TIMESTAMP WITH TIME ZONE	Date/Time

Related topics

Create a Teradata connection

Create a Teradata connection

Establish a zero copy connection to a Teradata system in Zero Copy Connector Hub.

Before you begin

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Teradata. For additional information about connecting to Teradata, refer to the Teradata documentation.

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
2. Find the Teradata connector and select **Connect**.
3. On the form, fill in the fields.

New Teradata Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	

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Field	Description
Connection URL	JDBC URL to establish the connection. For example: `jdbc:teradata://<host>:<port>;database=<databaseName>`
Authentication methods	
Authentication method	Authentication method to use with Teradata. Default is Basic Authentication.
Database username	Username associated with the database.
Database password	Password associated with the username.

4. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See .

If the connection fails, verify the connection details with your data source administrator and try again.

Amazon S3 Tables

The Amazon S3 Tables connector provides read-only access to data and metadata in Amazon S3 Tables.

A connection admin can set up a connection to Amazon S3 Tables in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from S3 Tables. This allows users to access data in S3 Tables through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Important: The Amazon S3 Tables primary connector is in preview. A primary connector in preview is developed and supported by ServiceNow, but is still being enhanced to include all planned functionality. While in preview, a connector may have limitations in platform support or available features.

A primary connector in preview is fully functional for its documented scope and receives the same ServiceNow support as other primary connectors. For details on specific functionality limitations, see KB0010487.

The connector has been enhanced to improve the performance of the following Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

- Sort
- Limit
- Filter
- GroupBy
- avg()

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- count()
- max()
- min()
- sum()
- References

Supported data types

The following table lists supported Amazon S3 Tables data types and the default matching data types in a data fabric table.

Important: Amazon S3 Tables data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Amazon S3 Tables	Data fabric table
boolean	True/False
int	Integer
long	Long
float	Floating Point Number
double	Decimal
decimal(p,s)	Decimal/Currency
string	String
date	Date
timestamp	Date/Time
timestamptz	Date/Time
uuid	GUID

Related topics

Create an Amazon S3 Tables connection

Establish a zero copy connection to Amazon S3 Tables in Zero Copy Connector Hub.

Before you begin

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Amazon S3 Tables. For additional information about connecting to Amazon S3 Tables, refer to the Amazon S3 Tables documentation.

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Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
2. Find the Amazon S3 Tables connector and select **Connect**.
3. On the form, fill in the fields.

New Amazon S3 Tables Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Iceberg Rest Catalog URI	URI of Iceberg Rest Catalog to connect to the AWS S3 Tables Rest endpoint. For example: `https://s3tables.<region>.amazonaws.com/iceberg`
Authentication methods	
S3 Table bucket ARN	Amazon Resource Name (ARN) of your S3 Tables warehouse. For example: `arn:aws:s3tables:<region>:<account-id>:bucket/<bucket-name>`
S3 Region	Amazon S3 Tables region.
S3 Access Key	Amazon S3 Tables access key used to connect.
S3 Secret Access Key	Amazon S3 Tables Secret Access key used to connect.

4. Select **Connect**.

Result

A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

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What to do next

If the connection succeeds, configure data steward access on the **Access Control** tab. See .

If the connection fails, verify the connection details with your data source administrator and try again.

Apache Iceberg

The Apache Iceberg connector provides read-only access to data and metadata in the Iceberg format.

A connection admin can set up a connection to Apache Iceberg in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from Apache Iceberg. This allows users to access Apache Iceberg data through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Important: The Apache Iceberg primary connector is in preview. A primary connector in preview is developed and supported by ServiceNow, but is still being enhanced to include all planned functionality. While in preview, a connector may have limitations in platform support or available features.

A primary connector in preview is fully functional for its documented scope and receives the same ServiceNow support as other primary connectors. For details on specific functionality limitations, see KBB0010487.

The connector has been enhanced to improve the performance of the following Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

- Sort
- Limit
- Filter
- GroupBy
- avg()
- count()
- max()
- min()
- sum()
- References

Supported data types

The following table lists supported Apache Iceberg data types and the default matching data types in a data fabric table.

Important: Apache Iceberg data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Apache Iceberg	Data fabric table
boolean	True/False

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Data type mapping (continued)

Apache Iceberg	Data fabric table
int	Integer
long	Long
float	Floating Point Number
double	Decimal
decimal(p,s)	Decimal/Currency
string	String
date	Date
timestamp	Date/Time
timestamptz	Date/Time
uuid	GUID

Related topics

Create an Apache Iceberg connection

Create an Apache Iceberg connection

Establish a zero copy connection to Apache Iceberg in Zero Copy Connector Hub.

Before you begin

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Apache Iceberg. For additional information about connecting, refer to the Iceberg connector documentation.

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
2. Find the Apache Iceberg connector and select **Connect**.
3. On the form, fill in the fields.

New Apache Iceberg Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.

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Field	Description
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Object storage authentication	
Object storage system	Storage system used. Default is Amazon S3.
AWS access key	Access key used to access S3.
AWS secret key	Secret key used to access S3.
AWS region	AWS region where your S3 bucket is located.

4. Configure the object storage system that you want to use with Apache Iceberg.

Option	Description
Amazon S3	**a.** Enter the access key used to access S3. **b.** Enter the secret key used to access S3. **c.** Enter the AWS region where your S3 bucket is located. **d.** Configure the metastore that you want to use with Apache Iceberg.
Azure Data Lake Storage (ADLS)	Enter the ADLS Access Key.

5. Configure the metastore that you want to use with Apache Iceberg.

Note: AWS Glue is only applicable when you select Amazon S3 as the object storage system.

Option	Description
Hive Thrift	**a.** Attach the truststore file using one of the fol lowing options: ▪ Upload the truststore file by selecting **At tach TrustStore file** and selecting the file. ▪ Copy and paste the contents of the trust store file. **b.** Enter the truststore password. **c.** Enter the metastore URI that you want to connect to using the Thrift protocol. For ex ample: `thrift://<host>:<port>`

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Option	Description
AWS Glue	**a.** Enter the AWS access key to connect to the Glue Catalog. **b.** Enter the AWS secret key to use to connect to the Glue Catalog. **c.** Enter the AWS region of the Glue Catalog.

6. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See .

If the connection fails, verify the connection details with your data source administrator and try again.

Cloudera Impala

The Cloudera Impala connector provides read-only access to data and metadata in Cloudera Impala.

A connection admin can set up a connection to Cloudera Impala in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from Cloudera Impala. This allows users to access Cloudera Impala data through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Important: The Cloudera Impala primary connector is in preview. A primary connector in preview is developed and supported by ServiceNow, but is still being enhanced to include all planned functionality. While in preview, a connector may have limitations in platform support or available features.

A primary connector in preview is fully functional for its documented scope and receives the same ServiceNow support as other primary connectors. For details on specific functionality limitations, see KBB0010487.

The connector has been enhanced to improve the performance of the following Glide queries and list view operations. These improvements allow the majority of queries to be executed at the data source.

- Sort
- Limit
- Filter
- GroupBy
- avg()
- count()
- max()
- min()

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- sum()
- References

Supported data types

The following table lists supported Cloudera Impala data types and the default matching data types in a data fabric table.

Important: Cloudera Impala data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Cloudera Impala	Data fabric table
BOOLEAN	Boolean
TINYINT	Long
SMALLINT	Long
INTEGER	Long
BIGINT	Long
REAL	Decimal
FLOAT	Decimal
DOUBLE	Decimal
NUMERIC	Decimal
DECIMAL	Decimal
CHAR	String
VARCHAR	String
DATE	Date
TIMESTAMP	Date/Time
BINARY	File attachment

Related topics

Create a Cloudera Impala connection

Create a Cloudera Impala connection

Establish a zero copy connection to a Cloudera Impala system in Zero Copy Connector Hub.

Before you begin

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Cloudera Impala. For additional information about connecting to Cloudera Impala, refer to the Cloudera Impala documentation.

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Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
2. Find the Cloudera Impala connector and select **Connect**.
3. On the form, fill in the fields.

New Cloudera Impala Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	JDBC URL to establish the connection. For example: `jdbc:cloudera://<host>:<port>;database=<databaseName>`
Authentication methods	
Authentication method	Authentication method to use with Cloudera Impala. Default is Basic Authentication.
User ID	User ID associated with the source.
Password	Password associated with the user ID.

4. Select **Connect**.

Result

A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next

If the connection succeeds, configure data steward access on the **Access Control** tab. See .

If the connection fails, verify the connection details with your data source administrator and try again.

ServiceNow Remote Instance

The ServiceNow Remote Instance connector provides read-only access to another ServiceNow instance.

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The ServiceNow Remote Instance connector enables you to query tables residing in remote ServiceNow instances and access that data as if it were stored locally. This connector is designed to allow a central instance to retrieve records from one or more remote instances in real time.

A connection admin can set up a connection to a remote ServiceNow instance in the Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from the remote instance. This allows users to access remote ServiceNow data through the table list view or by using GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

How the connector works

After a zero copy connection is established and a data steward creates a data fabric table with mapped data, the connector queries the remote instance each time users access the data fabric table. Records are retrieved in real time and displayed in lists and forms. They're never stored or persisted on your local instance. After users close the list or form, the retrieved data is purged from memory.

This approach differs from other data synchronization methods like Instance Data Replication (IDR) or custom API integrations because no data transfer or storage occurs on the local instance.

ServiceNow Connector — Oracle instance limitation

When using the ServiceNow Connector with Workflow Data Fabric or Zero Copy Connectors, the remote ServiceNow instance must be running on a supported database platform. Connecting to a ServiceNow instance that uses Oracle as its underlying database is not supported. Queries that include tables from an Oracle-backed ServiceNow instance fail.

⚠ **Warning:** This limitation applies specifically to ServiceNow to ServiceNow connectivity through the ServiceNow Connector. Workflow Data Fabric and Zero Copy Connectors support direct connections to external Oracle databases through the Oracle Connector.

Service account security model

Access to tables on the remote ServiceNow instance is controlled through a service account. The remote instance administrator creates this service account and grants it permissions to access only the specific tables required for the connection.

When configuring the connection, the connection admin provides the service account credentials. The permissions assigned to the service account on the remote instance determine which tables and fields are available through the zero copy connection. This security model ensures that data stewards can only map data that the remote instance administrator has explicitly made accessible.

Work with the remote instance administrator to perform the following tasks:

- Create a dedicated service account for zero copy access.
- Grant the service account read permissions to the required tables on the remote instance.
- Document which tables and fields the service account can access.

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Use case

A managed service provider operates twelve ServiceNow instances for different business units, each containing incident, change, and asset data specific to that unit. Due to data residency regulations in multiple regions, records can't be copied or moved between instances.

The provider designates one instance as the central processing instance where cross-organizational workflows and dashboards are managed. Using the ServiceNow Remote Instance connector, the central instance establishes zero copy connections to each of the twelve remote instances. Data stewards create data fabric tables that map incident and asset fields from the remote instances.

When an executive dashboard displays consolidated metrics, the central instance queries each remote instance and retrieves only the records needed for the current view. When a workflow requires a decision based on asset data from a specific region, the central instance looks up the relevant records without storing them. Throughout these operations, all data remains in its original instance, satisfying data residency requirements while providing the unified visibility the organization needs.

Related topics

Create a ServiceNow Remote Instance connection

Create a ServiceNow Remote Instance connection

Establish a zero copy connection to a remote ServiceNow instance in Zero Copy Connector Hub.

Before you begin

Work with your remote instance administrator to complete the following tasks on each remote instance that you want to connect to:

- Create an OAuth endpoint on the remote instance. For more information, see Create an endpoint for clients to access the instance.
- Create a user account with read access to the tables that you want to query. This account acts as the service account in the zero copy connection.
- Obtain the OAuth Client ID and OAuth Client Secret from the OAuth application registry record on the remote instance.

Role required: df_connection_admin

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Workflow Data Fabric Hub** > **Available connectors** > **Primary connectors**.
2. Find the ServiceNow Remote Instance connector and select **Connect**.
3. On the form, fill in the fields.

New ServiceNow Remote Instance Connection form

Field	Description
Name and description	

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Field	Description
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	HTTPS URL of the remote ServiceNow instance to establish the connection. For example: `https://<host>.service-now.com`
Authentication method	
OAuth Client ID	Client ID generated by the remote ServiceNow instance for the OAuth application. For example: `TRINO_CONNECTOR_OAUTH_CLIENT`
OAuth Client Secret	Client secret associated with the Client ID for the remote ServiceNow instance OAuth application.
Username	Username of the service account for the remote ServiceNow instance. For example: `abel.tuter`
Password	Password of the service account for the remote ServiceNow instance.

4. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the OAuth credentials and service account permissions with your remote instance administrator and try again.

MySQL

The MySQL connector enables access to relational database data from your MySQL instance without moving or copying data.

Connection admins set up connections to MySQL in the Zero Copy Connector Hub and grant data stewards access. Data stewards use the connection to create data fabric tables and map

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data from MySQL. Users can then access MySQL data through the table list view or GlideRecord scripts. For details, see Managing data fabric tables.

Important: The MySQL primary connector is in preview. A primary connector in preview is developed and supported by ServiceNow, but is still being enhanced to include all planned functionality. While in preview, a connector may have limitations in platform support or available features.

A primary connector in preview is fully functional for its documented scope and receives the same ServiceNow support as other primary connectors. For details on specific functionality limitations, see Primary Connectors Limitations (KBB0010487).

The connector supports pushdown for the following Glide queries and list view operations, allowing most queries to execute at the data source:

- Sort
- Limit
- Offset
- Filter
- GroupBy
- avg()
- count()
- max()
- min()
- sum()
- References

Supported data types

The following table lists supported MySQL data types and the default matching data types in a data fabric table.

Data type mapping

MySQL	Data fabric table
tinyint unsigned	Integer
smallint unsigned	Integer
int unsigned	Long
bigint unsigned	Decimal
json	Not supported
enum	String
datetime	Basic Date/Time
bit(1)	True/False
tinyint	Long
smallint	Integer
int/integer	Integer

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Data type mapping (continued)

MySQL	Data fabric table
bigint	Long
float (Real)	Floating Point Number
DOUBLE	Floating Point Number
decimal/numeric	Decimal
char(n)	Char (fixed-length character field)
varchar/nvarchar/longvarchar/longvarchar	String (variable-length character field)
date	Date
time	Basic Time
timestamp	Date/Time
binary/varbinary/longvarbinary	Varbinary

MySQL data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Related topics

Create a MySQL connection

Create a MySQL connection

Create a zero-copy connection to MySQL to access relational database data in Zero Copy Connector Hub without moving or duplicating data.

Before you begin

Role required: df_connection_admin

About this task

Table statistics are enabled by default for MySQL connections.

After you create this connection, data stewards can use it to create data fabric tables that map to MySQL data sources. For additional information about connecting, see the MySQL connector documentation.

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Locate the MySQL connector and select **Connect**.
3. Complete the connection form.

MySQL connection form

Field	Description
Name and description	

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Field	Description
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	JDBC URL to establish the connection. For example: `jdbc:mysql://<host>:<port>?sslMode=REQUIRED` The `sslMode` parameter in the URL is optional. Setting SSL mode in the Connection security configurations section is the recommended approach. If you specify `sslMode` in the URL, it takes precedence over that setting.
SSL	Option to enable or disable SSL for the connection. When enabled, additional fields appear based on the selected SSL mode, Server Certificate Source, and Store type. See MySQL connection security configuration fields for the complete conditional field set.

4. Configure the authentication method that you want to use with MySQL.

Option	Description
Basic	Option to use a username and password. **a.** Enter the username associated with the source. **b.** Enter the password associated with the username.
AWS IAM	Option to authenticate using AWS IAM to ken-based authentication. See MySQL au thentication method fields for the specific fields (Database user, AWS region, AWS ac cess key ID, AWS secret access key).
GCP IAM	Option to authenticate using GCP Cloud IAM token-based authentication. See MySQL au thentication method fields for the specific fields (Service account key (JSON), Database user, GCP token scope).
OAuth	Option to authenticate using Azure AD/En tra ID OAuth 2.0. See MySQL authentication method fields for the specific fields (OAuth credential type, Azure tenant ID, Azure client

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Option	Description
	ID, Azure client secret, and Azure token scope).

5. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Related topics

MySQL connection security configuration fields

MySQL authentication method fields

PostgreSQL

The PostgreSQL connector enables access to relational database data from your PostgreSQL instance without moving or copying data.

Connection admins set up connections to PostgreSQL in the Zero Copy Connector Hub and grant data stewards access. Data stewards use the connection to create data fabric tables and map data from PostgreSQL. Users can then access PostgreSQL data through the table list view or GlideRecord scripts. For details, see Managing data fabric tables.

For specific functionality limitations, see Primary Connectors Limitations (KBB0010487).

The connector supports pushdown for the following Glide queries and list view operations, allowing most queries to execute at the data source:

- Sort
- Limit
- Offset
- Filter
- GroupBy
- avg()
- count()
- max()
- min()
- sum()
- References

The connector also supports the following statistical aggregate pushdowns: `STDDEV_SAMP`, `STDDEV_POP`, `VARIANCE_SAMP`, `VARIANCE_POP`, `COVAR_SAMP`, `COVAR_POP`, `CORR`, `REGR_INTERCEPT`, and `REGR_SLOPE`. The connector also supports complex-expression pushdown, including arithmetic operations, `CAST`, `AND/OR`, `IN`, and `LIKE`.

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Supported data types

Note: The following PostgreSQL data types aren't supported: `BYTEA`, `UUID`, `JSON`, `JSONB`, `VECTOR`, `HSTORE`, `ARRAY`, `GEOMETRY`, `GEOMETRY(GEOMETRY TYPE, SRID)`, and `POINT`.

Data type mapping

PostgreSQL	Data fabric table
bit	True/False
boolean	True/False
smallint	Integer
integer	Integer
bigint	Long
real	Floating Point Number
double	Floating Point Number
numeric(p, s)	Decimal
decimal(p', s')	Decimal
numeric (unconstrained)	Decimal
char(n)	Char (fixed-length character field)
varchar(n)	String (variable-length character field)
enum	String
date	Date
time(n)	Basic Time
timestamp(n)	Basic Date/Time
timestampz(n)	Date/Time
money	String

Related topics

Create a PostgreSQL connection

Create a PostgreSQL connection

Create a zero-copy connection to PostgreSQL to access relational database data in Zero Copy Connector Hub without moving or duplicating data.

Before you begin

Role required: df_connection_admin

About this task

Table statistics are enabled by default for PostgreSQL connections.

After you create this connection, data stewards can use it to create data fabric tables that map to PostgreSQL data sources. For additional information about connecting, see PostgreSQL connector documentation.

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Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Locate the PostgreSQL connector and select **Connect**.
3. Complete the connection form.

PostgreSQL connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	JDBC URL to establish the connection. For example: `jdbc:postgresql://<host>:<port>/<database>?sslmode=require` The `sslmode` parameter in the URL is optional. Setting SSL mode in the Connection security configurations section is the recommended approach; if you specify `sslmode` in the URL, it takes precedence over that setting.
SSL	Option to enable or disable SSL for the connection. When **Enabled**, additional fields appear based on the selected SSL mode, Server Certificate Source, and Store type. See PostgreSQL connection security configuration fields for the complete conditional field set.

4. Configure the authentication method that you want to use with PostgreSQL.

Option	Description
Basic	Option to use a username and password. **a.** Enter the username associated with the source. **b.** Enter the password associated with the username.
AWS IAM	Option to authenticate using AWS RDS IAM (temporary STS token-based) authentication. See PostgreSQL authentication method fields for the specific fields (Database user, AWS re

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Option	Description
	gion, AWS access key ID, AWS secret access key).
GCP IAM	Option to authenticate using GCP Cloud IAM token-based authentication, with either a ser vice account or user credentials. See Postgre SQL authentication method fields for the spe cific fields (Service account key (JSON), Data base user, GCP token scope).
OAuth	Option to authenticate using Azure AD / Entra ID OAuth 2.0 (Resource Owner Password Cre dentials flow). See PostgreSQL authentication method fields for the specific fields (OAuth credential type, Database user, Azure tenant ID, Azure client ID, Azure client secret, Azure token scope).

5. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Related topics
- PostgreSQL connection security configuration fields
- PostgreSQL authentication method fields

Microsoft SQL Server
The Microsoft SQL Server connector enables access to relational database data from your Microsoft SQL Server instance without moving or copying data.

Connection admins set up connections to Microsoft SQL Server in the Zero Copy Connector Hub and grant data stewards access. Data stewards use the connection to create data fabric tables and map data from Microsoft SQL Server. Users can then access Microsoft SQL Server data through the table list view or GlideRecord scripts. For details, see Managing data fabric tables.

When you configure the connection with an access token, you can choose whether the connection authenticates using a shared, system-level OAuth entity profile or personal authentication.

Note: With personal authentication, each user's access to Microsoft SQL Server data is authenticated and audited against their own credentials, not a shared account. This supports stricter access control and clearer audit trails.

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The connector supports pushdown for the following Glide queries and list view operations, allowing most queries to execute at the data source:

- Sort
- Limit
- Offset
- Join (inner, left, right, full, and cross)

The connector also supports pushdown for cast expressions, string functions such as `LOWER` and `UPPER`, and date-part extraction, for example extracting the year from a date column. Unsupported expressions fall back to Trino with correct results.

The connector also supports the following aggregate pushdowns: `avg()`, `count()`, `max()`, `min()`, `sum()`, `STDDEV_SAMP`, `STDDEV_POP`, `VARIANCE_SAMP`, `VARIANCE_POP`, `COVAR_SAMP`, `COVAR_POP`, `CORR`, `REGR_INTERCEPT`, and `REGR_SLOPE`. The connector also supports complex-expression pushdown, including arithmetic operations, `CAST`, `AND/OR`, `IN`, and `LIKE`.

For known limitations, see the Knowledge Base article Primary Connectors Limitations (KBB0010487).

Supported data types

The following table lists supported Microsoft SQL Server data types and the default matching data types in a data fabric table.

Note: Microsoft SQL Server data types not included in the table aren't supported for data mapping in Zero Copy Connector Hub.

Data type mapping

Microsoft SQL Server	Data fabric table
BIT	True/False
TINYINT	Integer
SMALLINT	Integer
INT	Integer
BIGINT	Long
DECIMAL(p, s)	Decimal
NUMERIC(p, s)	Decimal
FLOAT(n)	Floating Point Number
REAL	Floating Point Number
DATE	Date
TIME(n)	Basic Time
DATETIME2(n)	Basic Date/Time
SMALLDATETIME	Basic Date/Time
DATETIMEOFFSET(n)	Date/Time
CHAR(n)	Char

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Data type mapping (continued)

Microsoft SQL Server	Data fabric table
VARCHAR(n)	String
TEXT	String
NCHAR(n)	Char
NVARCHAR(n)	String
NTEXT	String
VARBINARY(n)	String

Related topics

Create a Microsoft SQL Server connection

Create a Microsoft SQL Server connection

Create a zero-copy connection to Microsoft SQL Server to access relational database data in Zero Copy Connector Hub without moving or duplicating data.

Before you begin

Role required: df_connection_admin

About this task

Table statistics are enabled by default for Microsoft SQL Server connections.

After you create this connection, data stewards can use it to create data fabric tables that map to Microsoft SQL Server data sources. For additional information about connecting, see Microsoft SQL Server connector documentation.

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Locate the Microsoft SQL Server connector and select **Connect**.
3. Complete the connection form.

Microsoft SQL Server connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your syster
Connection name	System-generated name based on the Connection label. This field cannot be modified once connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	

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Field	Description

Connection URL	JDBC URL to establish the connection. For example:
	○ Azure SQL:
	`jdbc:sqlserver://<server>.database.windows.net:1433;database=<db>;encrypt=true`
	○ GCP or on-premises:
	`jdbc:sqlserver://<host>:1433;databaseName=<db>;encrypt=true;trustServerCertifi`
	The `encrypt` and `trustServerCertificate` parameters in the URL are optional. Sel in the Connection security configurations section is the recommended approach; if you spe parameters in the URL, they take precedence over that setting.

SSL	Option to enable or disable SSL for the connection. When **Enabled**, additional fields appear the selected SSL mode, Server Certificate Source, and Store type. See Microsoft SQL Serve security configuration fields for the complete conditional field set.

4. Configure the authentication method that you want to use with Microsoft SQL Server.

Option	Description
Basic	Option to use a Microsoft SQL Server login username and password. Compatible with all Microsoft SQL Server deployments, including Azure SQL, GCP Cloud SQL, AWS RDS, and on-premises. **a.** Enter the username associated with the source. **b.** Enter the password associated with the username.
OAuth	Option to authenticate using OAuth. **Note:** Azure SQL Server supports OAuth for this connector. AWS RDS and GCP Cloud SQL don't support IAM or to ken-based authentication for Microsoft SQL Server at the platform level, so use Basic authentication for those deploy ments. This is a cloud-provider limita tion, not a limitation of the connector. Select the OAuth credential type that you want to use. ○ **Azure Service Principal**: option to enter OAuth credentials directly from Azure AD (Entra ID). See Microsoft SQL Server au thentication method fields for the specif ic fields (Azure tenant ID, Azure client ID, Azure client secret, Azure token scope).

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Option	Description
	○ **Access Token**: option to use an existing OAuth entity profile, with either a shared (System) or per-user (Personal) integration type. See Microsoft SQL Server authentication method fields for the specific fields (OAuth entity profile, Select OAuth integration type).

5. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Related topics
Microsoft SQL Server connection security configuration fields

Microsoft SQL Server authentication method fields

Acumatica
The Acumatica connector enables access to ERP data from your Acumatica account without moving or copying data.

Connection admins set up connections to Acumatica in the Zero Copy Connector Hub and grant data stewards access. Data stewards use the connection to create data fabric tables and map data from Acumatica. Users can then access Acumatica data through the table list view or GlideRecord scripts. For details, see Managing data fabric tables.

Note:

Acumatica is a **REST** connector. Before you set up this connection, review REST connectorsfor prerequisites, authentication requirements, and API consumption considerations.

The Acumatica connector currently supports one table.

Supported data types

Data type mapping

Acumatica	Data fabric table
varchar	String
integer	Integer
double	Floating Point Number

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Related topics

Create an Acumatica connection

Create an Acumatica connection

Create a zero-copy connection to Acumatica to access ERP data in Zero Copy Connector Hub without moving or duplicating data.

Before you begin

1. Check your entitlements to determine whether you have access to the Workflow Data Fabric foundation entitlement, which provides eligibility for the REST Config connector download option.
2. Install the REST Config Framework plugin.
3. Install the Acumatica plugin.

The Acumatica connector appears in the Zero Copy Connector Hub UI only after both plugins are installed.

Role required: df_connection_admin

About this task

After you create this connection, data stewards can use it to create data fabric tables that map to Acumatica data sources.

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Locate the Acumatica connector and select **Connect**.
3. Complete the connection form.

Acumatica connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection Details	
Connection Alias	Connection alias that identifies the HTTP connection for this connector.

4. Select **Connect**.

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Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Oracle HCM (Discovery)

The Oracle HCM (Discovery) connector enables access to human capital management data from your Oracle HCM account without moving or copying data. Available tables and columns are discovered at runtime.

Connection admins set up connections to Oracle HCM (Discovery) in the Zero Copy Connector Hub and grant data stewards access. Data stewards use the connection to create data fabric tables and map data from Oracle HCM. Users can then access Oracle HCM data through the table list view or GlideRecord scripts. For details, see Managing data fabric tables.

Note:

Oracle HCM (Discovery) is a **REST** connector. Before you set up this connection, review REST connectors for prerequisites, authentication requirements, and API consumption considerations.

Supported data types

Data type mapping

Oracle HCM (Discovery)	Data fabric table
varchar	String
bigint	Long
boolean	True/False
double	Floating Point Number
date	Date
timestamp (3)	Basic Date/Time

How Oracle HCM (Discovery) differs from Oracle HCM

Because Oracle HCM instances can have custom tables and column definitions, this connector does not rely solely on a fixed, built-in set of tables. Instead, it queries your Oracle HCM instance at runtime to discover which tables and columns are available. This is similar to how a JDBC-based connector discovers schema information from a database. Discovered metadata is cached to avoid repeating this discovery process for every query.

Note:

Oracle HCM (Discovery) is a separate connector from Oracle HCM. Choose Oracle HCM (Discovery) if you want the connector to detect available tables and columns directly from your Oracle HCM instance. This approach does not rely on a fixed, built-in set of tables.

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Related topics

Create an Oracle HCM (Discovery) connection

Create an Oracle HCM (Discovery) connection

Establish a zero copy connection to an external Oracle HCM account in Zero Copy Connector Hub.

Before you begin

1. Check your entitlements to determine whether you have access to the Workflow Data Fabric foundation entitlement, which provides eligibility for the REST Config connector download option.
2. Install the REST Config Framework plugin.
3. Install the Oracle HCM plugin.

The Oracle HCM Discovery connector appears in the Zero Copy Connector Hub UI only after both plugins are installed.

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Oracle HCM (Discovery).

Procedure

1. Navigate to the available primary connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Primary connectors**.
2. Find the Oracle HCM (Discovery) connector and select **Connect**.
3. On the form, fill in the fields.

Oracle HCM (Discovery) Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection Details	
Connection Alias	The connection alias that identifies the HTTP connection for this connector.

4. Select **Connect**.

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Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Community connectors

Connect to external data sources using community connectors in Zero Copy Connector Hub.

Community connectors are developed by the open-source community and made available through the ServiceNow AI Platform for general use.

- Community connectors are certified by ServiceNow for essential or baseline functionality. However, their functionality can vary and might not cover all use cases supported by primary connectors.
- Community connectors aren't maintained by ServiceNow, nor included in the ServiceNow support scope.
- Community connectors aren't eligible for support or case resolution.

Community connectors and compatibility

Community connector	Minimum compatibility
Apache Cassandra	Yokohama Patch 5, Zurich, Australia
Apache Hive	Yokohama Patch 5, Zurich, Australia
Apache Hudi	Yokohama Patch 5, Zurich, Australia
Delta Lake	Yokohama Patch 5, Zurich, Australia
Exasol	Yokohama Patch 5, Zurich, Australia
MariaDB	Yokohama Patch 5, Zurich, Australia
MongoDB	Yokohama Patch 5, Zurich, Australia
OpenText Analytics Database (Vertica)	Yokohama Patch 5, Zurich, Australia
Prometheus	Yokohama Patch 5, Zurich, Australia
SingleStore	Yokohama Patch 5, Zurich, Australia

Apache Cassandra

The Apache Cassandra connector provides read-only access to data and metadata in a Cassandra database.

A connection admin can create a connection to Apache Cassandra and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from Apache Cassandra. This allows users to retrieve Apache Cassandra data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

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Related topics

Create an Apache Cassandra connection

Create an Apache Cassandra connection

Establish a zero copy connection to an Apache Cassandra database in Zero Copy Connector Hub.

Before you begin

You can optimize queries to Apache Cassandra by enabling table statistics. Consult your data source admin to confirm whether table statistics are enabled in Apache Cassandra before enabling this option in Zero Copy Connector Hub.

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Apache Cassandra. For additional information about connecting, refer to the Cassandra connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the Apache Cassandra data source and select **Connect**.
3. On the form, fill in the fields.

New Apache Cassandra Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	URL to establish the connection.
Port	Port used in the connection.
Datacenter	Datacenter that you want to connect to.

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4. Configure secure authentication by uploading a keystore file or by entering the keystore details manually.

Option	Description
Upload keystore file	**a.** Select **Attach KeyStore file**. **b.** Browse and select the keystore file.
Enter keystore contents manually	Copy and paste the contents of the keystore file.

5. Enter the keystore password.
6. Enter the data source username and password.
7. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Apache Hive

The Apache Hive connector provides read-only access to data and metadata from a Hive data warehouse.

A connection admin can create a connection to Apache Hive and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from Apache Hive. This allows users to retrieve Apache Hive data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Related topics

Create an Apache Hive connection

Create an Apache Hive connection

Establish a zero copy connection to an Apache Hive data warehouse in Zero Copy Connector Hub.

Before you begin
Role required: df_connection_admin

About this task
Work with your data source admin to create a connection to Apache Hive. For additional information about connecting, refer to the Hive connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

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Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the Apache Hive connector and select **Connect**.
3. On the form, fill in the fields.

New Apache Hive Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Object storage authentication	
Object storage system	Storage system used. Default is Amazon S3.
AWS access key	Access key used to access S3.
AWS secret key	Secret key used to access S3.
AWS region	AWS region where your S3 bucket is located.

4. Configure the metastore that you want to use with Apache Hive.

Option	Description
Hive Thrift	**a.** Attach the truststore file using one of the fol lowing options: ▪ Upload the truststore file by selecting **At tach TrustStore file** and selecting the file. ▪ Copy and paste the contents of the trust store file. **b.** Enter the truststore password. **c.** Enter the metastore URI that you want to connect to using the Thrift protocol. For ex ample: `thrift://<host>:<port>`

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Option	Description
AWS Glue	**a.** Enter the AWS access key to connect to the Glue Catalog. **b.** Enter the AWS secret key to use to connect to the Glue Catalog. **c.** Enter the AWS region of the Glue Catalog.

5. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Apache Hudi

The Apache Hudi connector provides read-only access to data and metadata in the Hudi format.

A connection admin can create a connection to Apache Hudi and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from Apache Hudi. This allows users to retrieve Apache Hudi data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Related topics

Create an Apache Hudi connection

Create an Apache Hudi connection

Establish a zero copy connection to Apache Hudi in Zero Copy Connector Hub.

Before you begin
Role required: df_connection_admin

About this task
Work with your data source admin to create a connection to Apache Hudi. For additional information about connecting, refer to the Hudi connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

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Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the Apache Hudi connector and select **Connect**.
3. On the form, fill in the fields.

New Apache Hudi Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Object storage authentication	
Connection URI	URI to establish the connection. For example: `thrift://<host>:<port>`
Object storage system	Storage system used. Default is Amazon S3.
AWS access key	Access key used to access S3.
AWS secret key	Secret key used to access S3.
AWS region	AWS region where your S3 bucket is located.

4. Configure the metastore that you want to use with Apache Hudi.

Option	Description
Hive Thrift	**a.** Attach the truststore file using one of the fol lowing options: ▪ Upload the truststore file by selecting **At tach TrustStore certificate** and selecting the file. ▪ Copy and paste the contents of the trust store file. **b.** Enter the metastore URI that you want to connect to using the Thrift protocol. For ex ample:

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Option	Description
	`thrift://<host>:<port>` **c.** Enter the truststore password.
AWS Glue	**a.** Enter the AWS access key to connect to the Glue Catalog. **b.** Enter the AWS secret key to use to connect to the Glue Catalog. **c.** Enter the AWS region of the Glue Catalog.

5. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Delta Lake

The Delta Lake connector provides read-only access to data and metadata in the Delta Lake format.

A connection admin can create a connection to Delta Lake and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from Delta Lake. This allows users to retrieve Delta Lake data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Related topics

Create a Delta Lake connection

Create a Delta Lake connection

Establish a zero copy connection to Delta Lake in Zero Copy Connector Hub.

Before you begin
Role required: df_connection_admin

About this task
Work with your data source admin to create a connection to Delta Lake. For additional information about connecting, refer to the Delta Lake connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

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Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the Delta Lake connector and select **Connect**.
3. On the form, fill in the fields.

New Delta Lake Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Object storage authentication	
Object storage system	Storage system used. Default is Amazon S3.
AWS access key	Access key used to access S3.
AWS secret key	Secret key used to access S3.
AWS region	AWS region where your S3 bucket is located.

4. Configure the metastore that you want to use with Delta Lake.

Option	Description
Hive Thrift	**a.** Attach the truststore file using one of the fol lowing options: ▪ Upload the truststore file by selecting **At tach TrustStore certificate** and selecting the file. ▪ Copy and paste the contents of the trust store file. **b.** Enter the metastore URI that you want to connect to using the Thrift protocol. For ex ample: `thrift://<host>:<port>` **c.** Enter the truststore password.

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Option	Description
AWS Glue	**a.** Enter the AWS access key to connect to the Glue Catalog. **b.** Enter the AWS secret key to use to connect to the Glue Catalog. **c.** Enter the AWS region of the Glue Catalog.

5. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Exasol

The Exasol connector provides read-only access to data and metadata in an Exasol database.

A connection admin can create a connection to Exasol and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from Exasol. This allows users to retrieve Exasol data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Related topics

Create an Exasol connection

Create an Exasol connection

Establish a zero copy connection to an Exasol database in Zero Copy Connector Hub.

Before you begin
Role required: df_connection_admin

About this task
Work with your data source admin to create a connection to Exasol. For additional information about connecting, refer to the Exasol connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

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Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the Exasol connector and select **Connect**.
3. On the form, fill in the fields.

New Exasol Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection Details	
Connection URL	JDBC URL to establish the connection. For example: `jdbc:exa://<host>:<port>;encryption=1;fingerprint=<FI`
Authentication method	
Username	Username associated with the source.
Password	Password associated with the username.

4. Select **Connect**.

Result

A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next

If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

MariaDB

The MariaDB connector provides read-only access to data and metadata from a MariaDB database.

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A connection admin can create a connection to MariaDB and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from MariaDB. This allows users to retrieve MariaDB data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Related topics

Create a MariaDB connection

Create a MariaDB connection

Establish a zero copy connection to an external MariaDB database in Zero Copy Connector Hub.

Before you begin

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to MariaDB. For additional information about connecting, refer to the MariaDB connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the MariaDB connector and select **Connect**.
3. On the form, fill in the fields.

New MariaDB Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	JDBC URL to establish the connection. For example:

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Field	Description
	`jdbc:mariadb://<host>:<port>?ssl=true`
Authentication method	
Username	Username associated with the source.
Password	Password associated with the username.

4. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

MongoDB

The MongoDB connector provides read-only access to data and metadata from a MongoDB database.

A connection admin can create a connection to MongoDB and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from MongoDB. This allows users to retrieve MongoDB data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Related topics

Create a MongoDB connection

Create a MongoDB connection

Establish a zero copy connection to a MongoDB database in Zero Copy Connector Hub.

Before you begin
Role required: df_connection_admin

About this task
Work with your data source admin to create a connection to MongoDB. For additional information about connecting, refer to the MongoDB connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

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Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the MongoDB connector and select **Connect**.
3. On the form, fill in the fields.

New MongoDB Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	URL to establish the connection. For example: `mongodb://<host>:<port>/database_name?ssl=true&authSource=external&authMechanism=X509`

4. Configure secure authentication by providing truststore information.

Option	Description
Upload truststore file	**a.** Select **Attach TrustStore file**. **b.** Browse and select the truststore file.
Enter truststore contents manually	Copy and paste the contents of the keystore file.

5. Configure secure authentication by providing keystore information.

Option	Description
Upload keystore file	**a.** Select **Attach KeyStore file**. **b.** Browse and select the keystore file.

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Option	Description
Enter keystore contents manually	Copy and paste the contents of the keystore file.

6. Enter the truststore password.
7. Enter the keystore password.
8. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

OpenText Analytics Database (Vertica)

The OpenText Analytics Database (Vertica) connector provides read-only access to data and metadata from an OpenText Analytics Database (Vertica) database.

A connection admin can create a connection to an OpenText Analytics Database (Vertica) database and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from the OpenText Analytics Database (Vertica). This allows users to retrieve external data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Related topics

Create an OpenText Analytics Database (Vertica) connection

Create an OpenText Analytics Database (Vertica) connection

Establish a zero copy connection to an external Vertica database in Zero Copy Connector Hub.

Before you begin
Role required: df_connection_admin

About this task
Work with your data source admin to create a connection to Vertica. For additional information about connecting, refer to the Vertica connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

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Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the OpenText Analytics Database (Vertica) connector and select **Connect**.
3. On the form, fill in the fields.

New OpenText Analytics Database (Vertica) Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	JDBC URL to establish the connection. For example: `jdbc:vertica://<host>:<port>?SSL=true`
Authentication method	
Username	Username associated with the source.
Password	Password associated with the username.

4. Select **Connect**.

Result

A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next

If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Prometheus

The Prometheus connector provides read-only access to data and metadata in Prometheus.

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A connection admin can create a connection to Prometheus and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from Prometheus. This allows users to retrieve Prometheus data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Related topics

Create a Prometheus connection

Create a Prometheus connection

Establish a zero copy connection to a Prometheus system in Zero Copy Connector Hub.

Before you begin

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to Prometheus. For additional information about connecting, refer to the Prometheus connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the Prometheus connector and select **Connect**.
3. On the form, fill in the fields.

New Prometheus Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	Endpoint for the Prometheus coordinator host. For example: `https://<host>/<path>`

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Field	Description
Authentication methods	
Authentication method	Authentication method to use with Prometheus. Default is Basic Authentication.
Username	Username for basic authentication.
Password	Password associated with the username.

4. Configure connection security.

Option	Description
Default	Select this option to use Java security CA cer tificates to establish a secure connection with the data source. This option uses public certificates that are al ready available in the Java security truststore.
TLS	Select this option if your data source requires one-way SSL and uses its own certificates.

5. If you selected TLS, attach the Base64-encoded truststore PEM file using one of the following options.

Option	Description
Attach TrustStore file	Upload the PEM file by selecting **Attach PEM file** and selecting the file.

Enter TrustStore file contents	Copy and paste the contents of the truststore file, ensuring the content begins with:
	`-----BEGIN CERTIFICATE-----`
	and ends with:
	`-----END CERTIFICATE-----`

6. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See .

If the connection fails, verify the connection details with your data source administrator and try again.

SingleStore

The SingleStore connector provides read-only access to data and metadata from a SingleStore database.

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A connection admin can create a connection to SingleStore and give data stewards access to that connection in Zero Copy Connector Hub. A data steward can select the established connection to create a data fabric table and map data from SingleStore. This allows users to retrieve SingleStore data through the table list view or GlideRecord scripts. For details on creating data fabric tables and mapping data, see Managing data fabric tables.

Related topics

Create a SingleStore connection

Create a SingleStore connection

Establish a zero copy connection to an external SingleStore database in Zero Copy Connector Hub.

Before you begin

Role required: df_connection_admin

About this task

Work with your data source admin to create a connection to SingleStore. For additional information about connecting, refer to the Single Store connector documentation.

Note: This connector was developed by the open-source community and made available through the ServiceNow AI Platform for general use. Functionality can vary and might not cover all use cases supported by primary connectors.

Procedure

1. Navigate to the available community connectors in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Available connectors** > **Community connectors**.
2. Find the SingleStore connector and select **Connect**.
3. On the form, fill in the fields.

New SingleStore Connection form

Field	Description
Name and description	
Connection label	Unique name for this connection. This helps in identifying the connection within your system.
Connection name	System-generated name based on the Connection label. This field cannot be modified once the connection is established.
Short description	Description of the connection explaining what it is about.
Connection attributes	
Connection URL	JDBC URL to establish the connection. For example:

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Field	Description
	`jdbc:singlestore://<host>:<port>/schema?useSsl=true`
Authentication method	
Username	Username associated with the source.
Password	Password associated with the username.

4. Select **Connect**.

Result
A test connection is made to the external data source, verifying that the connection details are correct and the data source is accessible.

What to do next
If the connection succeeds, configure data steward access on the **Access Control** tab. See Manage access to an established connection using roles.

If the connection fails, verify the connection details with your data source administrator and try again.

Manage access to an established connection using roles

Manage which data stewards can access an established connection and create data fabric tables.

Before you begin
Role required: df_connection_admin

About this task
Access to a zero copy connection in Zero Copy Connector Hub is controlled by the connection admin. The connection admin grants access using custom roles that identify the data stewards responsible for managing the quality and integrity of the data provided by the connection.

For example, an instance admin can create a custom role for an application and assign it to each of the data stewards who manage the data for that application. Once the role and the data stewards are defined, a connection admin can add the custom role to an established connection. When a custom role is added to the connection, it inherits the df_data_steward role, which grants access to the data stewards who have the custom role.

Note: Data stewards can access an established connection if they have a role that inherits the df_data_steward role. Users who are granted the df_data_steward role directly can view the Zero Copy Connector Hub but can't access any established connections.

Procedure
1. Navigate to the **Established connections** tab in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Established connections**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Established connections**.
2. Select the connection that you want to configure.
3. Select the **Access Control** tab.

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4. **Optional:** Grant data steward access by adding one or more roles.
   a. Select **Manage Access**.
   b. Browse or search for the role that you want to configure.
   c. Select the check box next to the role.
   d. **Optional:** Search and add additional roles as needed.
   e. Select **Save changes**.
5. **Optional:** Remove data steward access from one or more roles.
   a. Select **Manage Access**.
   b. Browse or search for the role that you want to update.
   c. Clear the check box next to the role that you want to remove.
   d. **Optional:** Search and remove additional roles as needed.
   e. Select **Save changes**.

Result

The df_data_steward role is granted to or removed from the selected roles. Each data steward with a role that contains the df_data_steward role can access the connection to create data fabric tables.

Example: Assigning data steward access to separate connections

1. The connection admin creates separate connections for accessing external ITSM and finance data in Zero Copy Connector Hub.
2. The instance admin creates the following custom roles in the ServiceNow AI Platform:
   - df_ITSM_data_steward
   - df_FINANCE_data_steward
3. The instance admin identifies the users who are responsible for creating and maintaining data fabric tables for the ITSM and finance applications.
4. The instance admin assigns the ITSM users to the df_ITSM_data_steward role and the finance users to the df_FINANCE_data_steward role.
5. The connection admin grants the df_data_steward role to ITSM data stewards by adding to the df_ITSM_data_steward role to the ITSM connection in Zero Copy Connector Hub.
6. The connection admin grants the df_data_steward role to finance data stewards by adding the df_FINANCE_data_steward role to the finance connection in Zero Copy Connector Hub.

After access is granted, ITSM data stewards can only access and manage external ITSM data, while finance data stewards can only access and manage external finance data.

View data assets from an established connection

View the external schema and tables that are accessible to the service account used in a zero copy connection.

Before you begin

Role required: df_connection_admin or a role containing the df_data_steward role

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Procedure

1. Navigate to the **Established connections** tab in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Established connections**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Established connections**.
2. Select the connection with data assets that you want to view.
3. Select the **Data Assets** tab.
4. Browse or search for available data assets in the schema explorer.
5. **Optional:** View the data fabric tables that are currently mapped to a source table.
   a. Select a source table in the schema explorer.
   b. Select the **Data fabric tables** sub-tab.
6. **Optional:** View the available columns in a source table.
   a. Select a source table in the schema explorer.
   b. Select the **Columns** sub-tab.

What to do next

- Identify the tables and columns that you want to map to a data fabric table.
- Create a data fabric table and map source columns to the target table. See Managing data fabric tables.
- Consult with the data source administrator if the required schema and tables aren't available from this connection.

Monitoring established connections

Maintain the health of established connections by monitoring connection status in Zero Copy Connector Hub.

Determine whether a connection requires an update by checking the status on the **Established connections** tab.

Connected

The connection to the data source has been tested and established.

Deactivated

The connection to the data source has been deactivated by the connection admin.

Needs configuration

The connection attributes or authentication information are missing from the connection details.

Needs mapping

The connection has been tested and established, but the data isn't mapped to a data fabric table.

Not connected

The connection details have been added, but the connection to the data source isn't working.

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Update an established connection

Keep connection details current by updating service account information, authentication, or security settings.

Before you begin

Role required: df_connection_admin

Procedure

1. Navigate to the **Established connections** tab in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Established connections**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Established connections**.
2. Select the connection that you want to configure.
3. Update the connection details.

   Important: Changing connection details can affect data mapping in the data fabric tables created using this connection. If you need to preserve the current data mapping, consult the data source administrator before updating the connection to ensure the data mapping isn't affected.

   a. Select **Edit**.

   b. **Optional:** Update the connection identification.

   (Optional) For example, update the connection description if data stewards can't find the connection or if the data source admin adds new data assets.

   c. **Optional:** Update the connection attributes.
   For example, you might update the connection attributes if the connection URL or service account information changes.

   d. **Optional:** Update the authentication method or private key information.
   For example, update the private key and pass phrase when the private key changes or is no longer valid.

   e. In the confirmation dialog box, confirm that you want to make the changes by selecting **Edit**.

4. Select **Save and connect**.

Result

The system tests the connection. If connection succeeds, the changes are saved.

What to do next

If the connection fails, View the connection log. Review the connection details with the data source admin and try again.

If your changes impact data fabric tables, ensure the proper access is configured on the **Access Controls** tab.

View the connection log

Monitor and troubleshoot a connection by viewing the connection log.

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Before you begin
Role required: df_connection_admin

Procedure
1. Navigate to the **Established connections** tab in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Established connections**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Established connections**.
2. Select the connection that you want to monitor.
3. Select the More Actions icon ( ), and select **View Connection Logs**.

Result
The Data Fabric Logs [df_log] table appears, displaying log entries for the current day related to this connection.

What to do next
Review the log entries and consult your data source administrator if necessary. Update the connection details if any connection attributes are incorrect. See Update an established connection.

Deactivate a connection

Temporarily disable the connection between data fabric tables and their data source by deactivating a connection.

Before you begin
Role required: df_connection_admin

About this task
A connection admin can stop queries to an external data source or prevent changes to data mapping by deactivating a connection. When a connection is deactivated, external data isn't available from any data fabric tables using the connection.

Procedure
1. Navigate to the **Established connections** tab in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Established connections**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Established connections**.
2. Select the connection that you want to deactivate.
3. Select the More Actions icon ( ), and select **Deactivate**.
4. Confirm that you want to deactivate the connection by selecting **Deactivate**.

Result
The connection is deactivated.

- External data is no longer pulled by any data fabric table using the connection.
- The **Data Assets** tab and **Access Control** tabs aren't accessible in the connection.

What to do next
To update the connection information or access the **Data Assets** or **Access Control** tabs again, you must reactivate the connection. See Reactivate a connection.

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Reactivate a connection

Manage data assets and access control in a deactivated connection by reactivating it.

Before you begin
Role required: df_connection_admin

About this task
A connection admin can reactivate a connection that's been temporarily deactivated.

Procedure
1. Navigate to the **Established connections** tab in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Established connections**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Established connections**.
2. Select the connection that you want to reactivate.

   Note: View all deactivated connections by selecting **Deactivated** in the **Status** list.

3. Select **Reactivate**.
4. **Optional:** Review and update connection details as needed.
5. Select **Save and connect**.

Result
The connection is activated.

- External data is pulled by any data fabric table using the connection.
- The **Data Assets** tab and **Access Control** tabs are accessible in the connection.

Delete a connection

Remove an established connection and its data fabric tables.

Before you begin
Role required: df_connection_admin

About this task
A connection admin can remove an established connection from the Zero Copy Connector Hub by deleting the connection. To delete the connection, you must delete all the data fabric tables using the connection first.

Procedure
1. Navigate to the **Established connections** tab in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Established connections**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Established connections**.
2. Select the connection that you want to delete.
   The current connection information is displayed on the **Connection details** tab.
3. Delete the connection immediately if it doesn't have any associated tables or delete the associated tables and then delete the connection.

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Option	Description
Delete a connection without any associated tables	**a.** Select the More Actions icon ( ), and select **Delete**. **b.** In the confirmation dialog box, select **Delete**.
Delete a connection with associated tables	**a.** Select the More Actions icon ( ), and select **Delete**. **b.** In the message that appears about deleting associated tables, select **View tables**. **c.** In the **Data fabric tables** tab, delete each associated table by selecting the More Actions icon ( ), and selecting **Delete**. **d.** Navigate back to **Established connections**. **e.** Select the connection that you want to delete again. **f.** Select the More Actions icon ( ), and select **Delete**. **g.** In the confirmation dialog box, select **Delete**.

Result
The connection and any associated tables are deleted from the Zero Copy Connector Hub.

Test an established connection

Test the connection to an external data source from an established connection.

Before you begin
Role required: df_connection_admin

Procedure
1. Navigate to the **Established connections** tab in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Established connections**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Established connections**.
2. Select the connection that you want to test.
3. Select **Test connection**.

Result
The test connection succeeds or fails. If the connection fails, consult your database administrator to verify the connection attributes and authentication details. Make any necessary changes, and then try again.

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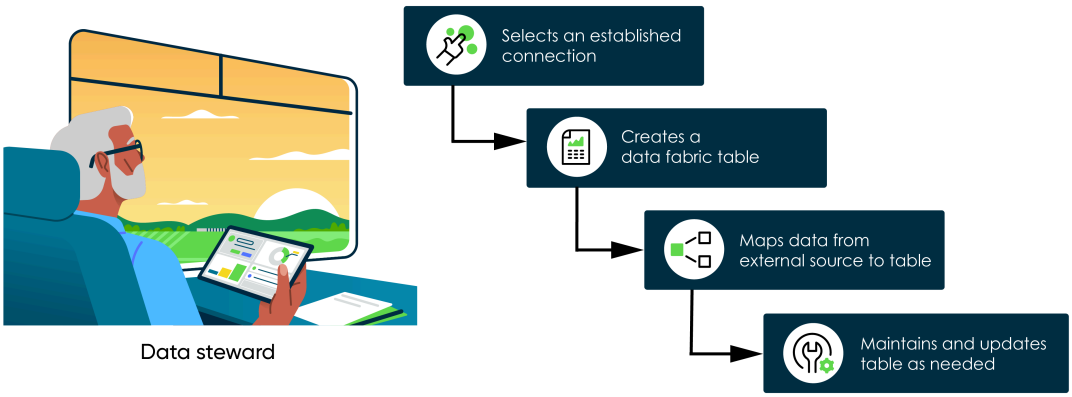
Managing data fabric tables

Access data virtually from an external source or a local table on your instance using data fabric tables.

Overview of managing data fabric tables

A data fabric table is a virtual representation of data stored in another source, accessible within the ServiceNow AI Platform. It enables users to interact with data from another source as if it's stored locally, without duplicating the data.#Data stewards are responsible for creating and managing data fabric tables using the process shown in this infographic.

Creating and managing data fabric tables



Viewing data fabric tables

View a list of all the data fabric tables that data stewards have created on the **Data fabric tables** tab.

- Search for a data fabric table by label or name.
- Filter the list of tables by data source and connection.
- Filter the list of tables by creator.
- View a list of data fabric tables from active connections in the **Active** tab.
- View a list of data fabric tables from connections that are deactivated or not configured in the **Others** tab.

Defining primary keys

A primary key is used to indicate uniqueness and identify records in a data fabric table. Designating a column as a primary key enables you to create references to that column from other data fabric tables. When mapping data in a new data fabric table, primary keys from the source table are automatically defined in the target data fabric table. If the source table doesn’t have a primary key, you can create one in the target table by choosing a column with unique values.

Note the following details when defining primary keys:

- Selecting a primary key doesn't enforce primary key constraints on the data fabric table or on the remote system. You must verify that records identified by the primary key are unique.
- Once you define a primary key, it can't be removed. If you determine that you need to change the primary key later, you must delete and recreate the data fabric table first.

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- If you decide not to define a primary key when creating a data fabric table, you can do so by editing the table later. Note that without a primary key, you can't create references to this table and searches won't work until a primary key is defined.
- For every primary key column identified in the source table, a corresponding primary key is automatically created in the data fabric table. Once the data fabric table is created, you can't modify the primary keys that were derived from the source table.
- You can't use a reference column as a primary key.

Reference tables

When mapping external source columns to a data fabric table, you can add references to other tables. Establishing references between tables creates a relationship between the two tables and provides data integrity. A data fabric table can reference another data fabric table or a local table on your instance. A local table can also reference a data fabric table.

Note the following requirements when creating references between tables:

- To reference a local table on your instance from a data fabric table, an instance administrator must create an ACL rule with the data_fabric record operation on the local table. For example, to create a reference to the User [sys_user] table, the following ACL rule is required:
  - Type: record
  - Operation: data_fabric
  - Name: User [sys_user]

  For details on creating a record ACL rule, see Configure an ACL.
- To see values in a reference column when viewing records in the new data fabric table, you must set the Display attribute to true for the referenced column. You can manage this attribute in the referenced table's definition. See Select a field as the table display value.
- Ensure the referenced table has at least one primary key column.
- Ensure the primary key column in the referenced table contains unique values.
- Ensure the primary key column matches the data type of the source column.

Table queries

Records retrieved from a data stored and stored in a data fabric table have a finite duration, or life cycle, within the ServiceNow AI Platform.

After a data fabric table is connected to a data source, each time the data fabric table is viewed or accessed, a new query is made to the data source. The retrieved data lives in memory for as long as the list or form appears. After you close the list or form, that retrieved data is purged from memory. The next time that you use or view the retrieved data in the data fabric table, records are repopulated from the data source.

Data fabric table limitations

- When mapping data, ensure that the data source does not use case-sensitive table names. For example, if both MY_TABLE and my_table exist in the database, the schema will not load because the system cannot differentiate between the tables.
- When creating a reference to another table, you can only select one primary key column as the reference key. You can't select a composite key as the reference key.
- When creating a reference to another table, you can only reference a table that has one primary key defined.

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For additional data fabric table limitations, see KB2017730.

Create a data fabric table

Retrieve data from an internal or external source by creating a data fabric table.

About this task

Unlike a remote table, a data fabric table uses a zero copy connection to its data source, eliminating the need for a script to populate the table. This connection allows you to access the data source directly, map the data you need, and create a data fabric table for data consumers on the ServiceNow AI Platform.

With a data fabric table, you can retrieve data from either an internal or external data source.

- Connect the data fabric table to your local database to reuse data from a physical table on your instance.
- Connect the data fabric table to an outside data source, such as a data lake or third-party database, to retrieve data that resides outside of your instance.

Before you begin

Role required: One of the following role combinations or admin.

- delegated_developer with sn_dd_<application_scope_name>_tablesforms OR sn_dd_<application_scope_name>_delegatedadmin, and a role containing the df_data_steward role
- delegated_developer with sn_dd_<application_scope_name>_tablesforms OR sn_dd_<application_scope_name>_delegatedadmin, and df_connection_admin

Read access to table records is automatically added to users with either of the delegated developer roles.

Note the following restrictions:

- Only a user with the admin role can create a data fabric table in the global scope.
- A data steward with the delegated_developer and the sn_dd_<application_scope_name>_tablesforms roles can create data fabric tables in the permitted application scope. These roles enable a data steward to create data fabric tables in an application scope if they have permissions for that application, but not in the global scope.

Procedure

1. Navigate to the **Established connections** tab in Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Established connections**.
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Established connections**.
2. Select the established connection that you want to use.
3. On the connection page, select the **Data assets** tab.
4. In the list of data assets, select the source table that you want to pull data from.
5. Select **Create data fabric table**.
6. Enter a label for the data fabric table and select **Continue**.
7. Map one or more columns from the source table to the data fabric table.
   Each column that you select is automatically created in the data fabric table with the same name and data type.

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8. **Optional:** Allow other tables to reference this table by defining a primary key using the Primary Key toggle switch.

   Note: Primary key columns detected in the source table are automatically selected as primary keys in the target table. If a primary key isn't detected in the source table automatically, you can select a column with unique values that you want to use as the primary key.

   - Selecting a primary key doesn't enforce primary key constraints on the data fabric table or on the remote system. You must verify that records identified by the primary key are unique.
   - Once you define a primary key, it can't be removed. If you determine that you need to change the primary key later, you must delete and recreate the data fabric table first.
   - If you decide not to define a primary key when creating a data fabric table, you can do so by editing the table later. Note that without a primary key, you can't create references to this table and searches won't work until a primary key is defined.
   - For every primary key column identified in the source table, a corresponding primary key is automatically created in the data fabric table. Once the data fabric table is created, you can't modify the primary keys that were derived from the source table.
   - You can't use a reference column as a primary key.

9. **Optional:** Link data between tables by creating a reference to another table.
   - To reference a local table on your instance from a data fabric table, an instance administrator must create an ACL rule with the data_fabric record operation on the local table. For example, to create a reference to the User [sys_user] table, the following ACL rule is required:
     - Type: record
     - Operation: data_fabric
     - Name: User [sys_user]

     For details on creating a record ACL rule, see Configure an ACL.
   - To see values in a reference column when viewing records in the new data fabric table, you must set the Display attribute to true for the referenced column. You can manage this attribute in the referenced table's definition. See Select a field as the table display value.

   a. Identify the column that represents the same records in both tables.

   b. In the Type column, change the column type to **Reference**.

   c. Select **Set reference**.

   d. In the Set Reference Label dialog box, enter the name of the table that you want to reference in the Table field.

      Note: Only tables with a single primary key appear in the list.

   e. In the Set Reference Label dialog box, select the primary key column that you want to use in the Reference key field.

   f. Finish configuring the reference by selecting **Set reference**.

10. Select **Finish**.

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Result
The data fabric table is created and connected to a data source. Data consumers can access the data fabric table and its data just like any physical table on the instance.

Update data mapping in a data fabric table

Update the data mapping between a source table and a data fabric table.

Before you begin
Role required: One of the following role combinations or admin.

- delegated_developer with sn_dd_<application_scope_name>_tablesforms OR sn_dd_<application_scope_name>_delegatedadmin, and a role containing the df_data_steward role
- delegated_developer with sn_dd_<application_scope_name>_tablesforms OR sn_dd_<application_scope_name>_delegatedadmin, and df_connection_admin

About this task
A data steward might need to update the field mapping for a data fabric table in the following scenarios:

- The data source administrator notifies the connection admin or data steward about a schema change in the external data source.
- A field in the data fabric table isn't named correctly.
- The data steward wants to create a relationship with another data fabric table by adding a reference column.
- A data steward wants to create a reference to the current data fabric table from another table but needs to designate a primary key in the current table first.

Procedure
1. Navigate to the **Data fabric tables** tab in the Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Data fabric tables**
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Data fabric tables**.
2. Find the data fabric table that you want to update and select **Edit**.
3. Add or remove mapped columns from the external source.
   - In the list of source columns, select the check box for each column that you want to add to the data fabric table. Each column that you select is automatically created in the data fabric table with the same name and data type.
   - In the list of source columns, clear the check box for each column that you want to remove from the data fabric table.
4. **Optional:** Update a field's display name by changing the column label.
   You can only change the label and not the column name.
5. **Optional:** Add or remove references to other tables.
   - To reference a local table on your instance from a data fabric table, an instance administrator must create an ACL rule with the data_fabric record operation on the local table. For example, to create a reference to the User [sys_user] table, the following ACL rule is required:
     - Type: record
     - Operation: data_fabric
     - Name: User [sys_user]

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For details on creating a record ACL rule, see Configure an ACL.

- To see values in a reference column when viewing records in the new data fabric table, you must set the Display attribute to true for the referenced column. You can manage this attribute in the referenced table's definition. See Select a field as the table display value.

Option	Description
Add a reference	**a.** In the Type column, change the column type to **Reference**. **b.** Select **Set reference**. **c.** In the Set Reference Label dialog box, enter the name of the table that you want to reference. **d.** In the Set Reference Label dialog box, select a primary key in the Reference key field. **e.** Select **Set reference**.
Remove a reference	In the Type column, change the column type from **Reference** back to the data type that matches the source column.

6. **Optional:** Add or remove a primary key from the data fabric table using the Primary Key toggle switch.
   If the current table will be referenced by another data fabric table, you must select a primary key to use as the reference.
7. Select **Finish**.

Delete a data fabric table

Remove a data fabric table from your instance by deleting it.

Before you begin

Role required: One of the following role combinations or admin.

- delegated_developer with sn_dd_<application_scope_name>_tablesforms OR sn_dd_<application_scope_name>_delegatedadmin, and a role containing the df_data_steward role
- delegated_developer with sn_dd_<application_scope_name>_tablesforms OR sn_dd_<application_scope_name>_delegatedadmin, and df_connection_admin

Procedure

1. Navigate to the **Data fabric tables** tab in the Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Data fabric tables**
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Data fabric tables**.
2. Delete a data fabric table.
   a. Find the data fabric table that you want to delete.
   b. Select the More Actions icon ( ), and select **Delete**.
   c. Confirm that you want to remove the table by selecting **Delete**.

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Result
The data fabric table is deleted and its data is no longer available on your instance.

View data fabric table records

View the records that are currently in a data fabric table.

Before you begin
Role required: none

Note that you must have read access to view records from a data fabric table in a list view.

Procedure

1. Navigate to the **Data fabric tables** tab in the Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Data fabric tables**
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Data fabric tables**.
2. Find the data fabric table that you want to view.
3. Select the More Actions icon ( ), and select **Open list**.

Result
The data source is queried and the data fabric table opens in a list view displaying records from the data source.

Change the connection in a data fabric table

Connect a data fabric table to a different data source.

Before you begin
Role required: a role containing the df_data_steward role in both the established connection and the new connection

Procedure

1. Navigate to the **Data fabric tables** tab in the Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Data fabric tables**
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Data fabric tables**.
2. Find the data fabric table that you want to update.
3. Select the More Actions icon ( ), and select **Change connection**.
   - A data fabric table with multiple primary keys can only use its current connection. To change the connection, you must delete and recreate the table with the data source that you want to use.
   - A data fabric table with a connection that still needs configuration or is deactivated can't use a different connection. You must finish configuring the connection or activate the current connection before you can change it.
4. Choose an established connection for the data source that you want to use and select **Continue**.
5. Select the source table with the data that you need.

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6. Map source table columns to the existing columns in the data fabric table.
7. Select **Finish**.

Deploying a data fabric table from one instance to another

Copy a data fabric table from one instance to another through an update set.

You can capture a data fabric table configuration, including the table identification information and column mapping, and then copy it to another instance using an update set. A connection admin must reestablish the connection on the target instance after importing the update set.

For details on using update sets, see General guidelines for planning the update process.

Accessing real-time data in applications

Fetch real-time data using a data fabric table instead of using the physical table included with an application.

Overview of data fabric tables in applications

An application developer can package both a physical table and a predefined data fabric version of the same table within a single application. The data fabric table has the same definition and columns as the physical table, but can access external data using a zero copy connection. This gives the instance admin flexibility to choose how to populate the table. For example, the instance admin can use any of the following methods:

- Use the physical table and enter data manually.
- Use the physical table and import data using Integration Hub.
- Use the predefined data fabric table to connect to an outside source and fetch external data without storing it permanently.
- Use the predefined data fabric table to connect to a physical table on the instance and fetch data from that table without copying it permanently.

By default, a data fabric table included with an application retrieves data from a physical table in the same application using the ServiceNow local instance connector. This makes a snapshot of the latest physical table data accessible from the data fabric table in lists, forms, or scripts when needed.

The instance admin can choose to keep the predefined data fabric table connected to its physical table or change the connection to retrieve external data or data from a different physical table.

Connecting to an external data source using requires coordination between the instance admin, connection admin, and data steward. To configure this type of data fabric table, follow the process shown in this infographic.

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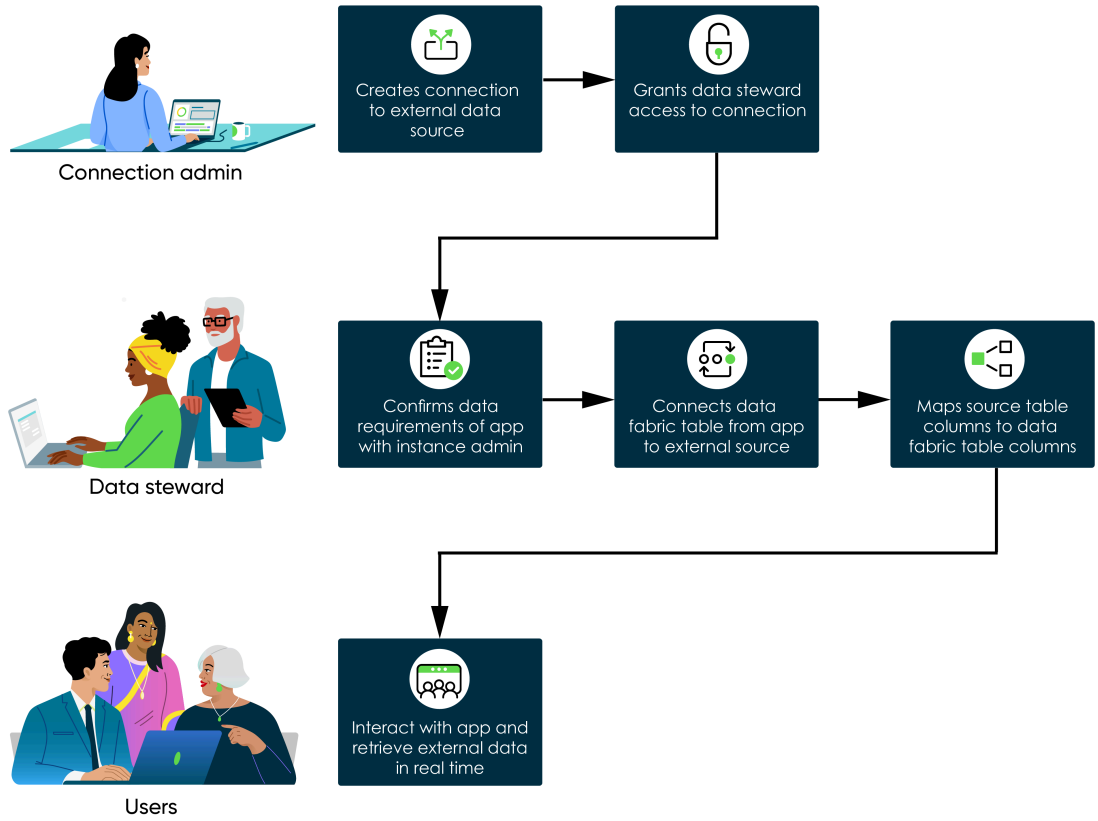
Connecting a predefined data fabric table to an external data source



In this workflow:

1. The connection admin creates a connection to an external source and enables the data steward to access the connection.
2. The data steward works with the instance admin to learn about the data requirements of the application.
3. The data steward connects the data fabric table from the application to an external source using the provided connection.
4. The data steward selects a source table and maps source columns to the existing columns in the data fabric table.
5. Users access the application, and interact with flows retrieving data from the external source in real-time.

Connect a predefined data fabric table to an external data source

Connect a data fabric table included with an application to an external data source.

Before you begin

- Work with the instance admin or application admin to identify the data fabric table that needs data from an external source.
- Work with the connection admin to create a connection to the external source or request access to an established connection.

Role required: a role containing the df_data_steward role

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About this task

You can fetch data from an external source using an application's data fabric table, instead of using the application's physical table. By using the data fabric table, users can access external data in real time, rather than accessing data that has been imported and stored in a physical table.

Procedure

1. Navigate to the **Data fabric tables** tab in the Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Data fabric tables**
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Data fabric tables**.
2. Find the data fabric table that you want to update.
3. Connect the table to an external data source.
   a. Select the More Actions icon (), and select **Change connection**.
   b. On the Select a connection page, select the established connection provided by the connection admin.
   c. Select **Continue**.
   A tree view of data assets appears, listing the available schema and tables in the external data source.
4. In the list of data assets, select the table that you want to fetch data from and select **Continue**.
5. Map source columns to each target column in the data fabric table.
   Because the data fabric table is predefined and belongs to an application, you can't add or remove columns when mapping data. The columns in the data fabric table are fixed.
   a. Review the label, name, and data type for each column in the target table.
   b. Select a source column with a matching data type for each target column.
6. Select **Finish**.

Result

The data fabric table is connected to the data source that you selected, with the field mapping you defined. Application users can access data from the data source in real time as if it's stored locally on the instance.

Connect a predefined data fabric table to a local table

Connect a data fabric table included with an application to a local table on your instance.

Before you begin

Identify the local table that you want to retrieve data from using the ServiceNow local instance connector.

Role required: a role containing the df_data_steward role

About this task

You can connect a data fabric table included with an application to a different physical table on your instance. After changing the connection, you can reuse the data from the physical table in your data fabric table.

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Procedure

1. Navigate to the **Data fabric tables** tab in the Zero Copy Connector Hub in one of the following ways:
   - Navigate to **All** > **Zero Copy Connector Hub** > **Data fabric tables**
   - Navigate to **Admin** > **Zero Copy Connector Hub** > **Data fabric tables**.
2. Find the data fabric table that you want to update.
3. Connect the table to a different local table on the instance.
   a. Select the More Actions icon ( ), and select **Change connection**.
   b. On the Select a connection page, select the **ServiceNow local instance** connection.
   c. Select **Continue**.
   A tree view of data assets appears, listing the local applications and tables.
4. In the list of data assets, select the table that you want to fetch data from and select **Continue**.
5. Map source columns to each target column in the data fabric table.
   Because the data fabric table is predefined and belongs to an application, you can't add or remove columns when mapping data. The columns in the data fabric table are fixed.
   a. Review the label, name, and data type for each column in the target table.
   b. Select a source column with a matching data type for each target column.
6. Select **Finish**.

Result

The data fabric table is connected to the local table that you selected using the ServiceNow local instance connector. Application users can access real-time data from the local table using the data fabric table.

Zero Copy Connectors reference

Reference topics provide information about roles and domain separation support.

Domain separation and Zero Copy Connectors

Domain separation is unsupported for Zero Copy Connectors. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

For more information on support levels, see Application support for domain separation.

Zero Copy Connectors roles

Zero Copy Connectors is installed with these roles.

To learn more about managing subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

Connection administrator [df_connection_admin]

Role for creating and managing connections in Zero Copy Connector Hub.

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Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

A user with the df_connection_admin role can create and manage connections in Zero Copy Connector Hub, and can also create and manage data fabric tables just like a user with the a role that contains the df_data_steward role.

Data steward [df_data_steward]

Role for creating and managing data fabric tables in Zero Copy Connector Hub.

Contains Roles

List of roles contained within the role.

None.

Groups

List of groups this role is assigned to by default.

None.

Special considerations

When a user contains a role that inherits the df_data_steward role, the user is considered a data steward in Zero Copy Connector Hub, and can create and manage data fabric tables. When the df_data_steward role is granted directly to a user, that user can access Zero Copy Connector Hub, but can't create or manage any data fabric tables.

PostgreSQL authentication method fields

Fields that appear on the New PostgreSQL Connection form depending on the selected authentication type.

Authentication type: AWS IAM

Field	Description
Database user	Database user for the connection when authenticating with AWS IAM. Required.
AWS region	AWS region where the RDS instance is hosted. Required.
AWS access key ID	Access key ID for the AWS IAM credentials used to authenticate. Required.

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Field	Description
AWS secret access key	Secret access key for the AWS IAM credentials used to authenticate. Required.

Authentication type: GCP IAM

Field	Description
Service account key (JSON)	Uploaded file or pasted JSON content for the GCP service account key. Required.
Database user	Database user for the connection when authenticating with GCP IAM. Required.
GCP token scope	OAuth scope requested for the GCP IAM token. Not required.

Authentication type: OAuth

Field	Description
OAuth credential type	Type of OAuth credential used to authenticate. Confirmed values: Azure Service Principal, Access Token. Required.
Database user	Database user for the connection when authenticating with OAuth. Required.
Azure tenant ID	Azure AD tenant ID for the service principal. Required.
Azure client ID	Client ID (application ID) of the Azure AD service principal. Required.
Azure client secret	Client secret for the Azure AD service principal. Required.
Azure token scope	OAuth scope requested for the Azure AD token. Not required.

Related topics

Create a PostgreSQL connection

PostgreSQL connection security configuration fields

Fields that appear under Connection security configurations on the New PostgreSQL Connection form when SSL is set to Enabled.

SSL mode: TLS (verify-ca)

Condition	Field	Description
Server Certificate Source: Default (JVM CA)	—	No additional fields.
Server Certificate Source: Custom CA	Store type	Format of the truststore. Confirmed values: PEM, JKS, PKCS12.
Server Certificate Source: Custom CA	Truststore	File containing the certificate(s) used to verify the PostgreSQL server's identity. Required for all Store type values.

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Condition	Field	Description
Server Certificate Source: Custom CA	Truststore password	Password for the truststore file. Required when Store type is JKS or PKCS12; not required when Store type is PEM.

SSL mode: mTLS

Condition	Field	Description
Store type: PEM	Keystore password	Password for the client certificate/ private key. Not required when Store type is PEM.
Store type: PEM	Client Certificate	File containing the client certificate presented to the PostgreSQL server. Required.
Store type: PEM	Client private key	File containing the client private key paired with the Client Certificate. Not required.
Store type: JKS or PKCS12	Keystore password	Password for the keystore file. Required.
Store type: JKS or PKCS12	Keystore	File containing the client certificate and private key in a single keystore container. Required.
(any Store type)	Server Certificate Source	Confirmed values: Default (JVM CA), Custom CA.
Server Certificate Source: Custom CA	Truststore	File containing the certificate(s) used to verify the PostgreSQL server's identity. Required.
Server Certificate Source: Custom CA	Truststore password	Password for the truststore file. Required when Store type is JKS or PKCS12; not required when Store type is PEM.

Related topics

Create a PostgreSQL connection

MySQL authentication method fields

Fields that appear on the New MySQL Connection form depending on the selected authentication type.

Authentication type: AWS IAM

Field	Description
Database user	Database user for the connection when authenticating with AWS IAM. Required.
AWS region	AWS region where the RDS instance is hosted. Required.

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Field	Description
AWS access key ID	Access key ID for the AWS IAM credentials used to authenticate. Required.
AWS secret access key	Secret access key for the AWS IAM credentials used to authenticate. Required.

Authentication type: GCP IAM

Field	Description
Service account key (JSON)	Uploaded file or pasted JSON content for the GCP service account key. Required.
Database user	Database user for the connection when authenticating with GCP IAM. Required.
GCP token scope	OAuth scope requested for the GCP IAM token. Not required.

Authentication type: OAuth

Field	Description
OAuth credential type	Type of OAuth credential used to authenticate. Confirmed values: Azure Service Principal, Access Token. Required.
Azure tenant ID	Azure AD tenant ID for the service principal. Required.
Azure client ID	Client ID (application ID) of the Azure AD service principal. Required.
Azure client secret	Client secret for the Azure AD service principal. Required.
Azure token scope	OAuth scope requested for the Azure AD token. Not required.

Related topics

Create a MySQL connection

MySQL connection security configuration fields

Fields that appear under Connection security configurations on the New MySQL Connection form when SSL is set to Enabled.

SSL mode: TLS (verify-ca)

Condition	Field	Description
Server Certificate Source: Default (JVM CA)	—	No additional fields.
Server Certificate Source: Custom CA	Store type	Format of the truststore. Confirmed values: PEM, JKS, PKCS12.
Server Certificate Source: Custom CA	Truststore	File containing the certificate(s) used to verify the MySQL server's identity. Required for all Store type values.

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Condition	Field	Description
Server Certificate Source: Custom CA	Truststore password	Password for the truststore file. Required when Store type is JKS or PKCS12; not required when Store type is PEM.

SSL mode: mTLS

Condition	Field	Description
Store type: PEM	Keystore password	Password for the client certificate/ private key. Not required when Store type is PEM.
Store type: PEM	Client Certificate	File containing the client certificate presented to the MySQL server. Required.
Store type: PEM	Client private key	File containing the client private key paired with the Client Certificate. Not required.
Store type: JKS or PKCS12	Keystore password	Password for the keystore file. Required.
Store type: JKS or PKCS12	Keystore	File containing the client certificate and private key in a single keystore container. Required.
(any Store type)	Server Certificate Source	Confirmed values: Default (JVM CA), Custom CA.
Server Certificate Source: Custom CA	Truststore	File containing the certificate(s) used to verify the MySQL server's identity. Required.
Server Certificate Source: Custom CA	Truststore password	Password for the truststore file. Required when Store type is JKS or PKCS12; not required when Store type is PEM.

Related topics

Create a MySQL connection

Microsoft SQL Server authentication method fields

Fields that appear on the New Microsoft SQL Server Connection form depending on the selected OAuth credential type.

OAuth credential type: Azure Service Principal

Field	Description
Azure tenant ID	Azure AD tenant ID for the service principal. Required.
Azure client ID	Client ID (application ID) of the Azure AD service principal. Required.

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Field	Description
Azure client secret	Client secret for the Azure AD service principal. Required.
Azure token scope	OAuth scope requested for the Azure AD token. Not required.

OAuth credential type: Access Token

Select this option if you created a record in the Application Registries [oauth_entity] table with a Microsoft SQL Server or IdP service principal for authentication.

This option keeps credentials within the instance and uses the ServiceNow AI Platform OAuth framework for token lifecycle management. For details on creating an OAuth entity profile, see Use a third-party OAuth provider. When configuring the profile, select **Client Credentials** as the grant type. If your OAuth provider requires scopes, add them on the OAuth Entity Scopes tab. Consult your data source or identity provider documentation for the required scope values.

Select the OAuth entity profile for your Microsoft SQL Server or IdP service principal.

Select the OAuth integration type that you want to use:

- **System**: Use the selected OAuth entity profile for all users of this connection. This is the default option.
- **Personal**: Require each user to authenticate individually with their own credentials before they can access Microsoft SQL Server data through this connection. Select **Get OAuth Token** to open the authentication flow in a new browser tab and sign in.

> **Note:** Each user can view, renew, or revoke their personal access token from the Personal Integrations Dashboard in the Zero Copy Connector Hub. If a user's token expires or is missing, an alert appears when that user tries to access data assets for this connection, with a link to sign in again.

Related topics

Create a Microsoft SQL Server connection

Microsoft SQL Server connection security configuration fields

Fields that appear under Connection security configurations on the New Microsoft SQL Server Connection form depending on the selected SSL mode.

SSL mode: TLS (verify-ca)

Condition	Field	Description
Server Certificate Source: Default (JVM CA)	—	No additional fields.
Server Certificate Source: Custom CA	Store type	Format of the truststore. Confirmed values: PEM, JKS, PKCS12.
Server Certificate Source: Custom CA	Truststore	File containing the certificate(s) used to verify the Microsoft SQL Server server's identity. Required for all Store type values.
Server Certificate Source: Custom CA	Truststore password	Password for the truststore file. Required when Store type is JKS or

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Condition	Field	Description
		PKCS12; not required when Store type is PEM.

SSL mode: mTLS

Condition	Field	Description
Store type: PEM	Keystore password	Password for the client certificate/ private key. Not required when Store type is PEM.
Store type: PEM	Client Certificate	File containing the client certificate presented to the Microsoft SQL Server server. Required.
Store type: PEM	Client private key	File containing the client private key paired with the Client Certificate. Required.
Store type: JKS or PKCS12	Keystore password	Password for the keystore file. Required.
Store type: JKS or PKCS12	Keystore	File containing the client certificate and private key in a single keystore container. Required.
(any Store type)	Server Certificate Source	Confirmed values: Default (JVM CA), Custom CA.
Server Certificate Source: Custom CA	Truststore	File containing the certificate(s) used to verify the Microsoft SQL Server server's identity. Required.
Server Certificate Source: Custom CA	Truststore password	Password for the truststore file. Required when Store type is JKS or PKCS12; not required when Store type is PEM.

Related topics

Create a Microsoft SQL Server connection

ServiceNow Otto for Zero Copy Connector

Use the ServiceNow Otto for Zero Copy Connector AI skills and agentic workflows to obtain information about ERP systems, software, models, and data products.

The ServiceNow AI Platform now brings you a new AI experience with three licensing tiers available:

- Foundation: AI basics to deliver insights
- Advanced: AI to boost productivity across relevant use cases
- Prime: Act autonomously with all AI assets, and create your own

For more information, see ServiceNow product tiers.

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Explore



Learn more about Otto for ZCC

Configure



Configure the Otto for ZCC application to get started

Use generative AI



Use generative AI capabilities offered by Otto for ZCC

Use agentic AI



Use agentic AI workflows offered by Otto for ZCC

Important:

- Not all model providers are available for customers with in-country SKUs, and some AI products/features are currently unavailable for in-country customers. For more information, see the KB1584492 article in the Now Support Knowledge Base. Be sure to check for model provider availability updates in future releases.
- Some AI products/features are currently unavailable for customers in the FedRAMP, NSC DOD IL5, or Australia IRAP-Protected data centers, self-hosted customers, or in other restricted environments. For more information, see the KB0743854 article in the Now Support Knowledge Base. Be sure to check for availability updates in future releases.
- Some AI products/features are currently available only for customers in some regions. Be sure to check for availability updates in future releases.
- Some AI products and skills are not available in Regulated Markets. For more information, see KB2593939: Regulated Markets AI Products/Skills Not Available. Be sure to check for availability updates in future releases.

Troubleshoot and get help

- ServiceNow Community on AI and Intelligence
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

AI limitations

This application uses artificial intelligence (AI) and machine learning, which are rapidly evolving fields of study that generate predictions based on patterns in data. As a result, this application may not always produce accurate, complete, or appropriate information. Furthermore, there is no guarantee that this application has been fully trained or tested for your use case. To mitigate these issues, it is your responsibility to test and evaluate your use of this application for accuracy, harm, and appropriateness for your use case, employ human oversight of output, and refrain from relying solely on AI-generated outputs for decision-making purposes. This is especially important if you choose to deploy this application in areas with consequential impacts such as healthcare, finance, legal, employment, security, or infrastructure. You agree to abide by ServiceNow's AI Acceptable Use Policy, which may be updated by ServiceNow.

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Data processing

This application requires data to be transferred from ServiceNow customers' individual instances to a centralized ServiceNow environment, which may be located in a different data center region from the one where your instance is, and potentially to a third-party cloud provider, such as Microsoft Azure. This data is handled per ServiceNow's internal policies and procedures, including our policies available through our CORE Compliance Portal.

Data collection

ServiceNow collects and uses the inputs, outputs, and edits to outputs of this application to develop and improve ServiceNow technologies including ServiceNow models and AI products. In addition, this application will collect information about applications (and associated application files) in which app generation was utilized. Customers can opt out of future data collection at any time, as described in the Now Assist Opt-Out page.

Exploring ServiceNow Otto for Zero Copy Connector

With the ServiceNow Otto for Zero Copy Connector application, you can obtain information about ERP systems, software, models, and data products.

Otto for ZCC overview

The sn_erp_integration.erp_ai_user role is required to work with generative AI and agentic AI in Otto for ZCC.

Otto for ZCC agentic workflows

Use the Explore ERP models agentic workflow to obtain information about working with ERP database tables and models.

Otto for ZCC AI agents

Use the OData Service Recommender AI agent to connect to SAP OData services without manually identifying endpoints or configuring data models. You can also have the agent create a data model if an appropriate one does not already exist.

Otto for ZCC skills

The Otto for ZCC application includes generative AI skills and features that enable you to find information about ERP software, models, data products, and more.

ERP data discovery

This skill gives you the ability to query SAP standard database tables for data and transactional records based on natural language queries.

ERP data query

This skill helps you identify SAP objects that can then be used to query the required data. For example, use ERP data query to fetch routing operations for a specific material in work center.

Configure ServiceNow Otto for Zero Copy Connector

If you have the admin role, you can configure the ServiceNow Otto for Zero Copy Connector application.

Before you begin

Role required: admin and sn_erp_integration.erp_ai_user

About this task

Use the AI Admin Hub console to configure Otto for ZCC. For additional information, see Overview tab in AI Admin Hub.

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The following skills are included in Otto for ZCC:

- ERP data discovery
- ERP data query

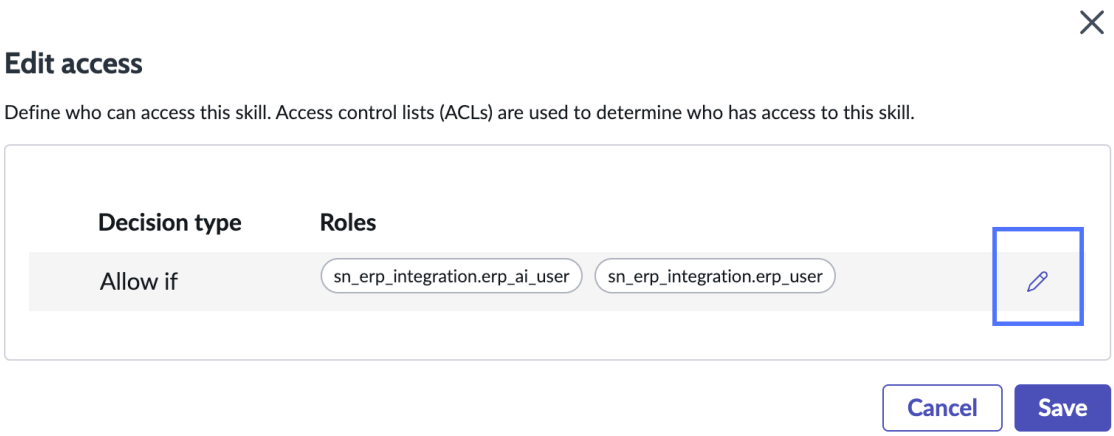
Procedure

1. Install the ServiceNow Otto for Zero Copy Connector plugin (sn_erp_ai).

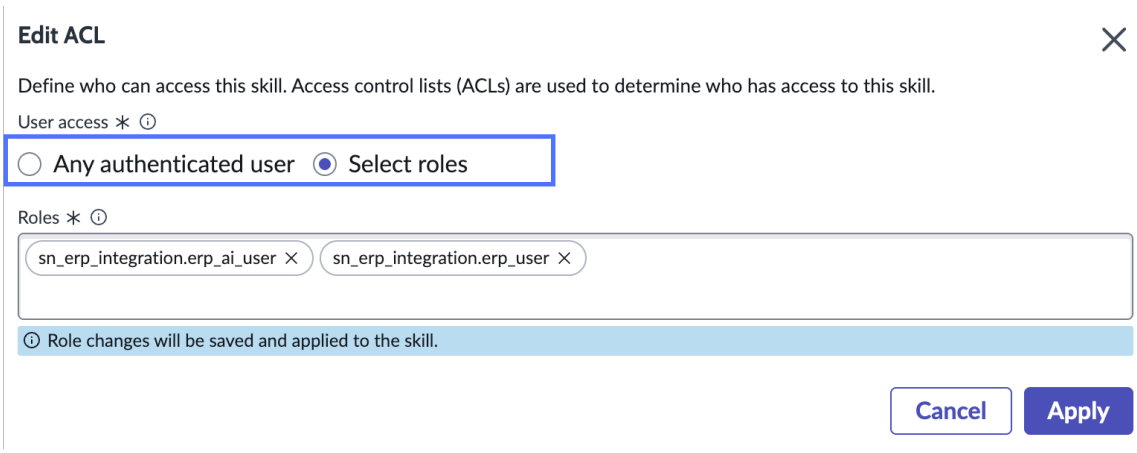
   For information about the installation process, see Install plugins for ServiceNow Otto.

2. View the skills by navigating to **All** > *Otto* **admin** > **Skills** and selecting **Other**.
3. Edit skill access by selecting the options icon next to the **Last modified** column and selecting **Edit access**.

   a. Select the edit (pencil) icon.



   b. Select **Any authenticated user** or **Select roles**.



   If you specified **Select roles**, add and delete roles as needed. To add a role, select inside the **Roles** text box and select a role from the list.

   To delete a role, select the X icon within the pill.

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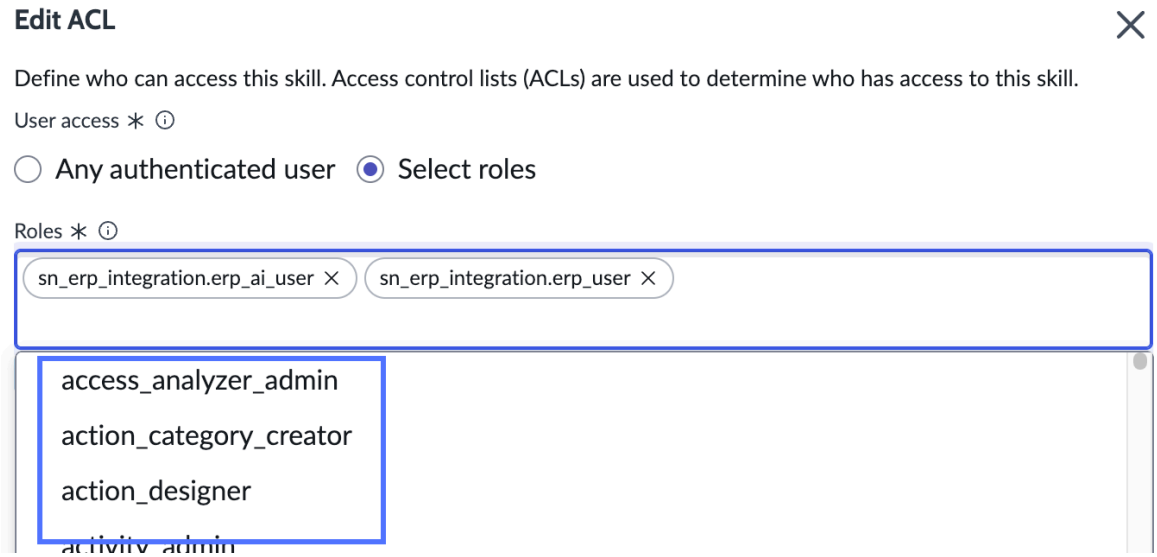

Note: The sn_erp_integration.erp_ai_user role is required for users to work with generative and agentic AI in ServiceNow Otto for ZCC.

c. When you're finished, select **Apply**.

4. **Optional:** You can delete a skill at any time by selecting the icon next to **Last modified** and selecting **Deactivate skill**.

Related topics

Overview tab in AI Admin Hub

Configuring Now Assist Admin features

Using ServiceNow Otto for Zero Copy Connector skills

ServiceNow Otto for Zero Copy Connector includes skills that can make working with connectors more efficient.

Important: Some generative AI skills, AI agents, and agentic workflows are turned on by default. For more information, see AI agents, skills, and agentic workflows on by default.

By default, all skills exist in the global domain. When you use AI in a domain-separated environment, users are only able to access data in their domain. For example, if a user uses the summarization skill, AI only uses material that exists in the user's domain when generating that summary. Additionally, there is no co-mingling of data for domain-separated instances when using generative AI skills. The data resides only on the instance, and the shared services used for generative AI do not persist any requests (prompts) and responses. For more information, see Domain separation in the AI Admin Hub console. (Note that global domain is not the same as global scope. For more information, see Exploring Next Experience pickers.)

ServiceNow Otto for Zero Copy Connector ERP data discovery skill

Use the ERP data discovery skill in ServiceNow Otto for Zero Copy Connector to query SAP standard database tables for data and records.

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Now Assist ERP data discovery overview

Important: This generative AI skill is turned on by default. The skill will be automatically available to appropriate role users for the application. For more information, see AI agents, skills, and agentic workflows on by default.

The sn_erp_integration.erp_ai_user role is required to work with generative AI and agentic AI in ServiceNow Otto for ZCC.

The ERP data discovery skill lets you query SAP standard database tables for data and transactional records based upon natural language queries. This skill simplifies the process of getting information, potentially increasing efficiency.

Along with data, transactional records such as purchase orders, sales orders, sales documents, material information, billing documents, and delivery data are searched.

ERP data discovery is designed to support a wide range of business needs. It is ideal for use cases involving automation, business intelligence, auditing, and operational visibility. Use ERP data discovery for general data retrieval, such as listing all purchase orders or customer records. You can also monitor exceptions, such as blocked deliveries, incomplete orders, delivery holds, or rejected items. ERP data discovery gives you access to key status fields, like delivery blocks, rejection reasons, and overall order progress.

The sn_erp_integration.erp_ai_user role is required to work with generative AI and agentic AI in ServiceNow Otto for ZCC.

Prerequisites for using ERP data discovery

Follow the instructions in Configure ServiceNow Otto for Zero Copy Connector to install the plugin.

Asking ServiceNow Otto for ERP data

Select the ServiceNow Otto icon ( ) from anywhere in your instance to open the ServiceNow Otto panel.

Ask for information in plain language. For example, `Get all sales orders from SAP where sales organization is 1710`.

ServiceNow Otto responds with the table and filter condition it will use and asks for your confirmation. Select **Yes**.

ServiceNow Otto provides the information you requested.

Your conversation is saved until you start a new chat. If the conversation ends unexpectedly, start a new chat by selecting the New chat icon ( ).

Additional example prompts

Consider trying the following prompts to become familiar with the data and records information that is available.

- Retrieve all purchase orders higher than a specific value or within a given date range.
- List customer records or materials by sales organization or region.

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- Identify blocked deliveries, incomplete orders, or rejected items.
- Monitor key process statuses like delivery blocks, rejection reasons, and order completion.

Licensing requirements

The ERP data discovery skill requires a Workflow Data Fabric Pro license.

ServiceNow Otto for Zero Copy Connector ERP data query skill

Use the ERP data query skill in ServiceNow Otto for Zero Copy Connector to identify SAP objects such as tables, BAPI, and OData endpoints.

ERP data query overview

Important: This generative AI skill is turned on by default. The skill will be automatically available to appropriate role users for the application. For more information, see AI agents, skills, and agentic workflows on by default.

The ERP data query skill helps you identify SAP objects that can then be used to query the required data. For example, use ERP data query to obtain an OData endpoint.

This skill can help you create new ERP models and model operations more quickly by automating the identification of correct SAP data sources. The skill also reduces the need for deep technical knowledge and manually looking up information.

The sn_erp_integration.erp_ai_user role is required to work with generative AI and agentic AI in Otto for ZCC.

Prerequisites for using ERP data query

Follow the instructions in Configure ServiceNow Otto for Zero Copy Connector to install the plugin.

Asking ServiceNow Otto to identify SAP objects

Select the *Otto* icon ( ) from anywhere in your instance to open the ServiceNow Otto panel.

Ask for information in plain language. For example, `Fetch routing operations for material 12345 in work center WC-10`.

ServiceNow Otto responds with the table and filter condition it will use and asks for your confirmation. Select **Yes**.

ServiceNow Otto provides the information you requested.

Licensing requirements

The ERP data query skill requires a Workflow Data Fabric Pro license.

Use ServiceNow Otto for Zero Copy Connector agentic workflows and AI agents

Use ServiceNow Otto for Zero Copy Connector agentic workflows and AI agents to improve and enhance working with ERP data.

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The sn_erp_integration.erp_ai_user role is required to work with generative and agentic AI in Otto for ZCC.

Available agentic workflows for Otto for ZCC

Agentic workflow	Description	Tools
Explore ERP models	Answers questions about working with configured ERP database tables and models.	• ERP action invoker AI agent • ERP data fetcher AI agent • ERP output formatter AI agent

Available AI agents for Otto for ZCC

AI agent	Description	Tools
OData Service Recommender	Identifies the most relevant OData service and endpoint, and can create a data model for the service if a model does not already exist.	• Existing model checker • Model operation URL generator • Read endpoints • OData Service Checker • Model Creator • Use web search

Important: By default, all agentic workflows and AI agent records are read-only.

Role masking

AI agents use role masking to determine which users can access them. Ones installed with your applications have specific roles that come included with the application. If you select *`Users with specific roles`* for user access, you must configure the security controls to include these roles. For the instructions to change the security controls, see Define security controls for an AI agent.

Standalone AI agents

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

Explore ERP models agentic workflow

Use the Explore ERP models AI agent team in ServiceNow Otto for Zero Copy Connector to obtain information about working with ERP database tables and models.

Explore ERP models agentic workflow overview

The Explore ERP models agentic workflow uses a team of AI agents to answer user questions about working with ERP database tables. The workflow also identifies models configured in ERP content packs.

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Prerequisites for the Explore ERP models agentic workflow

- The sn_erp_integration.erp_ai_user role is required to work with generative AI and agentic AI in Otto for ZCC.
- You must have the Knowledge Graph plugin installed. For more information, see Configuring Knowledge Graph.
- Follow the steps in before using the Explore ERP models agentic workflow.

AI agents used in the Explore ERP models agentic workflow

The following agents are used in the Explore ERP models agentic workflow.

AI agent	AI agent role
ERP action invoker AI agent	Gathers information for a specific operation and generates mandatory and optional inputs. Users can fill in a form to provide values for the mandatory inputs. The AI agent then formats and sends the inputs to an action script that creates the operation.
ERP data fetcher AI agent	Retrieves information about relevant models and model operations. Currently supports Read operations.
ERP output formatter AI agent	Refines and formats the information from the ERP action invoker AI agent.

Using the Explore ERP models agentic workflow

In this example, use the Explore ERP models agentic workflow to run a specific model.

1. Select the *Otto* icon ( ) from anywhere in your instance to open the *Otto* panel.
2. Ask for information in plain language. For example, `I want to run the Order Details model`.
3. Select the **Explore ERP models** option.
4. Select **Go to the ERP Model**.
5. If there are mandatory fields, provide the correct information in the specified format. You have the option to include additional fields.

   Otto provides the information you requested.

Your conversation is saved until you start a new chat. If the conversation ends unexpectedly, start a new chat by selecting the New chat icon ( ).

There might be AI agents installed on your instance that are not used in agentic workflows. To learn how to see all agents that are available to you, see Find AI agents.

ServiceNow Otto for Zero Copy Connector workflow troubleshooting

Use generative AI logs and Workflow Studio to troubleshoot issues with ServiceNow Otto for Zero Copy Connector agentic workflows.

The first troubleshooting option is to view generative AI logs.

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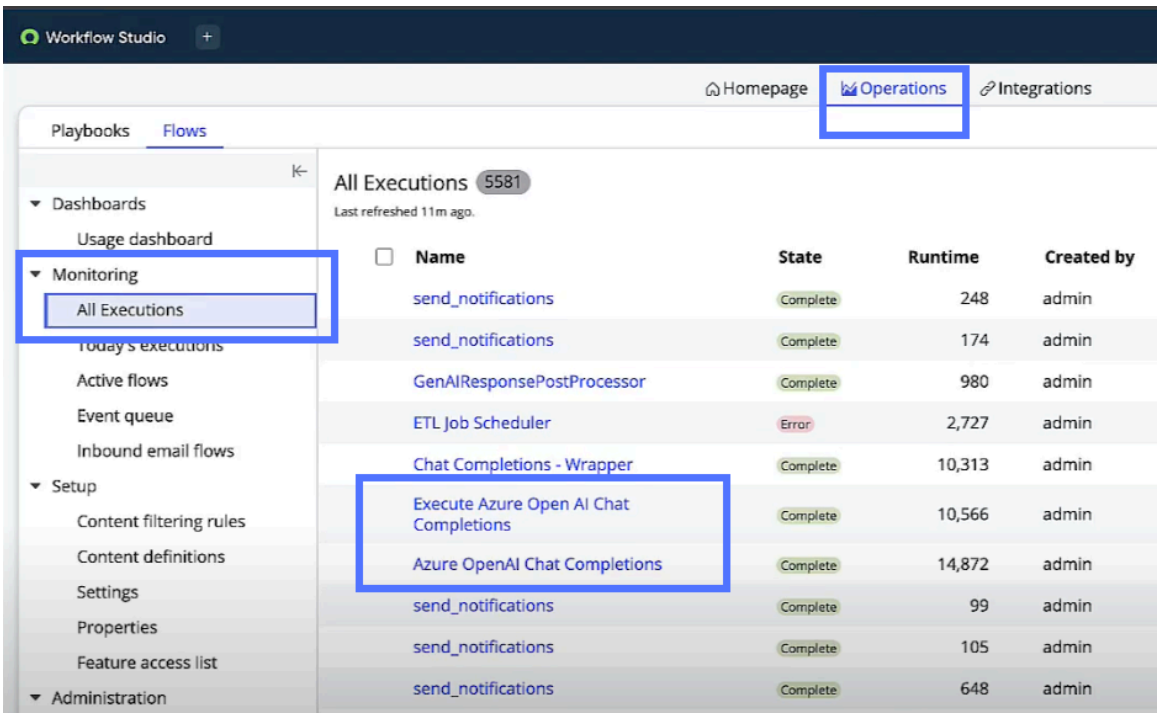
1. Select **All**, enter `sys_generative_ai_log_list.do` in the **Filter**, and press **enter** or **return** on your keyboard.
2. Open any record to view details.

A second option is to enable a system property and use Workflow Studio. The com.glide.oneapi.flow_debug property enables debugging capabilities for flows built with OneAPI so you can receive reporting and insights into flow execution.

1. Select **All** enter `sys_properties.list` in the **Filter**, and press **enter** or **return** on your keyboard.
2. Search for and open the property named **com.glide.oneapi.flow_debug**.
3. Check that the **Value** is set to **True**.
4. After the property is enabled, use Workflow Studio to check executions.



For more information, see Workflow Studio.

Zero Copy Connector for ERP

Zero Copy Connector for ERP (Enterprise Resource Planning) is a ServiceNow scoped application that enables you to retrieve and update data from an ERP system, such as SAP, SuccessFactors, and Workday.

Note: This scoped application was previously named ERP Data Hub and ERP Canvas.

Legacy systems of record, such as SAP, can have old, complex custom code and data. The old information requires more time and effort to move to newer versions of the system of record. Use Zero Copy Connector for ERP to find and replace custom code with digitized workflows, resulting in a clean ERP core. This is the process of ERP modernization.

The replatforming of legacy code enables innovation on top of the system of record without knowledge of the legacy system. Administrators and developers are then relieved of time-

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consuming efforts to create database views or endpoints in the system of record and can work on other projects, such as migration.

Use models as the foundation for ERP apps. These models include ERP system data in remote tables and extraction tables. The models enable you to perform read, update, and create operations on the ERP system. After you create models, you can use the extracted and transformed data to build apps that access the models. For example, use ServiceNow Studio or Creator Studio to build apps, or use the ERP data in flows within Workflow Studio.

Zero Copy Connector for ERP content packs are sets of predefined models and process extensions that are useful examples for developers with little or no SAP domain knowledge. Content packs accelerate the work so that building use cases involving SAP data becomes a faster process that more developers can accomplish. For more information, see Zero Copy Connector for ERP content packs.

Zero Copy Connector for ERP supports the following ERP systems:

- SAP ECC
- SAP S/4HANA
- SAP S/4HANA Cloud
- SuccessFactors
- Workday
- Oracle E-Business Suite (EBS)

Note: For information about new and updated features in the Brazil release, see https://www.servicenow.com/docs/access?context=zero-copy-connector-for-erp-rn&version=brazil&pubname=brazil-release-notes&ft:locale=en-US.

Explore



Learn about Zero Copy Connector for ERP concepts and features.

Configure



Install and configure Zero Copy Connector for ERP remote tables and connections.

Use Zero Copy Connector for ERP



Use Zero Copy Connector for ERP to build models and work with ERP data.

Use Zero Copy Connector for ERP content packs



Use Zero Copy Connector for ERP content packs to build ERP models faster.

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Use Zero Copy Connector AI agent collection



Use agentic workflows in ServiceNow Otto for Zero Copy Connector for ERP.

Reference



Get details about Zero Copy Connector for ERP components, such as tables, and terminology.

Learning resources for Zero Copy Connector for ERP

Learn more about Zero Copy Connector for ERP	ServiceNow resources
Zero Copy Connector for ERP has several training and learning resources for you to get started. (Some of these resources require logging in to the ServiceNow University site.)	Zero Copy Connector for ERP Fundamentals
	Introduction to Zero Copy Connector for ERP Data Products and Process Extensions
	ERP moion: Working toward a clean core

Requesting Zero Copy Connector for ERP on the store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Before you can use Zero Copy Connector for ERP, you must first download the application from the ServiceNow Store. If you don't see Zero Copy Connector for ERP on your instance after you have completed the download, clear your local cache.

Exploring Zero Copy Connector for ERP

Zero Copy Connector for ERP (Enterprise Resource Planning) enables you to connect to an ERP system to read, update, create, and extract data for use on the ServiceNow AI Platform.

Zero Copy Connector for ERP overview

Zero Copy Connector for ERP helps you identify custom Enterprise Resource Planning (ERP) apps and fields in an ERP system (such as SAP) to access their data on the ServiceNow AI Platform.

Zero Copy Connector for ERP supports the following ERP systems:

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- SAP ECC
- SAP S/4HANA
- SAP S/4HANA Cloud
- SuccessFactors
- Workday
- Oracle E-Business Suite (EBS)

Zero Copy Connector for ERP offers a unified data model for ERP systems. Zero Copy Connector for ERP enables you to manage tables that contain both standard and custom fields grouped within ERP models. You can send updates to and extract data from tables on the ERP system. Store extracted data in a remote table or an extraction table, depending on the size of datasets and refresh needs.

- Remote tables get their records from running an associated script against an external data source.
- Extraction tables retrieve large amounts of data using a scheduled query, and use transform tables to process data for use on the ServiceNow AI Platform.

Note: Zero Copy Connector for ERP doesn't replicate data into the ServiceNow AI Platform. It mirrors data that lives in the ERP system of record, and remains protected there.

Benefits of Zero Copy Connector for ERP

The unified data model of the ServiceNow AI Platform helps integrate ERP data into the ServiceNow AI Platform. Zero Copy Connector for ERP streamlines ERP data management, making it accessible and actionable within the ServiceNow AI Platform and ServiceNow instances. Configure extraction tables to pull custom or delta data from the ERP system regularly.

Zero Copy Connector for ERP key benefits

Benefit	Feature
Configure connections to the ERP system	Working with ERP systems in Zero Copy Connector for ERP
Build ERP models to create read, update, and create operations and organize mirrored ERP data	Building and managing models to work with ERP data
Work with and query remote tables to view ERP data on the ERP system	Using ERP remote tables in Zero Copy Connector for ERP
Configure extraction tables to pull custom data from the ERP system regularly	ERP data extraction and transformation
Use ERP data in ServiceNow Studio, Workflow Studio flows and playbooks, Table Builder, UI Builder, and Workspace Builder	Next steps after extracting data from your ERP system using Zero Copy Connector for ERP

Helpful resources

The following ServiceNow resources can help:

Video

Watch Unlock the full potential of your ERP system.

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Video

Watch Clean core ERP.

Obtaining Zero Copy Connector for ERP metrics and statistics

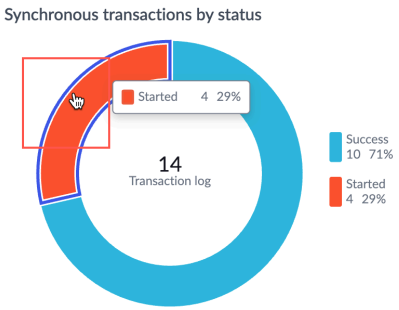
Use the Zero Copy Connector for ERP (Enterprise Resource Planning) home page dashboard to obtain statistics about transactions and information to help you troubleshoot.

View statistics, metrics, and debug information for Zero Copy Connector for ERP on the dashboard. Open links to related Zero Copy Connector for ERP properties, logs, events, and editors.

You must have the sn_erp_mining.erp_admin or sn_erp_mining.erp_user role to view the dashboard.

To view the dashboard, navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.

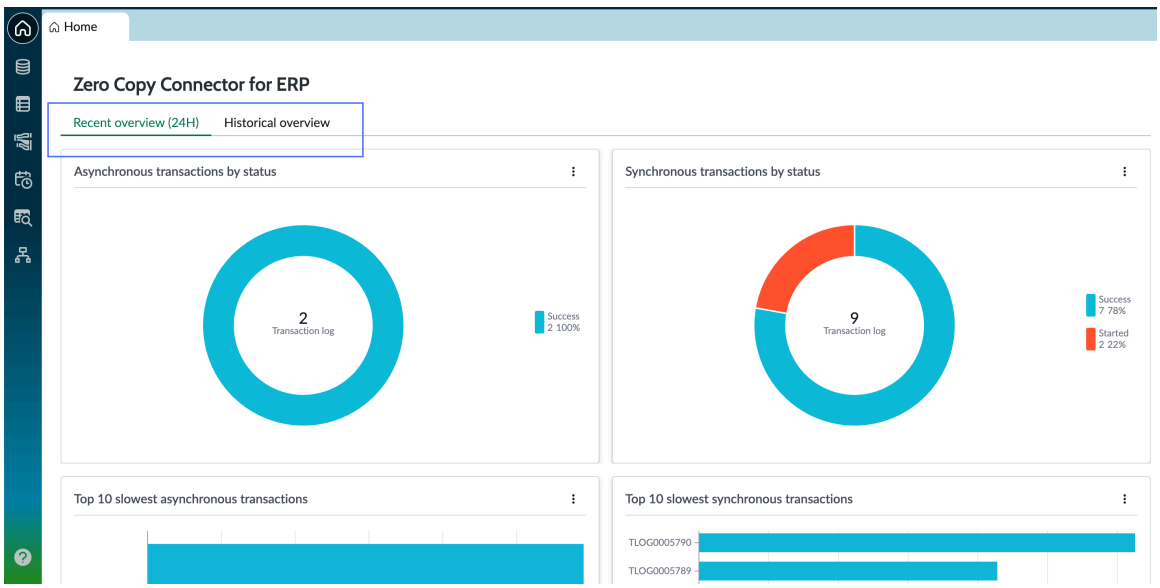
Select areas or items in the charts, graphs, and lists on the dashboard to view the underlying records. For example, select a section of a donut chart to see a list of the records for that section.



Dashboard tabs

The **Recent overview** tab contains information obtained in the last 24 hours.

The **Historical overview** tab contains all information.



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Data visualizations

Title	Type	Description
Asynchronous transactions by status	Donut	Background jobs, such as extractions, organized by status (for example, Started, Success, or Error).
Synchronous transactions by status	Donut	User-initiated jobs, such as remote lookup, organized by status (for example, Started, Success, or Error).
Top 10 slowest asynchronous transactions	Bar	Asynchronous transactions ordered by slowest response time.
Top 10 slowest synchronous transactions	Bar	Synchronous transactions ordered by slowest response time.
Asynchronous transactions by entity type	Bar	Asynchronous transactions organized by entity type (for example, read).
Synchronous transactions by entity type	Bar	Synchronous transactions organized by entity type (for example, read).
Users grouped by role (available on the **Recent overview** tab for users with the sn_erp_mining.erp_admin role)	Donut	Users who have initiated a job, organized by role.

Exploring Zero Copy Connector for ERP models

Build ERP (Enterprise Resource Planning) models in Zero Copy Connector for ERP to create read, update, and create operations and organize mirrored ERP data.

In Zero Copy Connector for ERP, a **model** is the foundational building block for accessing and working with ERP data. It represents the logical structure and organization of data coming from the ERP system. A model defines the tables, fields, read/update/create operations, and table join relationships that capture a specific business process or dataset. After you configure a model, you can use it as a data source for building apps, flows, playbooks, workspaces, and more.

Zero Copy Connector for ERP supports two types of models:

- ERP models follow the data structures defined by the external ERP system itself, accommodating the unique formats of each connected system.
- Platform models map ERP input and output fields to existing ServiceNow platform tables, standardizing ERP data into the data structure of the ServiceNow AI Platform for tighter integration.

Zero Copy Connector for ERP includes a standard set of models and supports creating custom models from scratch or cloning existing ones. Each model connects to one ERP system, and each model can have only one read operation, one update operation, and one create operation defined. Operations use one of several underlying methods depending on the type of operation and what the connected ERP system supports.

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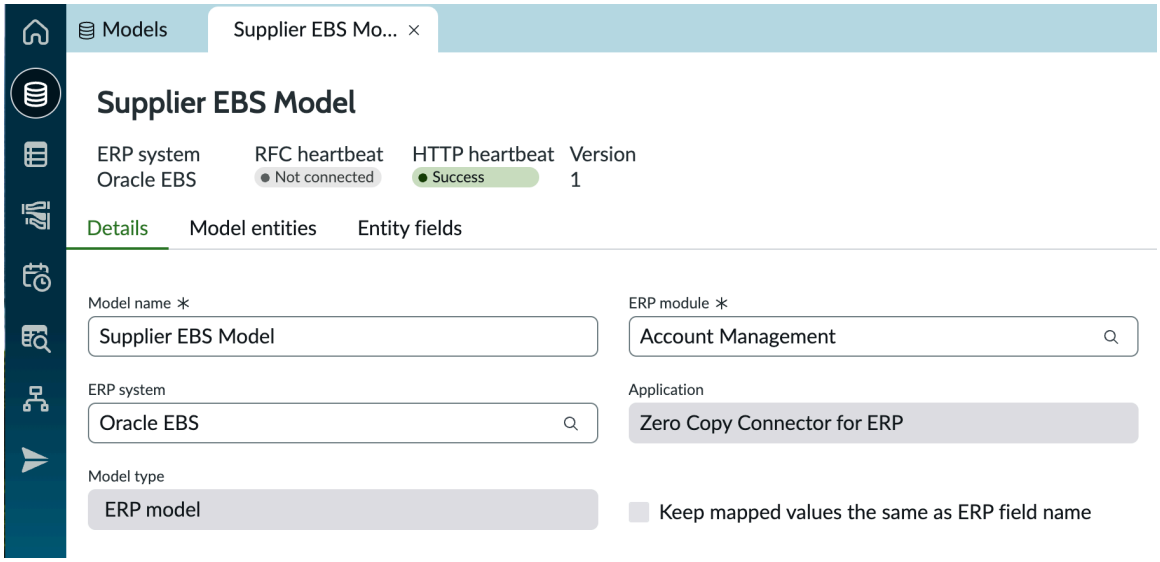

Key benefits

Models create a consistent, reusable data layer. You can connect the same ERP table to multiple models, and build as many models as needed to represent different business areas.

Through input and output parameter mapping, you define which ERP fields are used and what the model sends back to the ERP system on reads, updates, and creates. This means sensitive fields never reach remote or extraction tables. The fields are excluded at the model level before any data flows.

Models support a range of underlying connection methods (table reads, BAPIs, RFC, OData, IDoc, and REST APIs). You can match the method to what's available and appropriate for the ERP module and operation type you're working with.

After a model is ready and its operations are configured, use it as a data source across Workflow Studio flows, ServiceNow Studio, Workspace Builder, UI Builder, Table Builder, and playbooks. This makes models a universal integration point rather than something custom-built for a single use case.

Use case

A developer is building a vendor management application and needs to retrieve vendor data from SAP, enable updates to vendor payment terms, and create vendor records.

Instead of building three separate integrations, the developer creates a single vendor model connected to the appropriate SAP system. In the model manager, they add three operations:

- A read operation using an RFC/BAPI entity to retrieve vendor details.
- An update operation using OData to write payment term changes back to SAP.
- A create operation using a BAPI to create vendors.

The developer uses the model as the data source for a Workflow Studio flow that triggers when a new vendor request is submitted. The flow automatically reads existing vendor data, routes through an approval, and writes the approved changes directly back to the SAP system. No one needs to log in to the SAP system directly.

Exploring Zero Copy Connector for ERP content packs

Use Zero Copy Connector for ERP (Enterprise Resource Planning) content packs to view examples and create an ERP model faster.

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Zero Copy Connector for ERP content packs are collections of ERP models and process extensions, available as separate downloads from the ServiceNow Store. They give developers a significant head start when building SAP integrations, especially developers and teams with little or no SAP domain knowledge.

Each content pack is organized around a specific business process area. Currently available content packs include:

- Enterprise Data Foundation: Data models covering materials, vendors, customers, cost centers, chart of accounts, and foundational SAP reference data that spans modules.
- Quote to Cash: Sales order management models covering create, read, and update operations for sales orders, outbound deliveries, credit memos, customer invoices, and customer credit limits.
- Source to Settle: Procurement models covering purchase orders, purchase requisitions, and purchasing info records.
- Hire to Retire: Employee life cycle models covering candidates, employee profiles, job applications, job requisitions, and positions.

Key benefits

The biggest benefit is speed. Building models from scratch requires mapping SAP tables, BAPIs (business application programming interfaces), input/output fields, and operations by hand. Content packs give developers a ready-made starting point. Read, update, and create operations come pre-configured with typical input/output parameter mappings already in place.

SAP data structures are complex. Content packs make SAP integrations accessible to developers who don't have deep SAP expertise. The work of identifying the right tables, BAPIs, and field mappings has already been done.

Use case

A developer must build an application that manages sales order delivery and billing blocks in SAP. However, the developer isn't an SAP expert and doesn't know which fields control blocking behavior.

Rather than spending days researching, they install the Quote to Cash content pack. They find the CP: Sales Orders model already has Read, Update, and Create operations configured, with input and output parameters mapped to relevant SAP fields. They also find a process extension called Manage Delivery and Billing Block that contains two subflows: one that reads all sales orders with delivery or billing blocks, and one that updates the blocking status for a given order.

The developer clones the model into their own application scope, copies the process extension into Workflow Studio, and wires it to their application. The developer can do this work without needing to know the underlying SAP field names. What might have taken weeks of research is reduced to configuration work.

Exploring Zero Copy Connector for ERP remote tables and extraction tables

Configure remote tables and extraction tables to work with data from the ERP (Enterprise Resource Planning) system.

In Zero Copy Connector for ERP, use remote tables and extraction tables to obtain ERP data after a model has been configured. They serve the same general purpose but are designed for different data volumes. You can use them together when a single approach isn't enough.

You configure both table types within Zero Copy Connector for ERP and link them to a model that controls which fields are available. Standard remote and extraction tables are included with Zero

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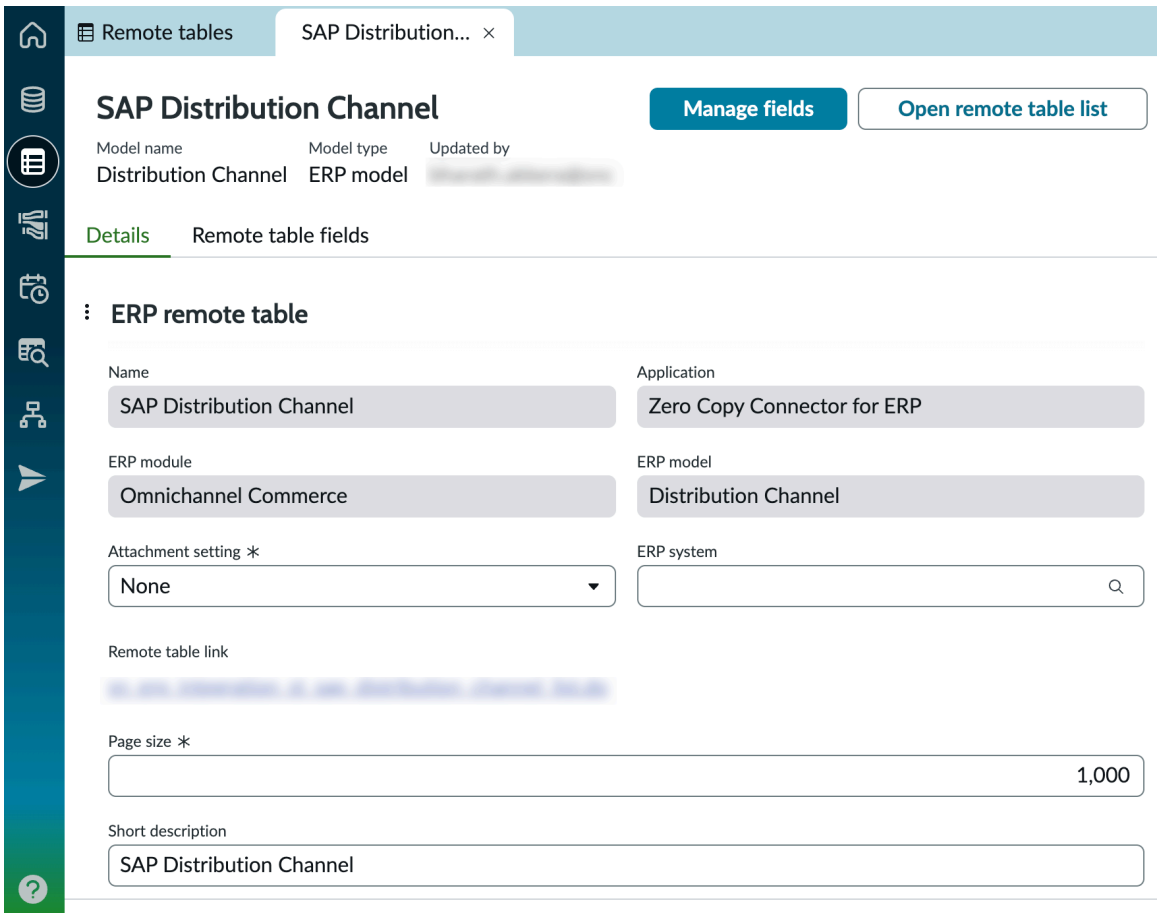
Copy Connector for ERP automatically (for areas such as sales, delivery, and procurement), and custom tables can be created as needed.

Remote tables

Remote tables get their records from running an associated script against an external data source. Remote tables describe the schema for the data that you need to retrieve from an ERP system. Use remote tables to connect to third-party sources, or to another instance, so that you can retrieve external data and optionally cache it in memory. You can view external data in lists or forms and process it with standard Glide scripts. You can also group, sort, aggregate, and filter the data just like you would for standard internal tables.



Extraction tables

Extraction tables are ETL (extract, transform, and load) data sources designed for large volumes of data. Instead of querying the ERP system in real time, extraction tables run on a scheduled basis, such as once per day. Extraction tables pull batches of data from the ERP system, save it to a temporary transform table, and then load it into a Glide table using import sets. The data is then available as a persistent, queryable table. Multiple extraction tables can map to the same ERP model, and you can create as many as needed.

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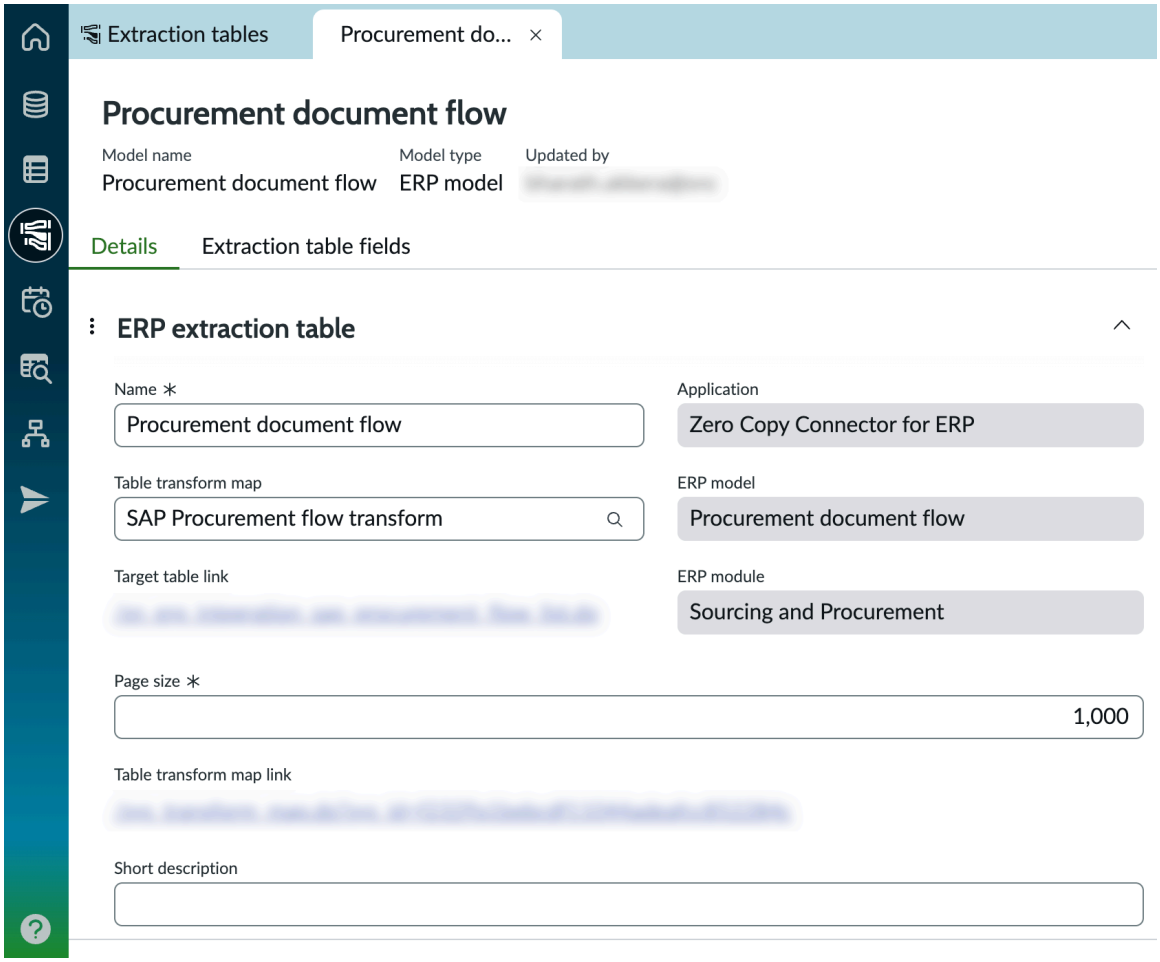

Key benefits

Remote tables provide real-time ERP data with no storage overhead. Because remote table data lives in memory and is never stored in ServiceNow, it is what's in the ERP system at the moment of the request. This makes remote tables ideal for looking up information and lightweight integrations where having current data is critical.

Extraction tables provide high-volume batch processing. For large data sets where querying the ERP system on demand is slow or resource-intensive, extraction tables pull bulk data on a schedule and store it locally. This makes it fast to query, supports complex reporting and analysis, and reduces the load on the ERP system by batching requests rather than making real-time calls.

Both remote and extraction tables let you select exactly which fields to expose. Sensitive fields, such as email addresses or birth dates, can be excluded at the table configuration level. All remote tables are additionally secured with ACLs, giving administrators granular control over which users can see which ERP data.

Data obtained through remote and extraction tables is available as a data source for building on top of ERP data. Use the data with applications such as ServiceNow Studio, Workflow Studio flows and playbooks, Table Builder, UI Builder, and Workspace Builder.

Use cases

A company wants to build a Source-to-Pay workspace that gives procurement teams visibility into open purchase orders. The data set includes hundreds of thousands of PO records across

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multiple SAP company codes. The procurement team needs to filter, analyze, and report on that data daily, but doesn't need it updated by the minute.

A developer creates an extraction table linked to the Purchase Orders model. They configure a scheduled extraction to run every day, pulling all open POs for the current month from SAP and loading them into a Glide table. The procurement workspace is built on top of that Glide table, giving users fast, filterable access to PO data without hitting SAP on every page load.

For instant needs, such as obtaining the current status of a PO for a supplier, the developer also configures a remote table pointing to the same model. When a procurement team member opens a PO record and needs live data, the remote table queries SAP directly and returns the current value on demand.

Exploring Zero Copy Connector for ERP systems

Create an ERP (Enterprise Resource Planning) system in Zero Copy Connector for ERP to connect to an external ERP system.

In Zero Copy Connector for ERP, an ERP system is a configuration record that represents a connection to a specific section or domain of your external ERP system. The record contains information that tells the ServiceNow AI Platform where to connect and how to communicate with your ERP, using a connection and credential alias.

Zero Copy Connector for ERP supports the following ERP systems:

- SAP ECC
- SAP S/4HANA
- SAP S/4HANA Cloud
- SuccessFactors
- Workday
- Oracle E-Business Suite (EBS)

Each ERP system record organizes the connection to the ERP system and points to ERP data rather than copying it. Zero Copy Connector for ERP doesn't replicate data into the ServiceNow AI Platform; it mirrors data that lives in the ERP system, where it remains protected.

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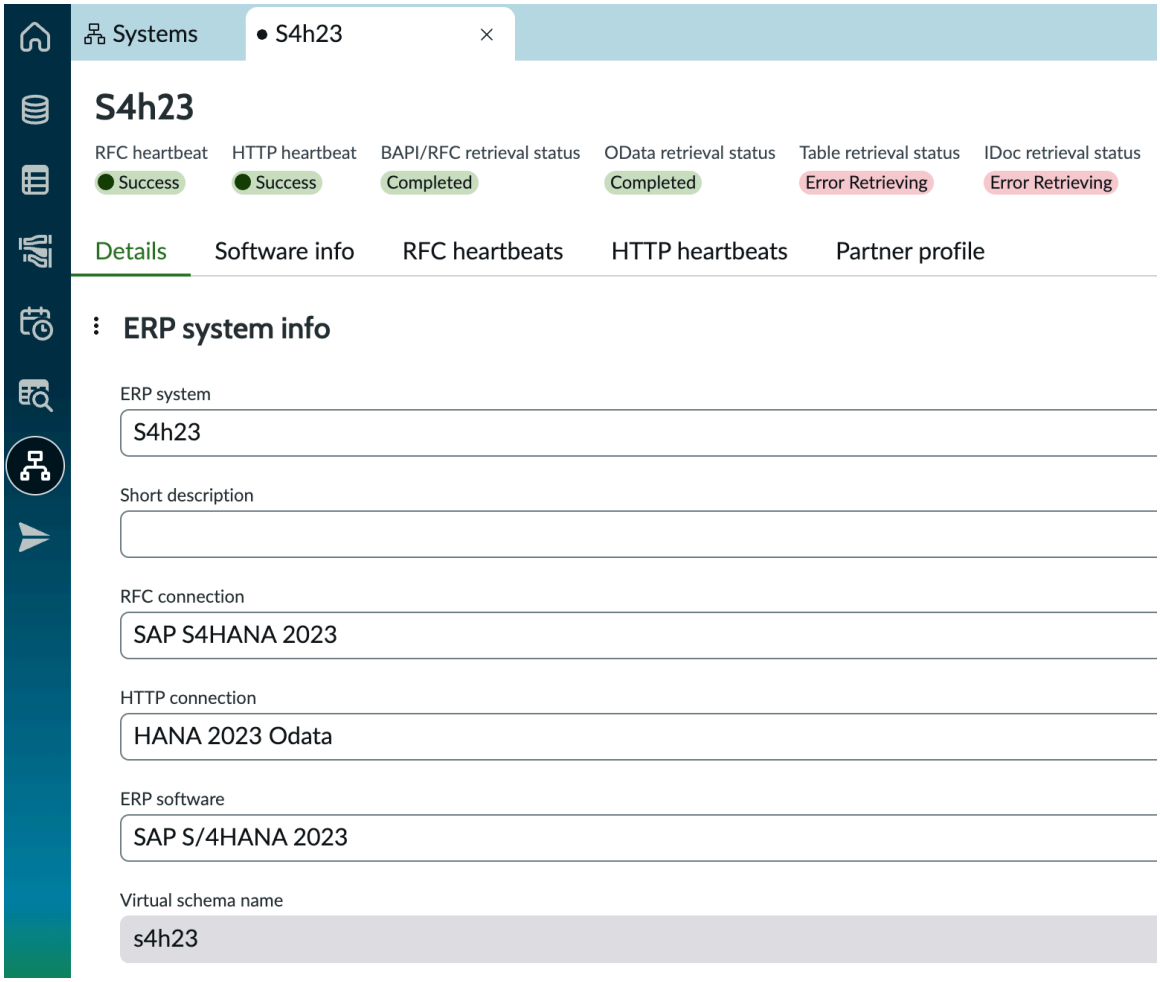

You can have multiple ERP system records on one instance (license-dependent). After creation, Zero Copy Connector for ERP regularly pings each system to confirm that the connection is healthy.

For more information, see Working with ERP systems in Zero Copy Connector for ERP.

Configuring Zero Copy Connector for ERP

Install Zero Copy Connector for ERP (Enterprise Resource Planning) to configure connections to ERP systems.

Connecting to an instance

Zero Copy Connector for ERP uses basic authentication to connect a ServiceNow instance with an instance on the ERP system (such as SAP).

After you configure a connection, you can read and update the ERP system and create records with Zero Copy Connector for ERP using ERP models. You can also create remote tables and extraction tables.

Use ERP Semantic Mining to identify legacy applications that are good candidates for replatforming, making their data immediately available on the ServiceNow AI Platform. For more information, see ERP Semantic Mining.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

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Connecting to multiple instances

The number of ERP connections you can have per ServiceNow instance depends on your license.

Requirements for installing Zero Copy Connector for ERP

Before you install Zero Copy Connector for ERP (Enterprise Resource Planning), you must complete several configurations on both the ERP system and the ServiceNow AI Platform.

Licensing

Check your entitlements to determine whether you have access to Zero Copy Connector for ERP. For more information, see Licensing.

ServiceNow AI Platform plugins

The following plugins are required to install Zero Copy Connector for ERP:

- Integration Hub plugin (for more information, see Request Integration Hub)
- Financial Services Remote Tables plugin (for more information, see Activate the remote tables plugin)

MID Server requirements

Note: If you use a cloud solution, such as S/4HANA Cloud or SuccessFactors, MID Server is not required.

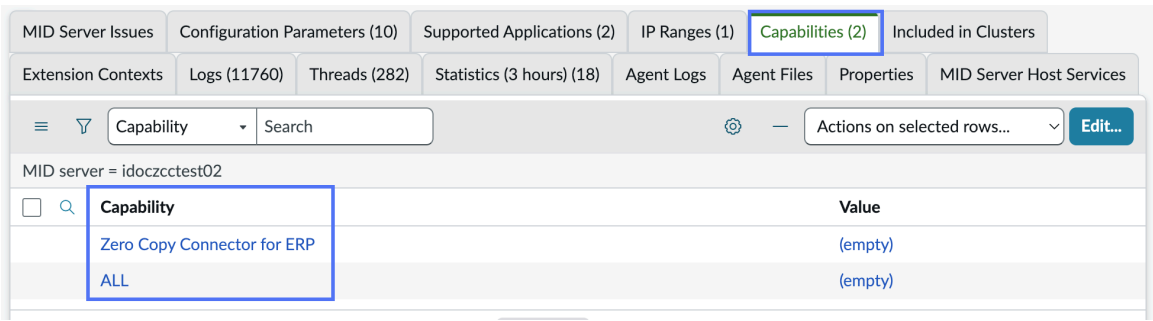
Communicating with the ERP system through a MID Server requires a valid connection and credential alias.

Note: The credentials you specify for the Zero Copy Connector for ERP connection must match the service user credentials in the system of record.

Zero Copy Connector for ERP and ERP Semantic Mining currently support ECC (minimum SAP Netweaver 7.31) and SAP S/4HANA systems.

Navigate to **All** > **MID Server** > **Servers**, select a MID Server, and add the following:

- In the **Supported applications** tab, edit the list to include Zero Copy Connector for ERP.
- In the **Capabilities** tab, add Zero Copy Connector for ERP.



For more information, see MID Server.

Assign the sn_erp_integration.erp_mid_server role to the mid_user account. The role enables the MID Server to use the ImportSet API to send data to the ServiceNow instance.

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1. Navigate to **All** > **User Administration** > **Users**.
2. Find and select the **mid_user**.
3. Select the **Roles** tab.
4. Select **Edit**.
5. Find and assign the **sn_erp_integration.erp_mid_server** role.

Required SAP authorizations in development system

For the credentials, use an SAP service-type user account in your ERP system that has the following SAP authorization objects:

- S_RFC with Activity 16 (Execute) for the following Function Modules:
  - RFCPING
  - BAPI_MONITOR_GETLIST
  - RFC_METADATA_GET
  - RFC_GET_FUNCTION_INTERFACE
  - RFC_READ_TABLE
  - DDIF_FIELDINFO_GET
- S_TABU_NAM with Activity 03 (Display) for the following tables:
  - DD01L
  - DD02L
  - DD02T
  - DD03L
  - DD04L
  - DD04T
  - DD12L
  - DD17S
  - DD40L
- S_DEVELOP with Activity 03 (Display)

Required SAP authorizations in production and test systems

For the credentials, use an SAP service-type user account in your ERP system that has the following SAP authorization objects:

- S_RFC with Activity 16 (Execute) for the following Function Modules:
  - RFCPING
  - BAPI_TRANSACTION_COMMIT
  - BAPI_TRANSACTION_ROLLBACK
  - RFC_METADATA_GET
  - RFC_GET_FUNCTION_INTERFACE
  - RFC_READ_TABLE
- S_TABU_NAM with Activity 03 (Display) for the tables that you use in models.

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SAP proprietary files

Contact the administrator of your SAP ECC RFC account to obtain the following SAP proprietary JAR files and other required files:

- Create a record called "SAP Jco Dll" and attach `sapjco3.dll`. Use this file if your MID Server is installed on a Windows server.
- Create a record called "SAP Jco so" and attach `libsapjco3.so`. Use this file if your MID Server is installed on a Linux server.
- Create a record called "SAP Jco Jar" and attach `sapjco3.jar`. Use this file for both Windows and Linux.

Note: Create the records at **All** > **MID Server** > **JAR Files**. For more information about creating JAR files and adding attachments, see Synchronize a JAR file to MID Servers.

The MID Server restarts multiple times during this process.

For details about these files, see SAP ECC RFC Spoke.

SAP configuration

You must configure the JCo connector before you install Zero Copy Connector for ERP. For more information, see Installing the SAP Java Connection (JCo) on the SAP Help Portal.

You must add the DuckDB JDBC JAR file as a MID Server JAR file. For more information and to download, see DuckDB JDBC Driver 1.1.1 on the Maven website.

You need the following on your ERP system:

- SAP ECC (minimum SAP NetWeaver 7.31)
- SAP S/4HANA (all versions supported)
- SAP Java Connector

Install Zero Copy Connector for ERP

Install Zero Copy Connector for ERP from the ServiceNow Store, so that you can connect to SAP and other ERP systems and start building models on the ServiceNow AI Platform.

Before you begin

For a complete list of prerequisites for installing Zero Copy Connector for ERP, including licensing information, see Requirements for installing Zero Copy Connector for ERP.

Role required: admin

About this task

Before you can configure ERP systems, build models, or work with ERP data on the ServiceNow AI Platform, you must install Zero Copy Connector for ERP from the ServiceNow Store and confirm entitlements for the product and its dependent applications.

Procedure

1. Go to the ServiceNow Store.
2. In search enter, `Zero Copy Connector for ERP`.
3. Select the *`Zero Copy Connector for ERP`* tile.
4. Select **Buy**.

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5. Log in using your ServiceNow credentials.
   Federal customers should select **Are you a federal customer?** and follow the instructions.
   If you don't have ServiceNow credentials and aren't a federal customer, select **Are you a customer who doesn't have ServiceNow ID?** and follow the instructions.
6. Check that you have entitlements (or licenses) to the product and dependent applications by viewing **Your Subscription Status**.
7. Select **Request Install**.
8. When complete, confirm the installation of Zero Copy Connector for ERP.
9. Select **Close** to return to the ServiceNow Store.

Result

Zero Copy Connector for ERP is installed on your instance. Complete the post-installation steps below before configuring ERP systems or building models.

What to do next

An admin or a user with the sn_erp_integration.erp_admin role must enable the *sn_erp_integration.enableModelModification* property for you to edit, customize, and clone ERP models and tables. The property must be enabled on the correct scope. After enabling the property, Zero Copy Connector for ERP retrieves all tables and BAPIs (Business Application Programming Interface) to use when managing models. The property must be configured for either a non-production or production state. (Enabling the property on a production instance can create metadata records when new models and fields are added in Zero Copy Connector for ERP.) System properties are maintained in the System Property table [sys_properties], which you can access by entering `sys_properties.list` directly in the Navigator Filter.

Connecting to SAP

Connect Zero Copy Connector for ERP (Enterprise Resource Planning) to an SAP system using a variety of methods.

Zero Copy Connector for ERP supports the following SAP systems:

- SAP ECC
- SAP S/4HANA
- SAP S/4HANA Cloud

Connect to SAP with RFC or BAPI

Connect Zero Copy Connector for ERP (Enterprise Resource Planning) to SAP directly or using a load balancer to enable access to the ERP system.

Before you begin

Role required: sn_erp_integration.erp_admin

Identify an existing connection to use or create a connection. For more information, see Get started with connections and Create an HTTP(s) connection.

Note the following:

- You must specify a connection and login credential to be used simultaneously. That is, the connection you configure uses the defined login credentials for the connection.
- The credentials you specify for the Zero Copy Connector for ERP connection must match the service user credentials in the ERP system.

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The following SAP systems are supported:

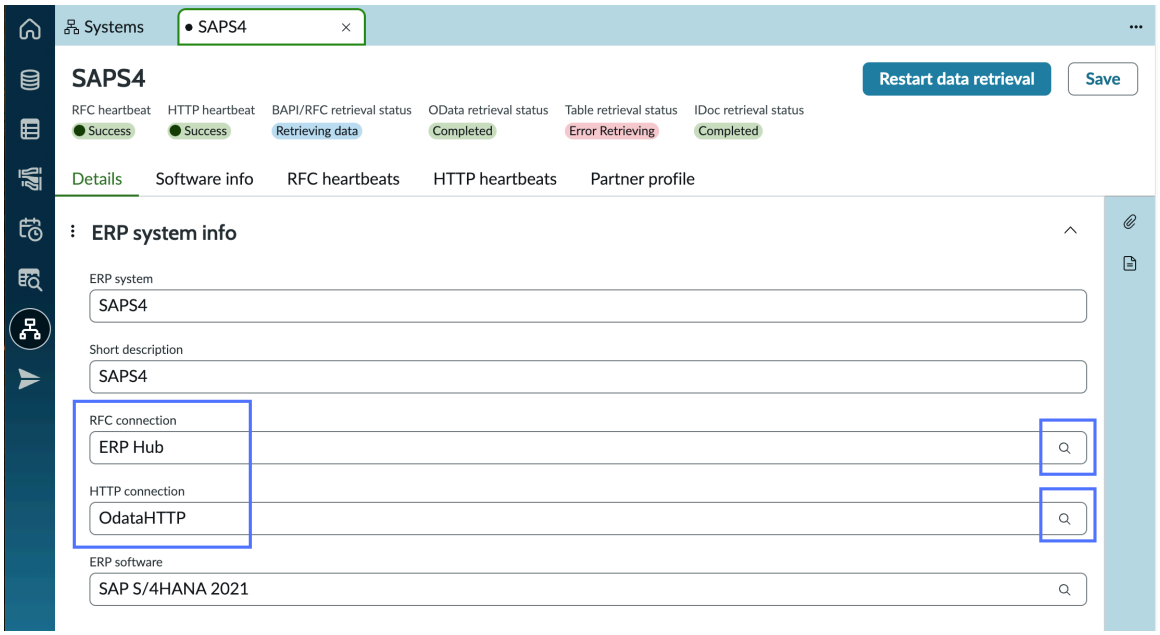
- SAP ECC
- SAP S/4HANA
- SAP S/4HANA Cloud

About this task

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP systems list by selecting the systems icon in the side panel.
3. Open a system record.
4. Add the configured connection.

   To see a list of all available RFC or HTTP connections, select the search for record icon (magnifying glass) in the field.



5. Select **Save**.
   For more information, see Zero Copy Connector for ERP system details field descriptions.

Add an RFC entity to a model operation

Specify the RFC entity that a Zero Copy Connector for ERP (Enterprise Resource Planning) model uses for a read, update, or create operation.

Before you begin

The read, update, or create operation must be added before an entity can be added to it. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

Role required: sn_erp_integration.erp_admin

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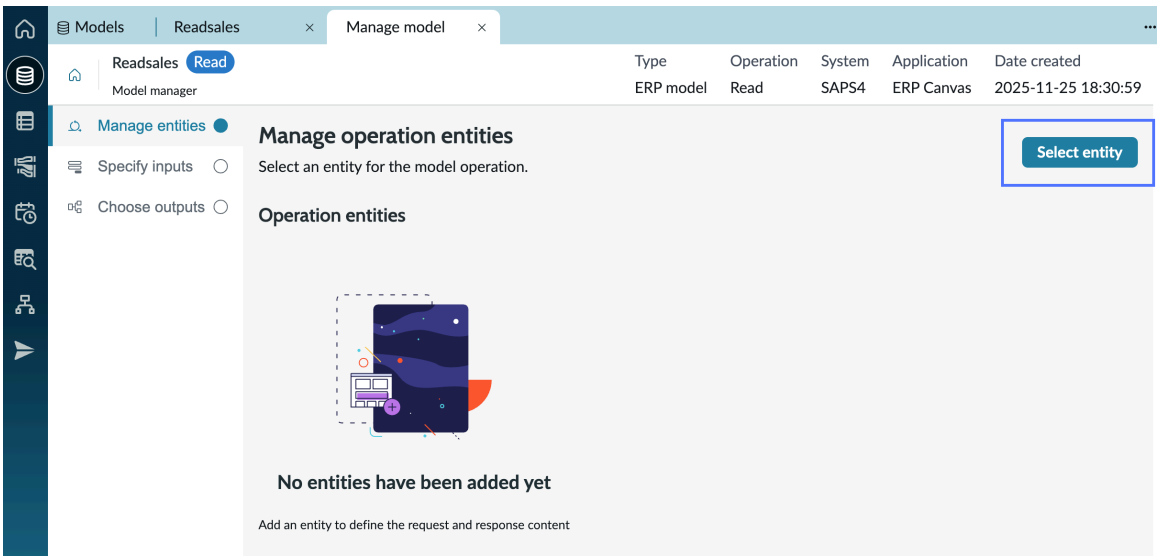
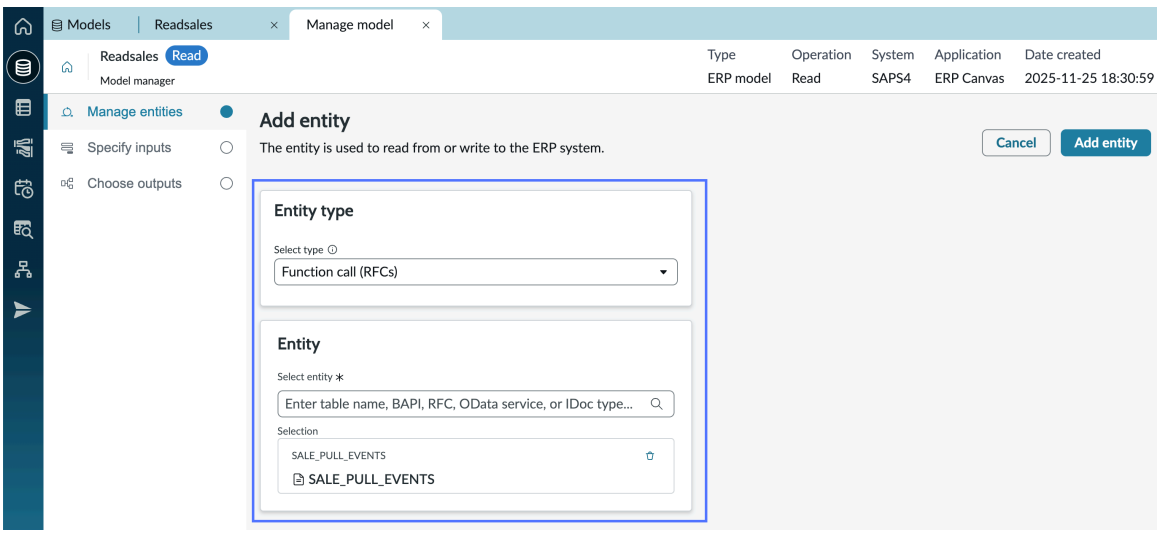
Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model to add an operation entity to.
4. Select the **Manage model** button.
5. Select an operation.
6. Select **Select entity** on the **Manage entities** tab.



7. In **Select type**, select **Function call (RFCs)**.
8. In **Select entity**, specify the RFC to use.



9. Select **Add entity**.

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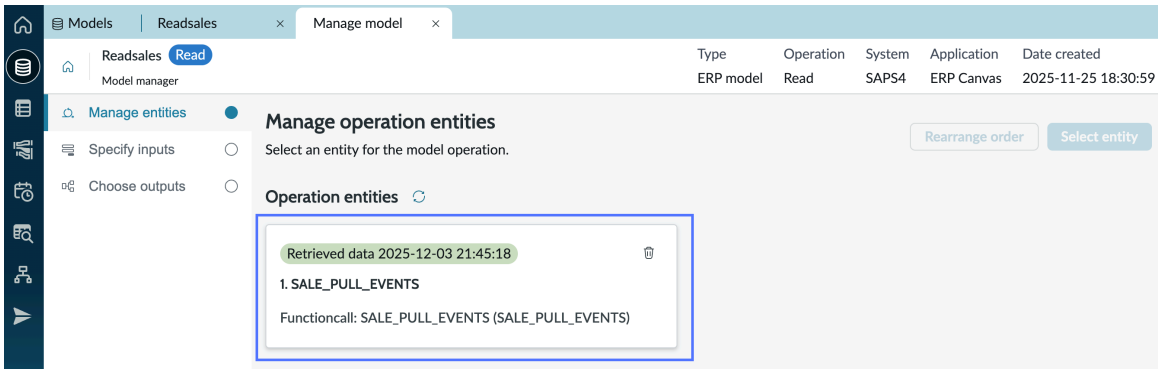
The entity card shows the date and time when the information was last retrieved.



Add a BAPI entity to a model operation

Specify the BAPI entity that a Zero Copy Connector for ERP (Enterprise Resource Planning) model uses for a read, update, or create operation.

Before you begin

The read, update, or create operation must be added before an entity can be added to it. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

This video was recorded in the Zurich release.

https://player.vimeo.com/video/1170454307?h=fd0c63dca5&badge=0&autopause=0&player_id=0&app_id=58479%22

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model to add an operation entity to.
4. Select the **Manage model** button.
5. Select an operation.
6. Select **Select entity** on the **Manage entities** tab.

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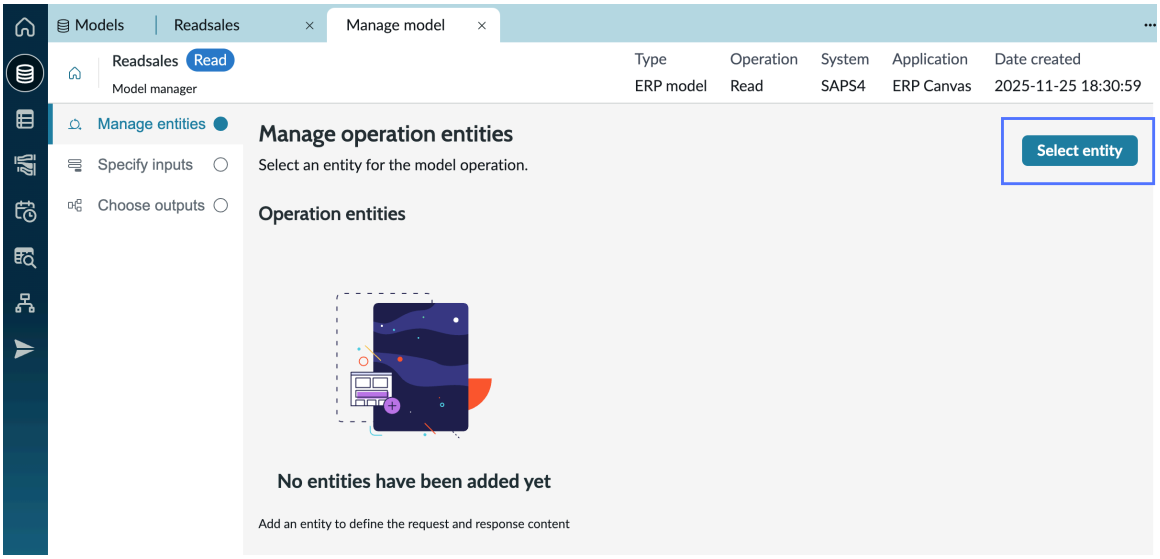
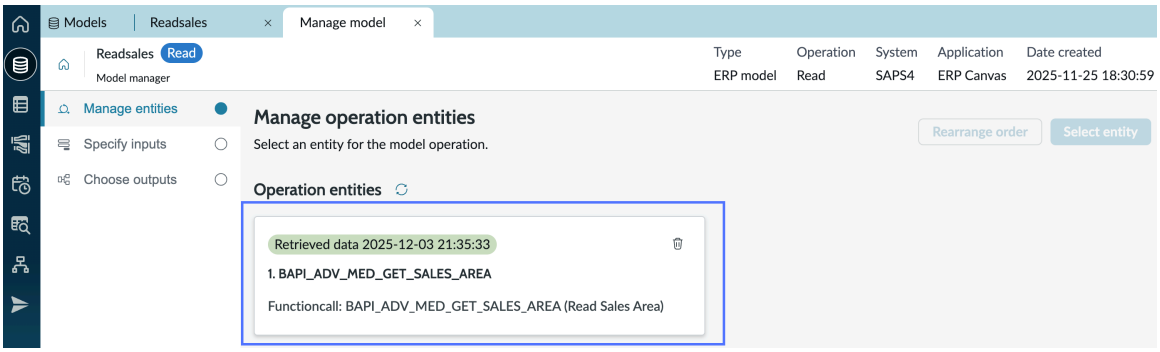


7. In **Select type**, select **Function call (BAPIs)**.
8. In **Select entity**, specify the BAPI to use.
9. Select **Add entity**.

   The entity card shows the date and time when the information was last retrieved.



Using a Secure Network Communication (SNC) connection in Zero Copy Connector for ERP

Use Secure Network Communication (SNC) for data communications between ServiceNow MID Server and SAP systems.

Secure Network Communication (SNC) is a security feature in SAP systems that confirms that the data transmitted over the network is protected by encryption, authentication, and integrity checks. SNC provides a secure communication pathway between SAP systems and external components, safeguarding sensitive information from unauthorized access, tampering, and eavesdropping.

SNC enables you to:

- Enhance security: By encrypting the data transmitted over the network, SNC helps prevent unauthorized access and helps protect confidentiality.
- Check data integrity: Integrity checks confirm that the data isn't altered during transmission, protecting against tampering.
- Authenticate communication parties: SNC provides strong authentication methods to verify the identities of the entities involved in the communication.

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SNC architecture

SNC operates within the SAP NetWeaver Application Server (AS) environment. It uses the Generic Security Services Application Program Interface (GSS-API) to integrate with external security libraries and products. Commonly used security libraries include Kerberos-based solutions and SAP's own Secure Login Library (SLL).

Configure an SNC connection in Zero Copy Connector for ERP

Learn how to set up an SNC connection, including preparing the environment, configuring the SAP system, and testing the configuration.

Before you begin

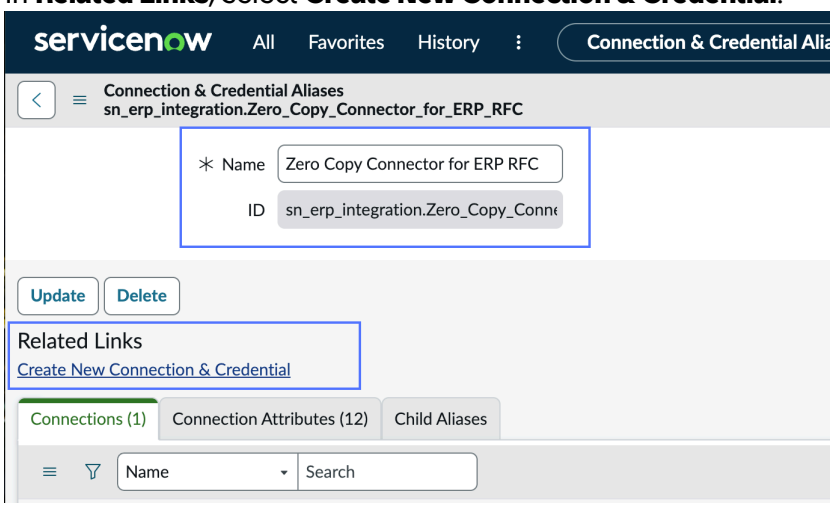
Role required: admin

Confirm that you have the following:

- An SNC-compatible security library, such as SAP Secure Login Library or a Kerberos-based library.
- Administrative access to the SAP system and the server where it's hosted.

Procedure

1. Install the required security library on the MID Server by navigating to **Connections & Credentials** > **Connection & Credential Aliases**.
2. Search for and open the *Zero Copy Connector for ERP* **RFC** alias with the ID sn_erp_integration.ERP_Canvas_RFC.
3. In **Related Links**, select **Create New Connection & Credential**.



4. Complete the form.
   For information about the fields, see Configure the Zero Copy Connector for ERP credentials and connection.
5. Restart the MID Server to apply the changes.
   For more information, see Manually start, stop, and restart a MID Server.
6. Verify that the SNC configuration is working correctly.

   a. Go to **All** > **Workflow Studio**.

   b. On the home page, select **Actions**.

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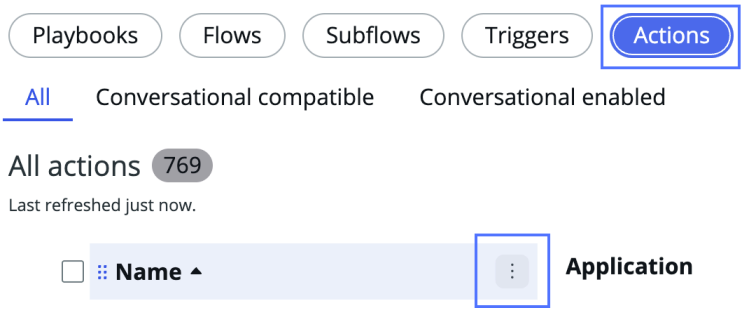
c. Hover over the **Name** column and select the filter icon.



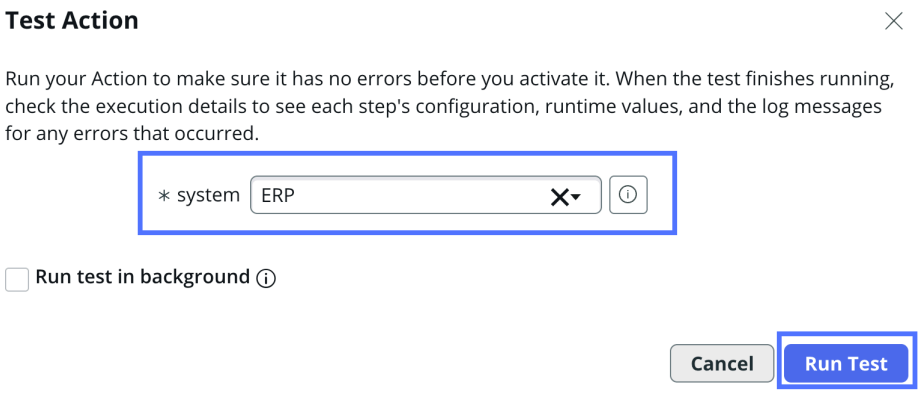
d. Filter for **contains** and type `heartbeat`.

e. Select **Apply**.

f. Select **HeartBeat**.

g. Select **Test**.

h. Specify a **system** and then select **Run Test**.



i. When the test is complete, select the link **Your test has finished running. View the Action execution details**.

j. Verify that the connection properties set are passed as input.

k. Verify that **isAlive** is true, and if it's false, validate the parameters.

Trouble?

- Confirm that the security library is correctly installed and accessible. For more information, see The SAP Security Library (SAPSECULIB) on the SAP help site.
- Verify that the SNC parameters are correctly set. For more information, see Setting the SNC Parameters on the SAP help site.
- Check the SNC PSE for validity and correct DN entries. For more information, see Creating or Replacing a PSE on the SAP help site.
- Confirm that the SAP clients are properly configured to use SNC. For more information, see Configuring MID Server.

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Creating and changing SAP business entities with IDoc

Work with SAP business entities that can only be created or changed using IDoc.

SAP still has some business entities that can only be created or changed using IDoc. In Zero Copy Connector for ERP (Enterprise Resource Planning), you can add IDoc entities to model operations and configure outbound messages. Monitor the asynchronous processing to obtain information about IDoc status and the business entity created or updated.

Note: IDoc supports only create and update operations, not read operations.

For details about IDoc, see the SAP support website IDoc information.

You must have the sn_erp_integration.erp_admin role to create and edit models.

Complete the following steps to work with IDoc entities in Zero Copy Connector for ERP:

1. Manage partner profiles. For more information, see View Zero Copy Connector for ERP partner profile information.
2. Explore the API for interacting with Zero Copy Connector for ERP models. For detailed information and examples for using the API, see sn_erp_integration API - Scoped, Global.
3. Add an IDoc entity to a model. For more information, see Add an IDoc entity to a model operation.
4. Create an outbound message. For more information, see Create an IDoc outbound message configuration in Zero Copy Connector for ERP.
5. Manage IDoc outbound messages. For more information, see View and troubleshoot IDoc messages.

Note: The Zero Copy Connector for ERP Monitor includes IDoc information on the asynchronous tabs. For more information about the Monitor, see Monitor Zero Copy Connector for ERP logged extraction and remote lookup transactions.

Complete IDOC prerequisites

Complete the prerequisites to work with SAP business entities that can only be created or changed using IDoc.

Before you begin

Role required: sn_erp_integration.erp_admin

Procedure

1. Set up partner profiles.
2. Explore the API for interacting with models.
3. Add an IDoc entity to a model.
4. Create an outbound message.
5. Manage IDoc outbound messages.

Result

Note: The Zero Copy Connector for ERP Monitor includes IDoc information on the asynchronous tabs. For more information about the Monitor, see Monitor Zero Copy Connector for ERP logged extraction and remote lookup transactions.

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Add an IDoc entity to a model operation

Specify the IDoc entity that a Zero Copy Connector for ERP (Enterprise Resource Planning) model uses for an update or create operation.

Before you begin

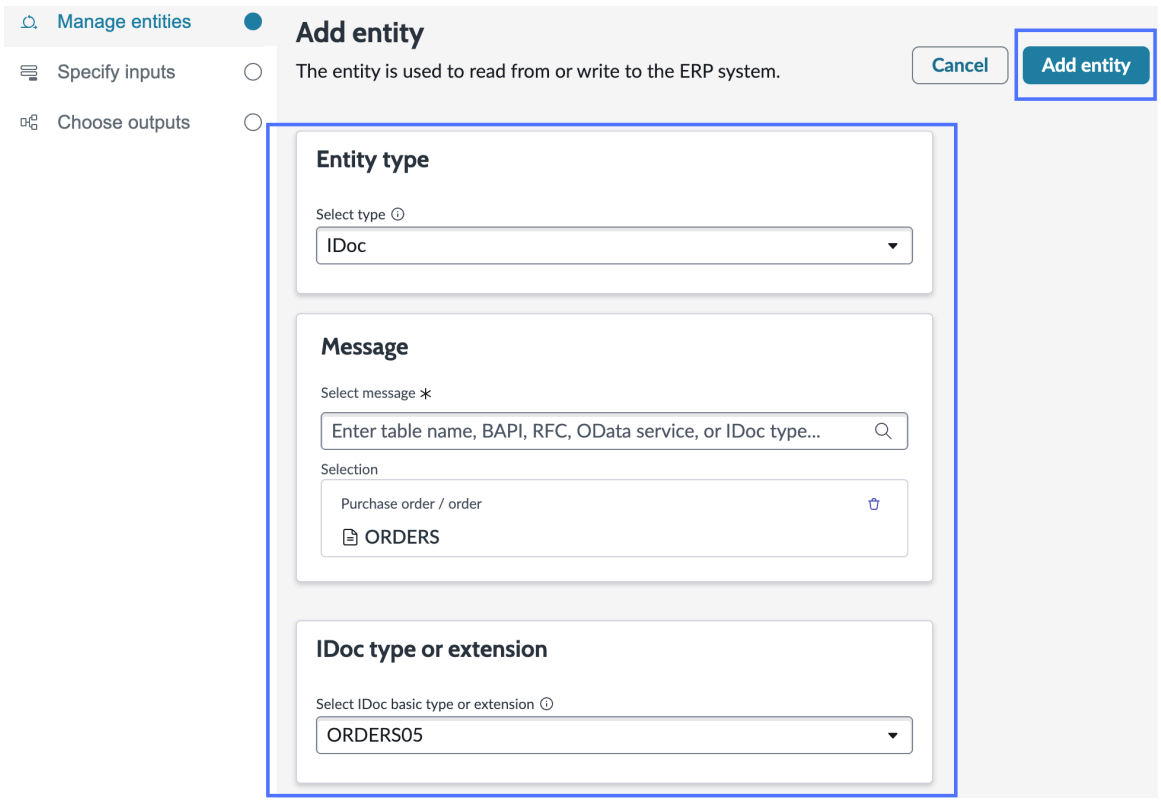
The create or update operation must be added before an entity can be added to it. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model to add an IDoc operation entity to.

   If you need to create a model, see Create a model.
4. Select the **Manage model** button.
5. Select a **Create** or **Update** operation (IDoc entities can't be used with **Read** operations).
6. Select **Select entity**.
7. In **Select type**, select **IDoc**.
8. In **Select message**, enter an IDoc message type, for example, ORDERS.
9. Select the basic type or extension, for example, ORDERS05.
10. Select **Add entity**.



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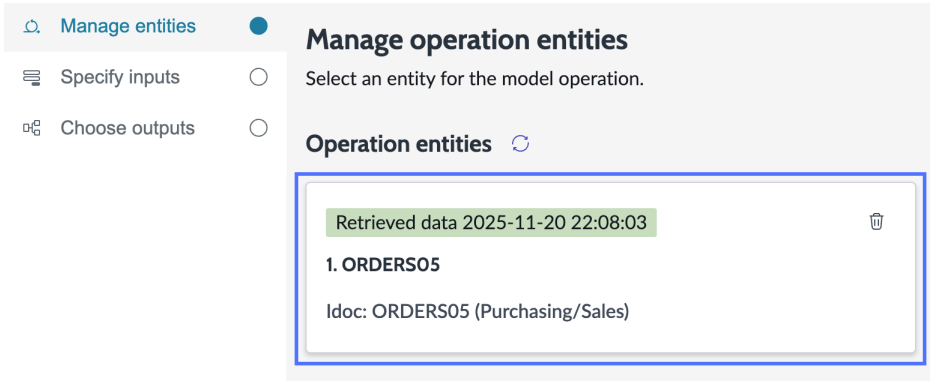
The metadata is retrieved. The entity card shows the date and time when the information was last retrieved.



What to do next

Explore the API for interacting with Zero Copy Connector for ERP models. For detailed information and examples of using the API, see sn_erp_integration API - Scoped, Global.

Create an IDoc outbound message configuration in Zero Copy Connector for ERP

Use IDoc outbound message configurations to create and change certain SAP business entities in Zero Copy Connector for ERP (Enterprise Resource Planning).

Before you begin

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the outbound messages list by selecting the outbound messages icon in the side panel.
3. Select **New**.
4. Enter a **Name**.
5. Select an **Operation**.
6. Specify a **System**.
7. Based on the system, specify a **Partner Profile**.
8. Specify the **Message type**, for example, ORDERS.

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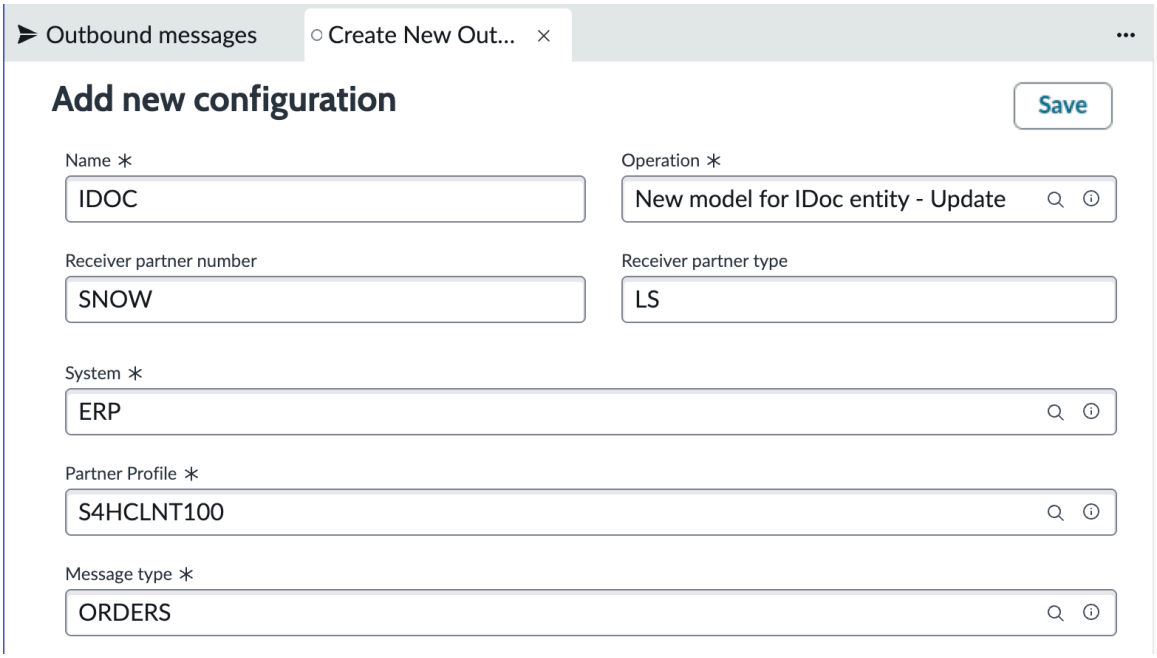

For a detailed description of the field values, see Outbound message configuration fields.

9. Select **Save**.

View and troubleshoot IDoc messages

When working with SAP business entities that can only be created or changed using IDoc, view outbound messages for details and troubleshooting information in Zero Copy Connector for ERP (Enterprise Resource Planning).

Before you begin

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the outbound messages list by selecting the outbound messages icon in the side panel.
3. Select an outbound message.
4. Select the **Messages** tab.
5. Select a **Message ID** to view details about a specific message.
6. View transaction details.

   For example:

   - Check the **Status** field to see if the message was successful.
   - Check the **IDoc payload** field if the message was not successful and you need to troubleshoot. Also, see sn_erp_integration API - Scoped, Global for detailed information and examples using the API.
   - The **IDoc number** can also be useful.

   For a detailed description of the field values, see Outbound message transaction details tab fields.

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7. Select the **Errors** tab to view information about any message errors that have occurred.

   For a detailed description of the field values, see Outbound message errors tab fields.

8. Select the **IDoc status for IDoc log** tab for technical information about the message.

   For a detailed description of the column values, see Outbound message IDoc status for IDoc log tab fields.

Connecting Zero Copy Connector for ERP to ERP using OData

Extract data securely from ERP OData v2 APIs for use in remote tables and extraction tables.

Important:

OData v2 doesn't use snapshot isolation, so you might experience some data consistency issues when retrieving data from an external ERP source.

Providing OData access to users

You must have an ERP system enabled for OData connections.

To give users OData access, see the following instructions on the SAP help site: Back-End Server: Assign OData Service Authorization to Users.

Enabling download of XML files

The glide.attachment.extensions system property restricts the file types that can be downloaded. This property is empty by default. Check that the xml file extension hasn't been added to this property. For more information, see .

System properties

The following are properties related to OData.

Property	Type	Description	Create manually?	Role needed to e
sn_erp_integration.catalog_service_path	string	After the hostname and port, this path is used to connect with any SAP catalog service. The default is: /sap/opu/odata/iwfnd/CATALOGSERVICE;v=2/ServiceCollection. After you create the property and set it to true, a list of all services is retrieved from SAP. The information is stored in an XML file and attached to the system record. The XML can be used later. For example, parse the XML	Yes	admin

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Property	Type	Description	Create manually?	Role needed to e
		while offline with no connection to SAP. **Note:** To update the table catalog information, first remove the attachment displayed on the ERP Systems page. Then, run the retrieval process again to refresh the list.		
sn_erp_integration.odata_max_record_fetch_limit	integer	Limits the number of records fetched for GET calls by adding the $top parameter to the OData calls. This reduces the number of records read from the OData endpoint.	No	admin
sn_erp_integration.odata_service_path	string	After the hostname and port, this path is used to connect with any SAP OData service. Add a URL in **Value** to specify the OData service. The default is: /sap/opu/odata/sap.	Yes	admin
sn_erp_integration.response_timeout	integer	Specifies the timeout value for OData response. If OData calls time out frequently, increase the timeout value. Specify the value in seconds. The default is 100 seconds. This value is used for responses both from external web and from a MID Server.	No	admin or sn_erp_integra
sn_erp_integration.use_cookies	true | false	Specifies whether to use cookies for an OData connection.	No	admin or sn_erp_integra
sn_erp_integration.use_csrf_token	true | false	Indicates whether a CSRF token is sent for OData calls in Zero Copy Connector for ERP operations.	No	admin or sn_erp_integra

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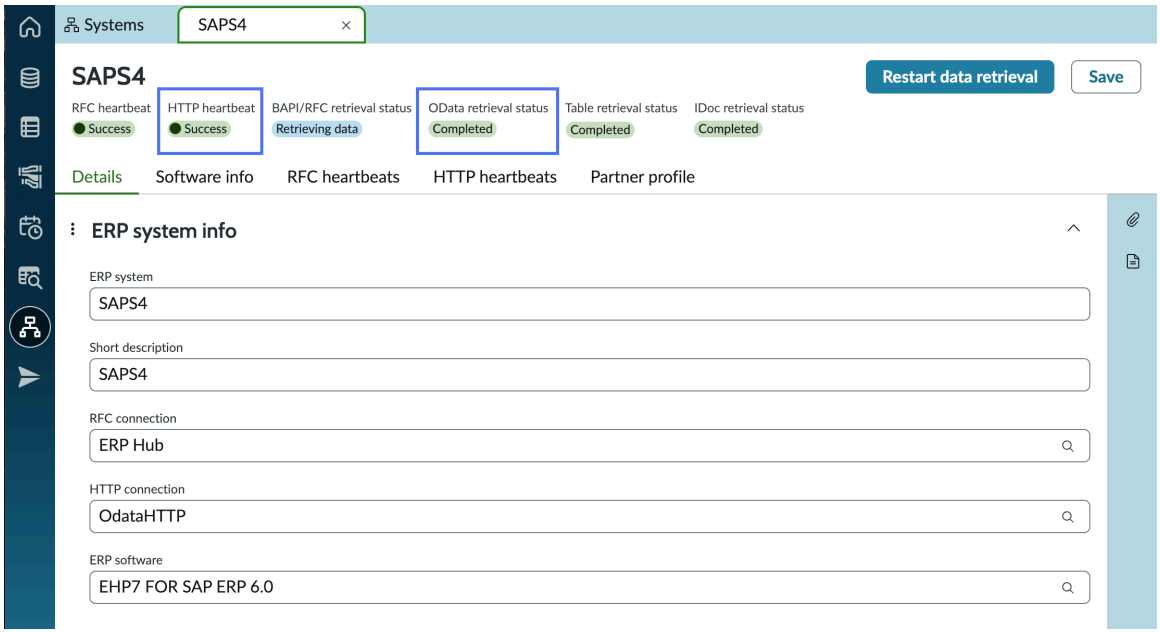
Note: To add a property manually, verify that your scope is set to Zero Copy Connector for ERP, then navigate to sys_properties.list and select **New**.

Heartbeat information

For an ERP system, there are separate heartbeat indicators for RFC and HTTP. When a system is established, the heartbeats are set to active and the status is updated, including any errors. If the heartbeat calls are successful, BAPI and OData retrieval is triggered in parallel and the status appears on the system record.



More information

For more information about using OData in Zero Copy Connector for ERP, see Create an OData connection in Zero Copy Connector for ERP and OData capabilities supported by Zero Copy Connector for ERP.

Add an OData entity to a model operation

Specify the OData entity that a Zero Copy Connector for ERP (Enterprise Resource Planning) model uses for a read, update, or create operation.

Before you begin

The read, update, or create operation must be added before an entity can be added to it. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model to add an operation entity to.
4. Select the **Manage model** button.
5. Select an operation.

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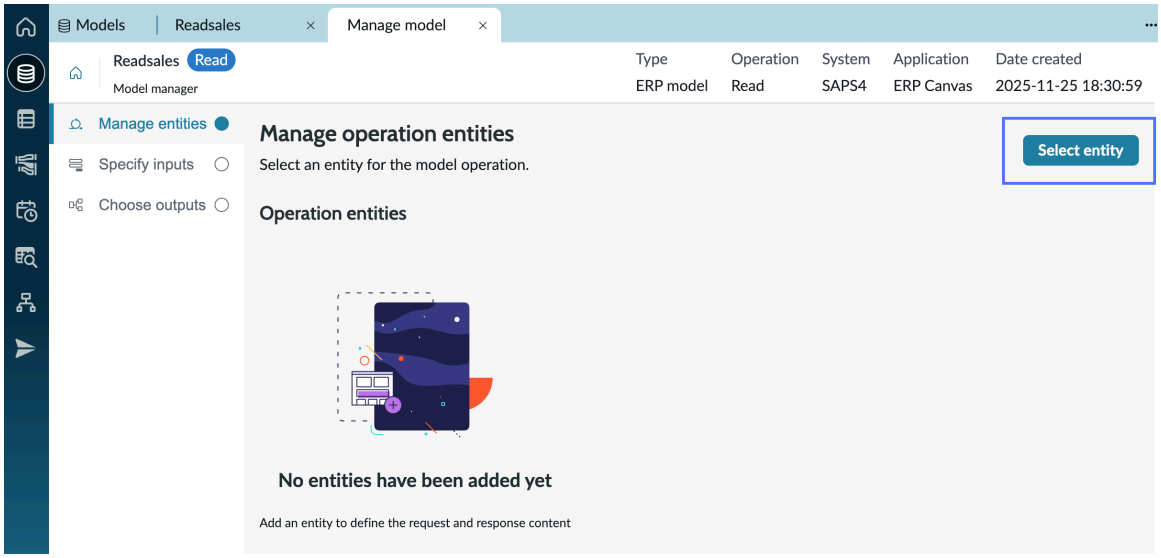
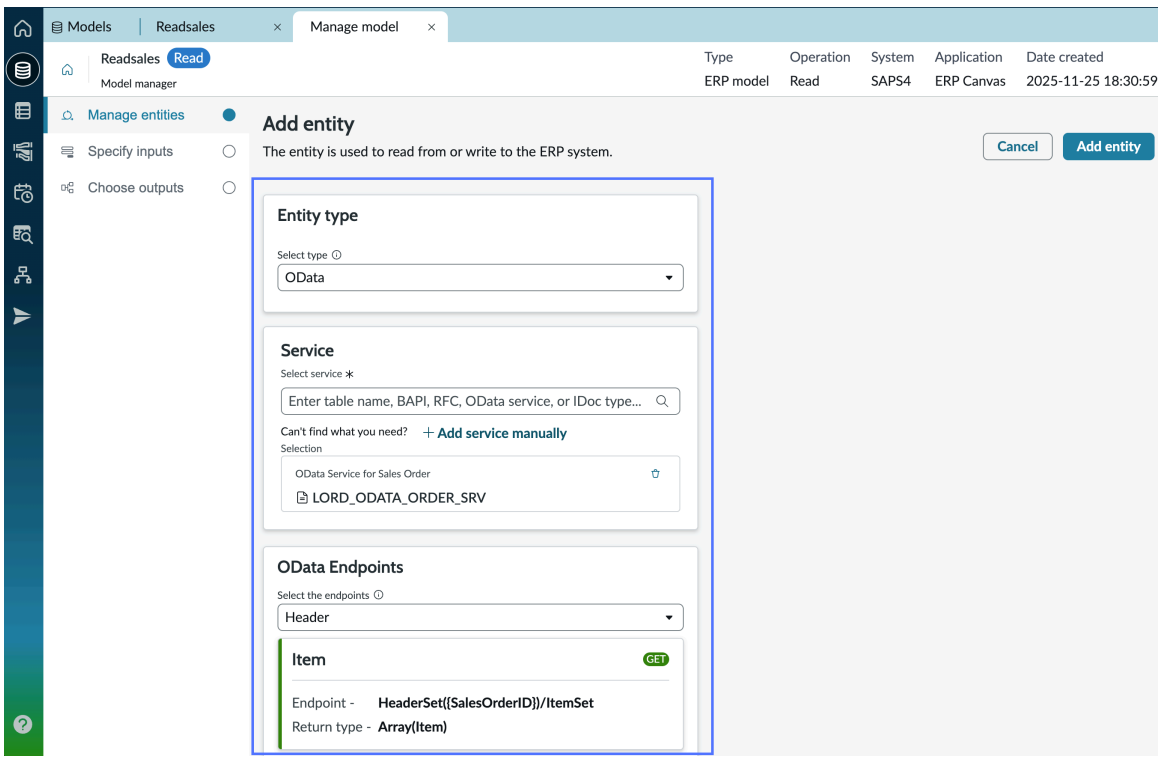
6. Select **Select entity**.



7. In **Select type**, select **OData**.
8. In **Select service**, specify the OData service to use.

   If you don't see the service you need, add the service by selecting **+ Add service manually**. For more information, see Add an OData service manually in Zero Copy Connector for ERP.

9. Wait for the **OData Endpoints** field to load, and then in **Select the endpoints**, specify an endpoint.



10. Select **Add entity**.

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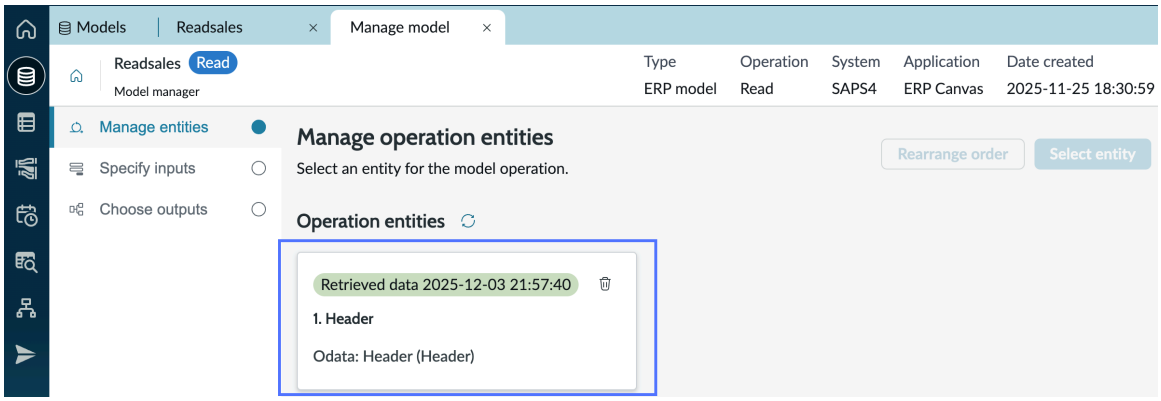
The entity card shows the date and time when the information was last retrieved.



OData capabilities supported by Zero Copy Connector for ERP

Zero Copy Connector for ERP (Enterprise Resource Planning) supports the $select, $filter, and $orderby OData v2 query capabilities.

For information about OData connections in Zero Copy Connector for ERP, see Connecting Zero Copy Connector for ERP to ERP using OData and Create an OData connection in Zero Copy Connector for ERP.

OData query capabilities

OData query	Description
$select and $filter	Available in the **Use ERP** flow. When you use the inputs and outputs parameters in the model, $select and $filter are applied.
$orderby	Available in the **Use ERP Data** flow. Order, ascending or descending, in which data is returned from an output variable.

Create an OData connection in Zero Copy Connector for ERP

Create an OData v2 connection to link to an ERP so data can be extracted for use in remote tables and extraction tables in Zero Copy Connector for ERP (Enterprise Resource Planning).

Before you begin

Role required: admin

For information about OData connections in Zero Copy Connector for ERP, see Connecting Zero Copy Connector for ERP to ERP using OData and OData capabilities supported by Zero Copy Connector for ERP.

About this task

An admin or a user with the sn_erp_integration.erp_admin role must enable the *sn_erp_integration.enableModelModification* property for you to edit, customize, and clone ERP models and tables. The property must be enabled on the correct scope. After enabling the property, Zero Copy Connector for ERP retrieves all tables and BAPIs (Business Application Programming Interface) to use when managing models. The property must

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be configured for either a non-production or production state. (Enabling the property on a production instance can create metadata records when new models and fields are added in Zero Copy Connector for ERP.) System properties are maintained in the System Property table [sys_properties], which you can access by entering `sys_properties.list` directly in the Navigator Filter.

Procedure

1. Confirm that you have an SAP system that has been enabled to make an OData connection.
2. Create a connection and credential alias.

   For credentials, you can use Basic Auth, OAuth, or API Key.

   For more information, see:

   - Basic authentication credentials
   - OAuth 2.0 credentials
   - API key credentials
   - Create a Connection & Credential alias
3. Create a connection and associate it with the new alias.
4. Create a system with the connection.
   For more information, see Create an ERP system in Zero Copy Connector for ERP.
5. On the system record, confirm that the heartbeats are successful and the retrieval status is complete.
   If any have failed, select **Restart data retrieval**. Any data retrieval that failed (BAPI, OData, or tables) is fetched again.
6. Create a model and, after saving, open the model record.
   For more information, see Create a model.
7. Select **Manage model**.
8. Select **Add model operation**.
   a. Choose a **Select type**.
   b. Select **Save and Continue**.
9. Select the new operation.
10. Select **Select entity**.

    a. In **Select type**, choose **OData**.

    b. In **Select service**, search for and select a service, for example **API_BUSINESS_PARTNER (Remote API for business partner)** in the OData service catalog.

    When you specify the service, a call is made to the SAP service to read its metadata. The default service is /sap/opu/odata/iwfnd/CATALOGSERVICE;v=2/ServiceCollection. If you must change the service, create a property named sn_erp_integration.odata_service_path and set the value.

    If you can't find the service you need, see Add a service manually in Zero Copy Connector for ERP.

    c. In **Select the endpoints**, search for and select an endpoint, for example **A_BusinessPartnerType**.

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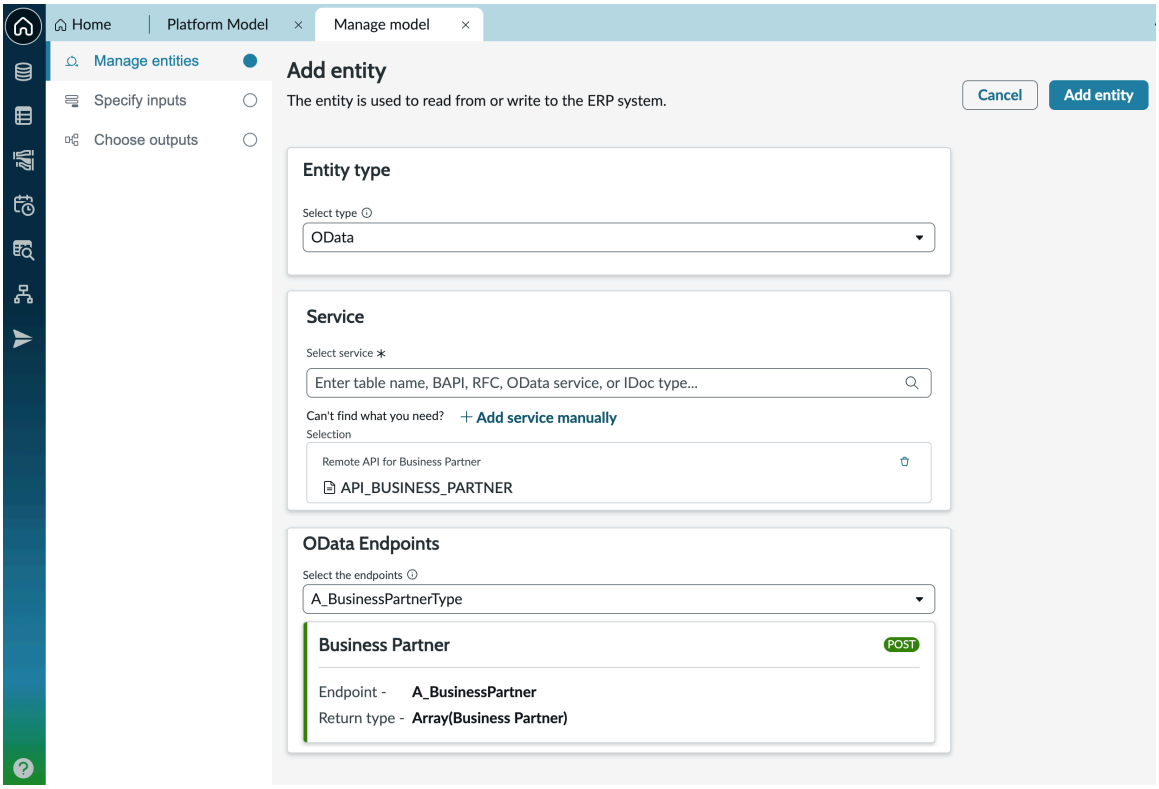


d. Select **Add entity**.

The flow named **GET SAP BAPIs and tables when system becomes active** runs to retrieve the data. The BAPI, table, and catalog tables are populated.

11. Select **Specify inputs** to check the information and edit as needed.

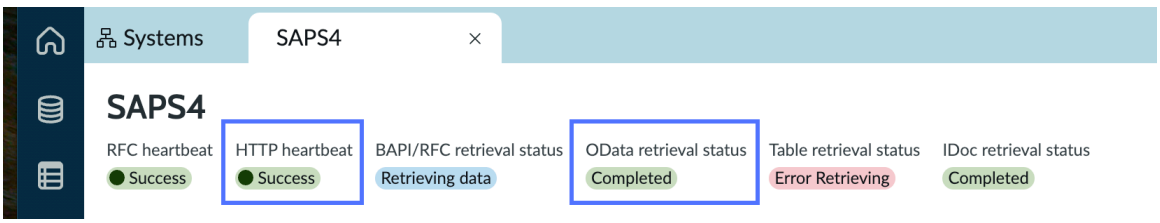
For more information, see Manage input parameters for a model operation.

12. Select **Choose output** to check the information and edit as needed.
For more information, see Choose output parameters for a model.

13. Open the ERP systems list by selecting the systems icon in the side panel.

14. Select the system.

15. Check the heartbeat and retrieval status until they're successful.



16. Create a model.

a. Open the ERP models page by selecting the models icon in the side panel.

b. Select **New**.

c. Add an **ERP model name**, **ERP module**, and **ERP system**, and select **Save**.

d. Select the new model in the list.

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e. Select **Manage model**.

f. Select **Add model operation**.

g. Select a **Select type**.

h. Select **Save and Continue**.

17. Select the new operation.

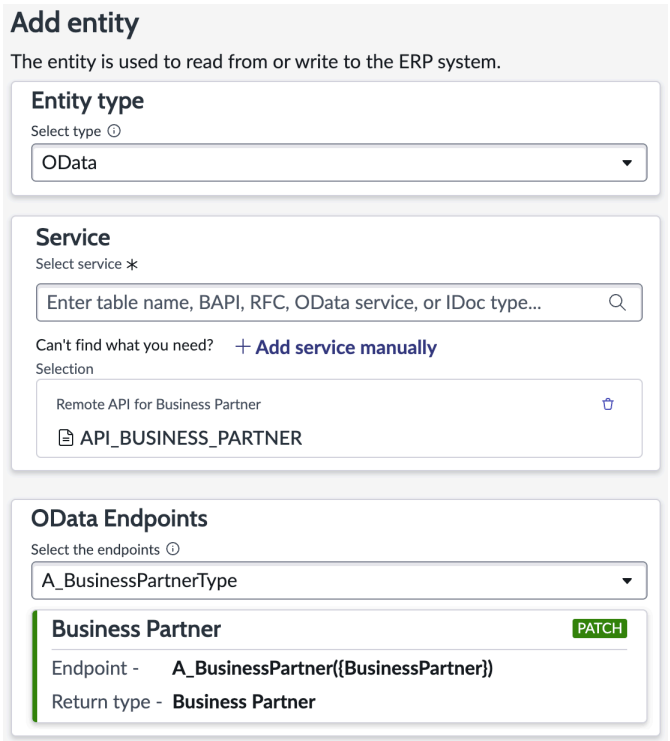
18. Select **Select entity**.

a. In **Select type**, select **OData**.

b. In **Select service**, specify a service, for example **API_BUSINESS_PARTNER (Remote API for Business Partner) OData service catalog**.

c. In **Select the endpoints**, search for and select an endpoint, for example **A_BusinessPartnerType Entity Name: Business Partner --- Return Type: Business Partner**.

d. Select **Add entity** and wait for retrieval to complete.



19. Select **Specify inputs** to check the information and edit as needed.

a. If there are required fields, select **Select mandatory fields**.

b. Select any mandatory inputs listed and select **OK**.

c. Select **Save**.

20. Select **Choose output**.

a. Select **+ New output**.

b. Select fields, for example **BusinessPartnerName** and **Full Name**.

c. Select **Save**.

21. Test with Workflow Studio.

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a. Navigate to **All** > **Workflow Studio**.

b. On the home page, select **Actions**.

c. In the **Name** column, filter for **contains Value** and type `Use ERP`.

d. Select **Apply**.

e. Select **Use ERP data**.

f. Select **Test**.

g. Specify the **ModelName**, **ModelOperation**, **Mandatory fields** (provide a value for the mandatory field if necessary), select a **System**, and select **Run Test**.

h. When complete, select the link **Your test has finished running. View the Action execution details**.

i. View and check the output, for example, in **Output Data**, select the **Response** to view the output.

Add an OData service manually in Zero Copy Connector for ERP

When adding an entity to a model using OData, if the service you need isn't listed, add the service manually in Zero Copy Connector for ERP (Enterprise Resource Planning).

Before you begin

Role required: sn_erp_integration.erp_admin

You can connect to an ERP system based on a metadata URL or an uploaded metadata file (xml). The file option enables you to, for example, access data from SuccessFactors. For more information, see Obtaining data from SAP SuccessFactors using OData V2 APIs.

Before you can add a service manually, you must do the following:

- Confirm that you have an SAP system that has been enabled to make an OData connection.
- Enable the *sn_erp_integration.enableModelModification* property. For more information, see Install Zero Copy Connector for ERP.
- Create a connection and credential alias, specifying HTTP as the **Connection type**. For more information, see Create a Connection & Credential alias.
- Create an HTTP connection for the service. Add the connection alias that you created and the connection URL.
- Create a system that uses the HTTP connection. For more information, see Create an ERP system in Zero Copy Connector for ERP. On the system record, confirm that the heartbeats are successful and the retrieval status is complete. If any have failed, select **Restart data retrieval**.
- If you're going to connect using a URL, copy the metadata URL from the ERP system to which you're linking. Use the relative URL containing only the path following the domain, for example, v2/northwind/northwind.svc/$metadata.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the model page by selecting the models icon in the side panel.
3. Select the model to which you want to add an operation entity.
4. Check that the correct system is selected in **ERP system**.
5. Select the **Manage model** button.

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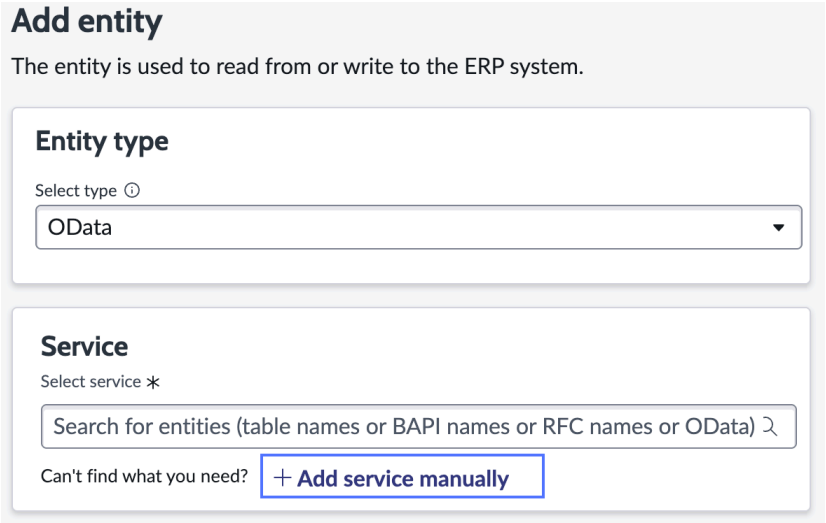
6. Select an operation.
   If you don't have an operation, see Add an operation to a model in Zero Copy Connector for ERP.
7. Select **Select entity** on the **Manage entities** tab.
8. In **Select type**, select **OData**.
9. Select **+ Add service manually**.



10. If you're using a metadata URL, follow these substeps (if you're uploading a metadata file, go to the next step).

    a. Select **Use metadata URL**.

       The **Connection URL** is added automatically based on the ERP system specified for the model. If no URL is listed or the listed URL is incorrect, edit the ERP system field on the model record.

    b. Paste in the **Metadata URL** and click outside of the field.

    c. Check that a **Service base URL** is filled in automatically and a **Service name** is created automatically.

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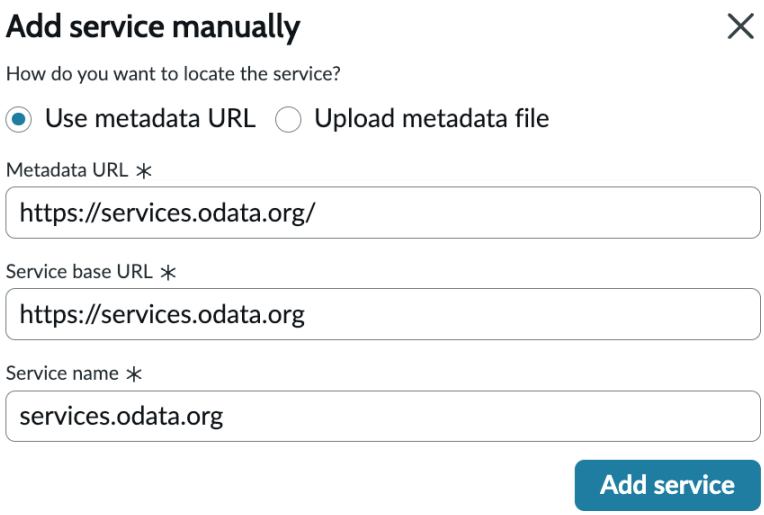
Note: If a **Service name** is not created, you have two options:

- Provide a different **Metadata URL**.
- In the **All** menu, enter `sn_erp_integration_odata_service_catalog.list` and delete the previous entry of service from the table.



11. If you're uploading a metadata file, follow these substeps.

a. Select **Upload metadata file**.

b. Select **Attach File**.

c. Select an xml file and then select **Open**.

d. Enter a **Service base URL**.

e. Check that a **Service name** based on the URL you entered is added automatically.

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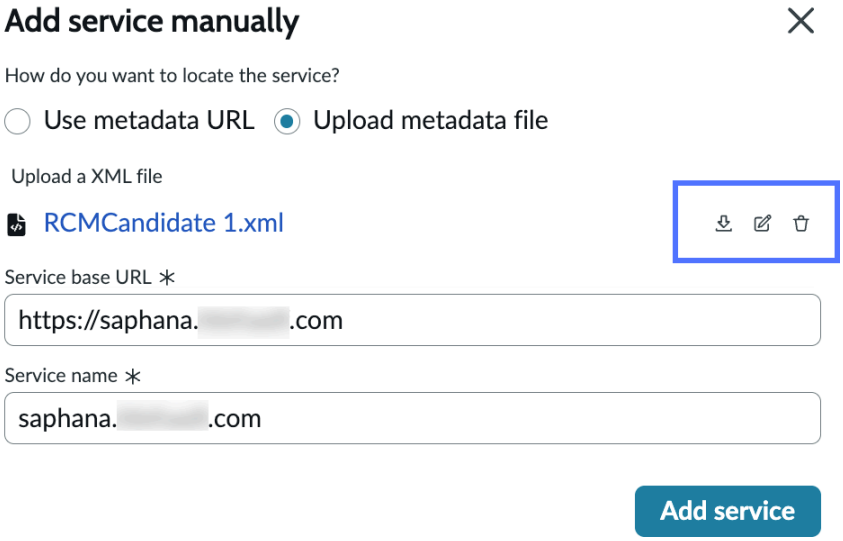
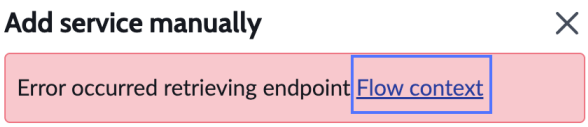
You can download, edit, or delete the xml file by selecting an icon.



12. When you're finished, select **Add service**.

    A background job named **Additional Service Handler** runs.

    Note: If there's an issue, an error message appears. Select **Flow context** for more information. You can also view execution details in Workflow Studio.

    The service is added to the entity record.

13. In **Select the endpoints**, search for and select an endpoint.
14. When you're finished, select **Add entity**.

Configure OAuth authorization code flow for Zero Copy Connector for ERP

Configure OAuth authorization code flow for SAP and use OAuth to authenticate and authorize users for OData endpoints.

Before you begin

Note: The OAuth authorization code flow can be used to call OData endpoints (create, read, and update). Currently, OAuth can't be used for tables, BAPI, or RFC.

To understand OAuth, see Set up OAuth and OAuth Inbound.

Consult with your SAP administrator:

- Obtain the client ID and client secret. You need this information for the application registry form.
- Ask whether the refresh token is a one-time usable token. A scheduled job that retrieves information from SAP runs once per day. If you need to run the scheduled job more often or on demand, discuss the access token and refresh token options. For more information, see Manage OAuth tokens.

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- Ask them to enable the gateway services to expose the OData endpoints to use.
- Ask them to create a scope in SAP for the exposed OData endpoints and give you the name and OAuth scope. You need this to configure the scope on the application registry form.

If you have already set up OAuth (for example, with REST through platform features), you can use it in Zero Copy Connector for ERP and skip to step 2 in the procedure.

Role required: sn_erp_integration.erp_admin

Procedure

1. To set up OAuth, register your application by navigating to **All** > **System OAuth** > **Application Registry**.

   a. Select **New**.

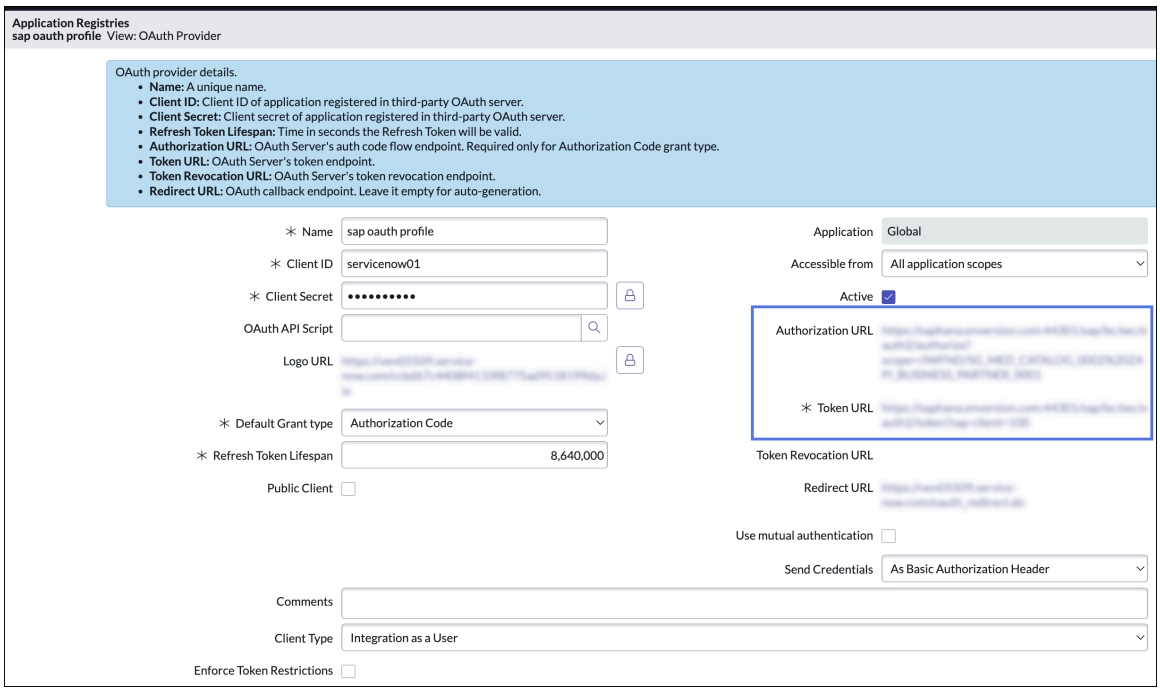
   b. Select **Connect to a third party OAuth Provider**.
   Use this form to set SAP as the OAuth provider and ServiceNow as the OAuth client. For detailed information about the fields on this form, see Connect to a third-party OAuth provider.

   c. Enter a **Name**.

   d. Set ServiceNow as the OAuth client by using the information you obtained from your SAP administrator to fill in the **Client ID** and **Client Secret** fields.

   e. In **Default Grant type**, specify how to authenticate SAP.

   f. Unlock the **Authorization URL** and **Token URL** fields to enter the URLs.



   g. Select the **OAuth Entity Scopes** tab.

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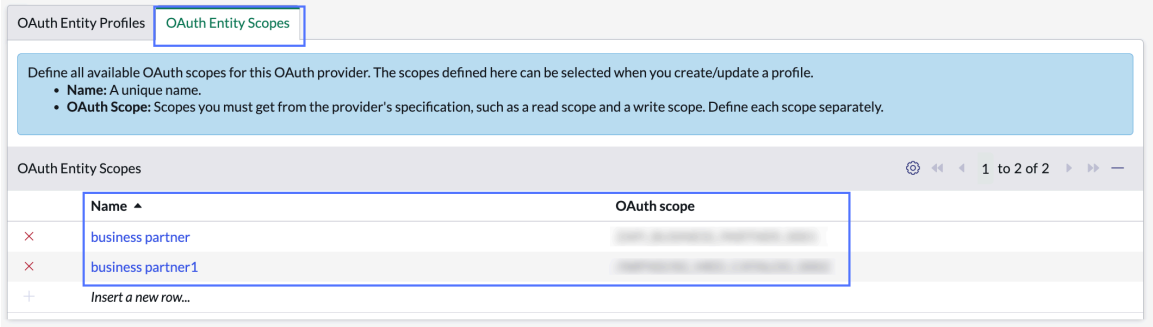
h. Double-click (or use the keyboard shortcut) in the **Name** and **OAuth scope** columns to enter the scope information you obtained from your SAP administrator.

You can add multiple scopes.



i. Select **Submit**.

2. Create a credential by navigating to **All** > **Connections & Credentials** > **Credentials**.

a. Select **New**.

b. Select **OAuth 2.0 credentials**.

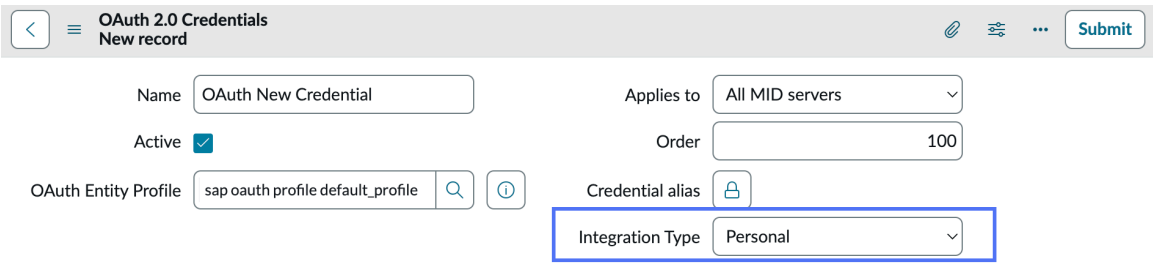
For detailed information about the fields on this form, see OAuth 2.0 credentials.

c. Enter a **Name**.

d. In **OAuth Entity Profile**, select **sap oauth profile default_profile**.

e. In **Integration type**, select **Personal**.

In most cases, it is acceptable to use system-based credentials. However, to obtain information from SAP, such as who changed information or details about approval activities, use the personal integration type. For more information, see Using the Personal Authentication dashboard.



f. Select **Submit**.

3. Add a connection to the correct alias, for example, the following steps use the **Zero Copy Connector for ERP HTTP** alias.

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a. Navigate to **All** > **Connections & Credentials** > **Connections & Credentials Aliases**.

b. In **Name**, search for and select **Zero Copy Connector for ERP HTTP**.

c. On the **Connections** tab, select **New**.

For detailed information about the fields on this form, see Create an HTTP(s) connection.

d. Enter a **Name**.

e. In **Credential**, specify the OAuth credential you created in step 2.

f. Enter the **Connection URL**.

g. Select **Submit**.

Oracle E-Business Suite support in Zero Copy Connector for ERP

Zero Copy Connector for ERP reads business data from Oracle E-Business Suite (EBS) 12.2 or later through REST services, without copying the data into ServiceNow.

Oracle as an ERP software family

Oracle EBS is available as a selectable ERP software option when you create an ERP system. Oracle forms its own ERP software family, separate from SAP.

For the steps to create the system, see Create an Oracle E-Business Suite connection.

Supported protocols

Oracle EBS connections support REST only. RFC, IDoc, and OData aren't supported.

Because Oracle EBS uses REST, the connection uses the HTTP connection template and reports HTTP heartbeat information rather than RFC heartbeat information.

Connection process

Requests are routed through a MID Server.

Building models from Oracle EBS data

Oracle EBS metadata discovery is manual.

Security

For information about role requirements and transport security for Oracle EBS connections, see Security for Oracle E-Business Suite connections.

REST API support for Oracle E-Business Suite

REST APIs exchange data with Oracle E-Business Suite (EBS).

Oracle coverage

REST support covers Oracle EBS 12.2 or later. Data flows directly from the Oracle ERP system to the target system.

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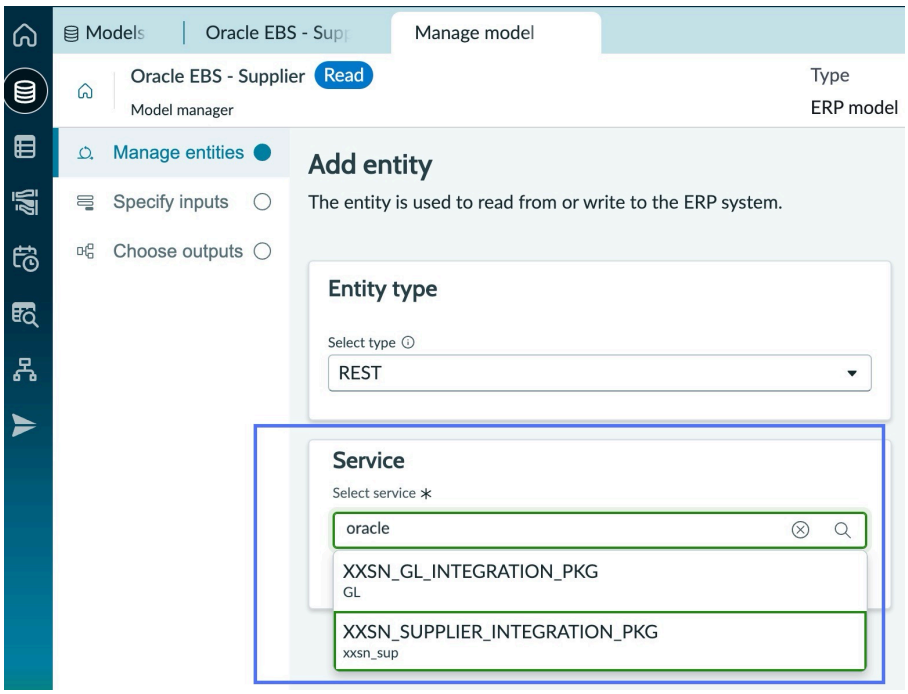
For general REST connectivity in Zero Copy Connector for ERP, see Connecting to other ERP systems using REST.

Service discovery

You can discover and list the REST APIs and services available on the Oracle ERP system. The list includes both active and inactive services, so you can see which services exist before you enable them.

Supported operations

Oracle EBS models with read operation are supported. There is no restriction on operations when using scriptable API.



Importing service definitions

Instead of defining each service manually, you can import a service definition to define REST services dynamically. Oracle EBS Integrated SOA Gateway services are described by WADL documents. For more information, see WADL service support for Oracle E-Business Suite. To add a service manually, see Add a WADL service manually in Zero Copy Connector for ERP.

Configuring REST operations

Each REST operation supports custom input parameters, request headers, and payload templates, so you can shape the request to match what the Oracle service expects.

For the steps, see Add an Oracle REST entity to a model.

Authentication

REST connections to Oracle E-Business Suite support basic authentication. For details, see Authentication methods for Oracle REST connections.

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Fault handling

REST faults are reported with detailed error information so you can identify which request failed and why. For more information, see Monitor Zero Copy Connector for ERP transactions and logged errors.

WADL service support for Oracle E-Business Suite

Oracle E-Business Suite (EBS) exposes custom PL/SQL integration services that are described by WADL documents rather than OpenAPI specifications. Zero Copy Connector for ERP discovers, parses, and models these services.

Services described by WADL

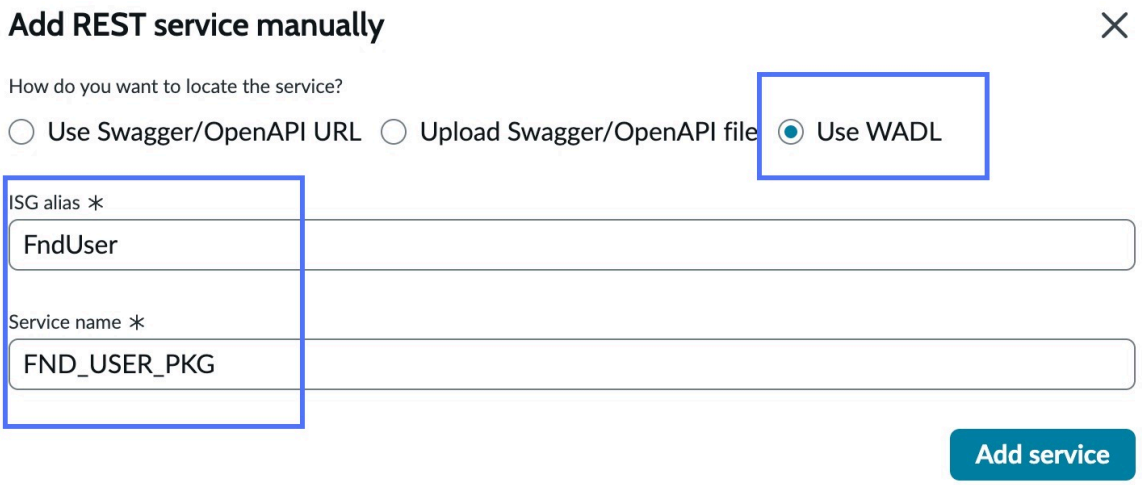
Oracle EBS publishes custom PL/SQL packages as REST services through the Integrated SOA Gateway (ISG). ISG describes each service with a Web Application Description Language (WADL) document plus a set of referenced XML Schema Definition (XSD) grammar files. ISG does not use an OpenAPI or Swagger specification.

Because of this, Oracle EBS services follow a separate path through Zero Copy Connector for ERP from the OpenAPI-based REST services described in Connecting to other ERP systems using REST. Both paths end at the same place: model entities and fields you map in Model Manager.

Service discovery and caching

When you add a WADL service, Zero Copy Connector for ERP fetches the WADL document and then walks the schema import graph to collect every XSD file the document references.

A WADL service is identified by its ISG alias combined with the ERP system it belongs to. That pairing must be unique. If you try to add a service whose alias already exists for the same system, the duplicate is rejected rather than overwriting the existing catalog record.



Input validation strategy

After fields are generated, a validation strategy is set on the operation based on how many of its required input fields were created. The strategy determines whether all required inputs must be supplied, at least one must be supplied, or no input validation is applied.

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Related tasks and reference

To add a WADL service manually when discovery does not find it, see Add a WADL service manually in Zero Copy Connector for ERP.

Security for Oracle E-Business Suite connections

Oracle E-Business Suite (EBS) connections in Zero Copy Connector for ERP use role-based access control, encrypted transport, and token-based authentication to protect ERP data.

Role-based access to Oracle EBS data

Access control lists (ACLs) grant the sn_erp_integration.erp_user role read access to the Oracle EBS tables, model operations, and configuration records. Users without this role can't read Oracle EBS data, even when the connection is healthy.

Oracle EBS follows the same ACL pattern as the SAP and Workday tables. For the full role list, see Zero Copy Connector for ERP roles.

The ACLs cover the tables that store WADL service catalog, endpoint, and schema cache records.

Authentication

For the authentication methods supported across Oracle REST connections generally, see Authentication methods for Oracle REST connections.

Authentication methods for Oracle REST connections

REST connections to Oracle ERP systems in Zero Copy Connector for ERP support basic authentication.

Basic authentication is supported. HTTP must be used. User name and password are set with each request. For more information, see Connect to SAP with RFC or BAPI.

For background on REST connectivity to Oracle ERP systems, see REST API support for Oracle E-Business Suite.

Transport requirements

For more information about the HTTP connection template, see Create an HTTP(s) connection.

Create an Oracle E-Business Suite connection

Configure a connection to Oracle E-Business Suite (EBS) 12.2 or later so that Zero Copy Connector for ERP can read data from your Oracle ERP system.

Before you begin
Role required: sn_erp_integration.erp_admin

Confirm that you have the following:

- An Oracle EBS 12.2 or later instance with the Integrated SOA Gateway (ISG) enabled.
- The base URL of the ISG REST endpoint.
- Credentials that are authorized to call the ISG REST services.

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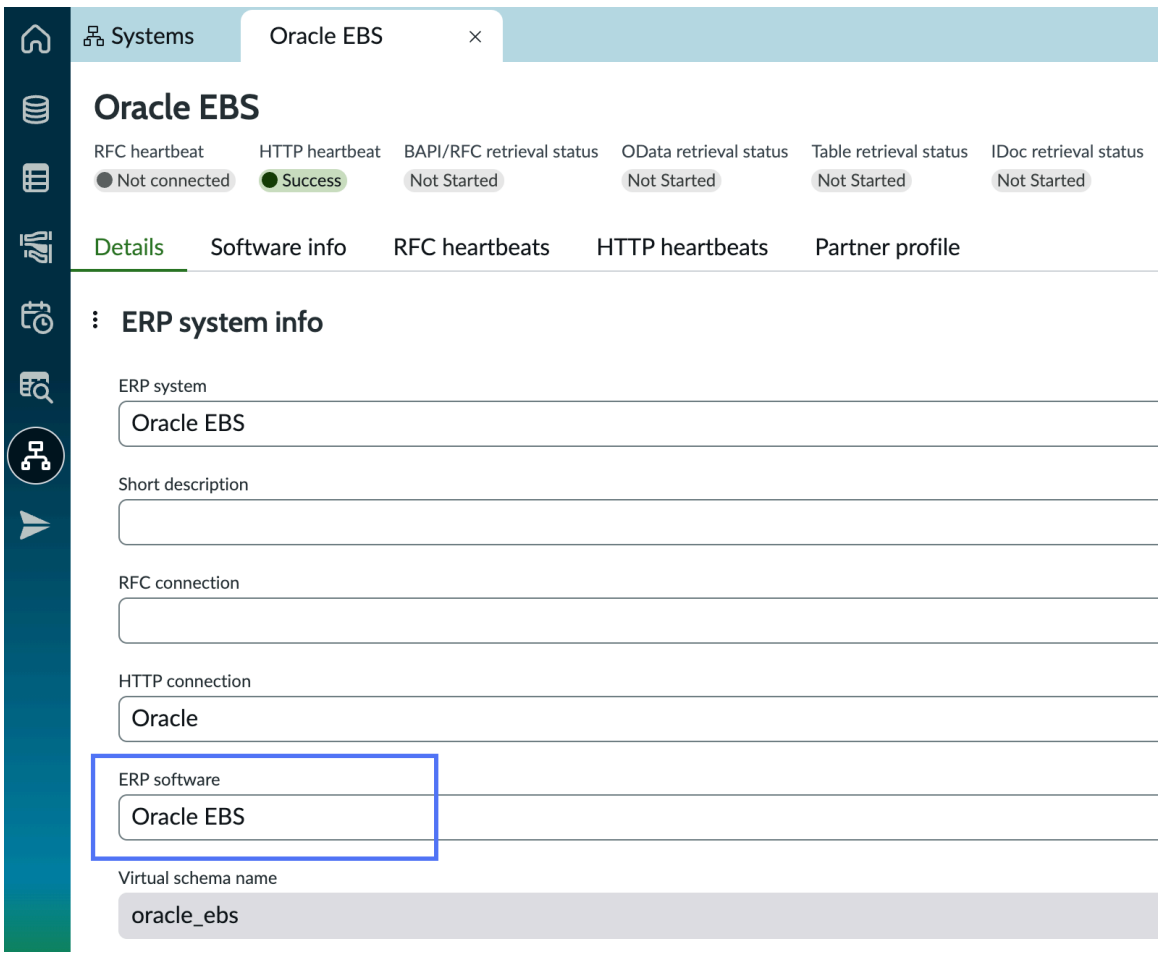
- A configured MID Server that can reach the ISG endpoint. For more information, see Configuring MID Server.
- The Oracle EBS context values for the data you want to read: operating unit (Org ID), ledger, responsibility, and language.

About this task

Oracle EBS connections use REST and the HTTP connection template. For background, see Oracle E-Business Suite support in Zero Copy Connector for ERP.

Procedure

1. Create a connection and credential alias for the Oracle EBS system.
   For the general process, see Create a Connection & Credential alias.
2. Enter the ISG base URL and the credentials for the Oracle EBS system.
3. Select the MID Server that routes requests to the ISG endpoint.
4. Enter the Oracle EBS context parameters.
   For the field values, see Oracle E-Business Suite connection field descriptions.
5. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
6. Create an ERP system and select the connection alias you created.
   For the general process, see Create an ERP system in Zero Copy Connector for ERP.
7. In the **ERP software** field, select **Oracle EBS**.



8. Select **Submit**.

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9. Verify the connection.
   For more information, see View Zero Copy Connector for ERP system heartbeat information.

Result
The Oracle EBS system appears in the ERP systems list and is available when you build models.

What to do next
Add a WADL service to generate model entities and fields automatically from the service definition. For more information, see WADL service support for Oracle E-Business Suite and Add a WADL service manually in Zero Copy Connector for ERP.

Add a WADL service manually in Zero Copy Connector for ERP

Add an Oracle E-Business Suite (EBS) service to a model by supplying its Integrated SOA Gateway alias, when the service you need isn't listed.

Before you begin
Role required: sn_erp_integration.erp_admin

Complete the following before adding a service manually:

- Enable the *sn_erp_integration.enableModelModification* property. For more information, see Install Zero Copy Connector for ERP.
- Create an Oracle EBS connection for the system. For more information, see Create an Oracle E-Business Suite connection.
- Obtain the Integrated SOA Gateway (ISG) alias for the service you want to add. The alias is the identifier Oracle EBS uses for the deployed service.

About this task
Services are normally discovered automatically from the ERP system. Add a service manually when discovery doesn't return the service you need. For background on how WADL services are discovered, see WADL service support for Oracle E-Business Suite.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the model page by selecting the models icon in the side panel.
3. Select the model to which you want to add an operation entity.
4. In the **ERP system** field, verify that the correct Oracle EBS system is selected.
5. Select **Manage model**.
6. Select an operation.
   If you don't have an operation, see Add an operation to a model in Zero Copy Connector for ERP.
7. Select **Select entity** on the **Manage entities** tab.
8. In **Select type**, select **REST**.

   WADL services are added through the same modal as REST services.
9. Select **+ Add service manually**.
10. In **How do you want to locate the service?**, select **Use WADL**.
11. In the **ISG alias** field, enter the Integrated SOA Gateway alias for the service, for example, `FndUser`.

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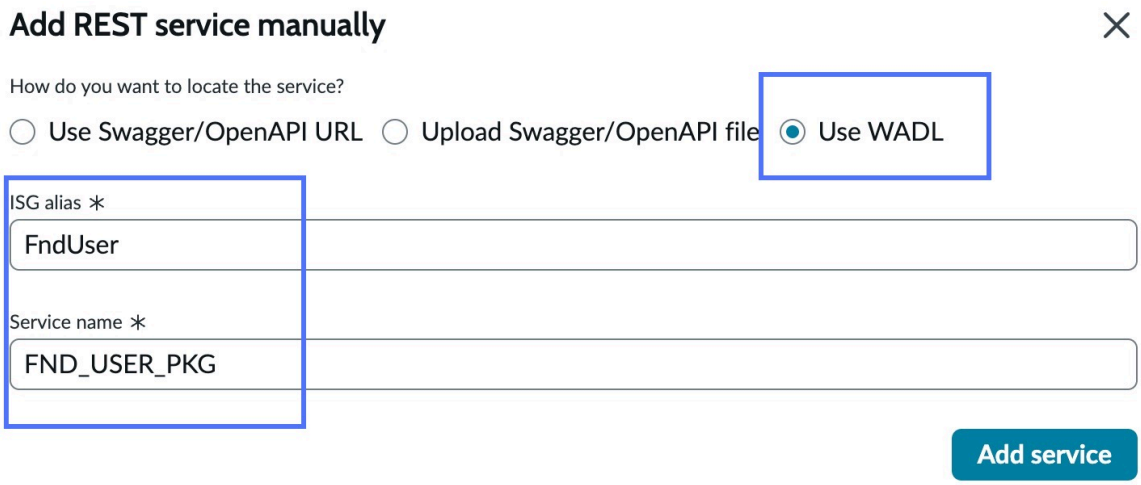
12. In the **Service name** field, enter a name for the service, for example, FND_USER_PKG.

    Both the alias and the service name are required.



13. Select **Add service**.

    Zero Copy Connector for ERP fetches the WADL document and its schema files, then creates the catalog and endpoint records for the service.

    Note: If the service can't be reached, or if a service with the same alias already exists for this system, the service isn't added. Verify the alias and the connection, then try again.

14. In **Select the endpoints**, select an endpoint.

    Read operations show GET endpoints.

15. Select **Add entity**.

Result

The service is added and its entities and fields are generated from the schema definitions, ready for mapping in Model Manager.

What to do next

Map the generated input and output fields for the operation. For more information, see Manage input parameters for model operation with a REST entity.

Add an Oracle REST entity to a model

Set the input parameters, headers, and payload template for an Oracle Fusion or Oracle E-Business Suite (EBS) REST entity. The model then sends the request to the Oracle service.

Before you begin

An Oracle ERP system with a REST connection must be configured. For more information, see REST API support for Oracle E-Business Suite.

A read operation must be added before an entity can be added to it. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

Note: With Oracle EBS models, only the read operation is supported.

Role required: sn_erp_integration.erp_admin

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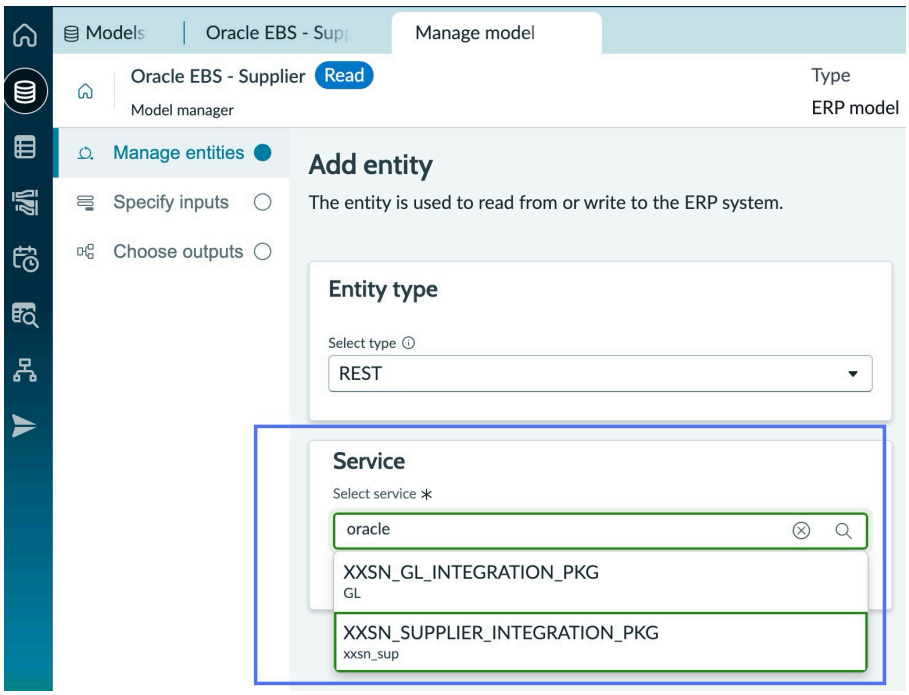
About this task

This procedure covers the Oracle-specific settings. For the general process of adding a REST entity to a model operation, see Add a REST entity to a model operation.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model to add an operation entity to.
4. Select the **Manage model** button.
5. Select the read operation.
6. Select **Select entity** on the **Manage entities** tab.
7. In **Select type**, select **REST**.
8. In **Select service**, specify the Oracle REST service to use.



If you don't see the service you need, add the service. For more information, see Add a WADL service manually in Zero Copy Connector for ERP.

9. In **REST Services**, select a **REST service** from the drop-down list.

   The service is listed, along with the endpoint and return type.

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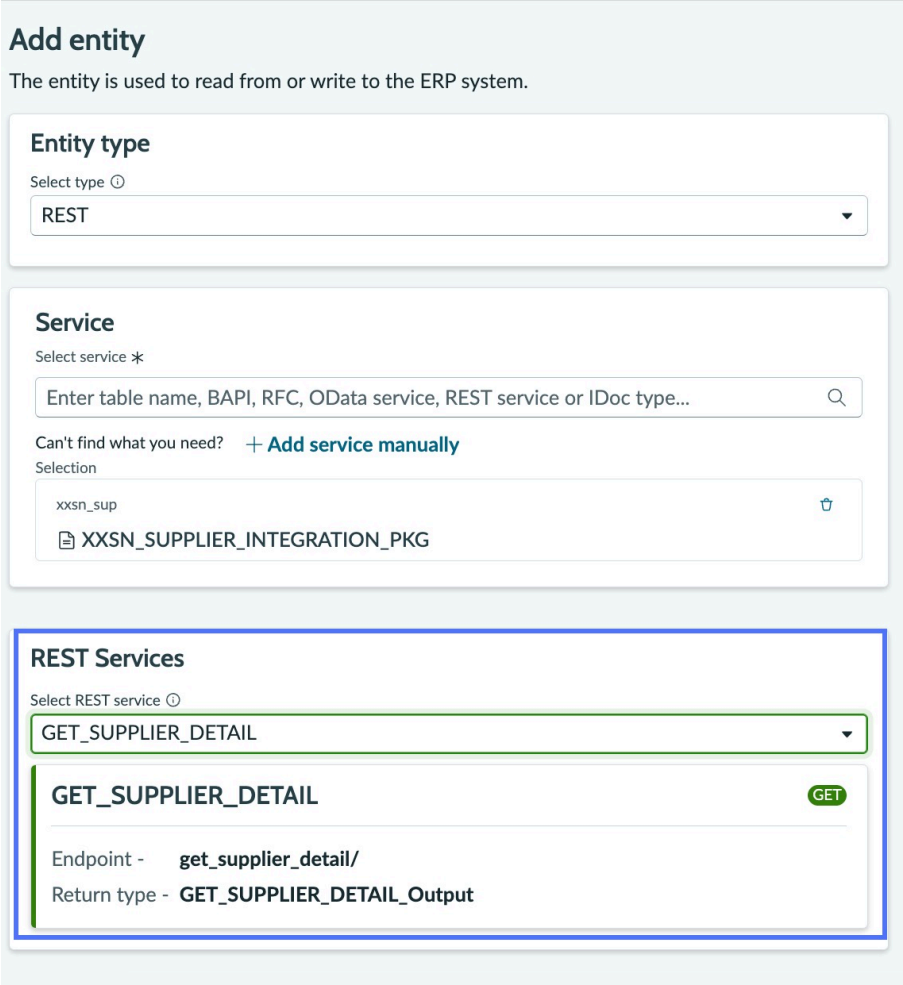

10. Select **Add entity**.

    The entity card shows the date and time when the information was last retrieved.

Manage input parameters for model operation with Oracle REST entity

Specify how fields on the ERP (Enterprise Resource Planning) system map to input parameters and their values. This defines the inputs for an operation that reads, creates, or updates the Oracle ERP system using REST.

Before you begin

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model with the operation that you want to add inputs to.
4. Select **Manage model**.
5. Open a model operation with an Oracle REST entity.
   If you don't have a model operation, add one to the model. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

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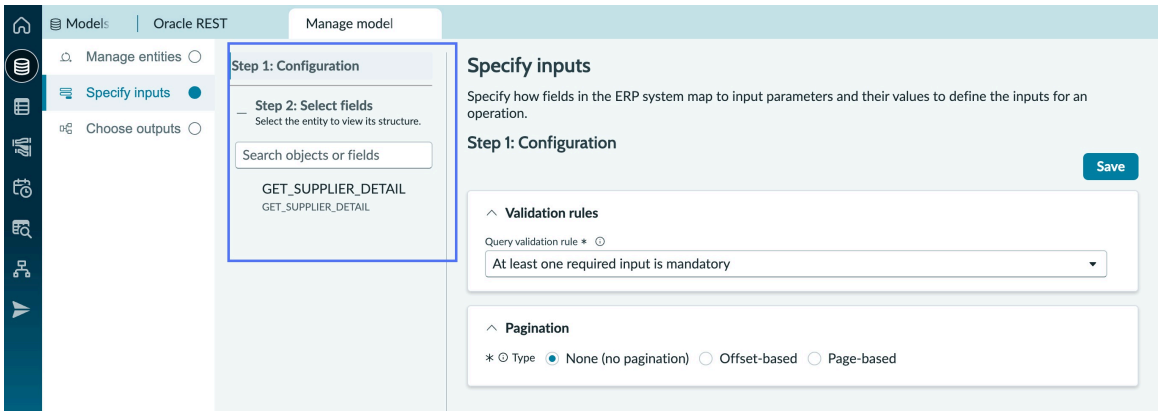
6. Check that at least one Oracle REST entity is listed.
   If you don't have an Oracle REST entity, add one to the operation. For more information, see Add an Oracle REST entity to a model.
7. Select **Specify inputs**.

   Complete the two tabs in order:

   - In **Step 1: Configuration**, set the validation rules and pagination.
   - In **Step 2: Select fields**, map fields and define the inputs for the operation.



8. In **Step 1**, define whether operation inputs are required by expanding the **Validation rules** section and selecting an option in **Query validation rule**.
   - **All required inputs are mandatory**
   - **At least one required input is mandatory**
   - **No validation on inputs**
9. Expand the **Pagination** section and select an option to configure pagination parameters and control how data is retrieved in batches.
   - Select **None (no pagination)** to skip pagination.
   - Select **Offset-based** to import data in batches based on time intervals.
   - Select **Page-based** to specify the number of records (limit) that can be fetched at a time.
10. Select **Save**.
11. In **Step 2**, select the entity.

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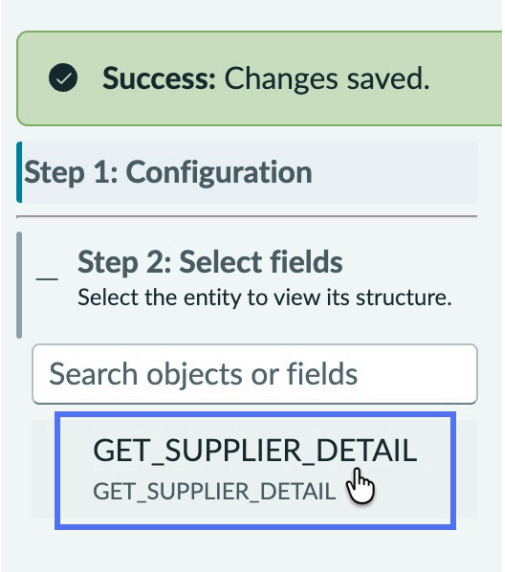
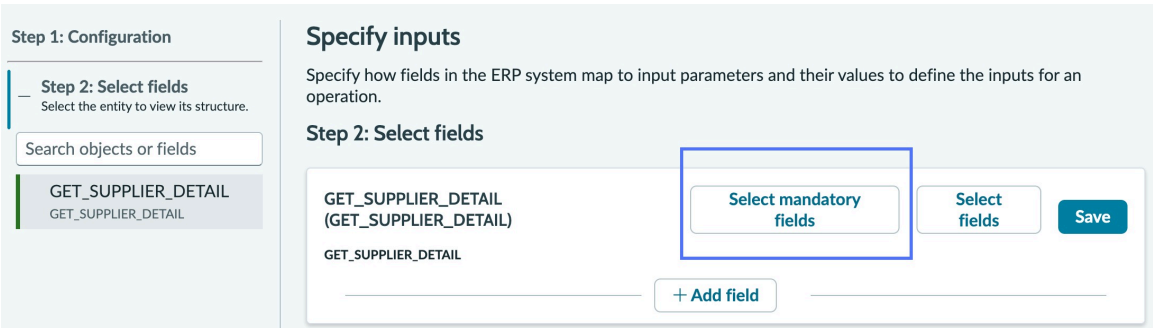
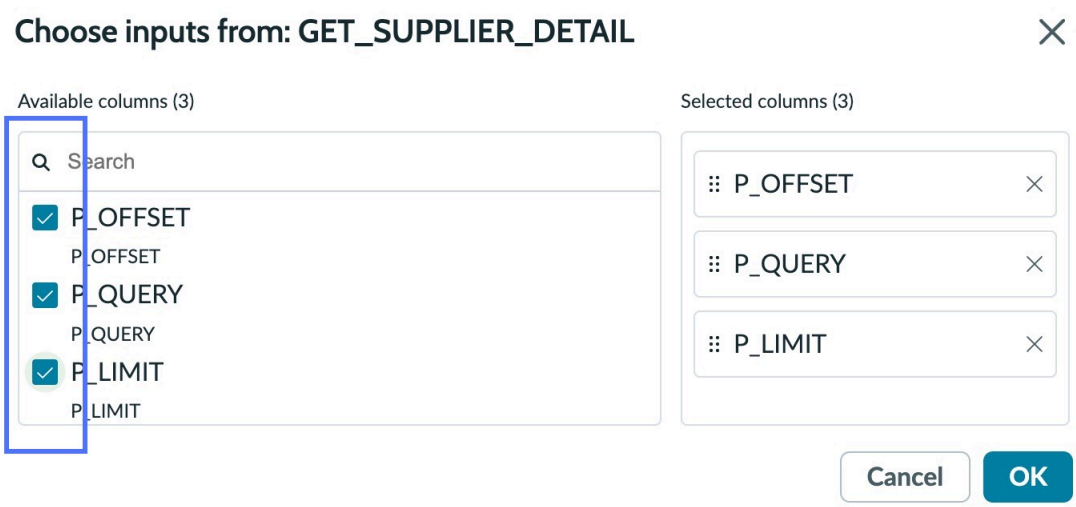


12. Select **Select mandatory fields**.



13. Add fields.



14. Select **OK**.

Zero Copy Connector for ERP automatically displays suggested mappings between source fields and mapped fields. This reduces the amount of manual work to do, while still giving you control to edit the mappings as needed. For more information, see Zero Copy Connector for ERP AI semantic field mapping.

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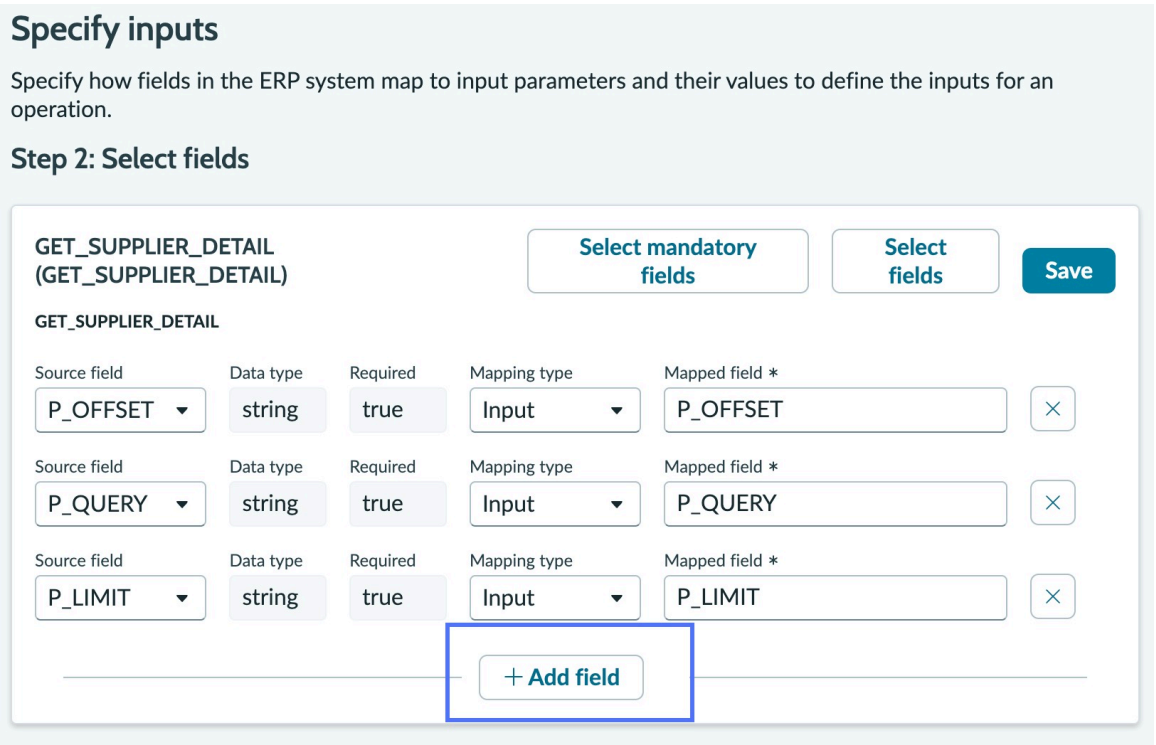
Mapped field names in inputs and outputs are generated automatically, but you can edit the names manually. For more information, see Edit input and output mapped value name in Zero Copy Connector for ERP.

15. Select **Select fields**.
16. For the non-mandatory fields, repeat steps 13-14.
17. Select **Save**.
18. **Optional:** Add a field.

    a. Select **+ Add field**.



(Optional)

    b. In **Source field**, select a field from the drop-down list.

    (Optional) The system adds field information to **Data type**, **Required**, **Mapping type**, and **Mapped field** automatically.

    The **Data type** field contains a variety of types including string, integer, array, and Boolean. For general information, see Workflow Studio input and output data variables.

19. Select **Save**.
20. Define the input parameters for the operation.

    For more information, see Manage input parameters for model operation with a REST entity.

21. Add any request headers that the Oracle service requires.

    For Oracle EBS services described by WADL, the Oracle context values are encoded automatically and don't need to be added by hand. How they're sent depends on the HTTP method: GET operations send them as individual query parameters, and POST operations send them as a single nested header structure.

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22. Define the payload template for create and update operations.
23. Map the response fields to the model output.

    For more information, see Select model output parameters for REST.

24. Select **Save**.

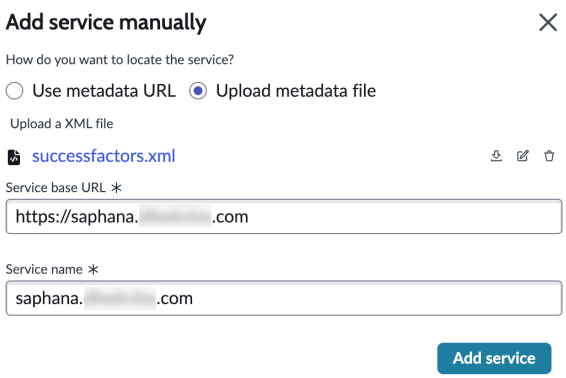
    Model validation runs automatically when REST is the selected protocol.

Obtaining data from SAP SuccessFactors using OData V2 APIs

Access talent management data from SAP SuccessFactors using OData V2 APIs.

SAP SuccessFactors is a set of integrated applications for HR functions such as employee data management and talent management.

To use SAP SuccessFactors data in Zero Copy Connector for ERP (Enterprise Resource Planning), upload an SAP SuccessFactors metadata (XML) file when adding an entity to a model using OData.



You can download, edit, or delete the metadata file using the icons.

After you upload the file, its entities appear in the Model Manager.

For more information and detailed steps, see Add an OData service manually in Zero Copy Connector for ERP.

For more information about the APIs, see SAP SuccessFactors API Reference Guide (OData V2) on the SAP Help Portal.

Obtaining data from Workday using REST APIs

Access data from Workday using REST APIs.

Workday is a set of applications for financial management, human capital management, and student information.

To use Workday data in Zero Copy Connector for ERP (Enterprise Resource Planning), upload a Workday metadata (XML) file when adding an entity to a model using REST.

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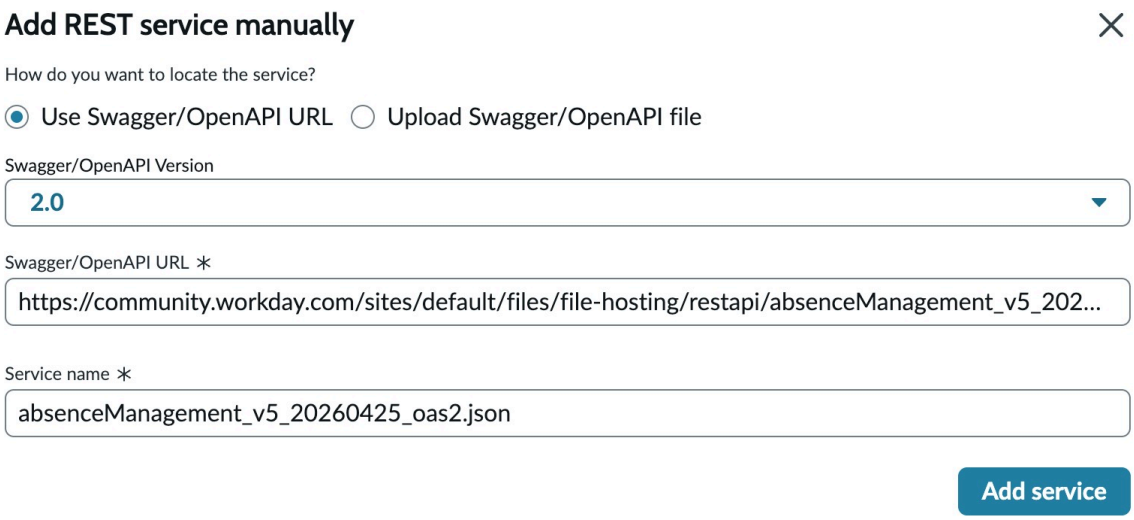

You can download, edit, or delete the metadata file using the icons.

After you upload the file, its entities appear in the Model Manager.

For more information and detailed steps, see Add a REST service manually in Zero Copy Connector for ERP.

For API details, see sn_erp_integration API - Scoped, Global.

Obtaining data from Workday using RaaS reports

Workday Reports as a Service (RaaS) exposes a Workday custom report as a callable endpoint, so you can obtain report data that no standard Workday API returns.

What RaaS reports provide

Workday Reports as a Service (RaaS) exposes a Workday custom report as an endpoint that returns the report output as data. Where a standard Workday REST API returns records from a defined business object, a RaaS endpoint returns whatever columns the report author configured.

Use RaaS when the data you need is already assembled in a Workday custom report and no equivalent standard API exists.

For standard Workday REST connectivity, see Obtaining data from Workday using REST APIs.

Using a RaaS report

When adding a RaaS report to a read model operation, supply the following:

- The report request URL, including its query parameters. Each query parameter in the URL becomes an input field.
- A sample JSON response from that request. The fields found across the rows in the sample become the output fields.

For the steps, see Add a Workday RaaS entity to a model operation.

Reviewing the inputs and outputs

After the service is added, you choose which of the derived fields the operation uses. The output fields include only the fields that appear in the sample response that you supply.

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Review and adjust the inputs and outputs before you use the model. For the steps, see Manage input parameters for RaaS and Manage model output parameters for RaaS.

Running a RaaS model from a script

After the model is configured, you can run the report from a server-side script through the scriptable API. Because the input variable names are generated from the report's query parameters, look them up with `getAvailableInputs()` before you pass values with `withJSON()`. Pass date values in the format that the report expects.

```
// Look up the generated input variable names for the report
const inputs = new API()
  .system('workday')
  .model('workday_raas_report')
  .operation('read')
  .getAvailableInputs();

// Run the report with values for its query-parameter inputs
const rows = new API()
  .system('workday')
  .model('workday_raas_report')
  .operation('read')
  .withJSON({
    start_date_input: '2026-01-01',
    end_date_input: '2026-03-31'
  })
  .execute();
```

For the full method reference, see sn_erp_integration API - Scoped, Global.

Workday RaaS report query parameters

Workday Reports as a Service (RaaS) reports take their filters as query parameters rather than path parameters, and each report defines its own set of parameters.

Query-parameter filters

Filters for a RaaS report are passed as query parameters on the request URL, rather than as path parameters. Other entity types in Zero Copy Connector for ERP continue to use path-parameter filtering.

Because each RaaS report defines its own parameters with no shared convention, the parameter names are captured per report from the request URL you enter. Every parameter is created as an optional string, because a URL carries only text. For the steps, see Add a Workday RaaS entity to a model operation.

URL and parameter handling

RaaS request handling

Item	Description
Report path	Requests use the RaaS path: `/ccx/service/customreport2/{tenant}/{report_owner}/{report_name}`. The host and the tenant come from the system connection on the model, so the stored path holds neither.

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RaaS request handling (continued)

Item	Description
Response format	A valid, sample JSON response from the request.

Add a Workday RaaS entity to a model operation

Use a Workday Reports as a Service (RaaS) report in a read model operation by entering the report request URL and a sample response.

Before you begin

The following items must be in place before you add a RaaS report service:

- The *sn_erp_integration.enableModelModification* property must be enabled. For more information, see Install Zero Copy Connector for ERP.
- A connection and credential alias must exist, with REST specified as the **Connection type**. For more information, see Create a Connection & Credential alias.
- A REST connection must exist for the Workday tenant, with the connection alias and the connection URL added to it.
- A system that uses the REST connection must exist. For more information, see Create an ERP system in Zero Copy Connector for ERP.
- A model that uses the Workday system and software must exist, with a read operation added to it. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

Role required: sn_erp_integration.erp_admin

About this task

You can add a RaaS report only to a read operation, not to a create or update operation.

Prepare the following before you start:

- The request URL for the report, including its query parameters.
- A sample JSON response from that request. Use a sample with enough rows to include every field the report can return. A field that is empty in every sampled row does not appear in the derived schema.

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the model page by selecting the models icon in the side panel.
3. Select the model to which you want to add an operation entity.
4. In the **ERP system** field, verify that the correct system is selected.
5. Select the **Manage model** button.

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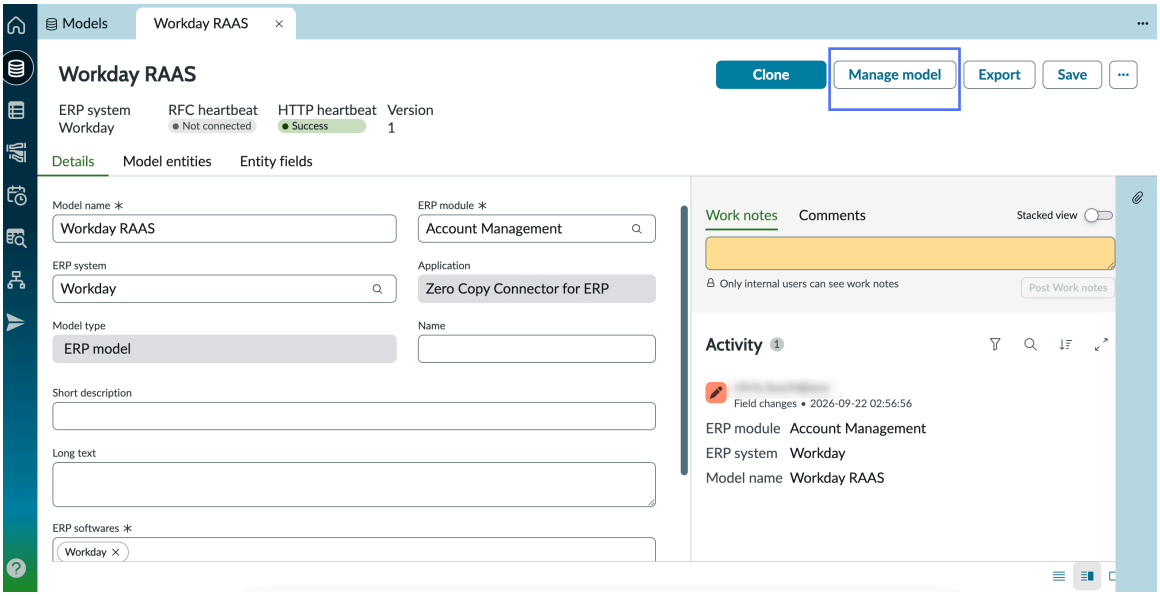
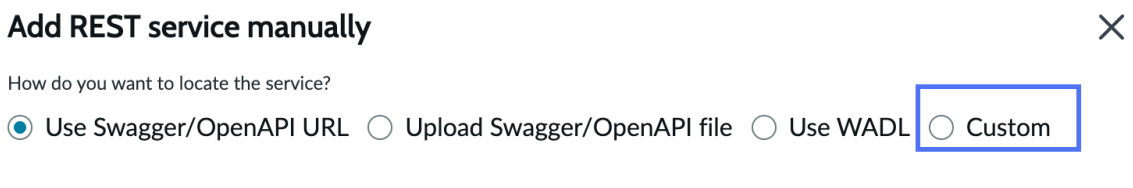
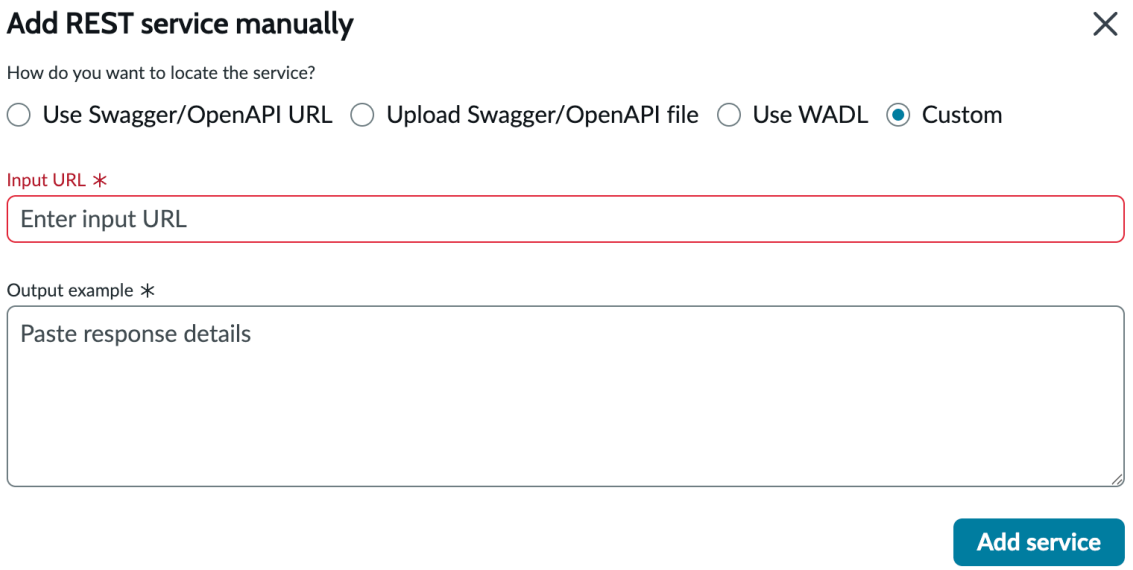


6. Select the read operation.
   If you don't have a read operation, see Add an operation to a model in Zero Copy Connector for ERP.
7. Select **Select entity** on the **Manage entities** tab.
8. In **Select type**, select **REST**.
9. Select **+ Add service manually**.
   The **Add REST service manually** dialog box opens.
10. Select **Custom**.



The **Custom** option is available only for read operations.



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11. In the **Input URL** field, enter the request URL for the report, including its query parameters.

    Enter either a full URL that starts with `http://` or `https://`, for example, `https://wd2-impl-services1.workday.com/ccx/service/customreport2/{tenant}/{report_owner}/CR_Worker_s_Termination_event?Start_date=2026-01-01T01%3A05%3A00.000-08%3A00&End_Date=2026-09-11T14%3A00%` Alternatively, add a path that starts with a forward slash. The system connection on the model supplies the host, so a path is enough.

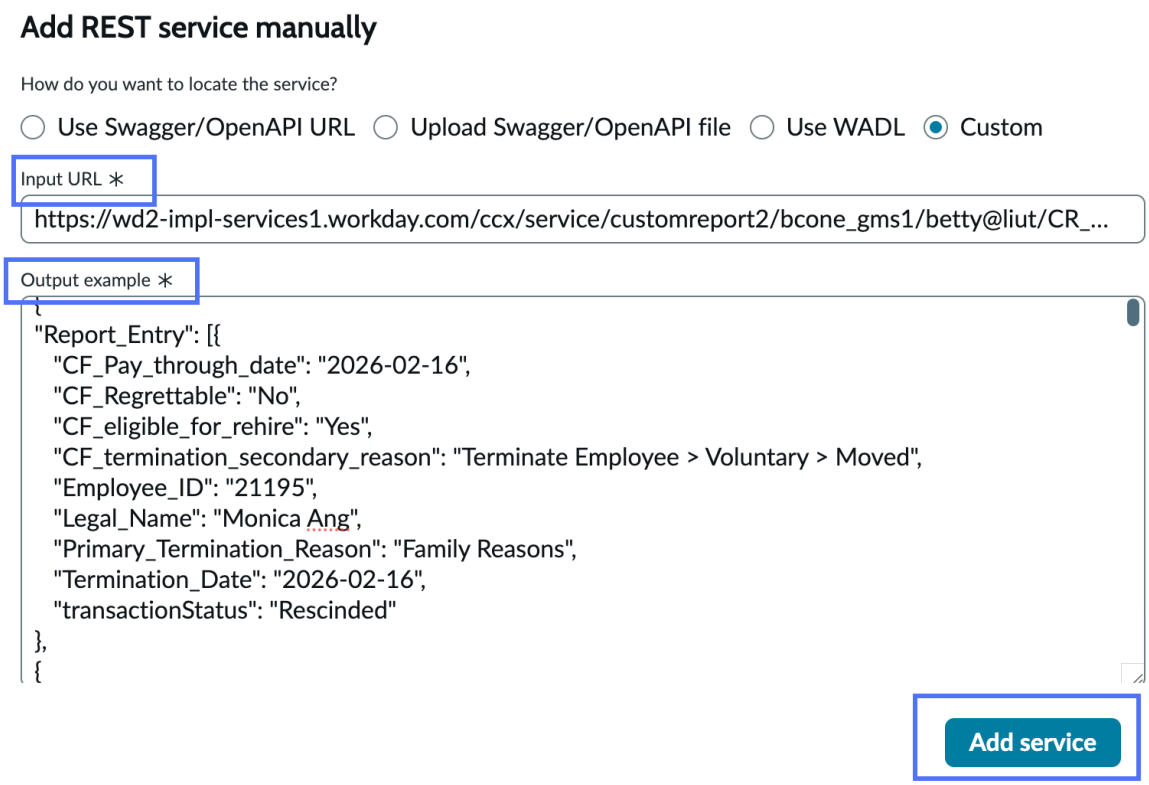
    Each query parameter in the URL (all information in the URL after the question mark) becomes an input field. For example, start date, end date, and format.

    For more details about inputs, see Manage input parameters for RaaS.

12. In the **Output example** field, paste a sample JSON response from the report.

    Fields are created as strings, numbers, or Boolean values. When the rows contain different types for a field, or a field has no value in one of the rows, the field is created as a string.

    For more details about outputs, see Manage model output parameters for RaaS.



13. Select **Add service**.

    A message confirms that the service was uploaded.

Result

The data derived from the input URL and the output example is retrieved.

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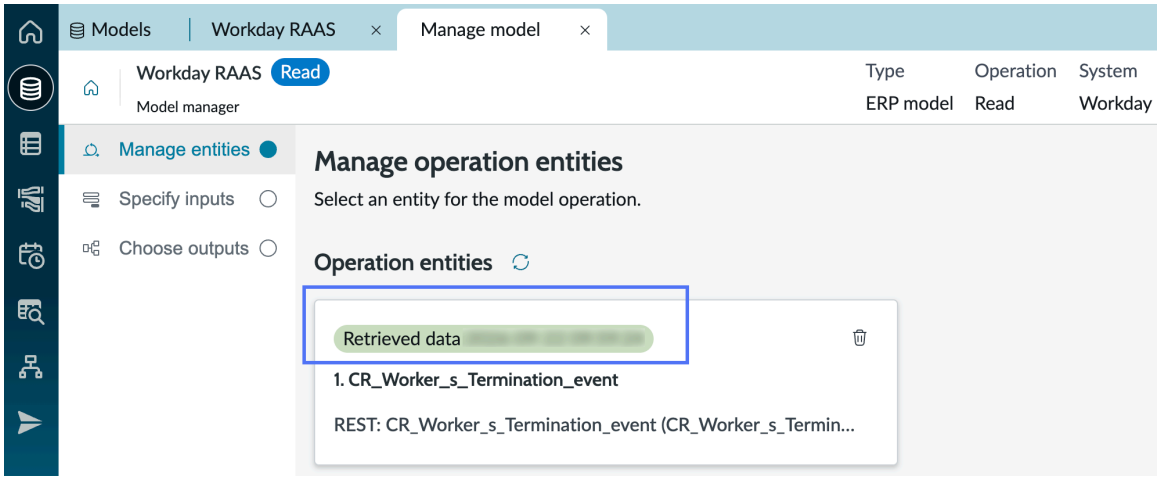

What to do next

Next, select the input and output fields that the operation uses. For the inputs, see Manage input parameters for RaaS. For the outputs, see Manage model output parameters for RaaS.

Manage input parameters for RaaS

Specify how fields on the enterprise resource planning (ERP) system map to input parameters and their values. This mapping defines the inputs for an operation that reads the ERP system using Workday Reports as a Service (RaaS).

Before you begin

The RaaS report must be added as a service. For more information, see Add a Workday RaaS entity to a model operation.

Role required: sn_erp_integration.erp_admin

About this task

Inputs are derived from the query parameters in the request URL that you entered when you added the service. Every input is created as an optional string, because a URL carries only text, so the required settings and data types might differ from what the report expects.

Before you use the model, the inputs must match the query parameters that the report accepts.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model with the operation that you want to add inputs to.
4. Select **Manage model**.
5. Open a model operation with a Workday RaaS entity.
   If you don't have a model operation, add one to the model. For more information, see Add an operation to a model in Zero Copy Connector for ERP.
6. Check that a Workday RaaS entity is listed.
   If you don't have a Workday RaaS entity, add one to the operation. For more information, see Add a Workday RaaS entity to a model operation.
7. Select **Specify inputs**.

   There are two tabs, which you complete in order:

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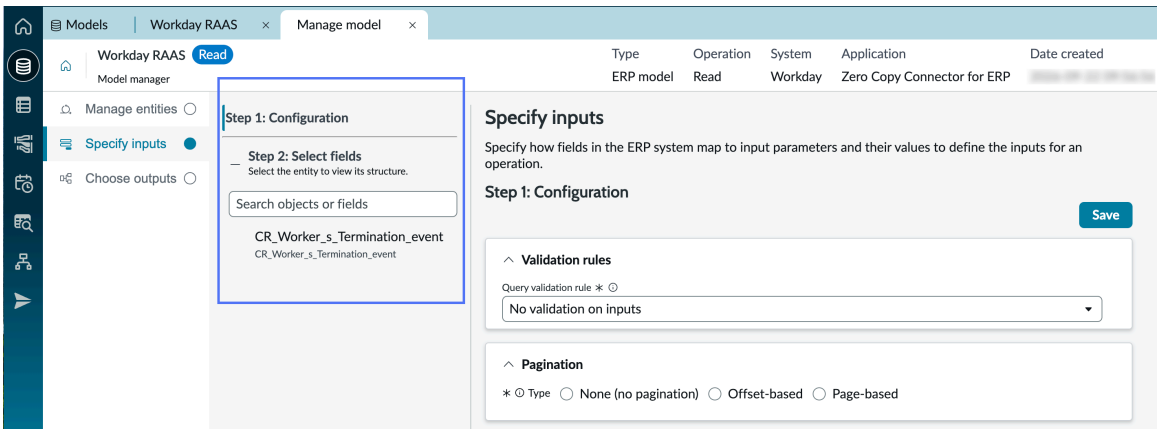
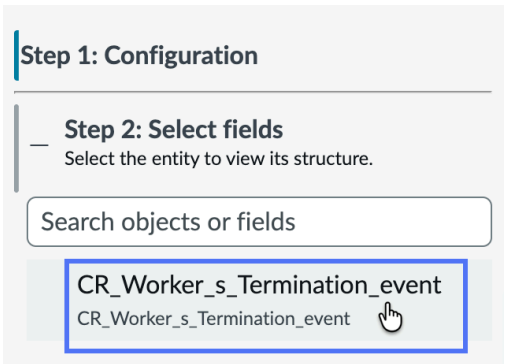
- In **Step 1: Configuration**, set the validation rules and pagination.
- In **Step 2: Select fields**, select the root entity, map fields, and define the inputs for the operation. The root entity is named for the last segment of the report path. Its fields are the query parameters from the input URL, such as `Start_Date`, `End_Date`, and `format`.



8. In **Step 1**, define whether operation inputs are required by expanding the **Validation rules** section and selecting an option in **Query validation rule**.
   - **All required inputs are mandatory**
   - **At least one required input is mandatory**
   - **No validation on inputs**
9. Expand the **Pagination** section and select an option to configure pagination parameters and control how data is retrieved in batches.
   - Select **None (no pagination)** to turn off pagination.
   - Select **Offset-based** to import data in batches based on time intervals.
   - Select **Page-based** to specify the number of records (limit) that can be fetched at a time.
10. Select **Save**.
11. In **Step 2**, select the entity.



12. Select **Select mandatory fields**.

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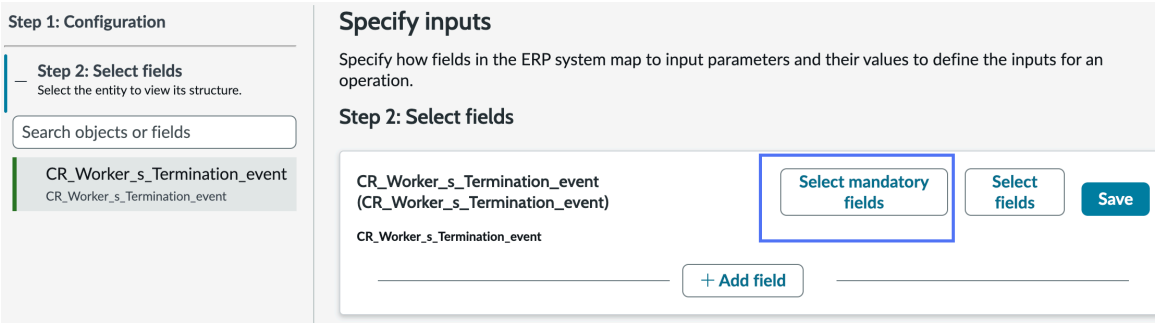


13. Add fields by selecting them in the **Available columns** list.

    After adding fields, you can rearrange their order in the **Selected columns** list by dragging the field card to a new location.

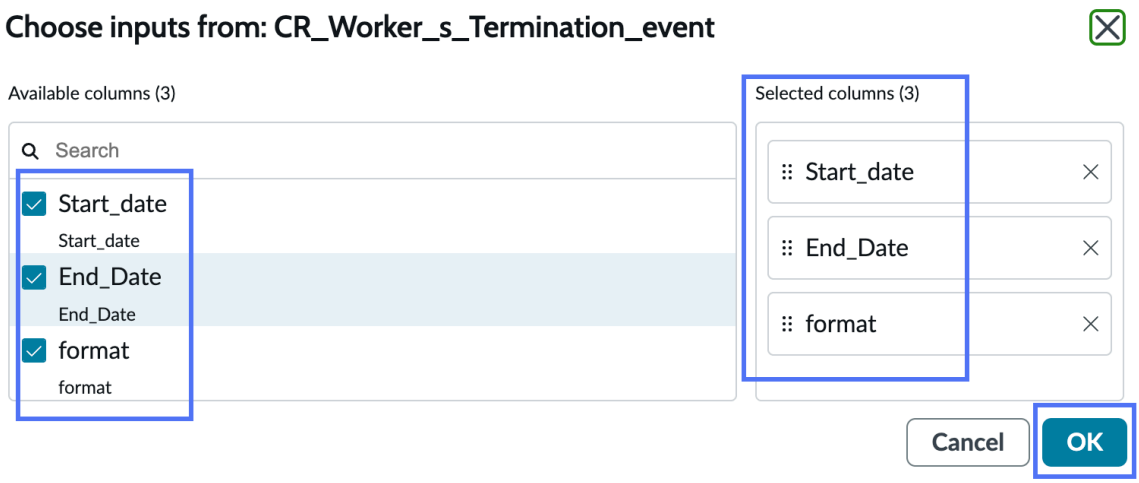
14. Select **OK**.

    Zero Copy Connector for ERP automatically displays suggested mappings between source fields and mapped fields. This reduces the amount of manual work to do, while still giving you control to edit the mappings as needed. For more information, see Zero Copy Connector for ERP AI semantic field mapping.

    Mapped field names in inputs and outputs are generated automatically, but you can edit the names manually. For more information, see Edit input and output mapped value name in Zero Copy Connector for ERP.

15. Select **Select fields**.
16. For the non-mandatory fields, repeat steps 13-14, adding the fields from the **Available columns** list and selecting **OK**.

    The fields in the **Available columns** list come directly from the URL entered when adding the service manually. For details about the URL, see Add a Workday RaaS entity to a model operation.



17. Select **Save**.
18. **Optional:** If needed, add a field.

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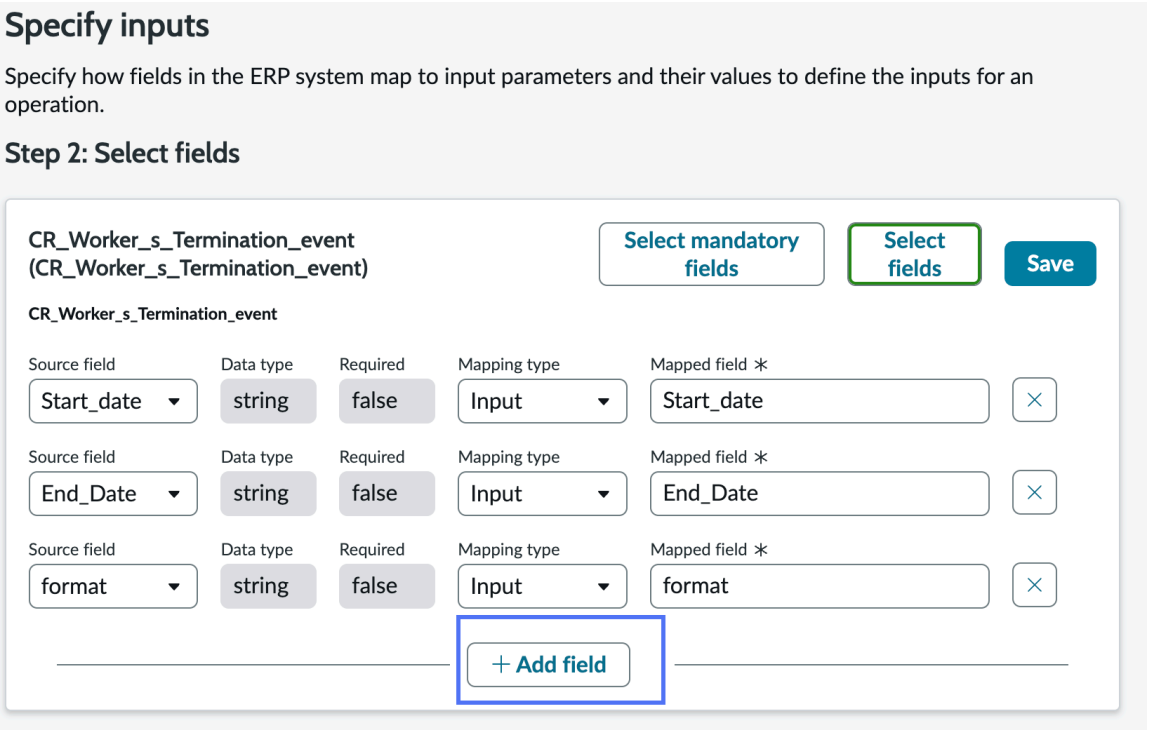
a. Select **+ Add field**.



(Optional)

b. In **Source field**, select a field from the drop-down list.

(Optional) Field information is added to **Data type**, **Required**, **Mapping type**, and **Mapped field** automatically.

The **Data type** field contains a variety of types including string, integer, array, and Boolean. For general information, see Workflow Studio input and output data variables.

19. Select **Save**.

Result
Your changes are saved to the model entity and its field records and apply the next time the model runs.

What to do next
Next, check the output parameters for the operation and update them as needed. For more information, see Manage model output parameters for RaaS.

Manage model output parameters for RaaS

Specify how fields on the enterprise resource planning (ERP) system map to output parameters and their values. This mapping defines the outputs for an operation that reads the ERP system using Workday Reports as a Service (RaaS).

Before you begin
Role required: sn_erp_integration.erp_admin

About this task
Outputs derived from a Workday RaaS sample response reflect only the fields present in that sample. Because Workday RaaS omits a field entirely when it has no value, a field that is empty in

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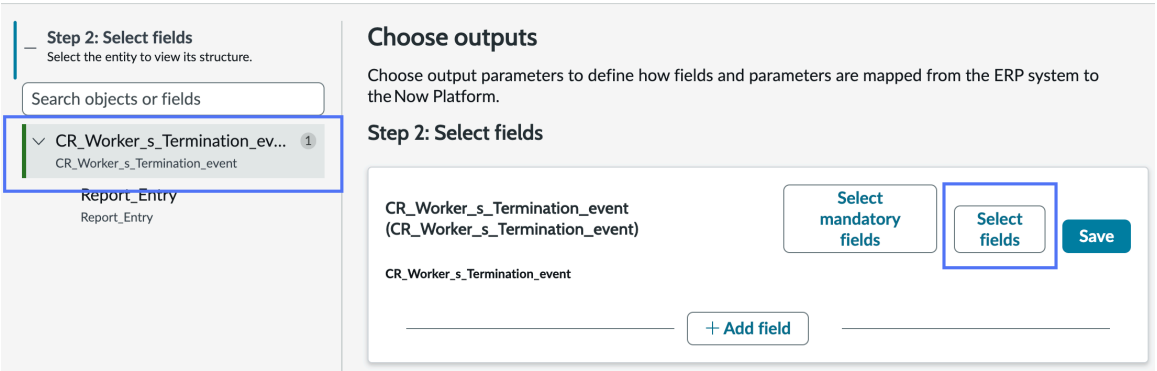
every sampled row does not appear. Data types and lengths inferred from sample values might also differ from how the field is defined in Workday.

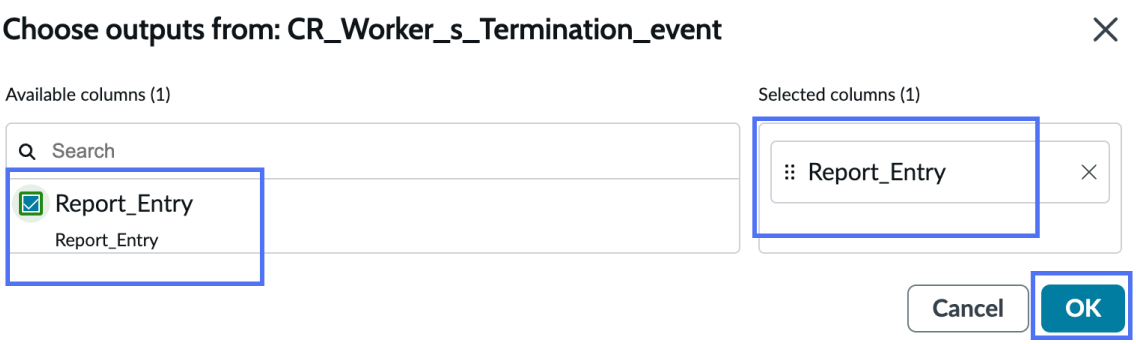
Before you use the model, the outputs must match the fields that the report returns.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the model page by selecting the models icon in the side panel.
3. Select the model with the read operation that you want to add outputs to.
4. Select **Manage model**.
5. Open a read operation with a Workday RaaS entity.
   If you don't have a read operation, add one to the model. For more information, see Add an operation to a model in Zero Copy Connector for ERP.
6. Check that a Workday RaaS entity is listed.
   If you don't have a Workday RaaS entity, add one to the operation. For more information, see Add a Workday RaaS entity to a model operation .
7. Select **Choose outputs**.
8. Select the root entity, for example, CR_Worker_s_Termination_event.
9. Select **Select fields**.



10. Select **Report_Entry** in the **Available columns** list.
11. Select **OK**.



12. Select **Save**.
13. In **Step 2: Select fields**, select **Report_Entry**.

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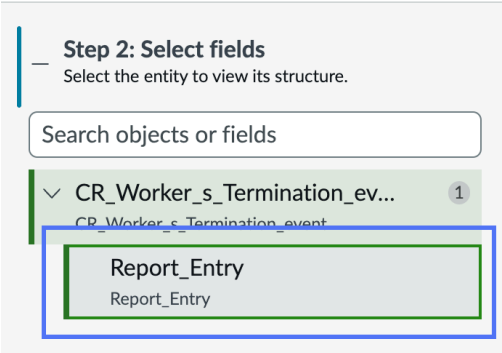
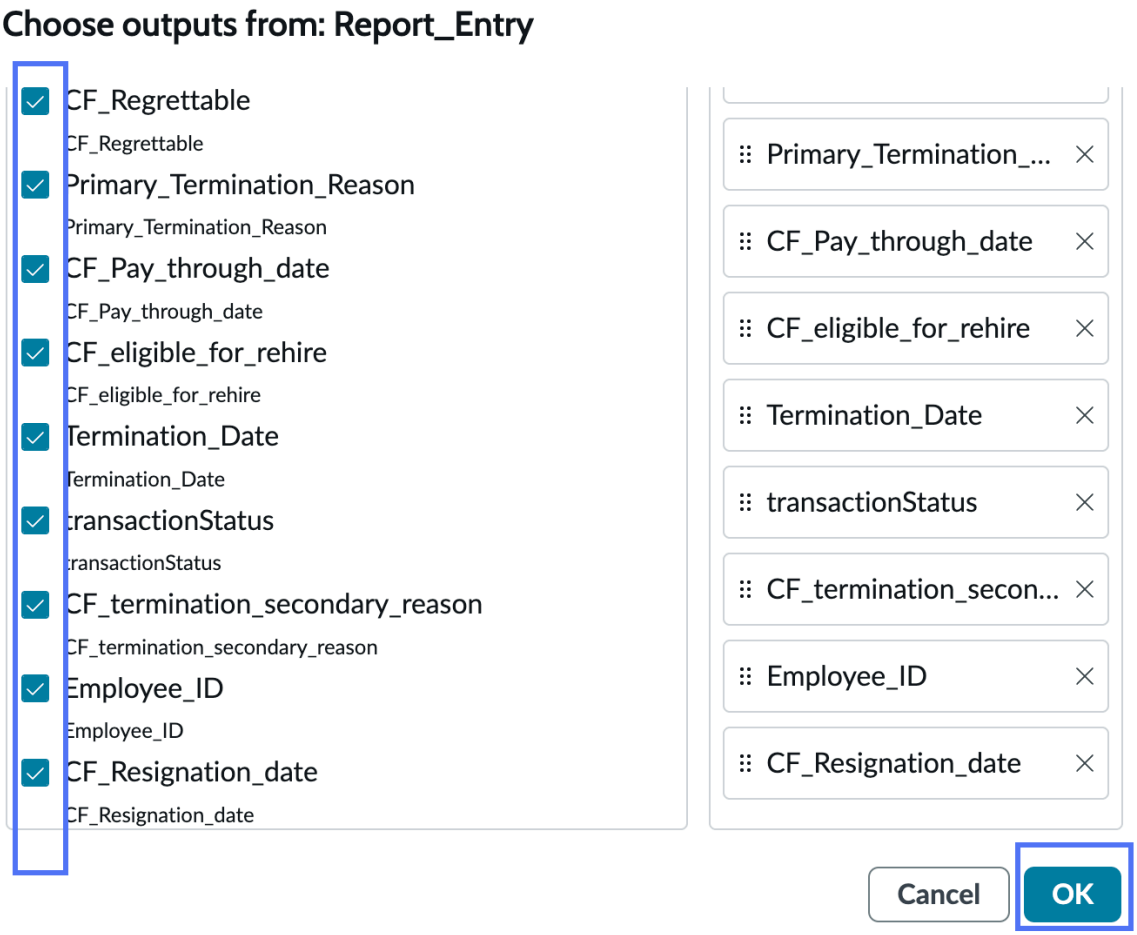


Report_Entry field is derived as an array because it holds the report rows.

14. Select **Select fields**.
15. Select all of the fields in the **Available columns** list.
16. Select **OK**.



17. Select **Save**.

Result
Your changes are saved to the model entity and its field records. The changes are applied the next time the model runs.

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Connecting to other ERP systems using REST

Extract data securely from an ERP with REST for use in remote tables and extraction tables.

REST access configuration

Access business data from an ERP using REST APIs. For more information, see REST API connector for Zero Copy Connector for ERP and Add a REST service manually in Zero Copy Connector for ERP.

For API details, see sn_erp_integration API - Scoped, Global.

Oracle ERP systems

Oracle E-Business Suite can connect using REST. For details specific to Oracle, see Oracle E-Business Suite support in Zero Copy Connector for ERP.

Providing REST access to users

You must have an ERP system enabled for REST connections. REST connections use the HTTP connection template. For more information, see Create an HTTP(s) connection.

Enabling download of XML files

The glide.attachment.extensions system property restricts the file types that can be downloaded. This property is empty by default. Check that the xml file extension hasn't been added to this property. For more information, see .

Heartbeat information

An ERP system has separate heartbeat indicators for RFC and HTTP.

When a system is established, the heartbeats are set to active and the status is updated, including any errors.

Supported Workday APIs

Zero Copy Connector for ERP supports most Workday APIs. For more information about services, see the Workday REST Services Directory in the Workday Community.

For steps to add a REST entity to a model operation, see Obtaining data from Workday using REST APIs and Add a REST entity to a model operation.

Add a REST entity to a model operation

Specify the REST entity that a Zero Copy Connector for ERP (Enterprise Resource Planning) model uses for a read, update, or create operation.

Before you begin

The read, update, or create operation must be added before an entity can be added to it. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

The service tables must be populated with any services you want to add using the AI search method. REST services are read from the REST endpoint table.

For an overview of the REST API connector, see REST API for Zero Copy Connector for ERP.

For information about the REST API connector tables added for Zero Copy Connector for ERP, see REST API connector tables for Zero Copy Connector for ERP.

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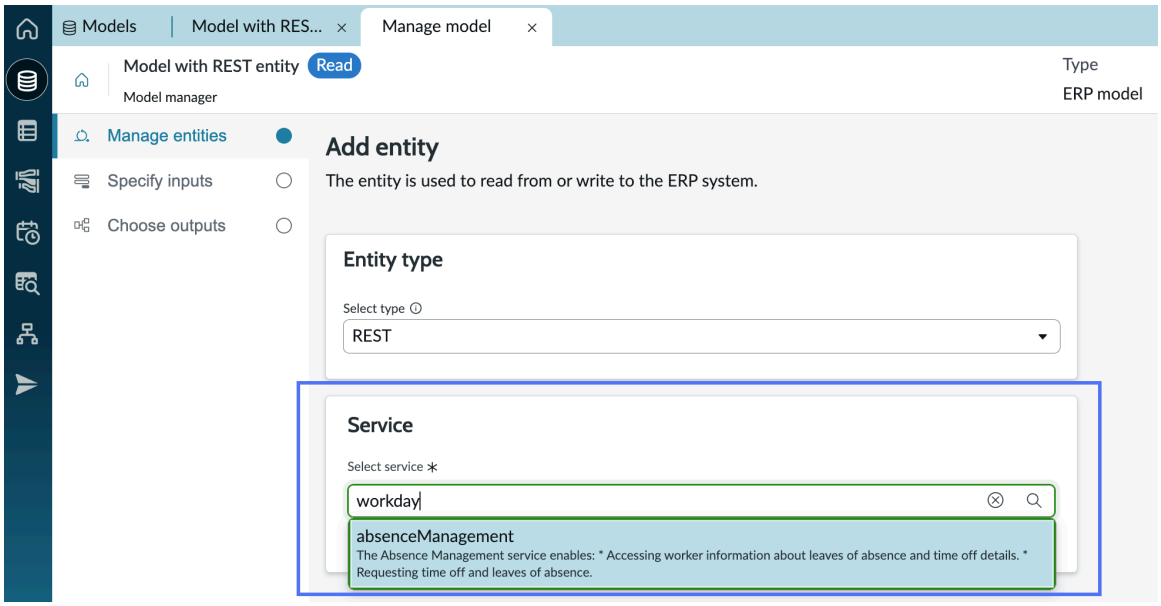
Oracle E-Business Suite services described by WADL documents are read from the WADL service tables. For more information, see Oracle E-Business Suite support in Zero Copy Connector for ERP

Note: Many REST APIs return deeply nested JSON objects. The connector supports up to three levels of nesting in response mapping. You can define nested levels for both input parameters and output fields in the Model Manager UI.

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model to add an operation entity to.
4. Select the **Manage model** button.
5. Select an operation.
6. Select **Select entity** on the **Manage entities** tab.
7. In **Select type**, select **REST**.
8. In **Select service**, specify the REST service to use.



If you don't see the service you need, add the service. For more information, see Add a REST service manually in Zero Copy Connector for ERP.

9. In **REST Services**, select a **REST service** from the drop-down list.

   The service is listed, along with the endpoint and return type.

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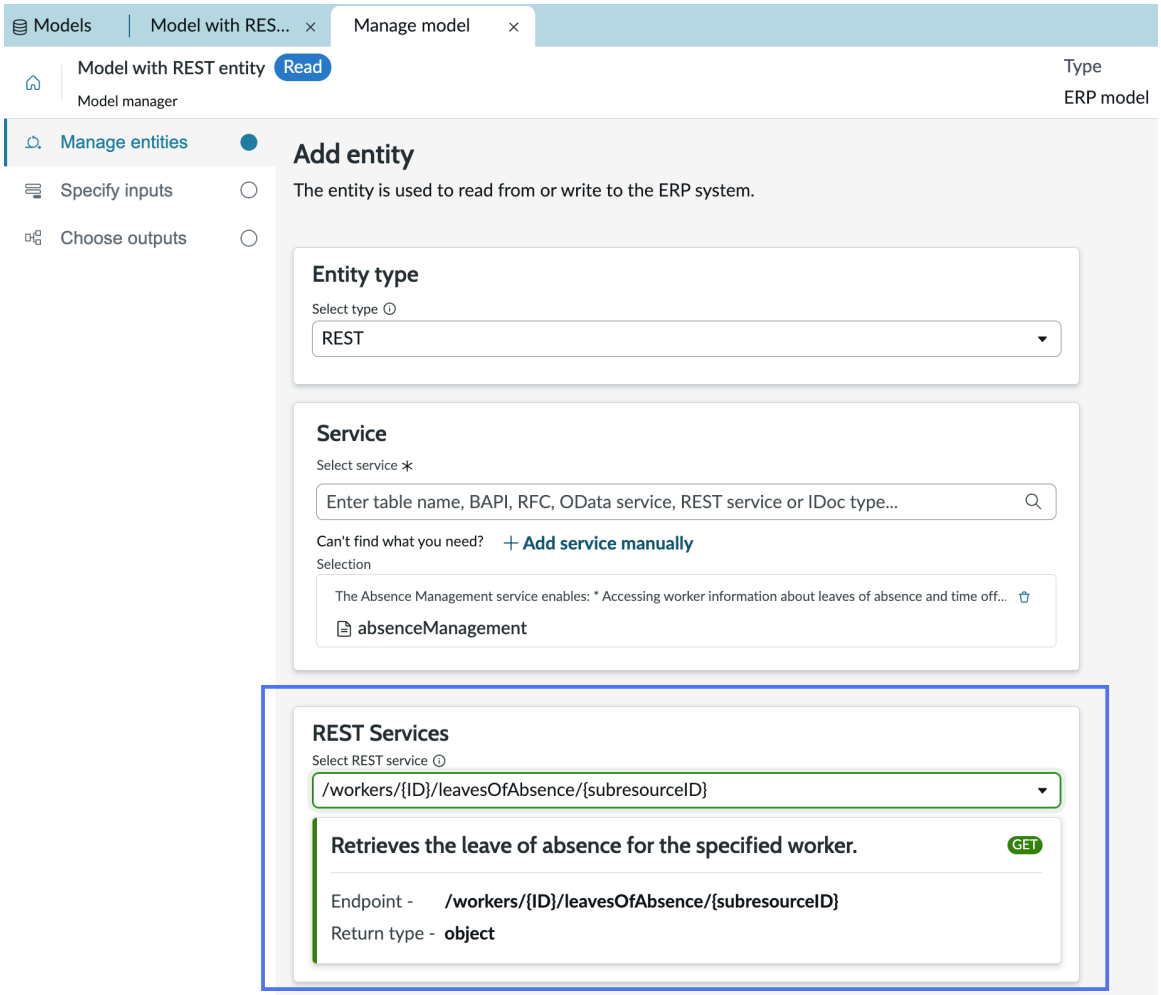

10. Select **Add entity**.

    The entity card shows the date and time when the information was last retrieved.

What to do next

Take the following actions:

- Map top-level and nested JSON fields (up to three levels deep) to model fields.
- Configure pagination parameters to control how data is retrieved in batches.
- Define input parameters and output fields.

REST API connector for Zero Copy Connector for ERP

Use the REST API connector to connect to any RESTful API with standardized API specification formats.

REST API connector

You can use REST APIs to access business data from ERP (Enterprise Resource Planning) systems. Integrating these APIs requires manual processes. The REST API connector solves this by providing a reusable, low-code integration layer.

For API details, see sn_erp_integration API - Scoped, Global.

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REST service connection configuration

REST connections use the HTTP connection template. For more information, see Create an HTTP(s) connection.

Authentication options

The connector supports the following authentication options:

- Basic Auth: A username and password (Base64-encoded). For more information, see Basic authentication credential.
- JWT (JSON Web Token): A bearer token authentication. For more information, see JWT Bearer.
- API Key: A key passed as a header or query parameter. For more information, see API key credentials.
- OAuth 2.0: A token authentication with automatic token refresh. For more information, see Manage OAuth tokens.

ServiceNow Vault stores credentials securely. For more information, see Exploring ServiceNow Vault.

The system validates that the configured credential type matches one of the authentication schemes defined in the API specification before allowing execution.

Importing a REST API definition into the Zero Copy Connector for ERP Model Manager

Import a REST API definition using one of the following methods:

- Use the Swagger/OpenAPI URL and provide a public URL that points to a specification file. The system extracts the service name from the URL automatically. You can edit the service name before adding the service. After the service is added, all endpoints matching the current operation type become available for selection.
- Upload a Swagger/OpenAPI JSON or Swagger/OpenAPI YAML file.

Mapping data to your data model

After you import a REST service, use the Model Manager to define entities and map API response fields to the data model. For more information, see Add a REST entity to a model operation.

MID Server support

If your REST API runs on-premises or behind a firewall, you can route API calls through a MID Server. The connection record includes a midServerName property that routes traffic through the designated MID Server. Cloud-hosted APIs can connect directly without a MID Server. For more information, see MID Server.

REST API connector tables

For information about the REST API connector tables that support Zero Copy Connector for ERP, see REST API connector tables for Zero Copy Connector for ERP.

Add a REST service manually in Zero Copy Connector for ERP

When adding an entity to a model using REST, if the service you need isn't listed, add the service manually in Zero Copy Connector for ERP (Enterprise Resource Planning).

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Before you begin

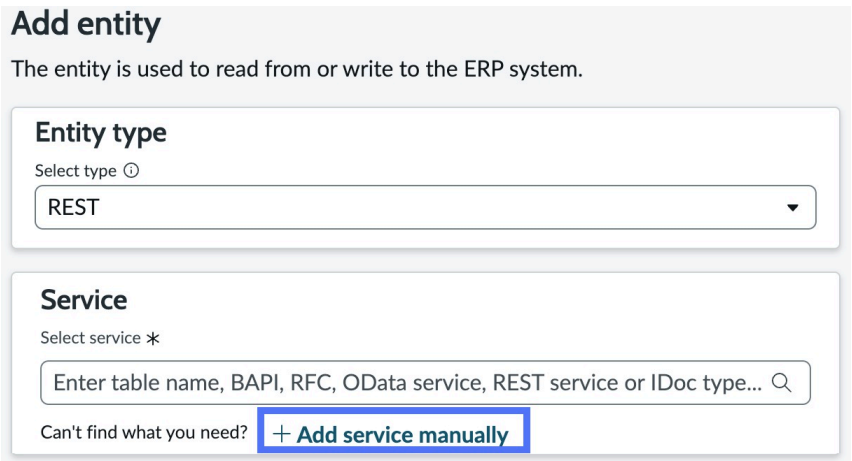
Role required: sn_erp_integration.erp_admin

Complete the following before adding a service manually:

- Enable the *sn_erp_integration.enableModelModification* property. For more information, see Install Zero Copy Connector for ERP.
- Create a connection and credential alias, specifying REST as the **Connection type**. For more information, see Create a Connection & Credential alias.
- Create a REST connection for the service. Add the connection alias that you created and the connection URL.
- Create a system that uses the REST connection. For more information, see Create an ERP system in Zero Copy Connector for ERP. On the system record, confirm that the heartbeats are successful and the retrieval status is complete. If any have failed, select **Restart data retrieval**.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the model page by selecting the models icon. in the side panel.
3. Select the model to which you want to add an operation entity.
4. In the **ERP system** field, verify that the correct system is selected.
5. Select the **Manage model** button.
6. Select an operation.
   If you don't have an operation, see Add an operation to a model in Zero Copy Connector for ERP.
7. Select **Select entity** on the **Manage entities** tab.
8. In **Select type**, select **REST**.
9. Select **+ Add service manually**.



10. If using a metadata URL, follow these substeps (if uploading a metadata file, go to the next step).

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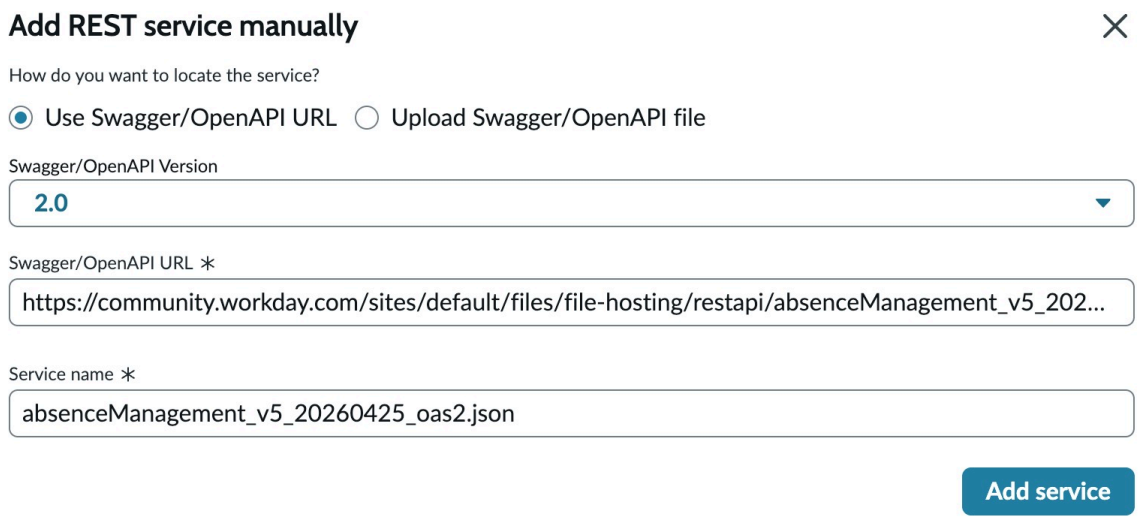
a. Select **Use Swagger/OpenAPI URL**.

b. In the **Swagger/OpenAPI Version** field, select a version such as 2.0 or 3.0.

c. Paste in a **Swagger/OpenAPI URL** and select outside of the field.

d. In the **Service name** field, verify that a name is created automatically.

You can edit the service name as needed.



11. If uploading a metadata file, follow these substeps.

a. Select **Upload Swagger/OpenAPI file**.

b. In **Swagger/OpenAPI Version**, select a version such as 2.0 or 3.0.

c. Select **Attach File**.

d. Select a JSON or YAML file and then select **Open**.

e. Enter a **Service name**.

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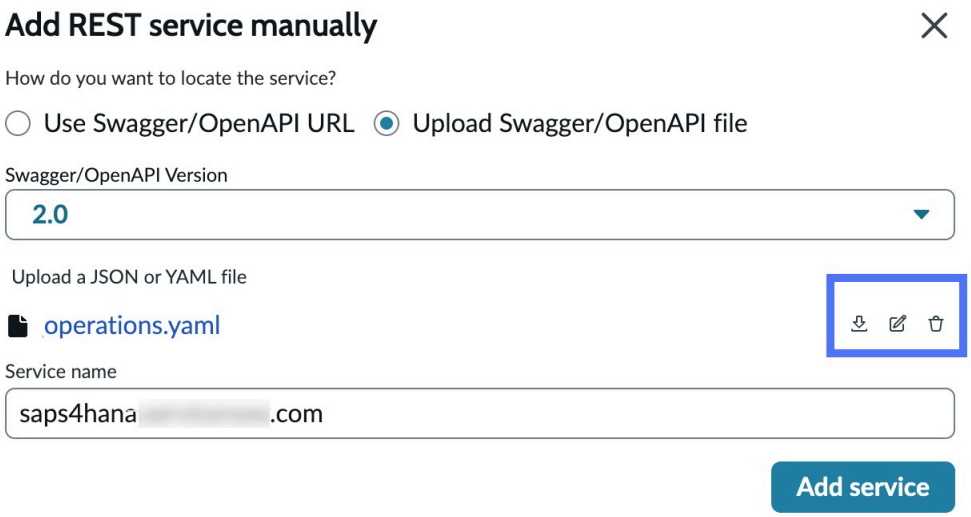
You can download, edit, or delete the file by selecting an icon.



12. When finished, select **Add service**.

A background job named **Additional Service Handler** runs.

Note: If an issue occurs, an error message appears. Select **Flow context** for more information. You can also view execution details in Workflow Studio.



The service is added to the entity record, along with the endpoint and return type. The endpoints available in an operation depend on the HTTP method associated with the operation type:

- Read operations display GET endpoints.
- Create operations display POST endpoints.
- Update operations display PATCH, PUT, and other update endpoints.

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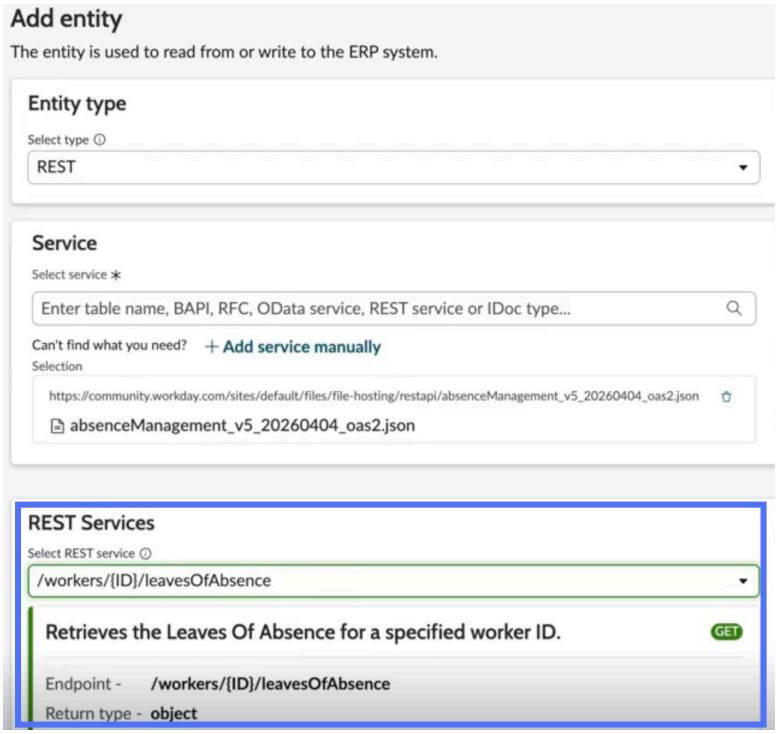

13. When finished, select **Add entity**.

Manage input parameters for model operation with a REST entity

Specify how fields on the ERP (Enterprise Resource Planning) system map to input parameters and their values. This defines the inputs for an operation that reads, creates, or updates the ERP system using REST.

Before you begin

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model with the operation that you want to add inputs to.
4. Select **Manage model**.
5. Open a model operation with a REST entity.
   If you don't have a model operation, add one to the model. For more information, see Add an operation to a model in Zero Copy Connector for ERP.
6. Check that at least one REST entity is listed.
   If you don't have a REST entity, add one to the operation. For more information, see Add a REST entity to a model operation.
7. Select **Specify inputs**.

   There are two tabs, which you complete in order:

   - In **Step 1: Configuration**, set the validation rules and pagination.
   - In **Step 2: Select fields**, map fields and define the inputs for the operation.

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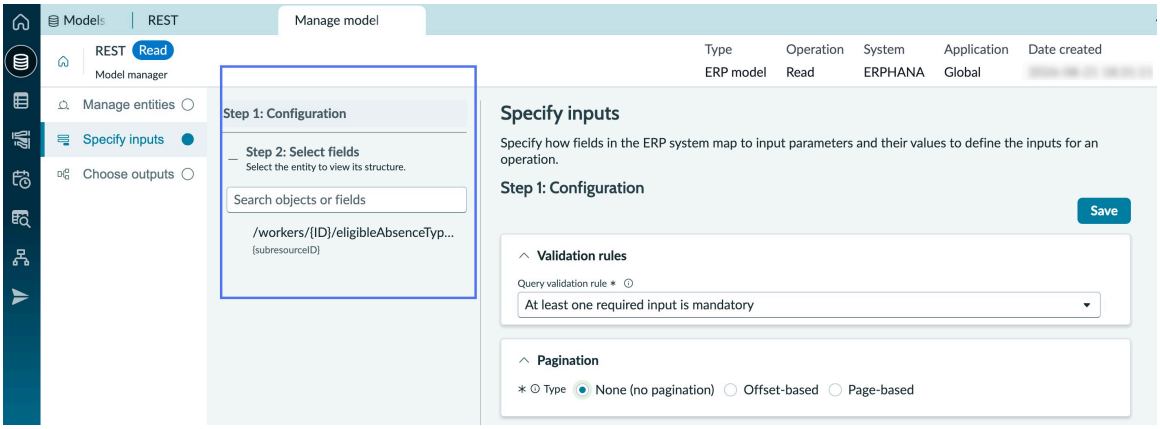
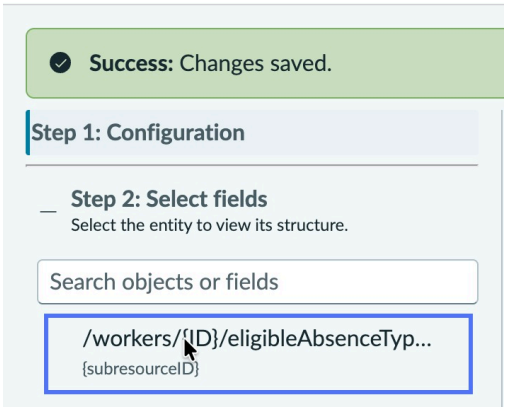


8. In **Step 1**, define whether operation inputs are required by expanding the **Validation rules** section and selecting an option in **Query validation rule**.
   - **All required inputs are mandatory**
   - **At least one required input is mandatory**
   - **No validation on inputs**
9. Expand the **Pagination** section and select an option to configure pagination parameters and control how data is retrieved in batches.
   - Select **None (no pagination)** to not use any pagination.
   - Select **Offset-based** to import data in batches based on time intervals.
   - Select **Page-based** to specify the number of records (limit) that can be fetched at a time.
10. Select **Save**.
11. In **Step 2**, select the entity.



12. Select **Select mandatory fields**.

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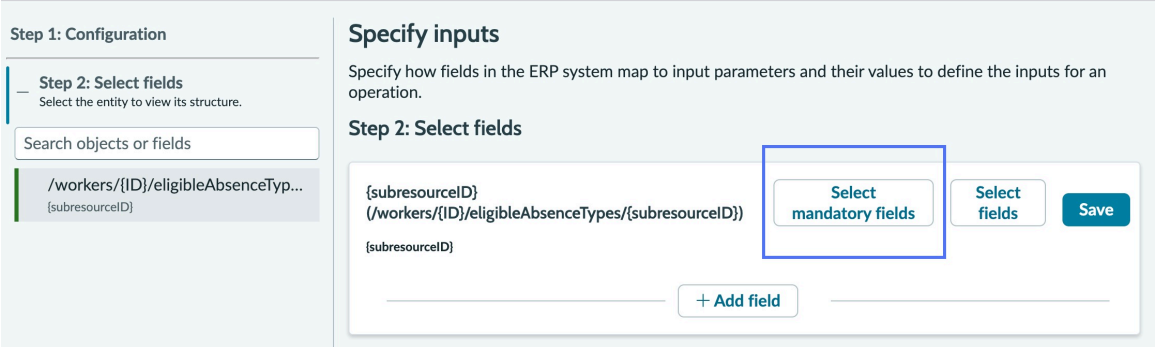

13. Add fields.



After adding fields, you can rearrange their order in the **Selected columns** list by dragging the field card to a new location.

14. Select **OK**.

Zero Copy Connector for ERP automatically suggests mappings between source fields and mapped fields. This reduces the amount of manual work to do, while still giving you control to edit the mappings as needed. For more information, see Zero Copy Connector for ERP AI semantic field mapping.

Mapped field names in inputs and outputs are generated automatically, but you can edit the names manually. For more information, see Edit input and output mapped value name in Zero Copy Connector for ERP.

15. Select **Select fields**.
16. For the non-mandatory fields, repeat steps 13-14.
17. Select **Save**.
18. **Optional:** If needed, add a field.

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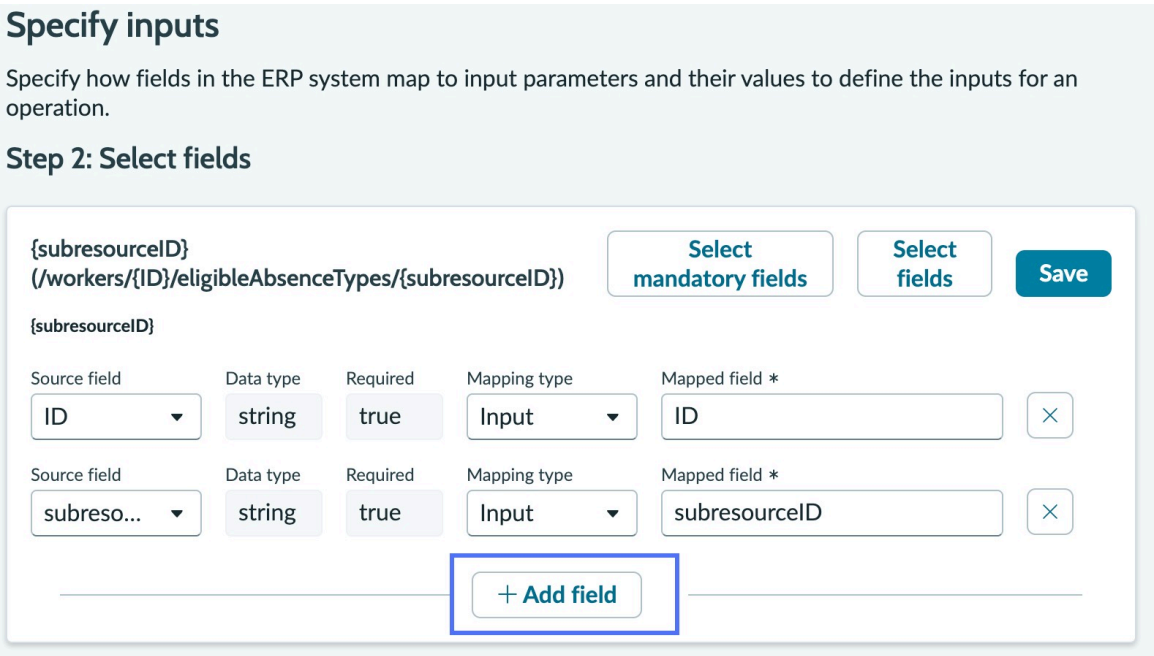
a. Select **+ Add field**.

(Optional)



b. In **Source field**, select a field from the drop-down list.

(Optional) Field information is added to **Data type**, **Required**, **Mapping type**, and **Mapped field** automatically.

The **Data type** field contains a variety of types including string, integer, array, and Boolean. For general information, see Workflow Studio input and output data variables.

19. Select **Save**.

What to do next

Next, check the output parameters for the operation and update as needed. For more information, see Select model output parameters for REST.

Select model output parameters for REST

Specify how fields on the ERP (Enterprise Resource Planning) system map to output parameters and their values. This defines the outputs for an operation that reads, creates, or updates the ERP system using REST.

Before you begin

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the model page by selecting the models icon in the side panel.
3. Select the model that you want to add an operation to.
4. Select the **Manage model** button.
5. Open a model operation with a REST entity.

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If you don't have a model operation, add one to the model. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

6. Check that at least one REST entity is listed.
   If you don't have a REST entity, add one to the operation. For more information, see Add a REST entity to a model operation.
7. Select **Choose outputs**.
8. In **Selection**, select a listed REST service.
9. Select **Select mandatory fields**, add fields, and select **OK**.
10. Select **Select fields** and add fields.
11. Select **OK**.

    Zero Copy Connector for ERP automatically suggests mappings between source fields and mapped fields. This reduces the amount of manual work to do, while still giving you control to edit the mappings as needed. For more information, see Zero Copy Connector for ERP AI semantic field mapping.

    Mapped field names in inputs and outputs are generated automatically, but you can edit the names manually. For more information, see Edit input and output mapped value name in Zero Copy Connector for ERP.

12. **Optional:** If needed, add a field.

    a. Select **+ Add field**.

    b. In **Source field**, select a field from the drop-down list.

       (Optional) Field information is added to **Data type**, **Required**, and **Mapped field** automatically.

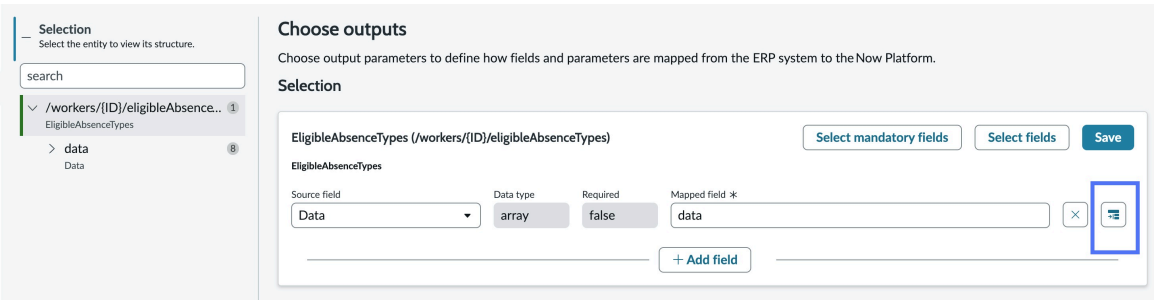
       The **Data type** field contains a variety of types including string, integer, array, and Boolean. For general information, see Workflow Studio input and output data variables.

    c. Select **OK**.

13. **Optional:** Add any nested output fields or parameters to choose what data to include from a complex parameter.

    a. Select the nesting options icon.

    (Optional)



    b. Select **+ Add field**.

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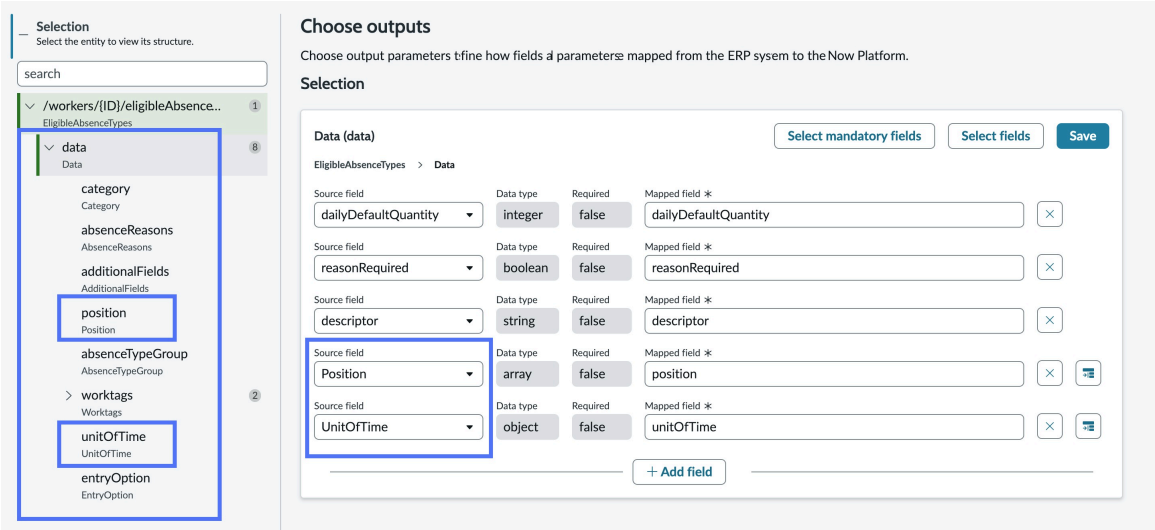
c. In **Source field**, select a field from the drop-down list.

(Optional) Field information is added to **Data type**, **Required**, **Mapping type**, and **Mapped field** automatically.

(Optional) The following example shows full data options, but only some have been specified as output.



14. Select **Save**.

Zero Copy Connector for ERP roles

Zero Copy Connector for ERP roles give team members the access they must have to configure ERP systems, build models, or read ERP data.

> **Important:** When you assign Zero Copy Connector for ERP roles to a user, you must include the scope. For example, assign the sn_erp_integration.erp_admin role, not just erp_admin.

For more information about assigning roles, see Assign a role to a user.

To learn more about product-specific (granular) admin roles, see Platform security granular admin roles.

Required roles and instances

All required roles are the same across development and production instances. However, only sn_erp_integration.erp_user is required to read data in a production instance.

Role	Description	Additional access
sn_erp_integration.erp_admin	Grants the user access to update the application setup.	Granular admin role for Zero Copy Connector for ERP that contains the sn_erp_integration.erp_user role.

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Role	Description	Additional access
		For more information on work with granular roles, see Platfo security granular admin roles
sn_erp_integration.erp_ai_user	Grants the user access to ERP-related generative AI capabilities, including skills, agentic workflows, and agents.	None
sn_erp_integration.erp_data_pill	Grants the user read access to all the tables required to make Financial Services Remote Tables requests. This role can be combined with any single Financial Services Remote Tables role. For example, combining sn_erp_integration.erp_data_pill and sn_erp_integration.sap_company_code_user enables the list of SAP Company Codes.	None
sn_erp_integration.erp_mid_server	Grants the user access to use the API to enable the MID Server to send attachments back to the ServiceNow instance.	• connection_admin • import_admin • import_scheduler • import_set_loader • import_transformer • snc_platform_rest_api_acc • sn_erp_integration.erp_adr
sn_erp_integration.erp_user	Grants the user read access to all remote tables.	Contains sn_erp_integration.erp_data_ and all the data model-specif roles listed in the Additional E data model roles section.
sn_erp_integration.etl_user	Grants the user access to trigger the ETL process.	Contains sn_erp_integration.erp_data_ and import_admin.

Additional ERP data model roles

Assign the following roles to give users access to specific ERP data models, such as purchasing or invoices, in Zero Copy Connector for ERP.

ERP data model-specific roles for Zero Copy Connector for ERP

Persona	Role
Company code user	sn_erp_integration.sap_company_code_user
Country user	sn_erp_integration.sap_country_user
Currency user	sn_erp_integration.sap_currency_user
Customer invoice user	sn_erp_integration.sap_customer_invoice_user

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ERP data model-specific roles for Zero Copy Connector for ERP (continued)

Persona	Role
Distribution channel user	sn_erp_integration.sap_distribution_channel_user
Division user	sn_erp_integration.sap_division_user
Language user	sn_erp_integration.sap_language_user
Material stock user	sn_erp_integration.sap_material_stock_user
Purchase document user	sn_erp_integration.sap_purchase_document_user
Purchasing organization user	sn_erp_integration.sap_purchasing_organization_user
Sales customer user	sn_erp_integration.sap_sales_customer_user
Sales delivery user	sn_erp_integration.sap_sales_delivery_user
Sales document user	sn_erp_integration.sap_sales_document_user
Sales organization user	sn_erp_integration.sap_sales_organization_user
Sales revenue recognition user	sn_erp_integration.sap_sales_revenue_recognition_user
Table metadata user	sn_erp_integration.sap_table_metadata_user
Transport user	sn_erp_integration.sap_transport_user
Vendor invoice user	sn_erp_integration.sap_vendor_invoice_user
Vendor user	sn_erp_integration.sap_vendor_user

Zero Copy Connector for ERP and security

In addition to role-based security and access control, Zero Copy Connector for ERP (Enterprise Resource Planning) protects personally identifiable data in other ways.

Personally identifiable data is secured with Zero Copy Connector for ERP in several ways.

- You can customize models and remote tables to exclude personal data in a specified field, such as email address.
- All remote tables are secured using access control rules (ACLs). If you have a remote table that contains sensitive data, use ACLs to restrict that table from ServiceNow users. For more information, see ServiceNow® access control .

Working with ERP systems in Zero Copy Connector for ERP

A Zero Copy Connector for ERP (Enterprise Resource Planning) system represents a connection to a section of your ERP system, such as sales orders or vendor invoices.

ERP systems organize connections to the ERP system

The Zero Copy Connector for ERP system plays a crucial role in data synchronization, sharing, and collaboration, enabling seamless integration and operation between the model and the connected ERP system.

Zero Copy Connector for ERP provides a standard set of models, such as SAP Material Stock and SAP Purchase Document. For a list, see Standard extraction tables for Zero Copy Connector for ERP. For information about building new models, see Create a model. Use Zero Copy Connector for ERP data products, sets of predefined models and process extensions, as examples to help

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you implement and deploy applications with less manual work. For more information, see Zero Copy Connector for ERP content packs.

Configuring ERP systems and checking connections

ServiceNow administrators configure Zero Copy Connector for ERP ERP systems. Zero Copy Connector for ERP supports connecting to multiple systems.

Zero Copy Connector for ERP regularly scans all connected ERP systems for the latest heartbeat, which indicates whether a ping to the ERP system connection is successful.

View a list of Zero Copy Connector for ERP systems

Check the ERP (Enterprise Resource Planning) systems list in Zero Copy Connector for ERP to view the heartbeats and retrieval status of your ERP systems.

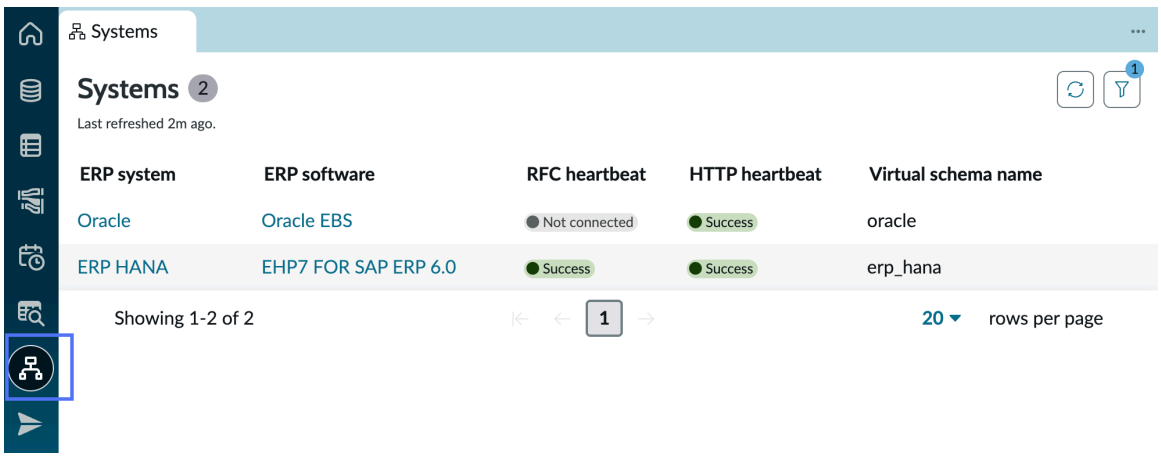
Before you begin

Role required: sn_erp_integration.erp_admin

- To create and modify ERP systems: sn_erp_integration.erp_admin
- To view the ERP systems list: sn_erp_integration.erp_user

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP systems list by selecting the systems icon in the side panel.



3. Select a system **Name**.
4. Check the retrieval and heartbeat information to confirm that the system has no connectivity issues.
   For a description of the field values, see Zero Copy Connector for ERP system list field descriptions.

Create an ERP system in Zero Copy Connector for ERP

Configure an ERP system in Zero Copy Connector for ERP to register your ERP connection so that models and tables can use it as a data source.

Before you begin

https://player.vimeo.com/video/1056865172?h=86d0ea3e38&badge=0&autopause=0&player_id=0&app_id=58479

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Role required: sn_erp_integration.erp_admin

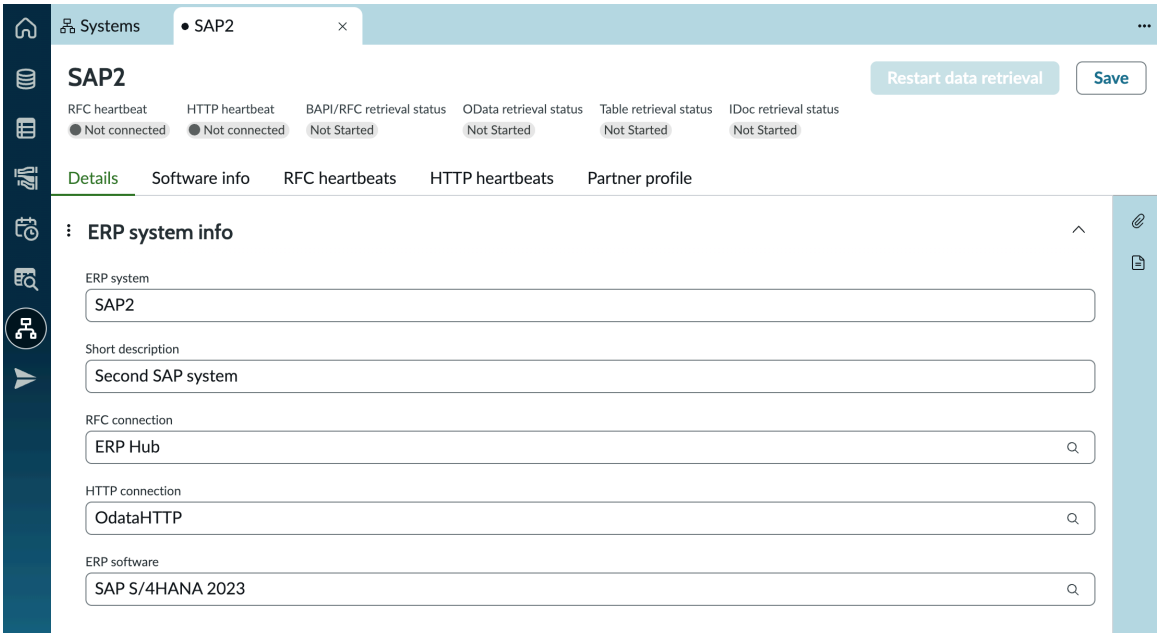
About this task

Zero Copy Connector for ERP supports connecting to multiple systems.

Beginning with the Australia Patch 8 release (September 2026), you can select Oracle E-Business Suite (EBS) as the ERP software when creating an ERP system record. For more information, see Oracle E-Business Suite support in Zero Copy Connector for ERP.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP systems list by selecting the systems icon in the side panel.
3. Select **New**.
4. On the form, fill in the fields.



For a description of the field values, see Zero Copy Connector for ERP system details field descriptions.

5. Select **Save**.

Result

After you create a system, you can view heartbeat and retrieval status on the ERP systems list page. For more information, see View a list of Zero Copy Connector for ERP systems.

Edit and delete ERP systems

After creating an ERP (Enterprise Resource Planning) system, you can edit system details or delete the system at any time.

Before you begin

Role required: sn_erp_integration.erp_admin

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Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP systems list by selecting the systems icon  in the side panel.
3. Open a system.
4. Edit system information, such as name, description, connection, or ERP software.
   For detailed information about the system record fields, see Zero Copy Connector for ERP system details field descriptions.
5. On the status bar, confirm that the heartbeats are successful and the retrieval status is complete.

   Note: If any failed, select **Restart data retrieval**. Any data retrieval that failed (BAPI, OData, or tables) is fetched again.

6. Delete an ERP system record from the ERP system table.
   a. Navigate to **All** > **System Definition** > **Tables**.
   b. In the **Name** column, search for and open sn_erp_integration_system.
   c. In **Related Links**, select **Show List**.
   d. Select the ERP system to delete.
   e. Select **Delete**.

View Zero Copy Connector for ERP software information

In Zero Copy Connector for ERP (Enterprise Resource Planning) , view software information including ERP family, database type, and more.

Before you begin

Role required: sn_erp_integration.erp_admin or sn_erp_integration.erp_user

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP systems list by selecting the systems icon  in the side panel.
3. Open a system.
4. Select the **Software info** tab.

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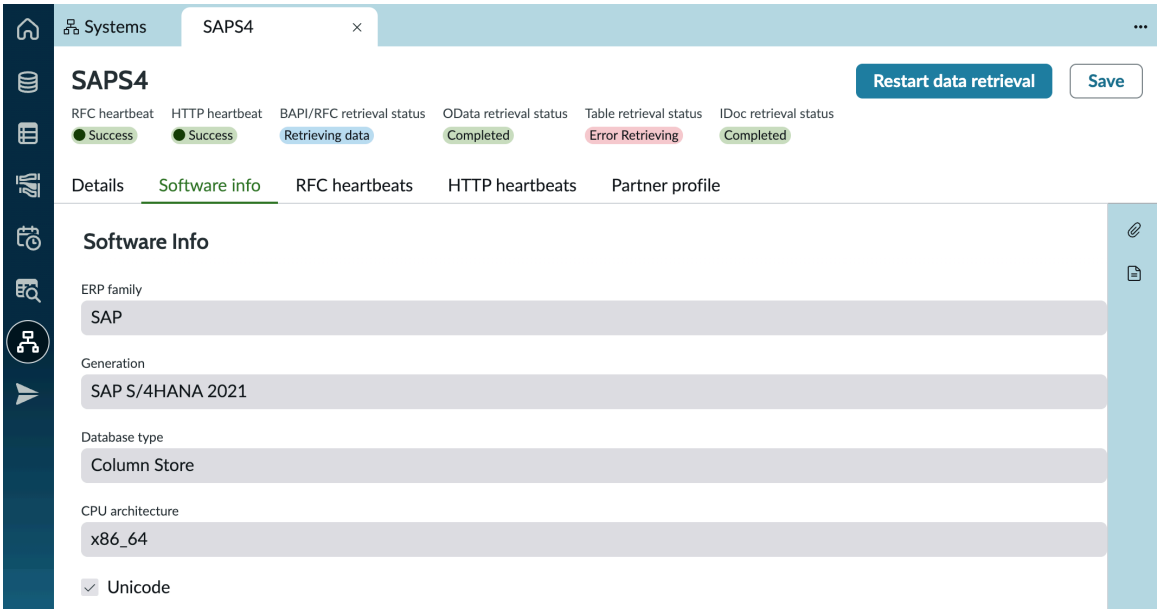


View software information including ERP family and generation. All fields are read only. For more information, see Zero Copy Connector for ERP software info tab field descriptions.

View Zero Copy Connector for ERP system heartbeat information

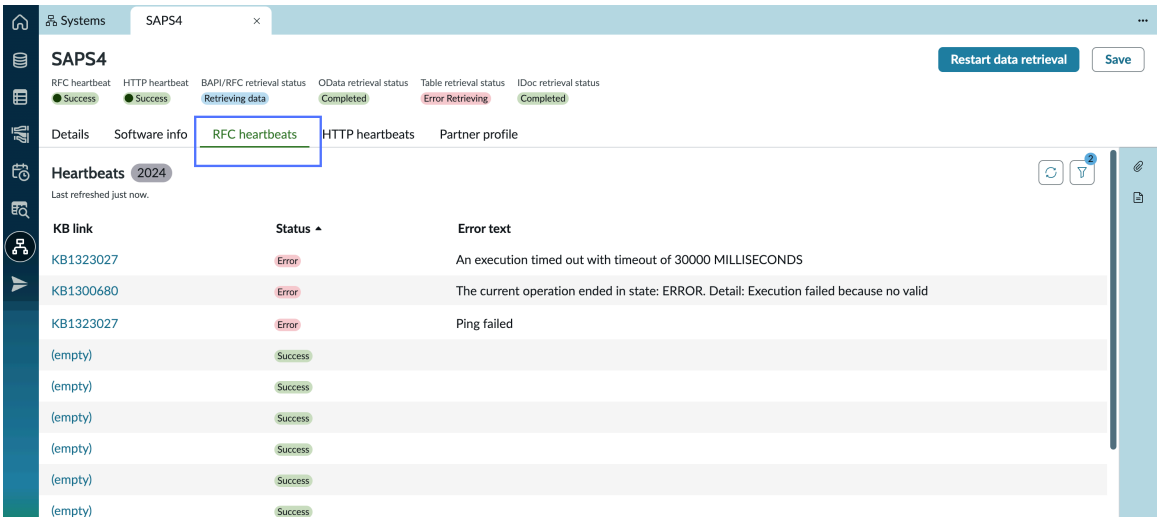
In Zero Copy Connector for ERP (Enterprise Resource Planning), the heartbeat shows the status, date, and time of connections to the ERP system, along with error information.

Before you begin

Role required: sn_erp_integration.erp_admin or sn_erp_integration.erp_user

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP systems list by selecting the systems icon in the side panel.
3. Open a system.
4. Select the **RFC heartbeats** or **HTTP heartbeats** tab.



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View information about the heartbeats, including updated date and time, and status. If there's an error, the error text is displayed and a link to a knowledge base article (if available) is provided. For more information, see Zero Copy Connector for ERP system details field descriptions.

By default, all heartbeat information is kept for one week, but users with the admin role can change that setting.

a. Navigate to **All** > **System Data Management** > **Data Management Policies**.

b. Open the **ERP heartbeat log policy** (sn_erp_integration_log_heartbeat).

c. Select the **Table Cleanup Rules** tab.

d. In the list, select **sn_erp_integration_log_heartbeat**.

e. Edit the **Age in seconds**.

View Zero Copy Connector for ERP partner profile information

In Zero Copy Connector for ERP (Enterprise Resource Planning), view partner profile information including number and type.

Before you begin

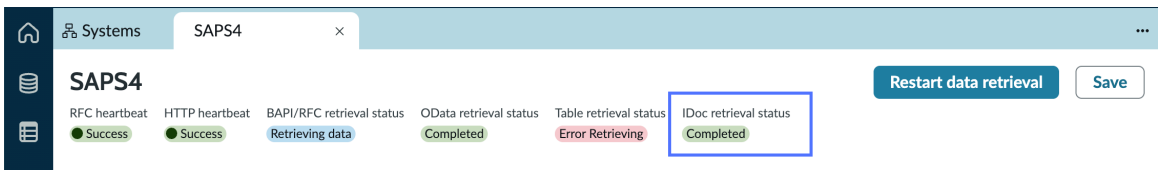
Role required: sn_erp_integration.erp_user

About this task

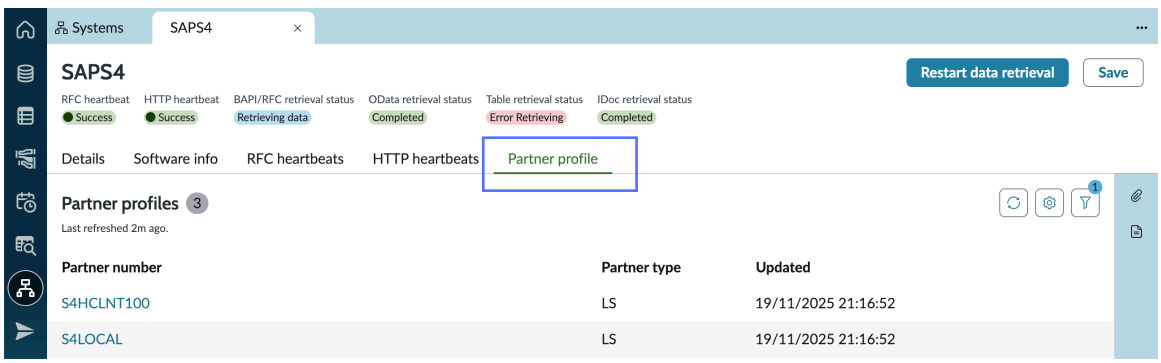
Partner profiles are fetched from SAP during initial load. If any new profiles are added on the remote SAP system, select the **Restart data retrieval** button on the system record in Zero Copy Connector for ERP to reload.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP systems list by selecting the systems icon in the side panel.
3. Open a system record.
4. Check the **IDoc retrieval status** on the record.



5. Select the **Partner profile** tab to view available profiles.



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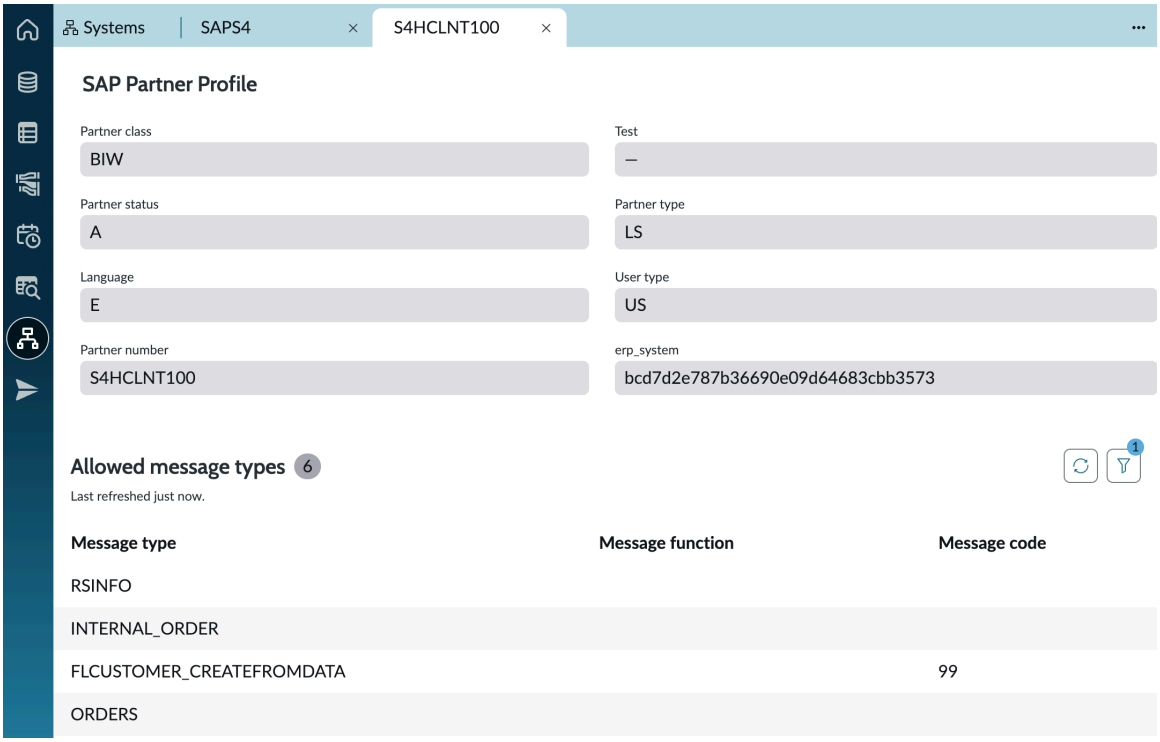
For column descriptions, see Zero Copy Connector for ERP partner profile tab column descriptions.

6. Select a **Partner number** to view information about a specific profile.



For field descriptions, see Zero Copy Connector for ERP partner profile field descriptions.

Specifying where ERP system data is saved

Use the data that Zero Copy Connector for ERP (Enterprise Resource Planning) retrieves from ERP systems in remote tables and extraction tables, or add it to flows as data pills in Workflow Studio.

Adding retrieved data to remote tables and extraction tables

Use the JSON contents of the **Response** in a flow's output to save the ERP data in the following ways:

- Store the data in a remote table. Remote tables get their records from running an associated script against an external data source.
- Store the data in an extraction table. Extraction tables retrieve large amounts of data using a scheduled query, and use transform tables to process data for use on the ServiceNow AI Platform.

When you add mapped fields or parameters as outputs and successfully read or update the ERP system, each parameter appears as a field. You can then add the field to a remote table or an extraction table. Manage the fields for the remote table or extraction table to add the retrieved parameters. For more information, see the following topics:

- Customize fields for an ERP remote table in Zero Copy Connector for ERP
- Select fields for an extraction table in Zero Copy Connector for ERP

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Using retrieved ERP data in flows

The **Use ERP Data** action returns ERP data in an output data pill called **Response**. The **Response** pill is available when you build a flow in Workflow Studio with the **Use ERP Data** action. The **Response** data pill is available in the following places of the action:

- The **Outputs** tab
- The **Output** section in the **Data** pane

You can then add the **Response** data pill or any of the child **record** data pills to a flow to parse the returned JSON.

For example, you can generate a record for each response from the ERP system, making that data available for use on the ServiceNow AI Platform. For more information, see Building flows to read or update the ERP system.

ERP data extraction and transformation

ERP (Enterprise Resource Planning) extraction tables enable you to create daily processes that extract large amounts of data. You can then include the extracted data in an ERP model in Zero Copy Connector for ERP.

Data in extraction tables

Use extraction tables, which are ETL (extract, transform, and load) data sources, to extract large amounts of data regularly.

For example, you can extract all open purchase orders for the current month from an SAP system into a Glide table once a day at a set time. You can then access that data through ServiceNow AI Platform, such as Source-to-Pay Operations or a PO workspace created in App Engine Studio.

After the extraction process is run, use import sets to map imported data into ServiceNow AI Platform tables. For more information, see Import sets.

Extraction tables use transform table maps

ERP extraction tables save data to a local transform table on the ServiceNow AI Platform. The transform table is a temporary table that holds data during the data integration or transformation process. Transform tables are an intermediary step before data is further processed, cleaned, or loaded into the target destination. For example, after import, the extraction table can run a Glide query on a transform table and save the output to several different target tables.

If you use a custom transform table, you must first create the table on the ServiceNow AI Platform, and the table must be in the application scope. For more information on creating table transform maps, see Create a transform map.

ETL processes in Zero Copy Connector for ERP are configured in the ServiceNow AI Platform app that needs the data, not Zero Copy Connector for ERP. For example, you can configure an extraction process in a flow in Workflow Studio.

Automatically available standard extraction tables

When you install Zero Copy Connector for ERP, the ServiceNow AI Platform automatically loads a standard set of ERP extraction tables, including sales, delivery, and procurement tables. For a list of standard extraction tables, see Standard extraction tables for Zero Copy Connector for ERP.

If you installed ERP Semantic Mining, that app populates some additional extraction tables, such as ERP application activity, Collector directory data, and Namespace data.

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Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

View ERP extraction tables

Work with ETL (extract, transform, and load) processes in Zero Copy Connector for ERP (Enterprise Resource Planning) to extract large amounts of data from the ERP system. Extracted data is stored in Glide tables in the ServiceNow AI Platform.

Before you begin

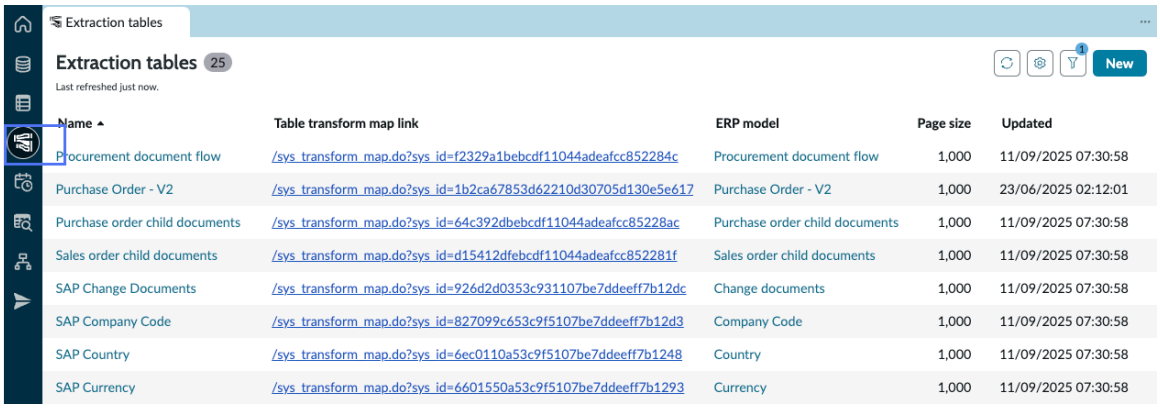
Role required: sn_erp_integration.erp_user

About this task

ERP extraction tables extract and save data to a transform table on the ServiceNow AI Platform. The transform table is a temporary table that holds data during the data integration or transformation process. Transform tables are an intermediary step before data is further processed, cleaned, or loaded into the target destination.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP extraction tables page by selecting the extraction tables icon in the side panel.



3. View the list of ERP extraction tables.

ETL source columns

Column	Description
Name	Name of the ETL process.
Table transform map link	Table that the extracted data is cached and stored in. Select the table name to view the table on the ServiceNow AI Platform in a new browser tab. For more information on creating table transform maps, see Create a transform map.
ERP model	ERP model used in the ETL extraction.

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Column	Description
	Select the ERP model name to view the details. For more information, see View and edit models.
Page size	Amount of data to read from the ERP system at a time. The default is 1000. Increasing the size may impact MID Server memory space.
Updated	Date and time the extraction table record was last saved.

4. **Optional:** View the details for an extraction table by selecting the table name.

What to do next

After the extraction process is run, use import sets to map imported data into ServiceNow AI Platform tables. For more information, see Import sets.

Add an ERP extraction table in Zero Copy Connector for ERP

Create an ERP (Enterprise Resource Planning) extraction table to capture large amounts of data every day, and save the data to a transformation (staging) table. The data is then available on the ServiceNow AI Platform, and you can add the extracted data to an ERP model or remote table.

Before you begin

The source table, target table, and table transform map must be configured before those tables can be added to an ERP extraction table. For more information on creating table transform maps, see Create a transform map.

Role required: sn_erp_integration.erp_admin

About this task

Zero Copy Connector for ERP provides several standard extraction tables, which you can use as-is. If you must change a standard extraction table, copy the table and then update the copied version.

You can create multiple ERP extraction tables, and multiple extraction tables can use the same ERP model. For example, create separate extraction tables for sales contracts, sales inquiries, and old sales orders.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP extraction tables page by selecting the extraction tables icon  in the side panel.
3. Select the **New** button.

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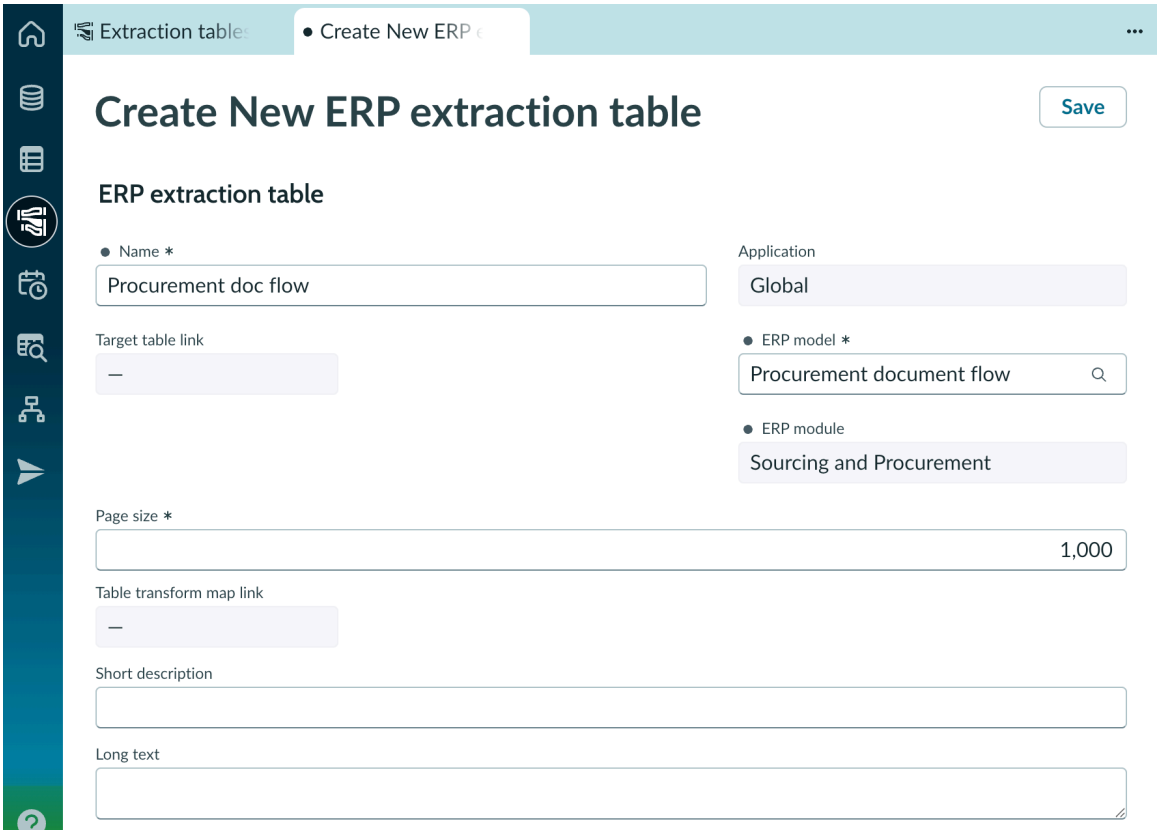

4. On the form, fill in the fields.
   For a description of the field values, see Zero Copy Connector for ERP extraction table field descriptions.
5. Select **Save**.

Select fields for an extraction table in Zero Copy Connector for ERP

Add or remove fields for an extraction table in Zero Copy Connector for ERP(Enterprise Resource Planning). For example, you may want to remove fields with sensitive information, such as birthdays.

Before you begin

If you don't see the fields that you want to add to the extraction table, you must first add them to the model. For more information, see Choose output parameters for a model.

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP extraction tables page by selecting the extraction tables icon in the side panel.
3. Select an extraction table to work with by selecting the **Name**.
4. Manage the columns to build the extraction table by selecting the arrow next to **Generate mapping** and then selecting **Select fields**.

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a. In **Available columns**, find the field to add and select the check box (if the list is long, use the search box to filter the list).

b. In **Selected columns**, drag fields up and down to rearrange how they appear in the table.

c. After you're finished, select **OK**.
The fields on the extraction table are updated.

5. Confirm that the fields appear correctly as columns on the extraction table by selecting the **Extraction table fields** tab.

Create a table transform map from an extraction table

In Zero Copy Connector for ERP (Enterprise Resource Planning), create a table transform map from an extraction table and map the source fields with target fields.

Before you begin

Role required: sn_erp_integration.erp_admin

Confirm that you have an extraction table associated with a model containing output parameters. For more information, see Add an ERP extraction table in Zero Copy Connector for ERP and Choose output parameters for a model.

Note: The following procedure generates a new transform map and a new staging table. To modify an existing transform map or an existing staging table, navigate to the record and update manually. Transform maps are in **System Import Sets** > **Administration** > **Transform Maps** and staging tables are in **System Definition** > **Tables**.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP extraction tables page by selecting the extraction tables icon  in the side panel.
3. Select an extraction table to work with by selecting the **Name**.
The table should have an ERP model that contains some output parameters.
4. Select **Generate mapping**.
5. In **Select mapping table**, specify the destination table for the data obtained from an external source.

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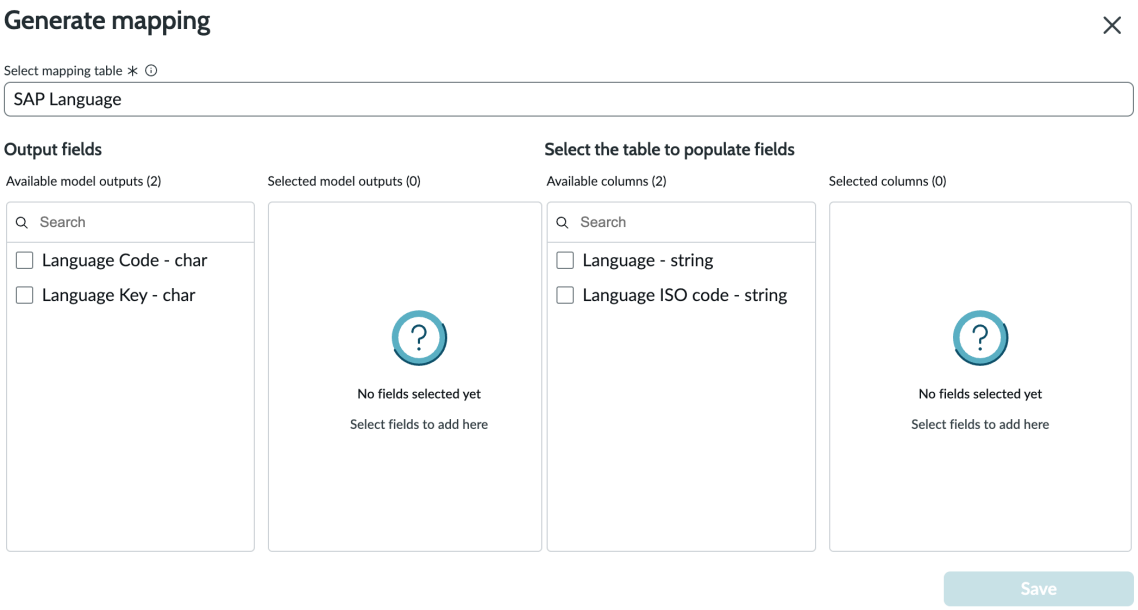
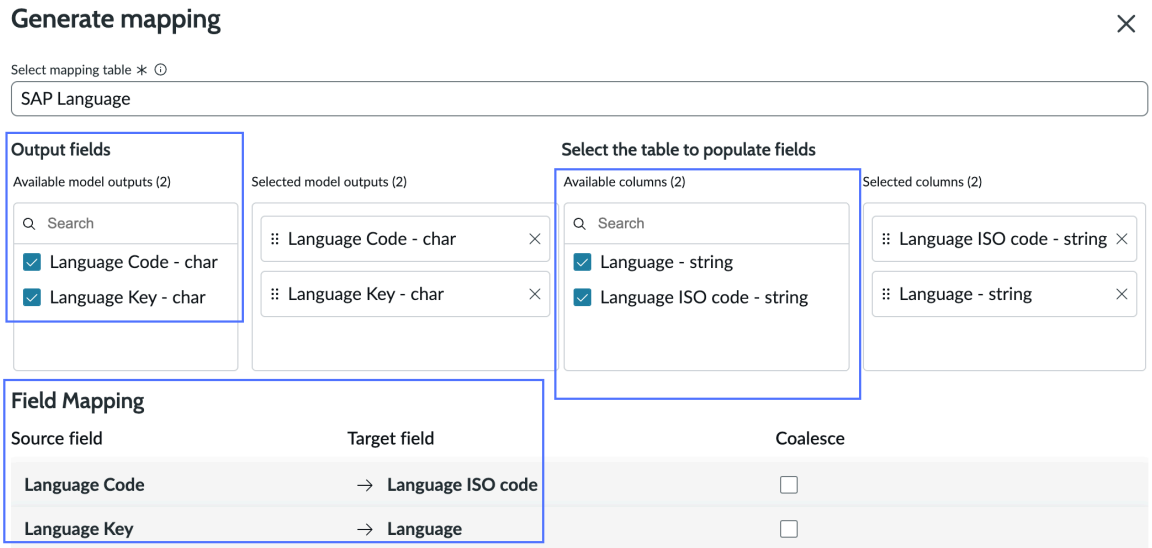


6. Create the mappings by selecting an output in the **Available model outputs** column and then selecting a column in **Available columns**.

   As you work, the mappings are saved in the **Field Mapping** section to create the import map staging table and the transform map. For general information, see Import sets key concepts and Create a transform map.



   To change a mapping, you can drag the items within the **Selected model outputs** column or the **Selected columns** column. As you make changes, the **Field Mapping** section updates automatically.

7. In the **Field Mapping** section, select the **Coalesce** option for each mapping.
   For more information, see Updating records using coalesce.
8. Select **Save**.
   The import set staging table and a transform map that can be used by Zero Copy Connector for ERP to push the data into the destination table are generated. The extraction table record opens. A confirmation message is displayed stating that the staging table was generated and there's a link to the transform map.
9. Select the link at the top to open the transform map.

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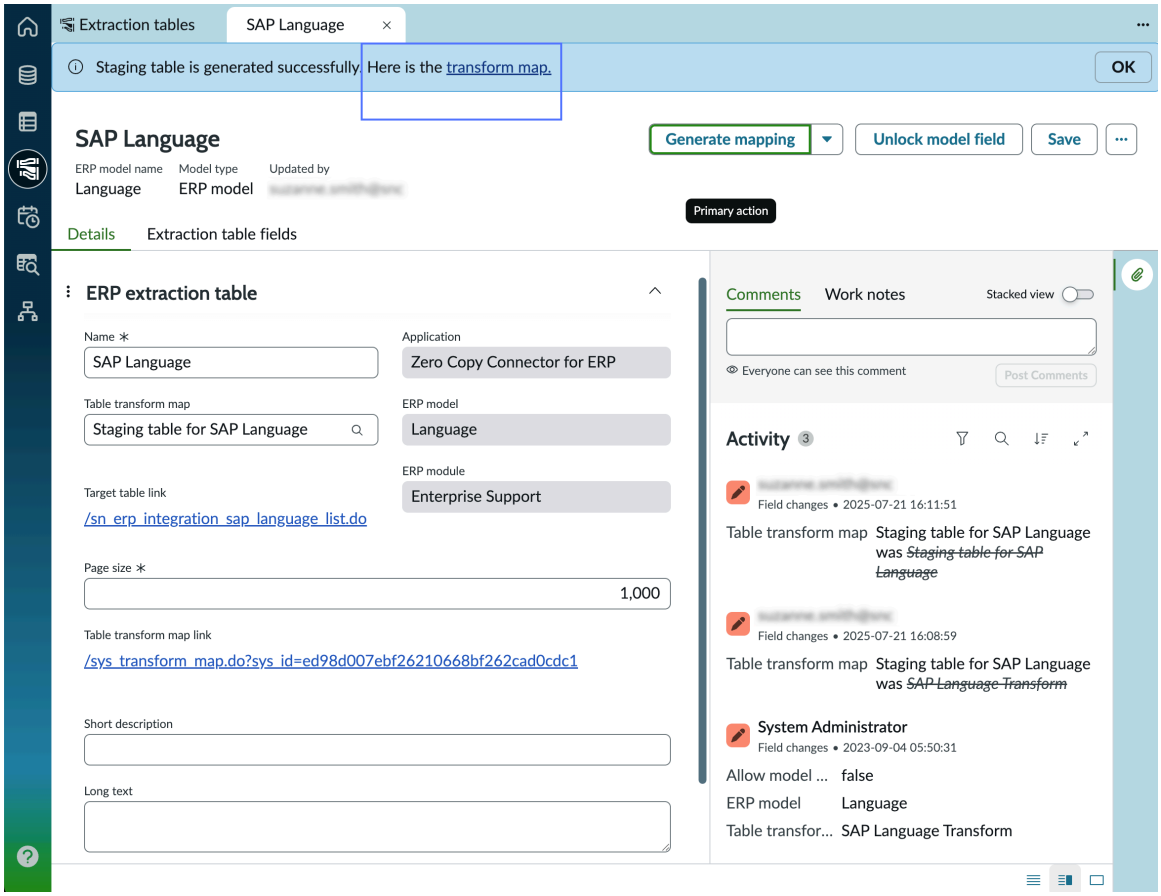

In **Source table**, the staging table is listed with its auto-generated name. The **Field Maps** related list contains the fields you mapped.

10. Return to the extraction table record (it might be open in a different browser tab).
11. To view the transform map at any time, select the link in **Table transform map link**.

Using Zero Copy Connector for ERP

Use Zero Copy Connector for ERP (Enterprise Resource Planning) to work with ERP models, remote tables, and extraction tables, and integrate ERP data from the ERP system onto the ServiceNow AI Platform.

The workflow of Zero Copy Connector for ERP generally follows its main sections, each of which you access by selecting the section icon in the contextual side panel.

You can also build flows in Workflow Studio to use retrieved ERP data for processes or tasks outside of Zero Copy Connector for ERP. For more information, see Building flows to read or update the ERP system.

Build an ERP model using remote tables and extraction tables to organize, load, and transform ERP data, as well as flows to query the ERP system.

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Parts of Zero Copy Connector for ERP

Zero Copy Connector for ERP section	Description
ERP models	Models function as templates for sets of tables that give you access to ERP data. You can use the standard Zero Copy Connector for ERP models as-is, or clone them to make changes. Manage models to map input and output data for reading and updating the ERP system using either table read operations or BAPIs (business application programming interfaces). For more information, see Building and managing models to work with ERP data.
Scripted API	Access ERP systems using the Zero Copy Connector for ERP scripted API. For more information, see REST API connector for Zero Copy Connector for ERP.
Flow action to query ERP data	Build a flow in Workflow Studio with the **Use ERP Data** flow action. Specify the details required to query the ERP system using the parameters defined in the model
Remote tables	Remote tables enable you to view and query data from the ERP system on the ServiceNow AI Platform. For more information, see Using ERP remote tables in Zero Copy Connector for ERP.
ERP extraction tables	Extraction tables use an extract, transform, load (ETL) process to extract large amounts of data from the ERP system at regular intervals, and then transform and save it to a Glide table. For more information, see ERP data extraction and transformation.

Building and managing models to work with ERP data

Models in Zero Copy Connector for ERP (Enterprise Resource Planning) function as templates for sets of tables that give you access to ERP data. Use model management to build read, update, and create operations that access the ERP system. The operations have specified inputs and outputs to map fields for use on the ServiceNow AI Platform.

Models represent datasets and create a staging area

A model represents the logical structure and organization of data coming from the ERP system. Models define the entities, attributes, read/update operations, and table join relationships that capture and represent business processes and data elements in the ERP system. When you first open Zero Copy Connector for ERP, you view a list of the models for your instance.

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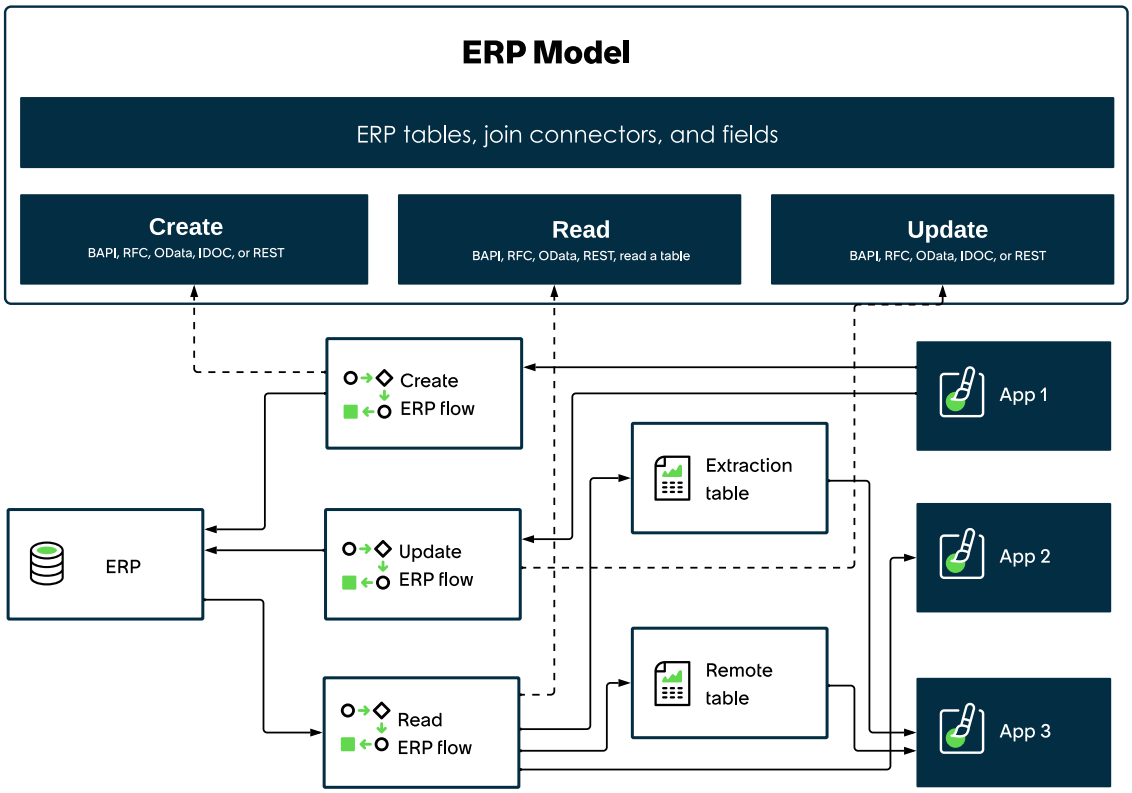
How models use operations to connect ERP systems with applications



Note: SAP data can also be accessed by script

Zero Copy Connector for ERP supports two types of models:

- Platform model: Model with input and output fields mapped to an already existing platform table. These models standardize ERP data by mapping it to existing ServiceNow platform tables.
- ERP model: New, custom ERP model. These models follow the data structures defined by the connected, external ERP system. ERP models accommodate the unique formats of each ERP system.

Zero Copy Connector for ERP provides a standard set of models, such as SAP Material Stock and SAP Purchase Document. For a list, see Standard extraction tables for Zero Copy Connector for ERP. For information about building new models, see Create a model. Use Zero Copy Connector for ERP data products, sets of predefined models and process extensions, as examples to help you implement and deploy applications with less manual work. For more information, see Zero Copy Connector for ERP content packs.

A model serves as a blueprint for configuring, customizing, and integrating the ERP system to meet your business requirements. A model functions as a staging area that contains all potential fields you can add to remote and extraction tables, as well as, create, read, and update operations. You can then use the tables and queried data as a data source on the ServiceNow AI Platform.

You can also build flows in Workflow Studio to use retrieved ERP data for processes or tasks outside of Zero Copy Connector for ERP. For more information, see Building flows to read or update the ERP system.

You can view the list of existing models or add a new one to create a custom dataset. After you add a remote table, you can manage models to map input and output parameters, update the ERP system using BAPIs, and create table joins. You can also create extraction tables that

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regularly pull large amounts of filtered data from the ERP system. Another option is to use a custom ERP action in Workflow Studio to bring queried ERP data into other ServiceNow AI Platform processes.

You can create as many models as needed, though you can't edit their field names. You must have the sn_erp_integration.erp_admin role to create and edit models.

Model structure

Each model is linked to tables on the ERP system, as well as remote tables and ERP extraction tables on the ServiceNow AI Platform. You can connect the same table to multiple different models.

Each model connects to one ERP system. The connected ERP system:

- Enables access to field and table information.
- Helps coordinate data synchronization, sharing, and collaboration, enabling integration and operation between the model and the ERP system.

Models encompass remote tables from the ERP system, as well as APIs, ERP extraction tables, and create/read/update operations, to create a holistic dataset. For example, you can have one model for sales orders and another for inventory.

Note:

After installing Zero Copy Connector for ERP, an admin or a user with the sn_erp_integration.erp_admin role must enable the *sn_erp_integration.enableModelModification* property so users can customize models. After enabling the *sn_erp_integration.enableModelModification* property, Zero Copy Connector for ERP retrieves all tables and BAPIs (Business Application Programming Interface) to use when managing models. System properties are maintained in the System Property table [sys_properties], which you can access using the module navigator, or by directly entering `sys_properties.list` in the Navigator Filter.

Managing models to perform create, read, and update operations on ERP systems

After you create or clone a model, you can specify how Zero Copy Connector for ERP reads, writes, and creates on the ERP system using the model manager page. When managing models, you can use a BAPI, which is an SAP remote procedure call that's similar to an API.

Each model can have only one create, one read, and one update operation defined.

For more information, see Exploring Zero Copy Connector for ERP models.

Create a model

Add a model in Zero Copy Connector for ERP (Enterprise Resource Planning) to create a dataset containing tables from the ERP system to read and send updates to the ERP system.

Before you begin
Role required: sn_erp_integration.erp_admin

This video was recorded in the Zurich release.

https://player.vimeo.com/video/1056865154?h=c516ac73c1&badge=0&autopause=0&player_id=0&app_id=58479%22

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About this task

A model functions as a staging area that contains all potential fields you can add to remote and extraction tables, as well as, create, read, and update operations. You can then use the tables and queried data as a data source on the ServiceNow AI Platform.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP models page by selecting the models icon in the side panel.
3. Select **New**.
4. On the new model tab, fill in the fields.
   For a description of the field values, see Zero Copy Connector for ERP new model field descriptions.
5. Select **Save**.
6. Open the ERP models page again by selecting the models icon.
7. Update the page by selecting the refresh list icon.
   The new model is displayed in the list.

What to do next

After you add a new ERP model, specify additional criteria. For example, which tables it reads and joins, any parameters for inputs and outputs, and whether it uses a BAPI to update the ERP system. For more information, see the following topics:

- Exploring Zero Copy Connector for ERP models
- Add joins between ERP tables

View and edit models

Create a holistic dataset by building ERP (Enterprise Resource Planning) models in Zero Copy Connector for ERP. Models encompass remote tables and extraction tables from the ERP system, as well as create, read, and update operations.

Before you begin

An admin or a user with the sn_erp_integration.erp_admin role must enable the *sn_erp_integration.enableModelModification* property for you to edit, customize, and clone ERP models and tables. The property must be enabled on the correct scope. After enabling the property, Zero Copy Connector for ERP retrieves all tables and BAPIs (Business Application Programming Interface) to use when managing models. The property must be configured for either a non-production or production state. (Enabling the property on a production instance can create metadata records when new models and fields are added in Zero Copy Connector for ERP.) System properties are maintained in the System Property table [sys_properties], which you can access by entering `sys_properties.list` directly in the Navigator Filter.

Role required: sn_erp_integration.erp_admin

About this task

A model functions as a staging area that contains all potential fields you can add to remote and extraction tables, as well as, create, read, and update operations. You can then use the tables and queried data as a data source on the ServiceNow AI Platform.

Zero Copy Connector for ERP provides a standard set of models, such as SAP Material Stock and SAP Purchase Document. For a list, see Standard extraction tables for Zero Copy Connector for

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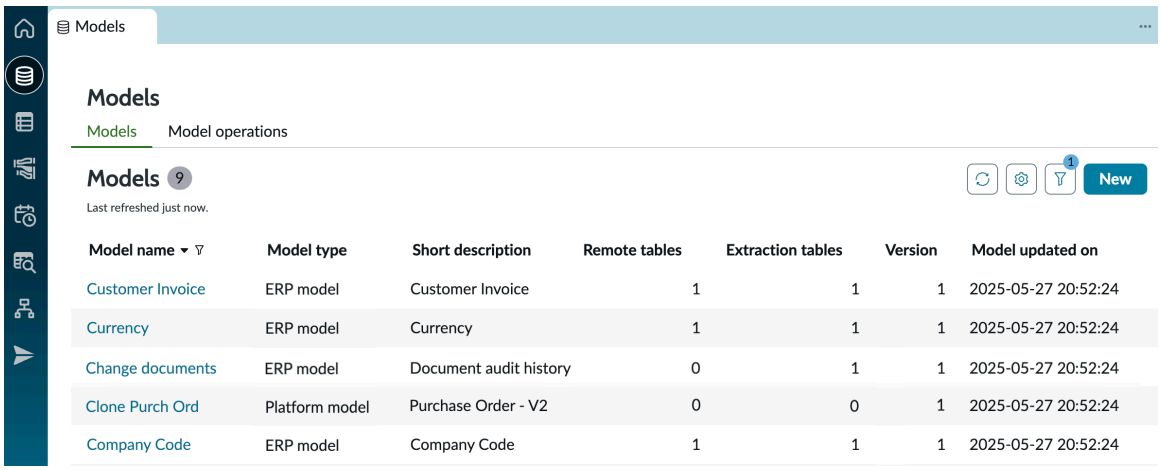
ERP. For information about building new models, see Create a model. Use Zero Copy Connector for ERP data products, sets of predefined models and process extensions, as examples to help you implement and deploy applications with less manual work. For more information, see Zero Copy Connector for ERP content packs.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the models page by selecting the models icon in the side panel.



3. Review the list of ERP models.

Column	Description
Model name	Name of the model.
Model type	ERP model or Platform model.
Short description	Brief description of what the model represents.
Remote tables	Number of remote tables on the ServiceNow AI Platform that are linked to the ERP model.
Extraction tables	Number of extraction tables on the ServiceNow AI Platform that are linked to the ERP model.
Version	Specific variant of the model.
Updated	Date and time the model was last updated.

4. **Optional:** View and work with the following on the **Details** tab of an ERP model:
   - Public comments and private work notes.
   - The Activity stream for the model.
   - File attachments.
5. Select **Save**.
6. View and confirm that the table entities included in the model by selecting the **Model entities** tab of the ERP model record.
   View details for an individual table by selecting the table name in the **Model entities** tab.

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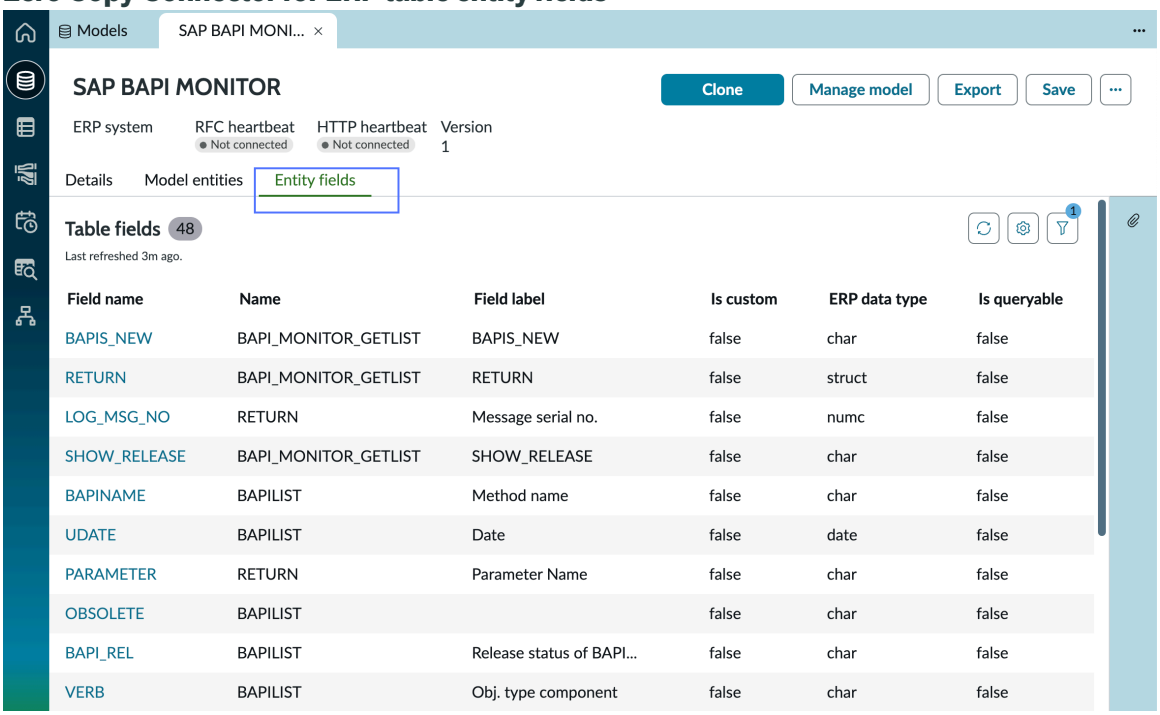
Zero Copy Connector for ERP automatically scans the linked ERP system to retrieve the latest entity data. However, you can select the refresh icon to update the data on demand.

Field	Description
Name	Name of the model table on the ERP system.
Alias	Alias for the table. The alias refers to an alternative or substitute name for the table. An alias enables you to assign and customize a recognizable name for easier reference and identification. The alias can be a maximum of 40 characters, and contain a-z, A-Z, 0-9, and underscores.
Status	Status of the data synchronization, such as **Retrieved table data**.
Updates	Number of times the model entity was updated.

7. **Optional:** Export the list of tables in the model by selecting the **Export** button. You can select the **File type**, such as **JSON** or **Excel**, and the **Delivery type**, such as **Download**.
8. View and confirm the table entity fields included in the ERP model by selecting the **Entity fields** tab of the ERP model record.

   For a description of the field values, see Zero Copy Connector for ERP ERP model table field descriptions.

Zero Copy Connector for ERP table entity fields



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What to do next

After you have noted the available fields and tables, you can add new table entities to a model by managing the model. When you manage the model, you can also create read, update, and create operations using table reads and BAPIs (Business Application Programming Interface). For more information, see Exploring Zero Copy Connector for ERP models.

Clone an ERP model in Zero Copy Connector for ERP

Clone a standard ERP (Enterprise Resource Planning) model that ships with Zero Copy Connector for ERP. After you clone the model you can make modifications, such as adding new fields or tables.

Before you begin

An admin or a user with the sn_erp_integration.erp_admin role must enable the *sn_erp_integration.enableModelModification* property for you to edit, customize, and clone ERP models and tables. The property must be enabled on the correct scope. After enabling the property, Zero Copy Connector for ERP retrieves all tables and BAPIs (Business Application Programming Interface) to use when managing models. The property must be configured for either a non-production or production state. (Enabling the property on a production instance can create metadata records when new models and fields are added in Zero Copy Connector for ERP.) System properties are maintained in the System Property table [sys_properties], which you can access by entering `sys_properties.list` directly in the Navigator Filter.

Role required: sn_erp_integration.erp_admin

About this task

Zero Copy Connector for ERP provides a standard set of models, such as SAP Material Stock and SAP Purchase Document. For a list, see Standard extraction tables for Zero Copy Connector for ERP. For information about building new models, see Create a model. Use Zero Copy Connector for ERP data products, sets of predefined models and process extensions, as examples to help you implement and deploy applications with less manual work. For more information, see Zero Copy Connector for ERP content packs.

Clone ERP models to make customizations so that your changes don't break connections to other ServiceNow AI Platform applications.

Note: You must have permissions to access the model operations to clone a model. For more information, see Operation-level security for models.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP models page by selecting the models icon in the side panel.
3. Select the name of the ERP model that you want to clone.
4. Select **Clone**.
5. In the **Clone this model** modal, enter the new **ERP model name**.

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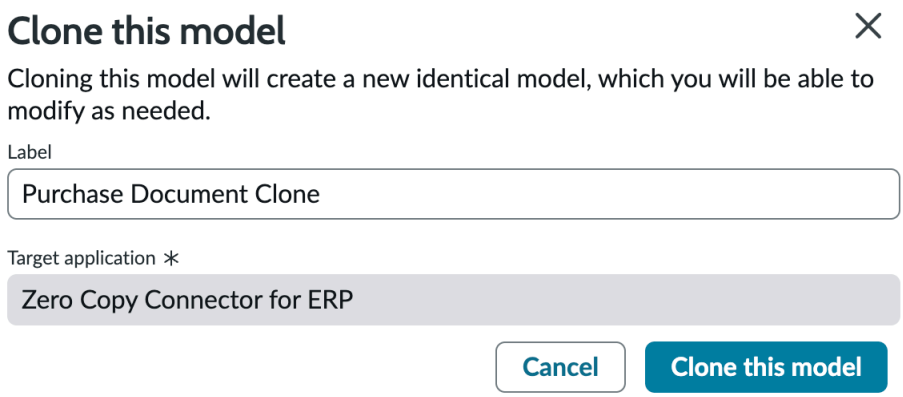

Note: The **Target application** field lists the scope in which the original model was created. The same scope is used for the clone.

6. Select **Clone this model**.
7. **Optional:** Change information about the cloned model on the **Details** tab, such as updating the name.

Warning: Changing the ERP system connected to the ERP model affects the available remote tables and extraction tables. If you change the ERP system, you must confirm the change on a warning modal.

For a description of the field values, see Zero Copy Connector for ERP clone model field descriptions.

Result
The cloned model is created and opens on the model details page.

What to do next
Next, manage the model to specify additional criteria, such as the tables it reads and joins. You can also define create, read, and update operations, and input/output parameters. For more information, see Exploring Zero Copy Connector for ERP models.

Export and import custom models in Zero Copy Connector for ERP

Move a custom ERP (Enterprise Resource Planning) model from one instance to another by exporting and importing a remote update set.

Before you begin
Role required: sn_erp_integration.erp_admin

Confirm that the application scope for the custom model exists on the instance to which you're importing it.

The *glide.attachment.extensions* system property restricts the file types that can be downloaded. This property is empty by default. Check that the XML file extension hasn't been added to this property. For more information, see .

About this task
You might need to move a custom ERP model from one instance to another. For example, after creating a custom ERP model in a non-production instance, you need to move the model to a production or another non-production instance. Export the custom ERP model and all of its related files, such as entities and operations, into an XML file within a remote update set. Then, import the remote update set into another instance.

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The XML file contains:

- Operations
- Entities
- Input fields
- Output fields

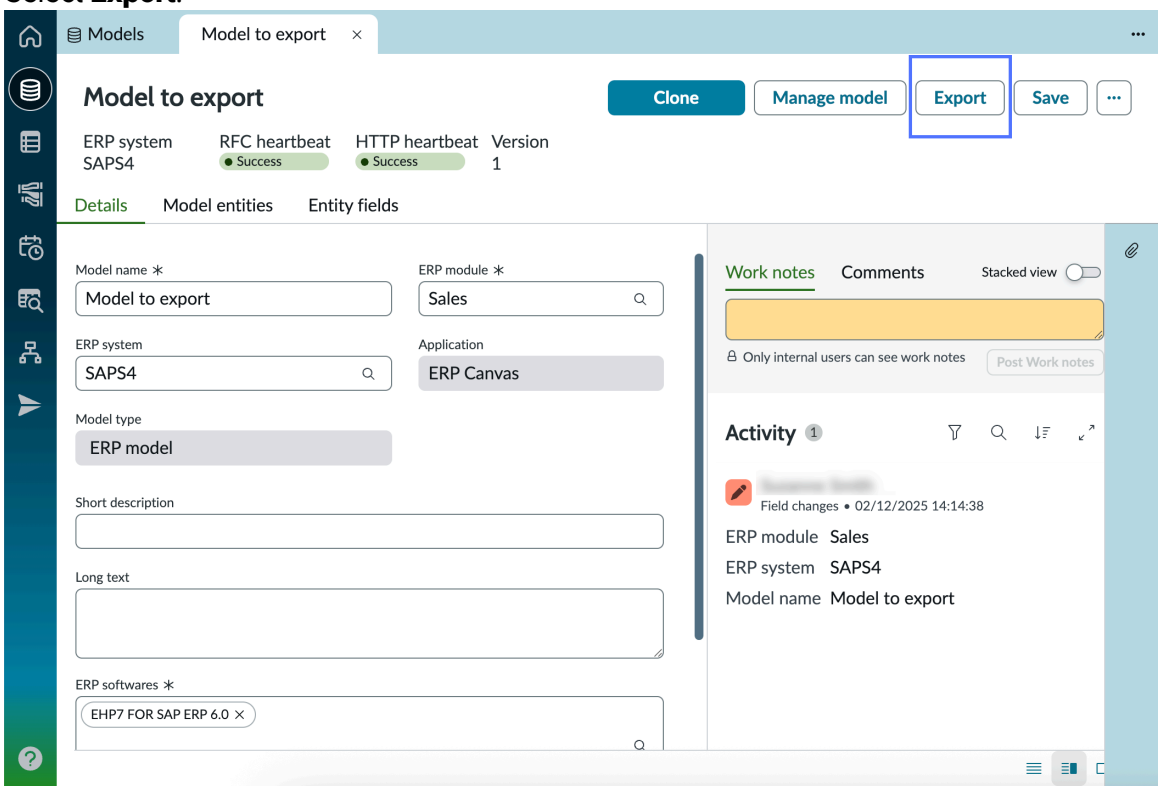
Note the following rules when exporting and importing custom ERP models:

- Internal models can't be exported and imported.
- The system value isn't imported.
- Only one model can be exported at a time.

Note: A new version of the model is created when you export a model. For more information, see Use model versioning.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. On the **Models** page, select the custom model to export.
3. Select **Export**.



4. Specify a location for the downloaded file.
   By default, this location is the downloads folder for Google Chrome and Safari browsers. The export process might take a few minutes depending on the size of the model.
5. Navigate to the download location and confirm that the XML file is there.
   The file name should look similar to **sys_remote_update_set_f08252b6c3da16106f44d1af050131d0.xml**.
6. Open the instance to which you're importing the custom model.

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The following steps use update sets. For general information, see Exploring System Update Sets.

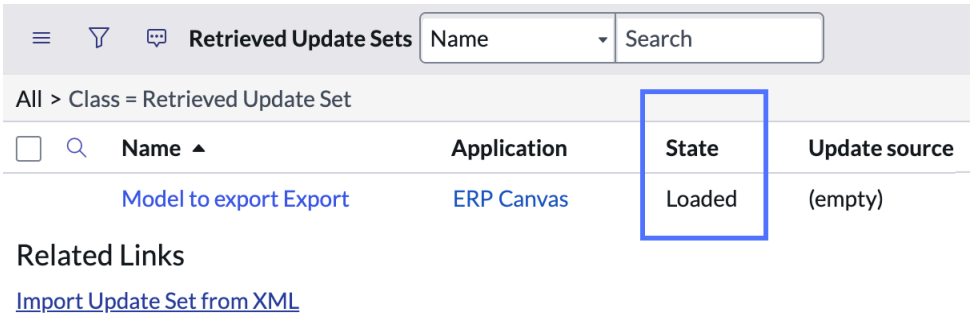
a. Navigate to **All** > **System Update Sets** > **Retrieved Update Sets**.

b. In **Related Links**, select **Import Update Set from XML**.

c. Select **Choose File**, navigate to the XML file you exported, select the file, and select **Open**.

d. Select **Upload**.

The file is imported and displayed in the retrieved update sets list with the **State** set to **Loaded**. If the import fails, check that the application scope for the custom model exists on the instance to which you're importing it.



e. Select the file.

f. Select **Preview Update Set** and check for any errors, such as a collision.
For detailed information about previewing and resolving issues, see Preview a remote update set.

g. When you're finished previewing and have resolved any errors, select **Close**.

h. Select **Commit update set** to create a local copy.
For detailed information about the update set commit process, see Commit an update set.

i. When the local copy is created, select **Close**.

7. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
8. On the **ERP Models** page, find and open the model you imported.
9. Confirm that you're in the correct application scope.
10. Specify an **ERP system**.
11. Make any other necessary changes to the model.
For detailed information about editing and managing models, see Exploring Zero Copy Connector for ERP models.

Use model versioning

Use model versioning in Zero Copy Connector for ERP (Enterprise Resource Planning) to determine the version of a model on development and production instances.

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Before you begin

For versioning to take place, the *sn_erp_integration.enableModelModification* system property must be set to true on your development instance. For more information about the system property, see Building and managing models to work with ERP data.

Role required: sn_erp_integration.erp_admin

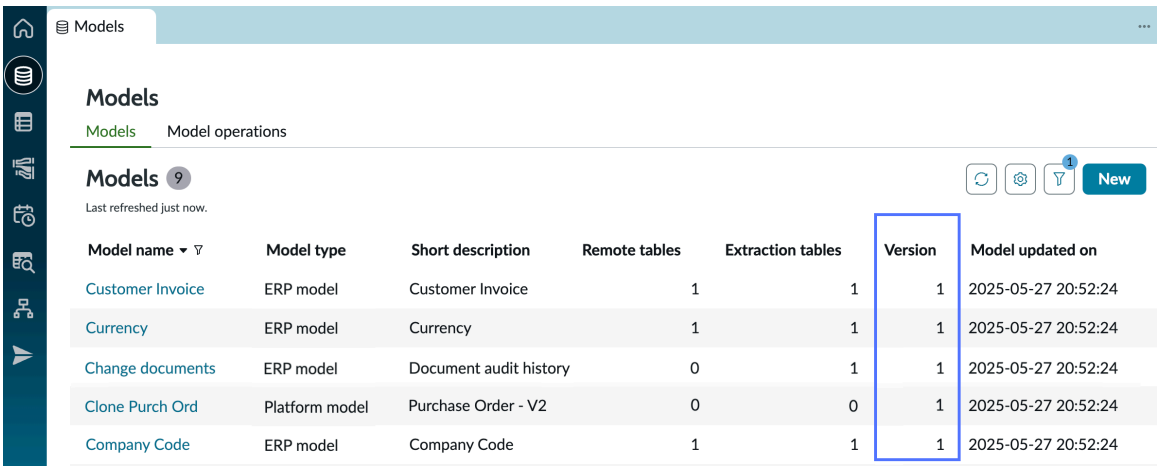
About this task

As you work with model records on a development instance, at certain intervals you're likely to export the model, and then import the model to your production instance. Each time you export a model, the version number increases by one on the development instance. The version number appears in the model list and on individual model records. By checking the model list on your development and production instances, you can easily determine if the most recent version of a model is in use on your production instance.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP models page by selecting the models icon in the side panel.

   View the **Version** column in the list.



Model name	Model type	Short description	Remote tables	Extraction tables	Version	Model updated on
Customer Invoice	ERP model	Customer Invoice	1	1	1	2025-05-27 20:52:24
Currency	ERP model	Currency	1	1	1	2025-05-27 20:52:24
Change documents	ERP model	Document audit history	0	1	1	2025-05-27 20:52:24
Clone Purch Ord	Platform model	Purchase Order - V2	0	0	1	2025-05-27 20:52:24
Company Code	ERP model	Company Code	1	1	1	2025-05-27 20:52:24

3. Select a model in the list to open a record.

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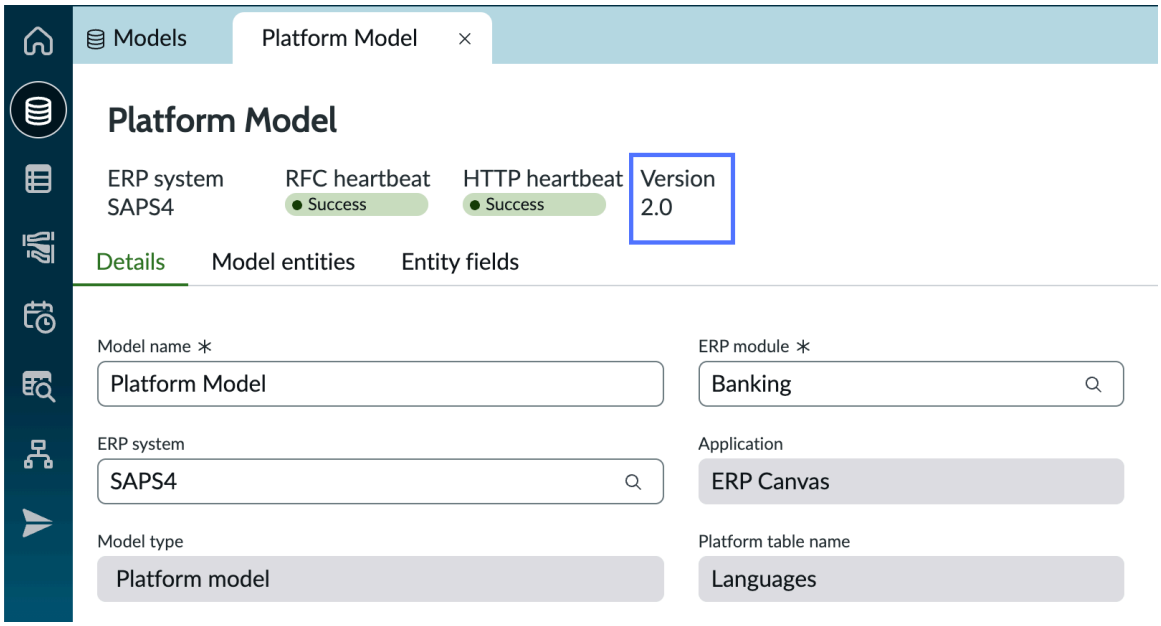
4. View the version on the individual model record.



Adding an entity to a model

Specify the operation entity that Zero Copy Connector for ERP (Enterprise Resource Planning) uses for read, update, or create operations.

Using model entities in Zero Copy Connector for ERP

Specify the entity that a model uses for read, update, or create operations.

You must have the sn_erp_integration.erp_admin role to create and edit models.

- Read operations retrieve ERP data by reading a table or using a BAPI, RFC, or OData.
- Update operations use a BAPI, RFC, OData, or IDoc to write updates to the ERP system.
- Create operations use a BAPI, RFC, OData, or IDoc to create an instance of the business object in the SAP system.

Add a read table entity to a model operation

Specify the read table entity that a Zero Copy Connector for ERP (Enterprise Resource Planning) model uses for a read, update, or create operation.

Before you begin

The read, update, or create operation must be added before an entity can be added to it. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model to add an operation entity to.
4. Select the **Manage model** button.

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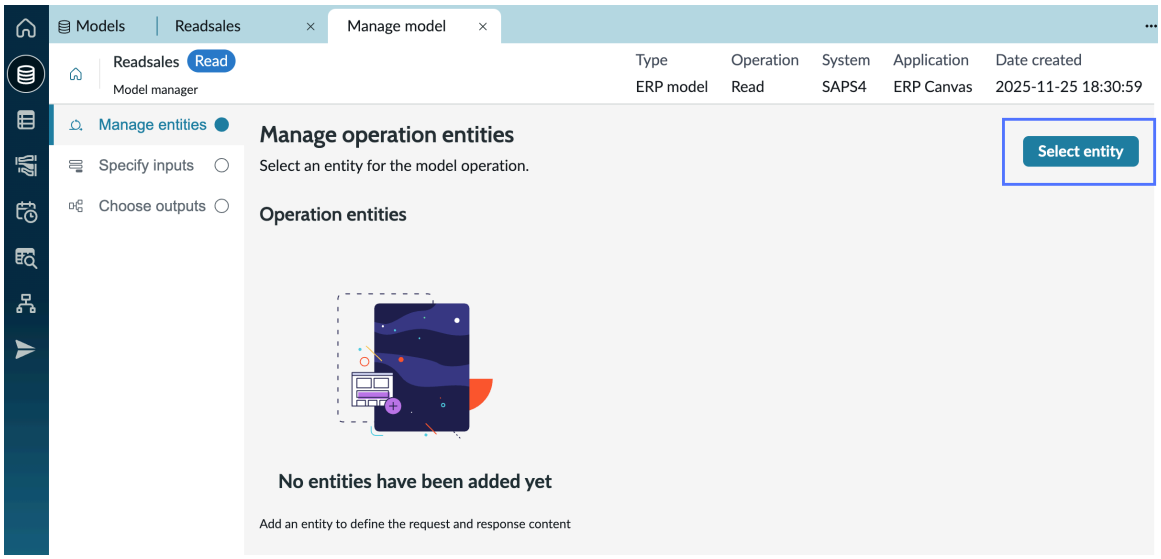
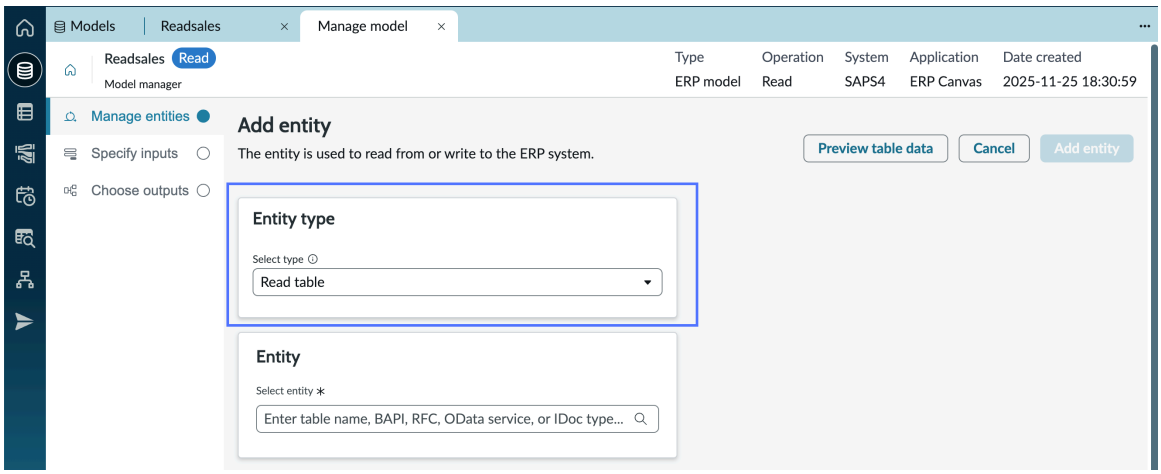
5. Select an operation, for example, a **Read** operation.
6. Select **Select entity** on the **Manage entities** tab.



7. Select a type, for example, **Read table**.



You can select **Preview table data** to view table details before specifying an entity. For more information, see Preview read table entities in Zero Copy Connector for ERP.

8. Select an entity, for example, a read table name.

   The AI Search for this field helps you find entities faster, for example, by entering `Countries` instead of `T005`.

   For table read operations, you may need to check the **Model entities** tab of the current or another related model to get the table name. Alternatively, ask your SAP administrator. For more information, see View and edit models.

9. Select **Add entity**.

   The entity card shows the date and time when the information was last retrieved.

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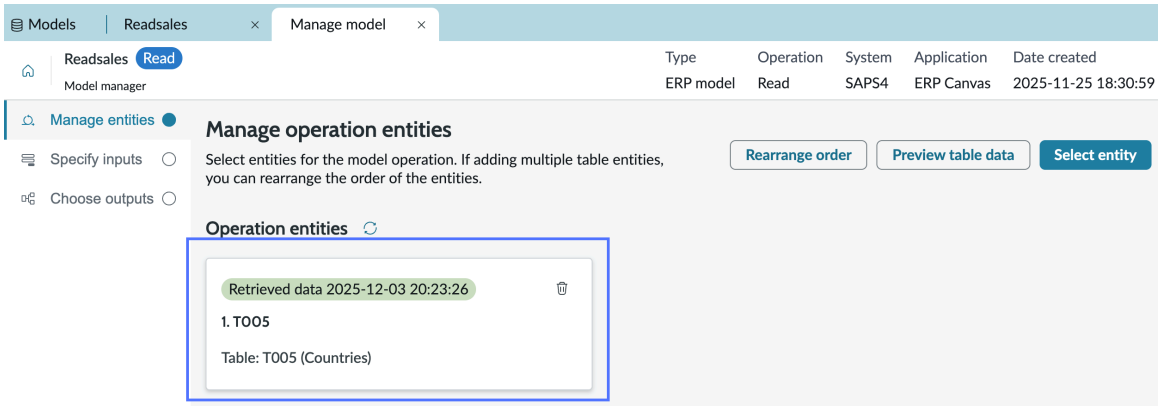

10. **Optional:** Rearrange and delete table entities as needed.

Important: Reordering deletes any existing table joins for the reordered entities.

a. Select **Rearrange order**, drag the tables to the order that you want, and select **Confirm reorder**.

b. To remove any tables you don't need, select the delete icon on the card for a table.

(Optional) Deleting an entity removes all of its related field mappings and table joins.

Preview read table entities in Zero Copy Connector for ERP

Preview read table entities in Zero Copy Connector for ERP (Enterprise Resource Planning) to examine and verify the entity before adding it to a model.

Before you begin

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model to which you want to add a read table entity.
4. Select **Manage model**.
   If you have a read operation already, skip to step 8.
5. Select **Add model operation**.
6. In **Select type**, select **Read**.
7. Select **Save and continue**.
8. Select the **Read** operation tile.
9. Select **Select entity**.
10. In **Select type**, select **Read table**.
11. Select **Preview table data**.

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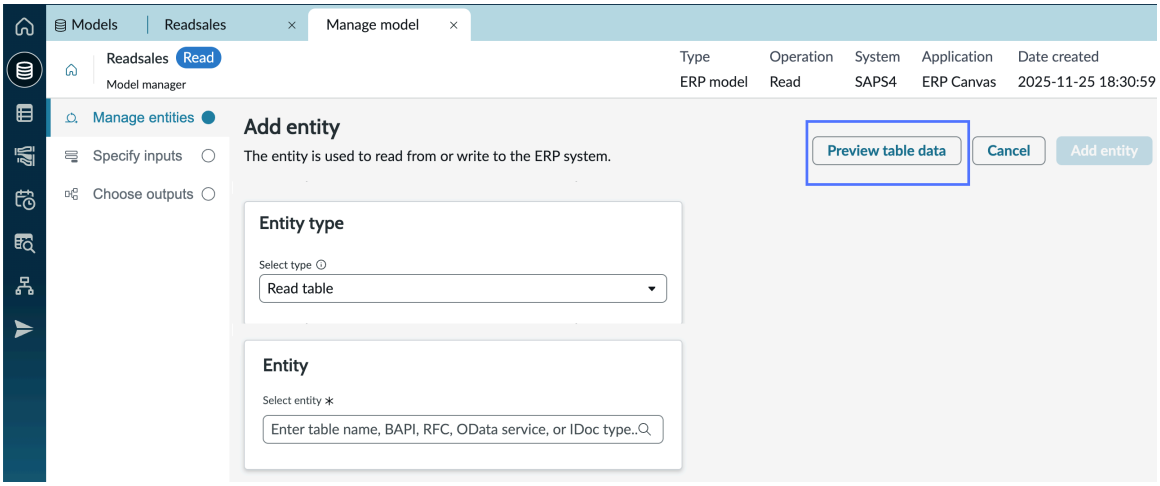
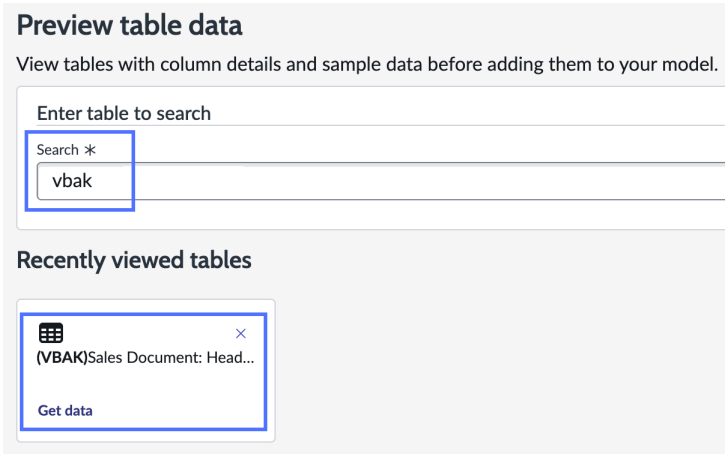
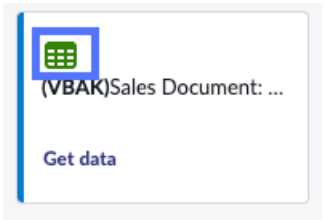


12. In **Search**, start entering any part of a table name and make a selection from the list.
13. In **Recently viewed tables**, select **Get data** on the table tile to obtain real-time data.



After the data is retrieved and available to view, the icon on the table tile turns green.



14. Select the tile.
15. Explore the information available for the table.

    Ten rows of randomly selected records are displayed. Use the **Query** option to search for a specific record.

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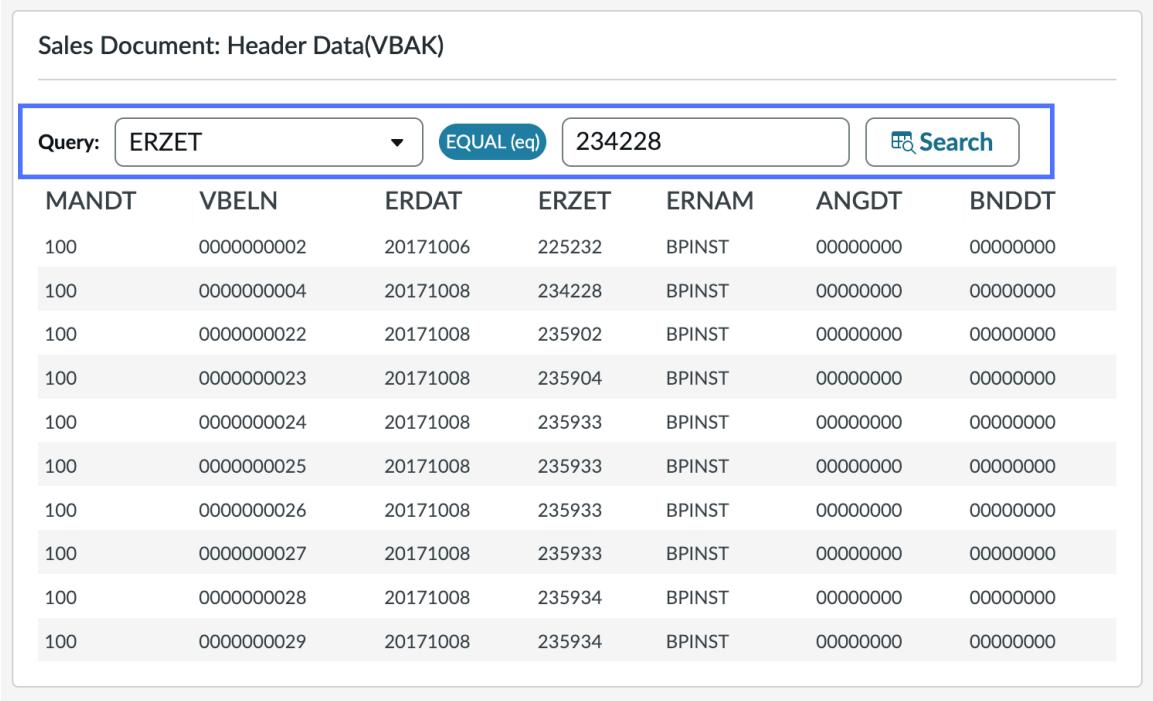
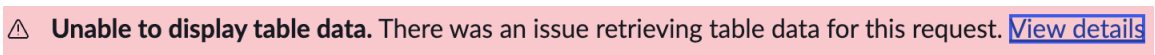
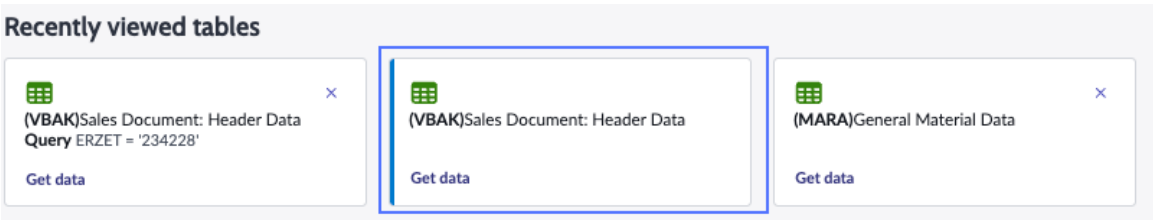


MANDT	VBELN	ERDAT	ERZET	ERNAM	ANGDT	BNDDT
100	0000000002	20171006	225232	BPINST	00000000	00000000
100	0000000004	20171008	234228	BPINST	00000000	00000000
100	0000000022	20171008	235902	BPINST	00000000	00000000
100	0000000023	20171008	235904	BPINST	00000000	00000000
100	0000000024	20171008	235933	BPINST	00000000	00000000
100	0000000025	20171008	235933	BPINST	00000000	00000000
100	0000000026	20171008	235933	BPINST	00000000	00000000
100	0000000027	20171008	235933	BPINST	00000000	00000000
100	0000000028	20171008	235934	BPINST	00000000	00000000
100	0000000029	20171008	235934	BPINST	00000000	00000000

Note: If no records are found when querying, an error message is displayed. Select the **View details** link to open a new browser tab containing information about the error.



To return to the unfiltered list, select the tile in **Recently viewed tables**.



The **Selected fields** section contains the columns that are displayed in the records list.

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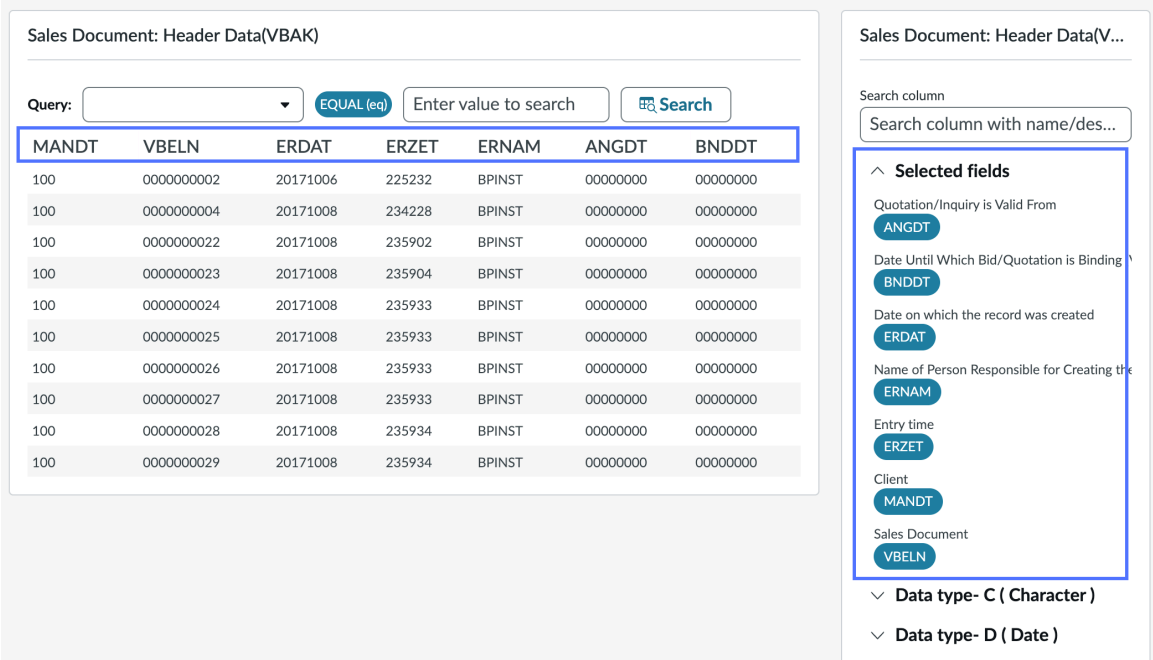

All fields associated with the table are listed and are categorized based on data type, such as date or time. Edit the **Selected fields** section by selecting a pill to remove it from the list or expanding a category and selecting a pill to add it to the list.

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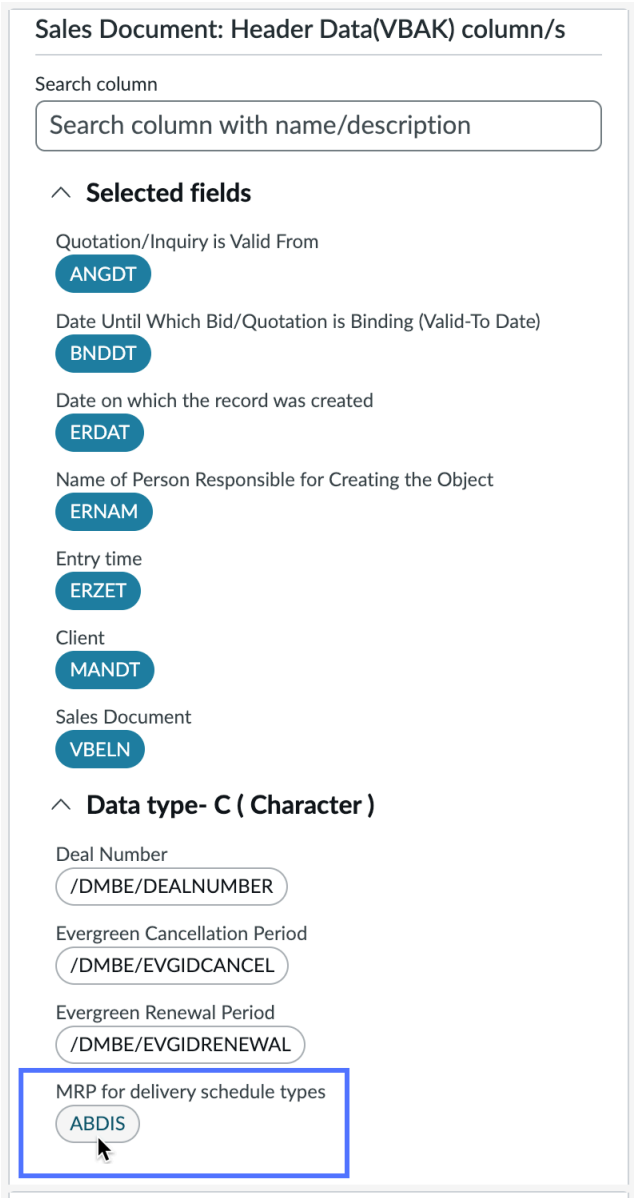

Note: Add no more than 7-8 fields to the **Selected fields** list so information is displayed clearly in the records list.

To find a specific field, use the search. Keywords you enter are used to search the description, table type, and the table name.

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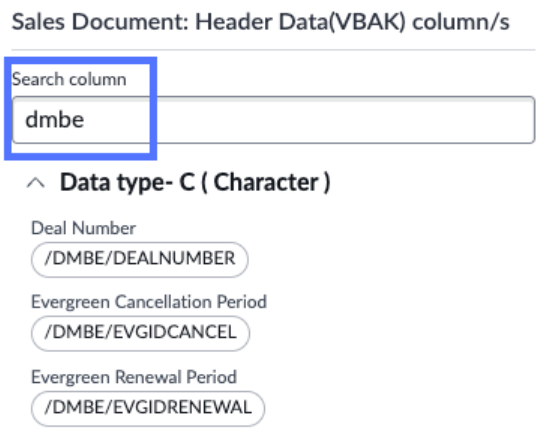
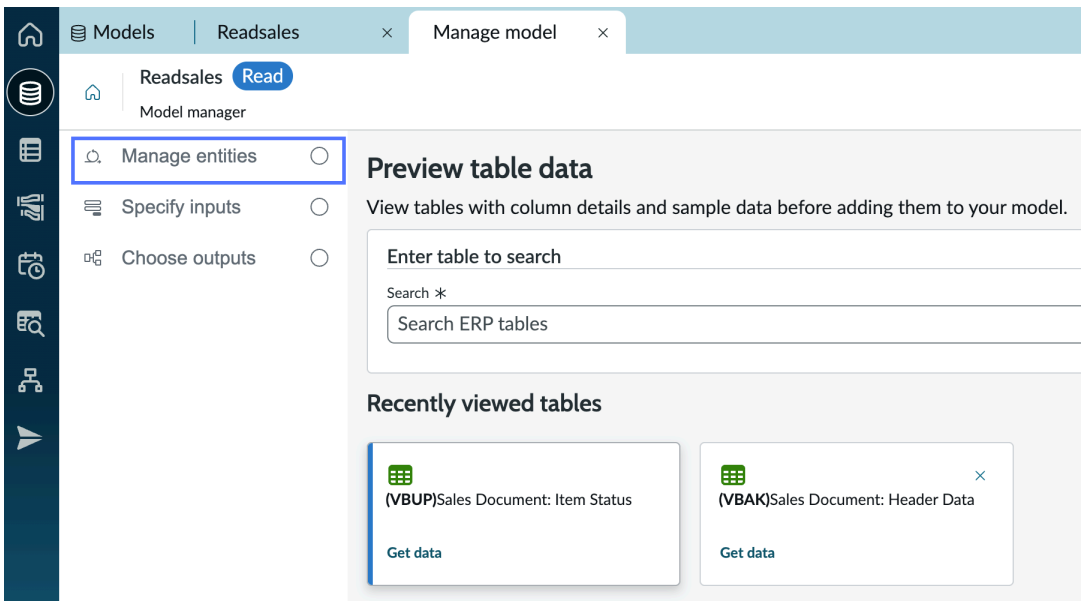


16. Continue to search for tables or select table tiles in **Recently viewed tables** and explore the table contents.

What to do next

After viewing tables, select **Manage entities**, then **Select entity**. In **Select type**, select **Read** and in **Select entity** specify the table for the read operation to use.



For detailed information about adding entities, see Adding an entity to a model.

Add an operation to a model in Zero Copy Connector for ERP

Add an operation to an ERP (Enterprise Resource Planning) model in Zero Copy Connector for ERP to define how the model retrieves data, writes data, or creates a new instance of the business object.

Before you begin

Role required: sn_erp_integration.erp_admin

This video was recorded in the Zurich release.

https://player.vimeo.com/video/1170449051?h=5048109ac6&badge=0&autopause=0&player_id=0&app_id=58479%2Fembed%22

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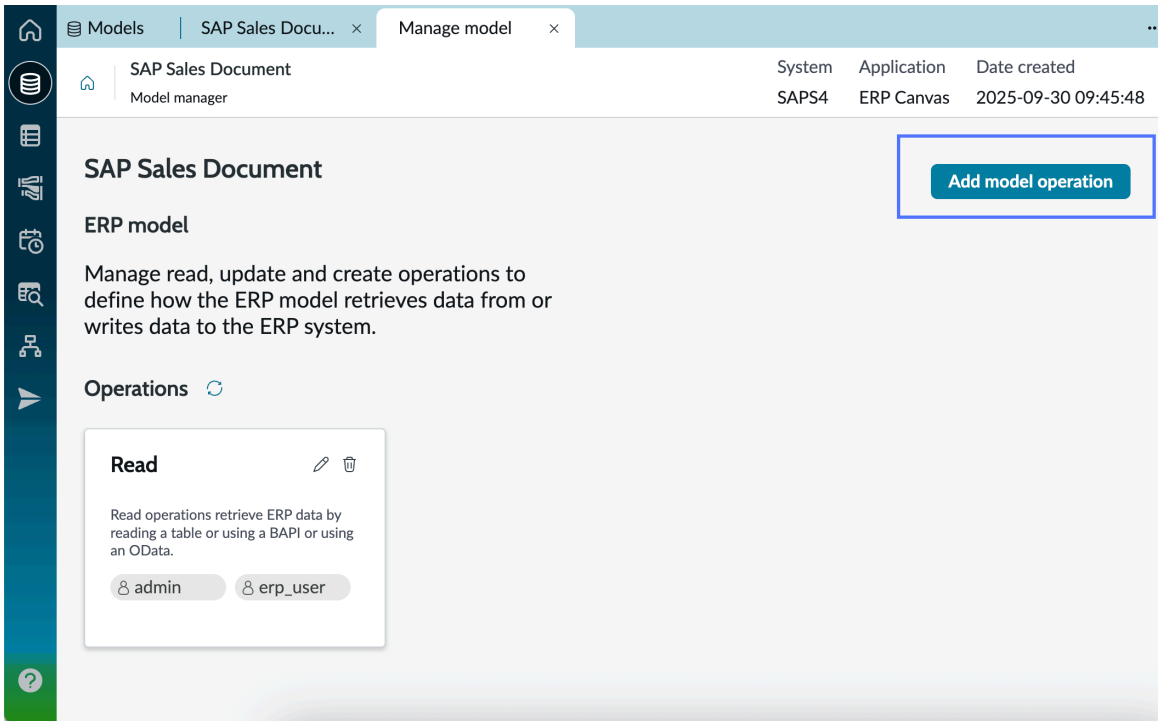
- Read operations retrieve ERP data by reading a table or using a BAPI, RFC, or OData.
- Update operations use a BAPI, RFC, OData, or IDoc to write updates to the ERP system.
- Create operations use a BAPI, RFC, OData, or IDoc to create an instance of the business object in the SAP system.

Note: For update operations where ETag is required and OData services are used, the ETag is fetched by default and sent with the update call. Verify that you don't make overriding changes.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model to which you want to add an operation.
4. Select the **Manage model** button.
5. Select **Add model operation**.



6. In the **Select type** field of the **Add operation** modal, specify the type of operation you're adding.
   - **Update** sends data back to write to the ERP system.
   - **Read** reads and retrieves data from the ERP system and brings it onto the ServiceNow AI Platform.
   - **Create** is used to create a new instance of the business object in the SAP system.

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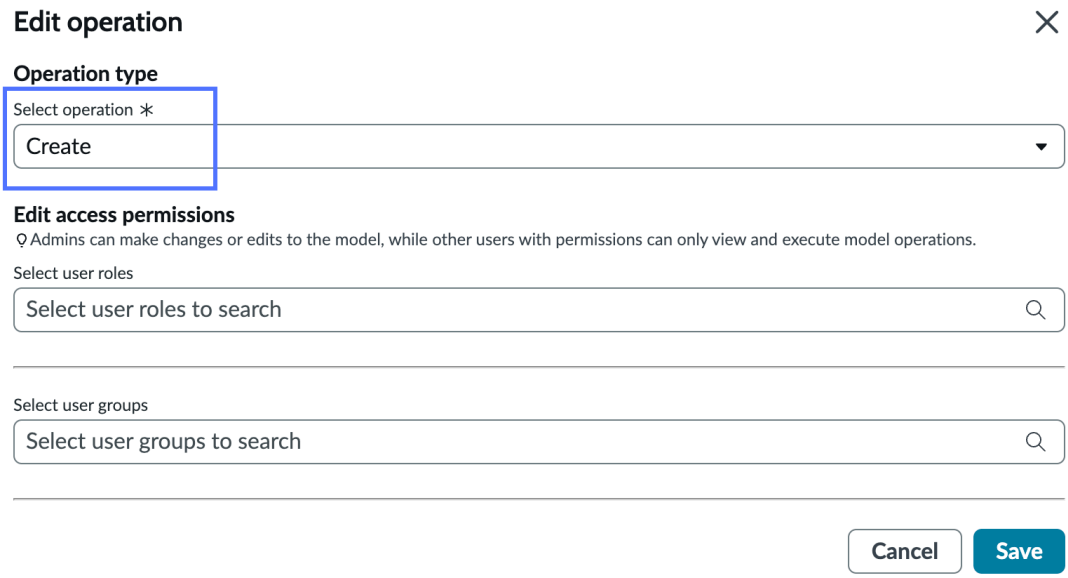
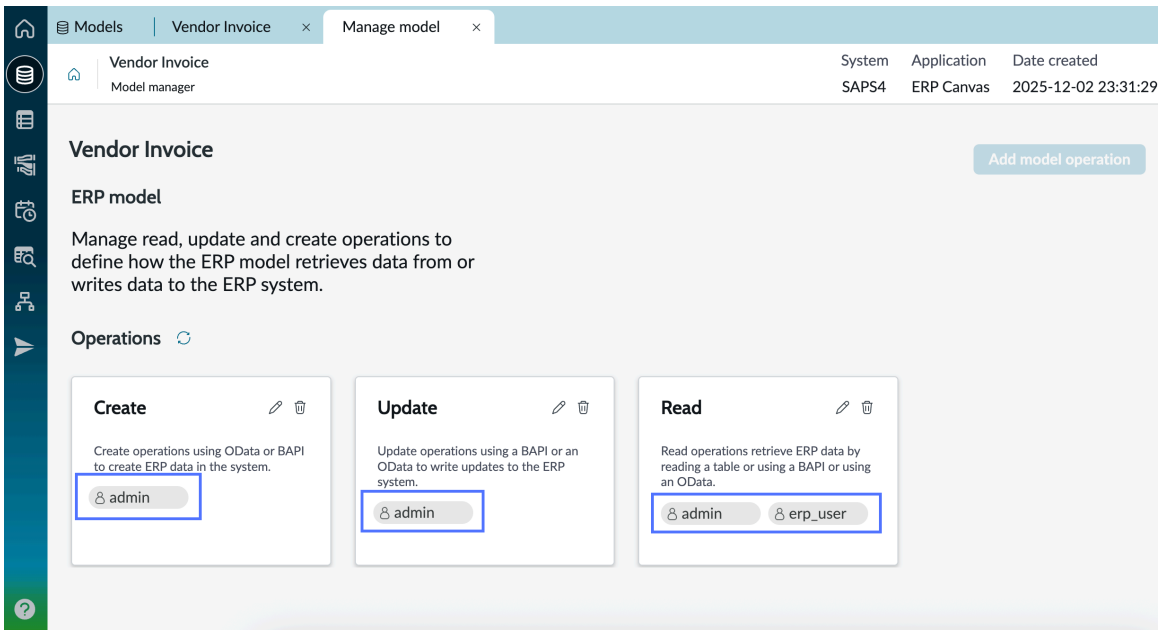


7. Select at least one user role or group that can read or run the model operation.
   To prevent disruptions, all existing model operations have been assigned the admin role and the erp_user role by default. You can edit these permissions on the existing operations at any time to suit your needs. To change the permissions, select the edit (pencil) icon on the model operation card. For more information about model operation security, see Operation-level security for models.
8. Select **Save and continue**.

   The operation tile is displayed with the roles and groups you added.



Result

The foundation of the operation is created.

What to do next

Next, you must add the read or update entity to the operation. For more information, see Adding an entity to a model.

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You can select the delete icon ( ) on the operation's card to remove any operations you don't need, or to start over.

Operation-level security for models

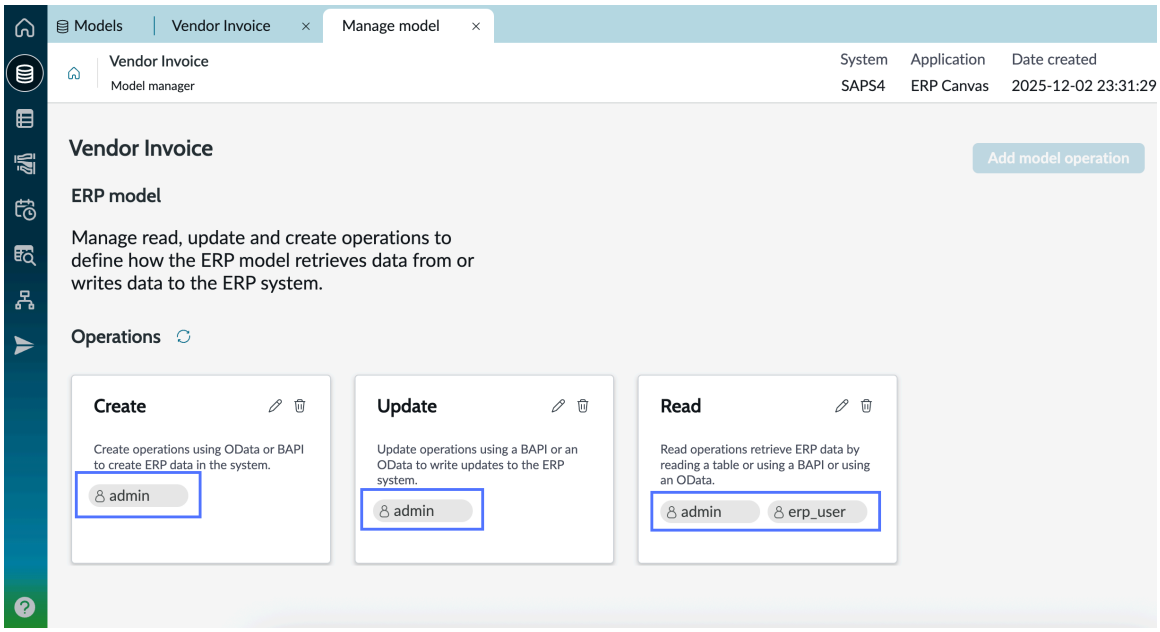
Control access to model operations with user roles and groups.

Model operation security

You must have the sn_erp_integration.erp_admin role to create and edit models.

In Zero Copy Connector for ERP, new permission rules for model operations require you to have a specified role or be part of a specified user group to execute model operations. Each model operation must have at least one user role or one user group specified. You can add multiple user roles and groups as needed.

On a single model, different operations can have different permissions. For example, a financial data model can have some users with only read access to review data, but they can't update or create a financial record. For that same model, you can give other users or groups access to update and create financial records.



Security of existing operations

To help prevent disruptions, all existing model operations have been assigned the admin role and the erp_user role by default.

You can edit these permissions on the existing operations at any time to suit your needs. To change the permissions, select the edit (pencil) icon on the model operation card.

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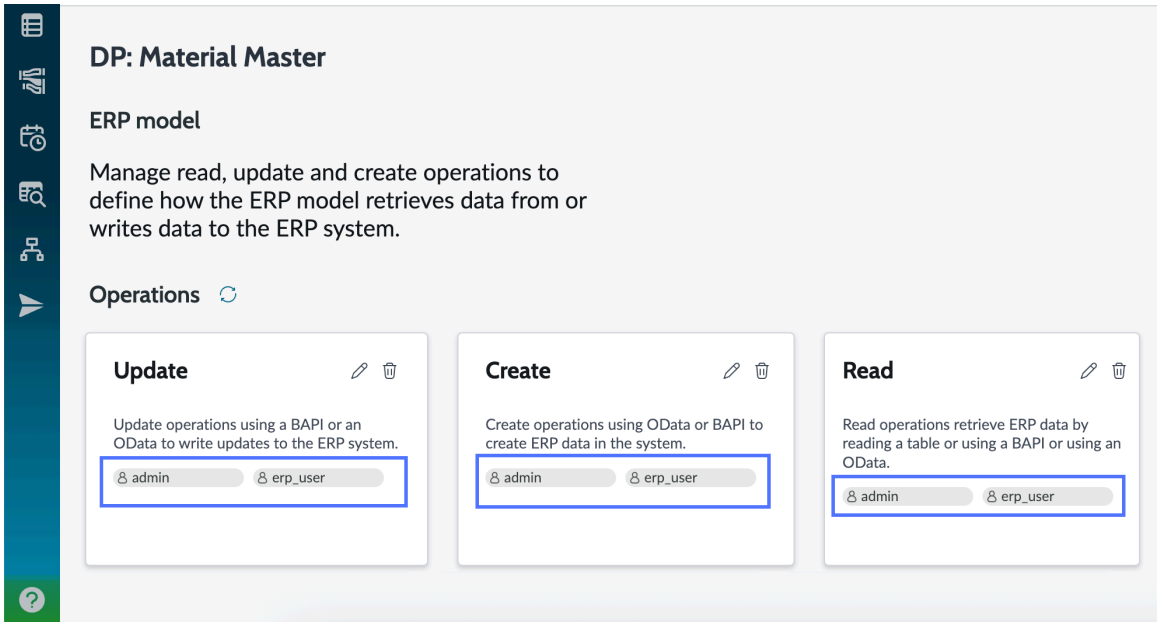

Additional resources

To learn more about adding an operation, see Add an operation to a model in Zero Copy Connector for ERP.

To clone a model, you must have permissions to access the model operations. For more information, see Clone an ERP model in Zero Copy Connector for ERP.

Add joins between ERP tables

Link multiple ERP (Enterprise Resource Planning) tables to build an ERP model in Zero Copy Connector for ERP using table joins.

Before you begin

Table joins require a read operation that uses table read entities. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

When you add table joins, the parent table is the first table listed on the **Manage entities** tab of the ERP model manager page. Child tables pull information from the parent table.

Note:

- If you have more than one table for an operation, you must join the tables.
- You can create table joins only for table read operations, not for operations that use a BAPI (Business Application Programming Interface).

Role required: sn_erp_integration.erp_admin

About this task

Table joins link different tables through shared fields. Joins enable you to access data from multiple tables based on logical relationships between them. The relationship can be conditional, which you specify using join conditions. Use inner joins or outer joins. An inner join returns records that have matching values in both tables. Outer joins combine left and right join results to return all rows with matches or NULLS.

Join fields defines the common attribute or key used to connect records in a child table with their corresponding parent records.

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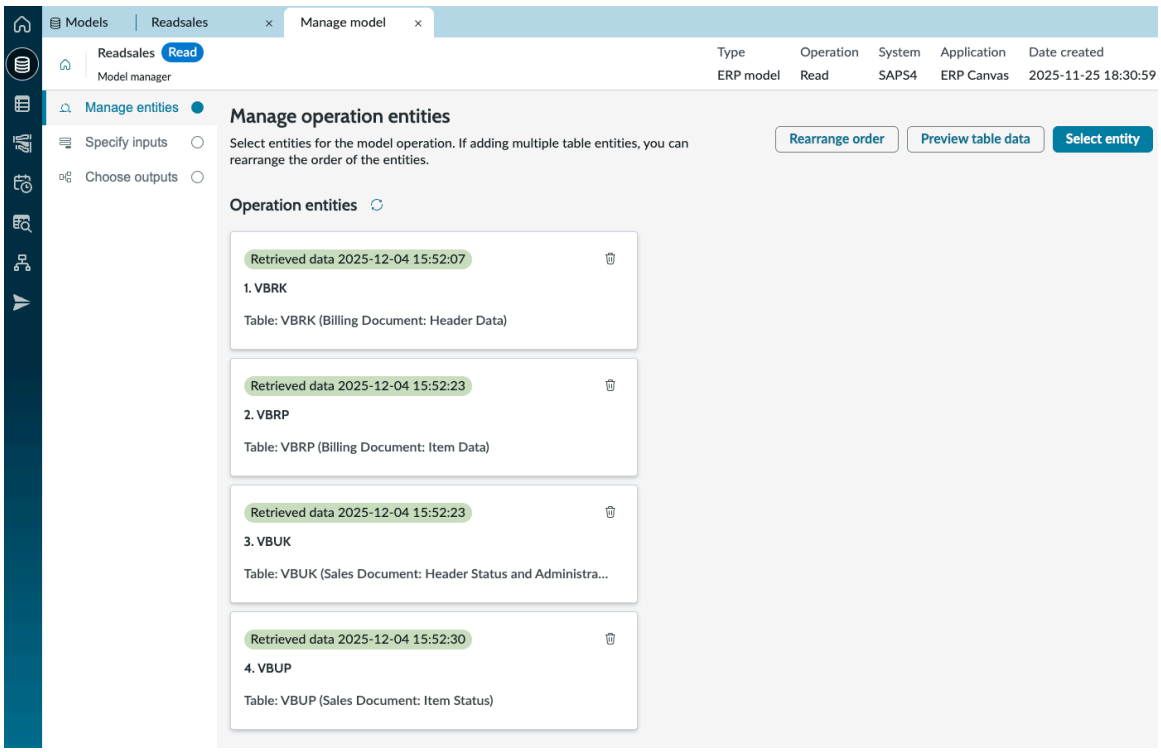
Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model that you want to add a join to.
4. Select the **Manage model** button.
5. Select the **Read** operation that you're adding the table join to.
6. **Optional:** Add the tables to join as **Table read** operation entities if they haven't yet been added to the model.

   (Optional) For more information, see Adding an entity to a model.



7. Rearrange the tables on the **Manage entities** tab to place the parent table for the join as the first table listed on the ERP model manager page.

   Important: Reordering deletes any existing table joins for the reordered entities.

   a. Select the **Rearrange order** button.

   b. Drag the tables to the order that you want, with the parent table as the first table listed on the page.

   c. Select the **Confirm reorder** button.
8. Select the **Specify inputs** tab, which is where you update input parameters to specify table join as a parameter.
   The input parameters for each table appear.
9. Create a table join parameter.

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a. In the **Output parameter(s)** section, identify the parameter that will be the parent join field and note its name.

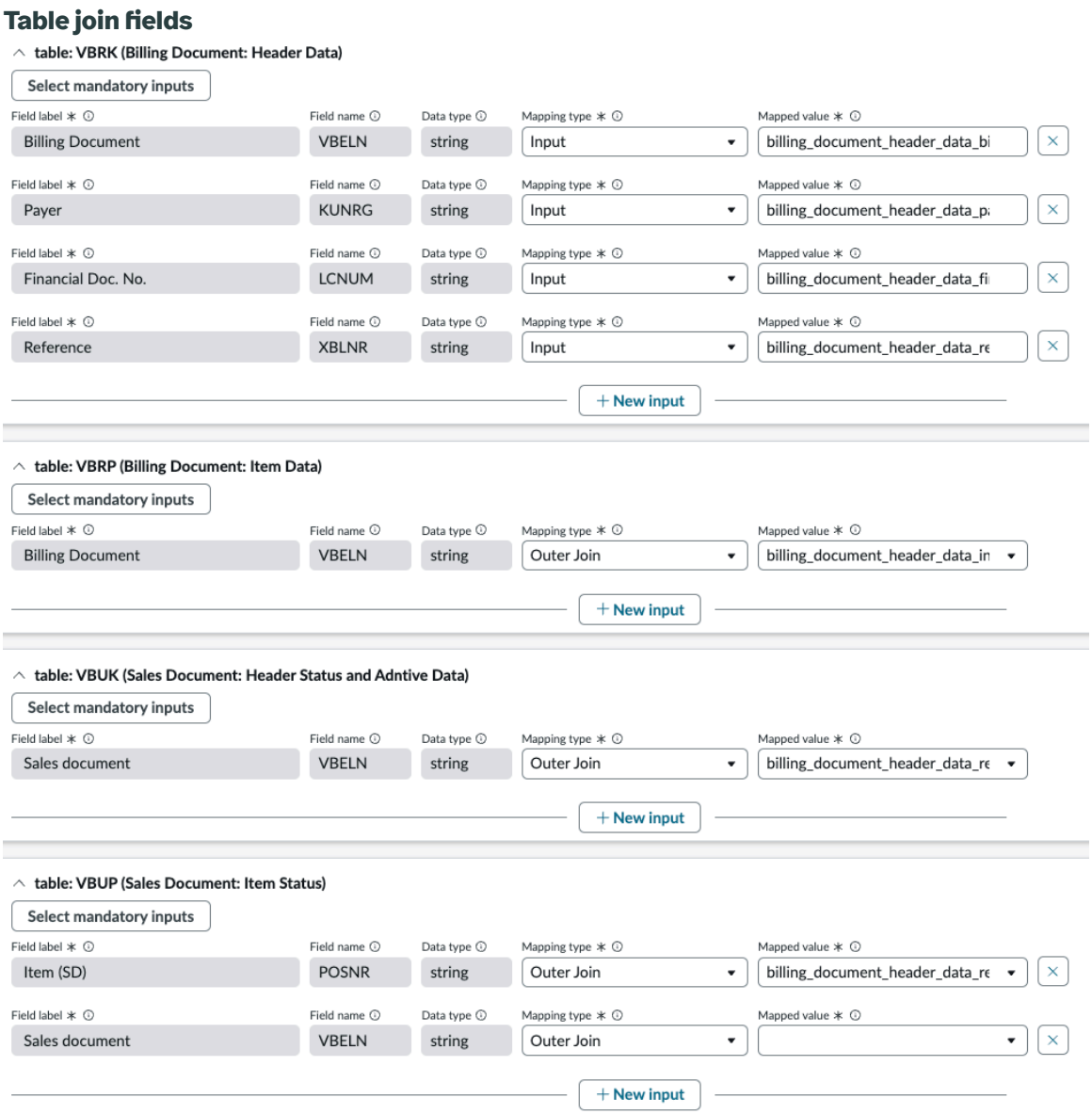
b. Add a new mapped field row in the table by selecting the add (+) icon.

c. Enter or select the parent join **Field name** in the new field row.

d. Select **Join** from the **Type** field.
The value in the child table **Mapped value** field updates automatically with the joined field name.

For example, in the SAP Material Stock model, you can specify **Material** as the parent field in the **Field name** field, and join it to the material ID by entering `mard_material_matnr` in the parent **Mapped value** field.

e. Select **Save**.



10. Optional: Add or update any output parameters as needed in the Output parameters section.

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The joined parameter that you added to as an input is automatically added to the **Choose output** tab.

For more information, see Choose output parameters for a model.

Result

After you're done creating table joins, you can specify where the returned ERP data goes, and build flows that retrieve and output the data. For more information, see the following topics:

- Specifying where ERP system data is saved
- Building flows to read or update the ERP system

Zero Copy Connector for ERP model management

Manage model inputs, outputs, and mappings.

Manage input parameters for a model operation

Specify how fields on the ERP (Enterprise Resource Planning) system map to input parameters and their values. Mapping defines the inputs for an operation that reads, creates, or updates the ERP system from Zero Copy Connector for ERP.

Before you begin

Role required: sn_erp_integration.erp_admin

About this task

If you're already in the process of managing a model and ready to specify inputs, you can skip to step 5.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP model page by selecting the models icon in the side panel.
3. Select the model with the operation that you want to add inputs to.
4. Select **Manage model**.
5. Open a model operation.
   If you don't have a model operation, add one to the model. For more information, see Add an operation to a model in Zero Copy Connector for ERP.
6. Check that at least one entity is listed.
   If you don't have an entity, add one to the operation. For more information, see Adding an entity to a model.
7. Select **Specify inputs**.
   The required parameters for the operation appear in both of the following places:
   - The Operation parameters section.
   - The Table/Functioncall section, where you define the parameters the operation uses. The Table section appears for read operations, and the Functioncall section appears for BAPI (Business Application Programming Interface) operations.

     Zero Copy Connector for ERP automatically suggests mappings between table fields in source systems and target models. For example, map the fields of source table "purchase order - v2" with the fields of a relevant target table such as "platform table purchase order." This reduces the amount of manual work to do, while still giving you control to edit the

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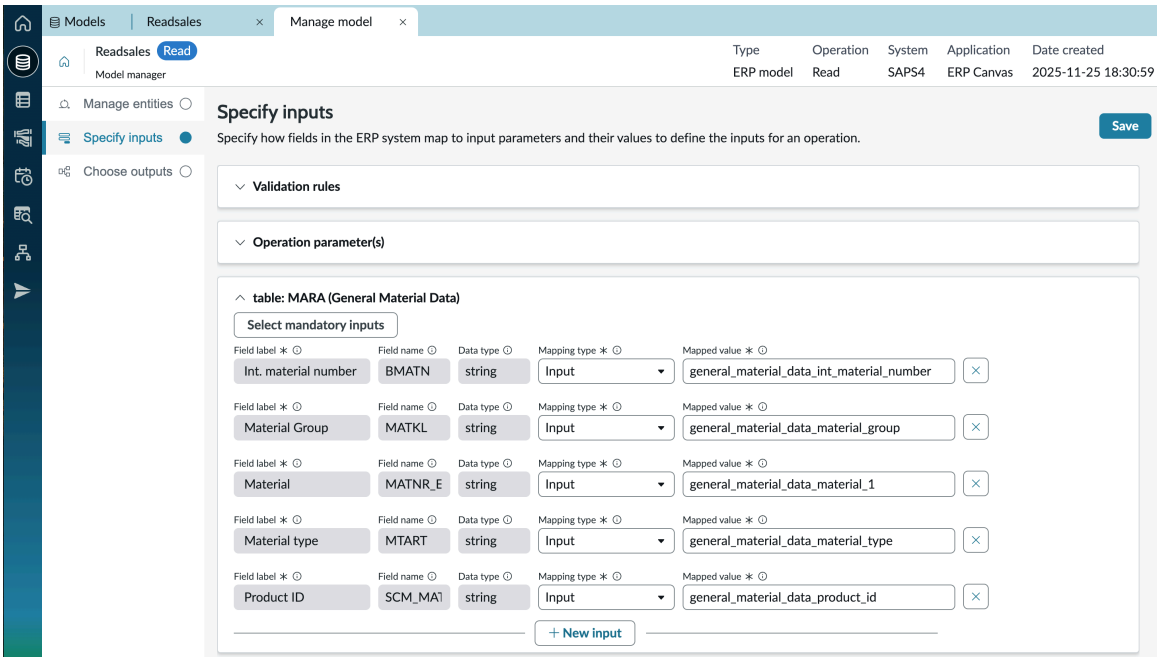
mappings as needed. For more information, see Zero Copy Connector for ERP AI semantic field mapping.

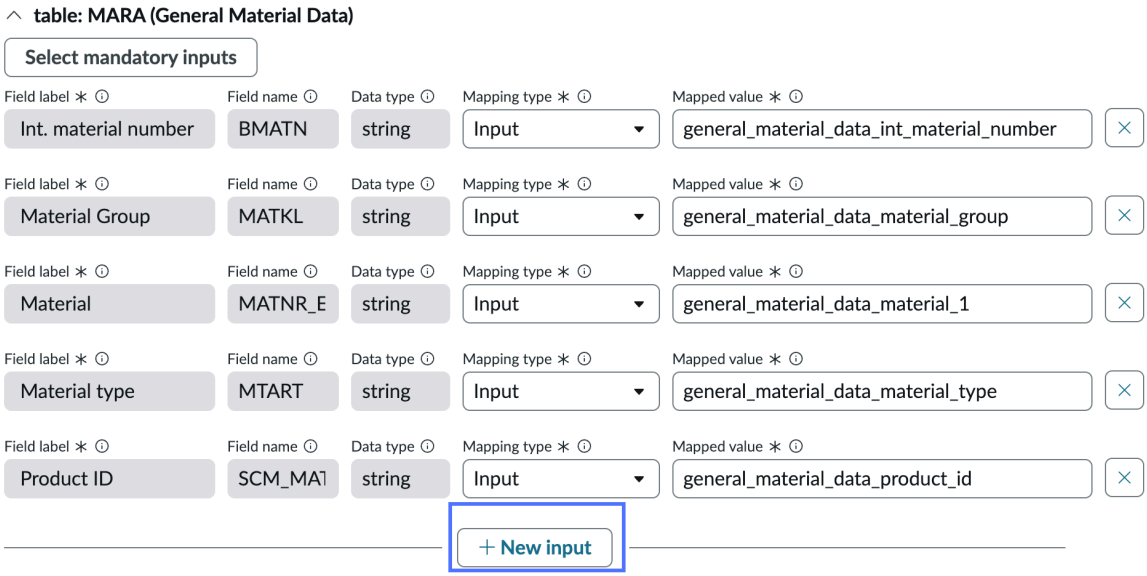
Mapped value names in inputs and outputs are generated automatically, but you can edit the names manually. For more information, see Edit input and output mapped value name in Zero Copy Connector for ERP.



8. Review the required and optional parameters that are already defined for the operation to understand what you must add.
9. Define a new input parameter to be sent when querying the ERP system.
   For table read operations, a Tables section appears in the mapped table fields section for each defined table entity. Make sure that you're adding the parameter for the correct table.

   Note: It doesn't matter what order you define parameters in. Zero Copy Connector for ERP displays optional parameters in alphabetical order when you save.

   a. Select **+ New input** below the last-defined parameter in the table.



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Note: When you add an input field, the field is automatically added as a field in the output. The field is listed and is read only in the **Prepopulated outputs** section on the output page.

b. Fill in the fields to define the parameter.

Fields to define an input parameter

Field	Description
Field label	Name of the field from the ERP system that you're defining as a parameter. Zero Copy Connector for ERP automatically retrieves fields from the table defined in the operation entity.
Field name	(Read-only) Name of the field in the ERP system.
Data type	(Read-only) Automatically populated value that specifies the type of data the parameter contains.
Mapping type	Definition of how the parameter is sent. ▪ **Input** parameters have their **Mapped value** automatically populated. ▪ **Constant** defines a parameter whose value never changes, for example, to use as filter criteria. You must specify the value in the parameter's **Mapped value** field. ▪ **Outer or Inner Join** (table read operations only) indicates that you're creating a table join. For more information, see Add joins between ERP tables.
Mapped value	Specific value of the parameter. ▪ For **Input** parameters, accept the system-generated name or edit the name. For more information about editing mapped values, see Edit input and output mapped value name in Zero Copy Connector for ERP. ▪ For **Constant** parameters, enter a set value that's always sent for the parameter. ▪ For **Outer or Inner Join** parameters, select the field to join the parameter with. For details on creating joins, see Add joins between ERP tables.

If you're adding a complex, nested parameter, such as an address that includes other parameters (for street, for city, etc.), Zero Copy Connector for ERP automatically identifies that it needs additional related parameters. Zero Copy Connector for ERP creates new, nested parameter rows that you must then populate with the related values. You can nest only parameters with **Object** or **Array** as the **Data type**.

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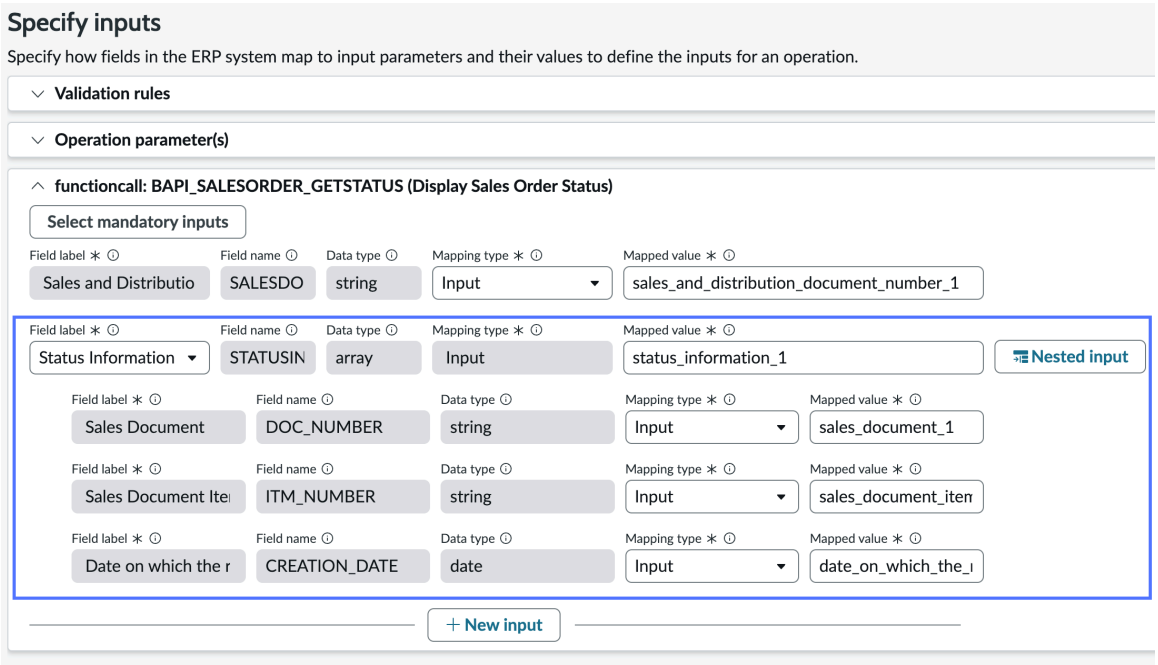
10. **Optional:** Remove any optional parameters that you don't need when querying the ERP system by selecting the remove (X) icon.
11. Make any additional edits to existing parameters.

    The following example shows an input with nested inputs for a BAPI.



12. Select **Save**.

What to do next

Next, check the output parameters for the operation and update as needed. For more information, see Choose output parameters for a model.

Choose output parameters for a model

Specify output parameters for a model operation in Zero Copy Connector for ERP to define which ERP fields map to the ServiceNow AI Platform and how the returned data is stored.

Before you begin

Role required: sn_erp_integration.erp_admin

About this task

If you're already in the process of managing a model and ready to specify outputs, you can skip to step 5.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the model page by selecting the models icon in the side panel.
3. Select the model that you want to add a read operation to.
4. Select the **Manage model** button.
5. Open a model operation.
   If you don't have a model operation, add one to the model. For more information, see Add an operation to a model in Zero Copy Connector for ERP.

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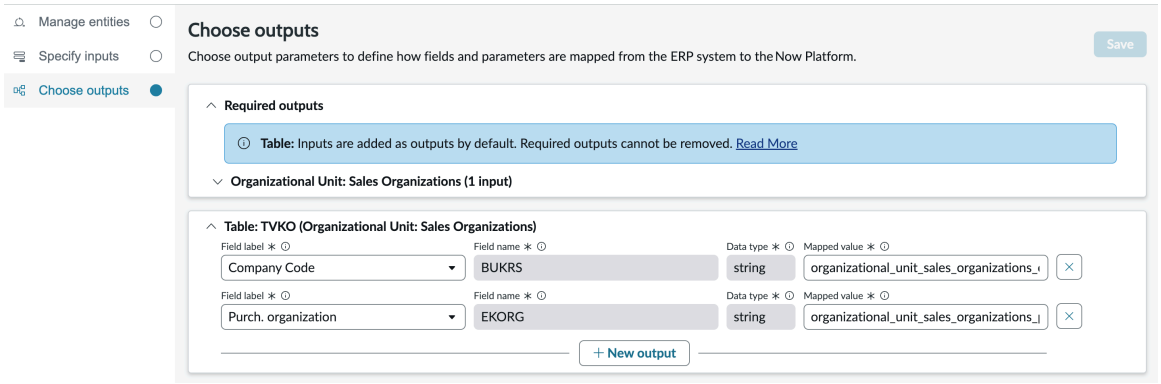
6. Open an entity.
   If you don't have an entity, add one to the operation. For more information, see Adding an entity to a model.
7. Select the **Choose outputs** tab.
8. Review the existing outputs to see if you must add any additional parameters.



The **Required outputs** section lists any fields that you added to the inputs. The output page displays these fields as read-only; edit or remove them on the input page.

Note: Required output applies only to table and OData entities.

In the Table/Functioncall section, define the parameters the operation uses. The Table section appears for read operations, and the Functioncall section appears for BAPI operations.

Zero Copy Connector for ERP automatically suggests mappings between table fields in source systems and target models. For example, map the fields of source table "purchase order - v2" with the fields of a relevant target table such as "platform table purchase order." This reduces the amount of manual work to do, while still giving you control to edit the mappings as needed. For more information, see Zero Copy Connector for ERP AI semantic field mapping.

Note: The system generates mapped value names in inputs and outputs automatically, but you can edit them manually. For more information, see Edit input and output mapped value name in Zero Copy Connector for ERP.

9. Add a new output field or parameter.

   a. Select the add icon (+) next to the last-defined parameter.
      If you are adding a mapped field for a table read operation, make sure to add the field to the applicable table section.

   b. Search for and select the **Field name** for table reads or **Parameter name** for BAPI (Business Application Programming Interface) operations.
      The **Data type** field is automatically updated with the applicable values for your selection.

   c. Enter the corresponding value in the **Mapped value** field.

   If you're adding a complex, nested parameter, such as an address that includes other parameters (for street, for city, etc.), Zero Copy Connector for ERP automatically identifies that it needs additional related parameters. Zero Copy Connector for ERP creates new, nested parameter rows that you must then populate with the related values. You can nest only parameters with **Object** or **Array** as the **Data type**.

   The following example shows outputs and nested outputs for a BAPI.

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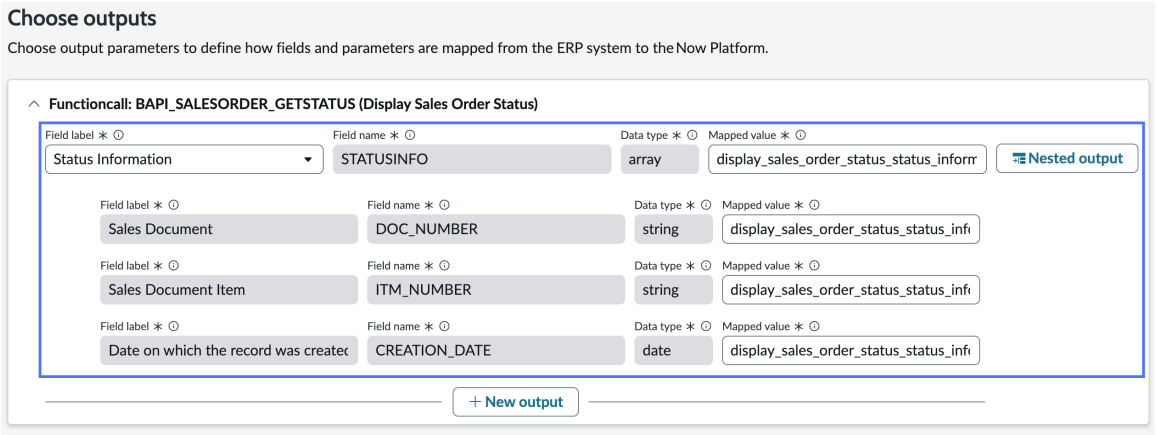

10. **Optional:** Add any nested output fields or parameters to choose what data to include from a complex parameter.
    For example, you may have a full billing address in the object parameters but only need the city and postal code as output.
    a. Specify the parent output field or parameter.
    b. Select the settings icon or add icon + for the parent row.
    c. In the modal that appears, select any additional, related fields or parameters to include.
    The parent automatically updates with the related, nested fields or parameters you selected.
11. Select **Save**.

Result

When you add mapped fields or parameters as outputs and successfully read or update the ERP system, each parameter appears as a field. You can then add the field to a remote table or an extraction table. Manage the fields for the remote table or extraction table to add the retrieved parameters. For more information, see the following topics:

- Customize fields for an ERP remote table in Zero Copy Connector for ERP
- Select fields for an extraction table in Zero Copy Connector for ERP

Edit input and output mapped value name in Zero Copy Connector for ERP

Manually edit mapped value field names for input and output when managing models in Zero Copy Connector for ERP (Enterprise Resource Planning).

Before you begin

Role required: sn_erp_integration.erp_admin

About this task

In ERP model manager, the mapped value name in inputs and outputs is system-generated automatically. Edit the value manually as needed. Specify a unique value. You can revert to the system-generated name at any time.

Let's step through an example. In Zero Copy Connector for ERP, create a model. For more information, see Create a model.

Procedure

1. On the new model, select **Manage Model** and add a read operation.
   For more information, see Add an operation to a model in Zero Copy Connector for ERP.
2. On the read operation, add a read table entity, for example, on the T005 Countries table.

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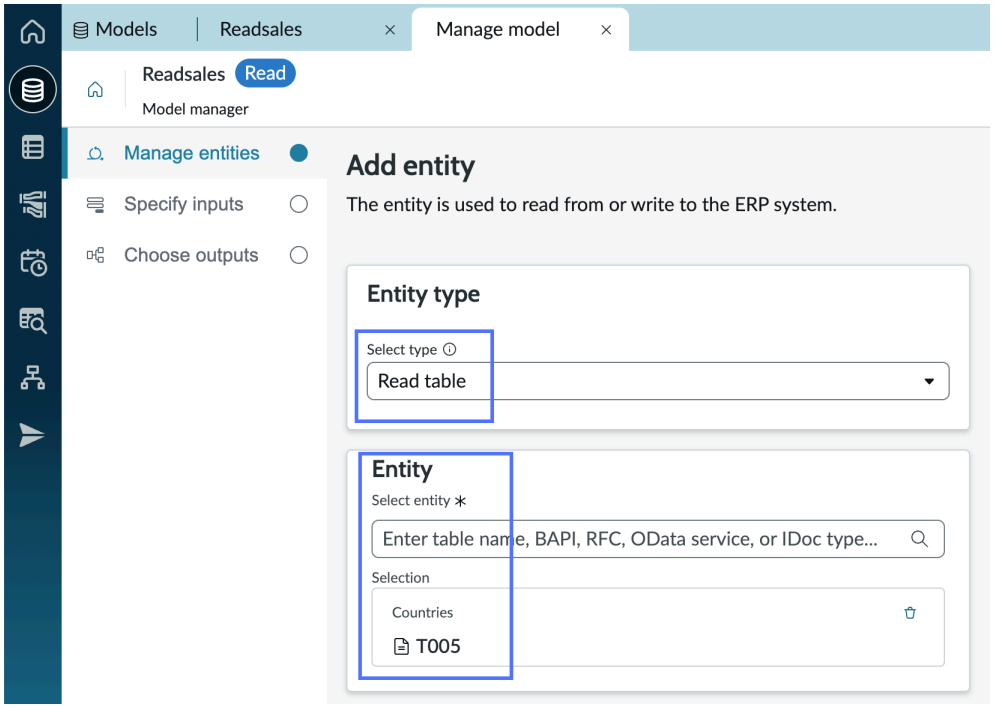
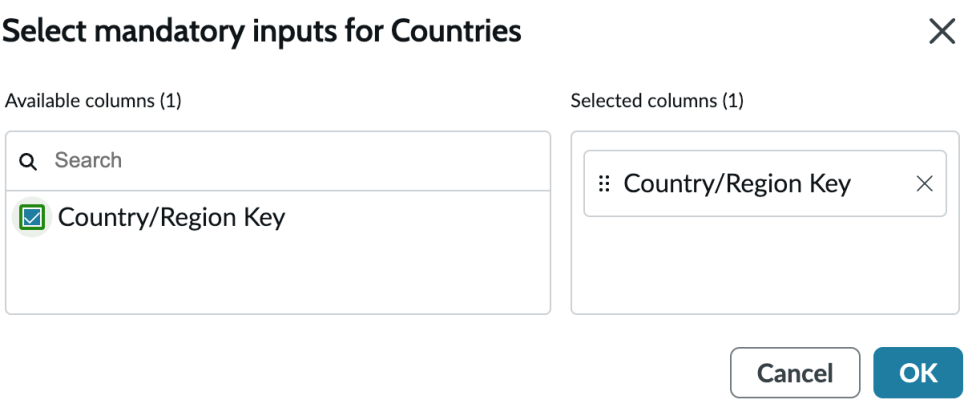


For more information, see Adding an entity to a model.

3. After data is retrieved, select **Specify inputs**.
4. Select **Select mandatory inputs**.
5. Select **Country/Region Key** and select **OK**.



The system-generated mapped value is countries_country_region_key. The operation parameter value is set to the same name.

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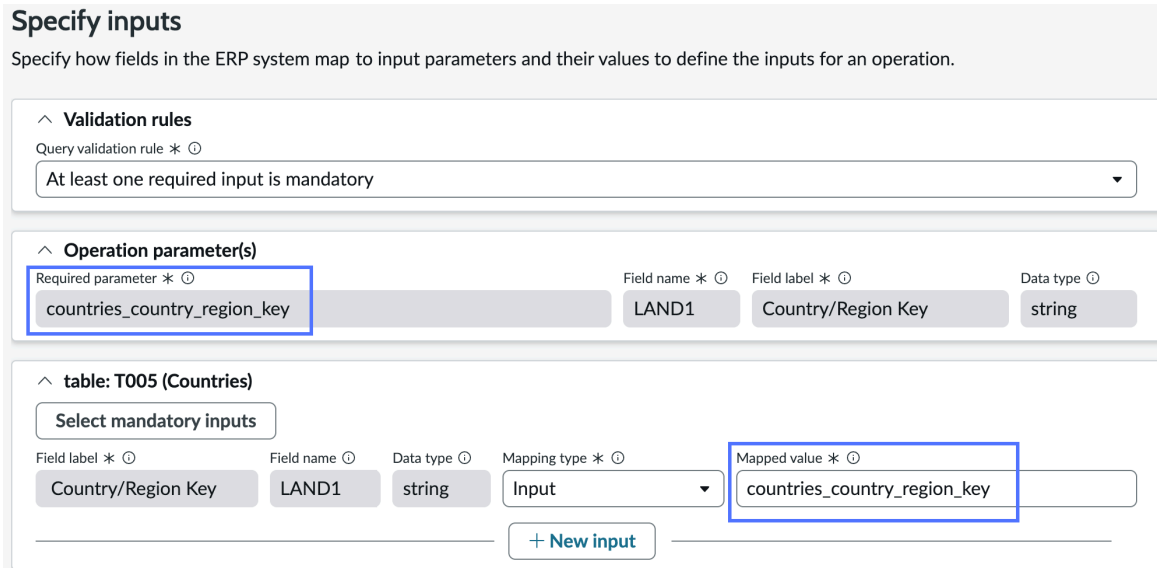
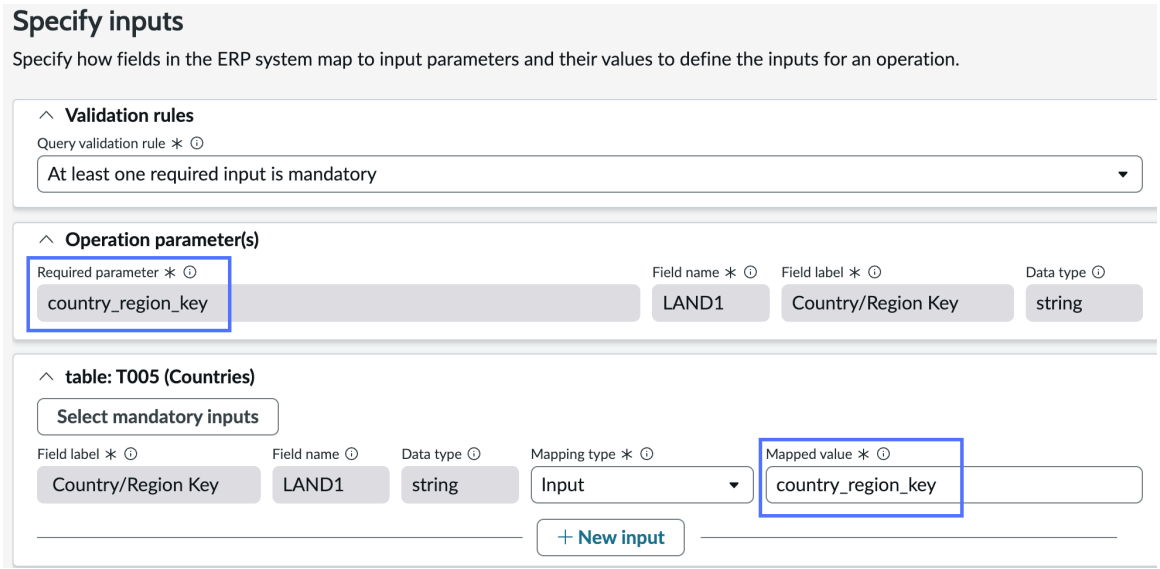


6. Change the mapped value to, for example, **country_region_key** and select **Save**.

   The updated mapped value is displayed and the operation parameter value changes to match automatically.



7. If a new input is added, the mapped value is system-generated but is editable.

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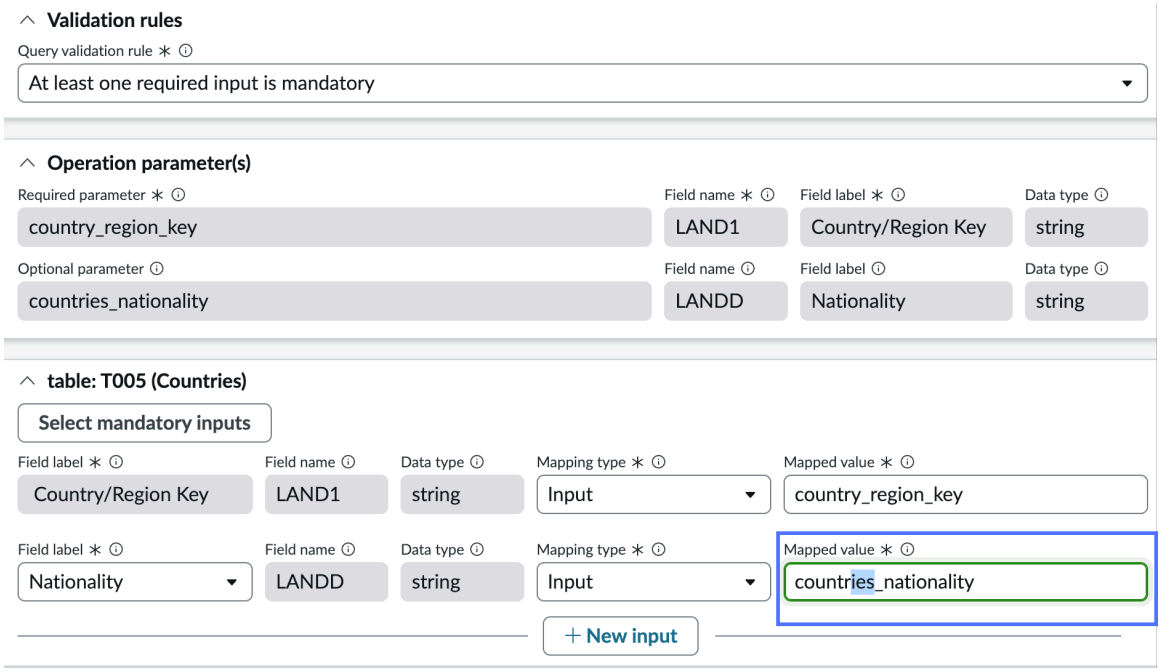
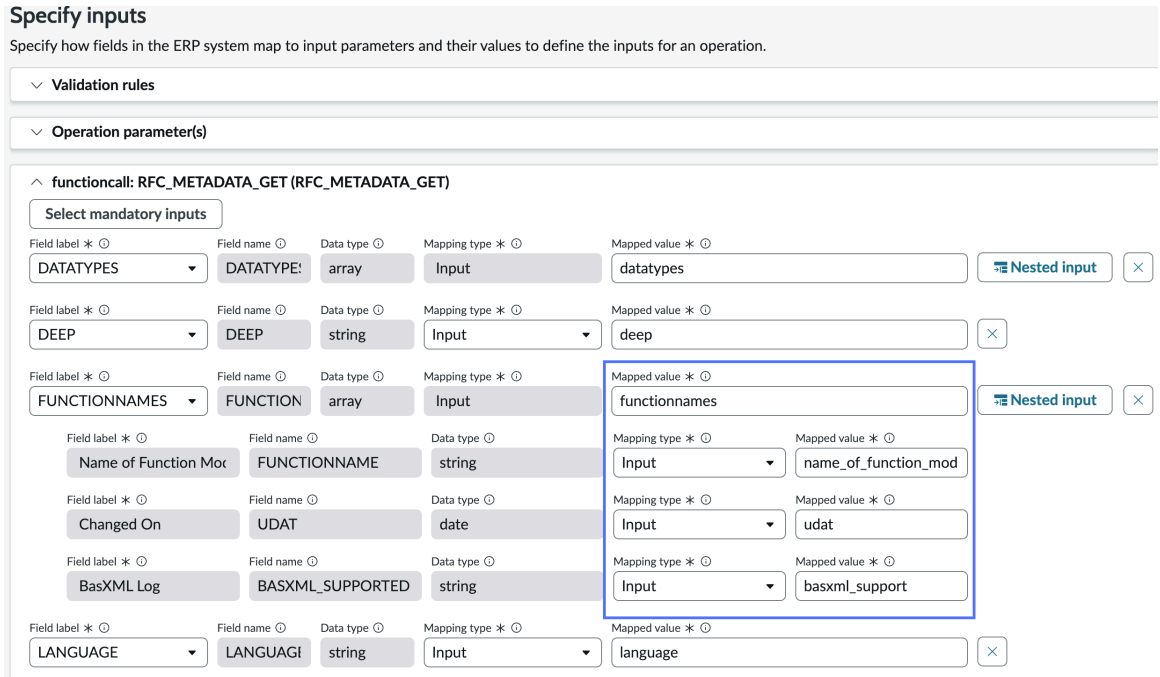
For example, add the **Nationality** field and edit the name from **countries_nationality** to **country_nationality** so it's more consistent with the **country_region_key** name.



Trouble?

- If a new child (nested) input is added, the system-generated mapped value doesn't contain the parent name. You can edit the child name for inputs and outputs. For input, the edited name is used in the operational parameter. In this example, the **UDAT** and **BASXML_SUPPORTED** fields were added and their system-generated names can be edited to contain or more closely match the parent name.



- If a join is used, the changed name should be available on the join fields as well. For more information about joins, see Add joins between ERP tables.

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- If the same field exists in both input and output, but they have different mapped values, the name of the output field is given precedence and used.
- If you want to revert to the system-generated name at any time, remove the field and then add it again. Another option is to change the mapping type and then change it back.

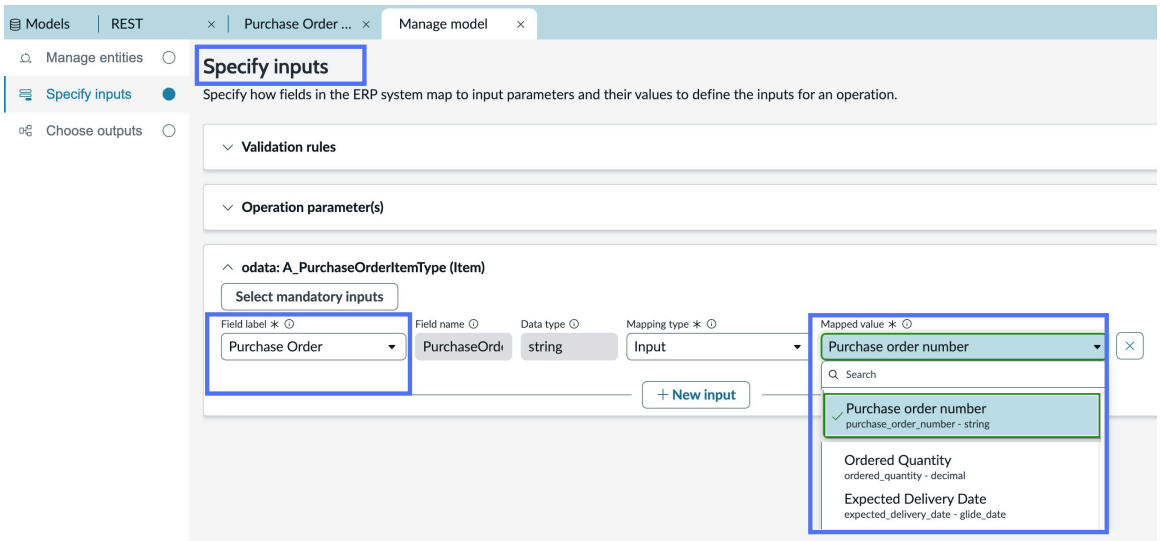
Zero Copy Connector for ERP AI semantic field mapping

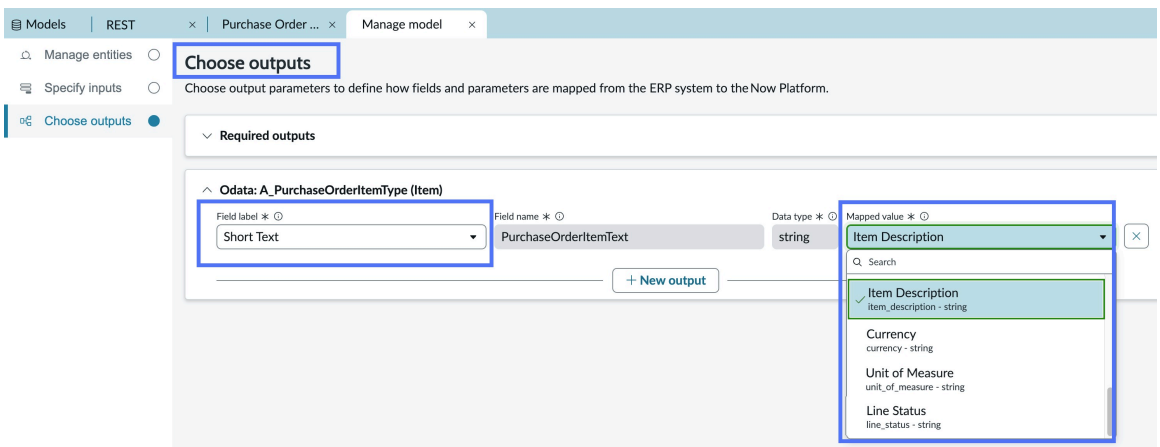
Semantic field mapping uses AI to rank target fields in the platform data model by how closely their meaning matches a selected source field.

When you configure a Zero Copy Connector for ERP (Enterprise Resource Planning) platform data model, you map fields from an external system to fields in the corresponding Glide table. This mapping can involve hundreds of fields on each side. Semantic field mapping uses AI to identify the most relevant target field for each source field you select, reducing the manual effort required to complete the mapping.

Semantic field mapping process

When you select a source field in the inputs or outputs configuration of a platform model operation entity, the platform evaluates all target fields in the Glide table. It then ranks them by semantic relevance to the selected source field. The ranked list of candidates is displayed automatically so you can review and confirm the mapping.





The ranking is based on semantic similarity — the meaning of the field relative to the source field — rather than alphabetical order or exact name matching. Fields with different names can rank

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highly if their semantic meaning is closely related. The ranking considers all source fields and all target fields together, then orders the target fields for a one-to-one mapping that maximizes the similarity between sources and targets.

Semantic field mapping can consider field name, field type, and field description when evaluating candidates.

Scope and applicability

The automatic semantic field mapping is available when the source table has an associated platform table.

Confidence scores and ranking

Each candidate target field is assigned a confidence score that reflects how closely its semantic meaning matches the selected source field. You can review the ranking before confirming the mapping.

Important: AI-generated field mapping suggestions may not be accurate in all cases. Review the ranked candidates and confirm the appropriate target field before saving the connector model.

Retrieving data

To retrieve data from an Enterprise Resource Planning (ERP) system, use remote tables or extraction tables.

- Remote tables get their records from running an associated script against an external data source.
- Extraction tables retrieve large amounts of data using a scheduled query, and use transform tables to process data for use on the ServiceNow AI Platform.

Zero Copy Connector for ERP data fabric tables

View external records from a data fabric table in lists and forms the same way you view records in a physical table.

ERP data access using table list view or GlideRecord scripts

The SAP ECC and SAP S/4HANA connectors provide read-only access to data and metadata from SAP systems. An admin can set up a connection to SAP ECC or SAP S/4HANA in the Workflow Data Fabric Hub Zero Copy Connector Hub and grant data stewards access to this connection. Data stewards can then use the established connection to create a data fabric table and map data from SAP ECC or SAP S/4HANA SAP S/4HANA. Lastly, access SAP data by using the table list view or GlideRecord scripts.

Additional resources

For details about the SAP connectors and data fabric tables, see:

- SAP ECC connector
- SAP S/4HANA connector
- Data fabric tables
- Managing data fabric tables

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Using ERP remote tables in Zero Copy Connector for ERP

Remote tables in Zero Copy Connector for ERP (Enterprise Resource Planning) enable you to view and query data from the ERP system on the ServiceNow AI Platform.

Remote tables are linked to ERP models

Note: Zero Copy Connector for ERP doesn't replicate data into the ServiceNow AI Platform. It mirrors data that lives in the ERP system of record, and remains protected there.

Each ERP remote table connects to one ERP model, which links the remote table to the ERP system and other related values. When building a remote table, you can add any of the fields that Zero Copy Connector for ERP finds when scanning the ERP system, which is connected through the ERP model. Scanning for and adding fields confirms that all necessary fields are available, such as when using the table as a data source when building an app.

The connected model, which is defined on the remote table **Details** tab, controls the available fields on the remote table. If you change the model for a remote table, the available fields change as well.

Limitations of remote tables

To promote data integrity, you can't create new remote tables in Zero Copy Connector for ERP, but you can clone existing models and extend standard ERP remote tables to customize them. For more information, see Clone an ERP model in Zero Copy Connector for ERP.

ERP remote tables have a limit of 1,000 records. If you need a larger amount of data, use an ERP extraction table. For more information, see ERP data extraction and transformation.

For general information about remote tables in the ServiceNow AI Platform, see Remote tables.

View and edit ERP remote table details with Zero Copy Connector for ERP

View and edit details for ERP (Enterprise Resource Planning) remote tables in Zero Copy Connector for ERP, such as their attachment settings and short descriptions.

Before you begin

Role required: sn_erp_integration.erp_admin

About this task

To promote data integrity, you can't create new remote tables in Zero Copy Connector for ERP, but you can clone existing models and extend standard ERP remote tables to customize them. For more information, see Clone an ERP model in Zero Copy Connector for ERP.

For information on adding and removing fields to and from remote tables, see Customize fields for an ERP remote table in Zero Copy Connector for ERP.

ERP remote tables have a limit of 1,000 records. If you need a larger amount of data, use an ERP extraction table. For more information, see ERP data extraction and transformation.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the Remote tables page by selecting the remote tables icon in the side panel.

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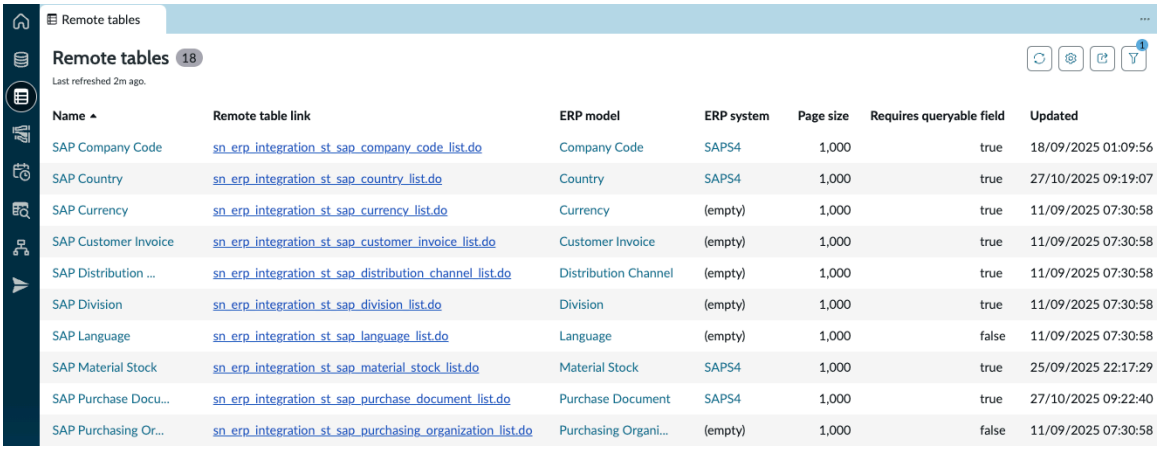

Name	Remote table link	ERP model	ERP system	Page size	Requires queryable field	Updated
SAP Company Code	sn_erp_integration_st_sap_company_code_list.do	Company Code	SAPS4	1,000	true	18/09/2025 01:09:56
SAP Country	sn_erp_integration_st_sap_country_list.do	Country	SAPS4	1,000	true	27/10/2025 09:19:07
SAP Currency	sn_erp_integration_st_sap_currency_list.do	Currency	(empty)	1,000	true	11/09/2025 07:30:58
SAP Customer Invoice	sn_erp_integration_st_sap_customer_invoice_list.do	Customer Invoice	(empty)	1,000	true	11/09/2025 07:30:58
SAP Distribution ...	sn_erp_integration_st_sap_distribution_channel_list.do	Distribution Channel	(empty)	1,000	true	11/09/2025 07:30:58
SAP Division	sn_erp_integration_st_sap_division_list.do	Division	(empty)	1,000	true	11/09/2025 07:30:58
SAP Language	sn_erp_integration_st_sap_language_list.do	Language	(empty)	1,000	false	11/09/2025 07:30:58
SAP Material Stock	sn_erp_integration_st_sap_material_stock_list.do	Material Stock	SAPS4	1,000	true	25/09/2025 22:17:29
SAP Purchase Docu...	sn_erp_integration_st_sap_purchase_document_list.do	Purchase Document	SAPS4	1,000	true	27/10/2025 09:22:40
SAP Purchasing Or...	sn_erp_integration_st_sap_purchasing_organization_list.do	Purchasing Organi...	(empty)	1,000	false	11/09/2025 07:30:58

3. View the details for a remote table by selecting the remote table **Name**.
4. **Optional:** Refresh the data stored in the remote table attachment outside of the scheduled cycle by selecting the **Refresh attachment data** button.
   The remote table attachment is the cached response from the ERP system. If the remote table **Attachment setting** field is set to **Use attachment**, Zero Copy Connector for ERP doesn't call the ERP system when someone fetches data from the remote table.
5. Edit the remote table details as needed.
   For a description of the field values, see Zero Copy Connector for ERP remote table form field descriptions.
6. View the fields in the remote table by selecting the **Remote table fields** tab.
7. **Optional:** View the ERP remote table as a list on the ServiceNow AI Platform by selecting the **Open remote table list** button.
8. Select **Save**.

Customize fields for an ERP remote table in Zero Copy Connector for ERP

Add or remove columns in remote tables in Zero Copy Connector for ERP (Enterprise Resource Planning) to create your ERP model. For example, remove fields with sensitive information, such as birthdays.

Before you begin

Role required: sn_erp_integration.erp_admin

About this task

Zero Copy Connector for ERP scans the ERP system for the ERP model to find all available fields that you can add to a remote table. You can view all available fields from the ERP system in the ERP model. Using the **Manage fields** modal to add available columns from the ERP system to a remote table automatically creates them in the remote table.

If you don't see the fields that you want to add to the remote table, you must first add them to the model. For more information, see Choose output parameters for a model.

The connected model, which is defined on the remote table **Details** tab, controls the available fields on the remote table. If you change the model for a remote table, the available fields change as well.

Note: You can't edit field names in remote tables, but you can add a new label for a field.

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Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the Remote tables page by selecting the remote tables icon in the side panel.
3. Select a table to work with by selecting the **Name**.
4. Manage the columns to build the remote table by selecting the **Manage fields** button.
   a. In **Available fields**, find the field to add and select the check box (if the list is long, use the search box to filter the list).
   b. In **Selected fields**, drag fields up and down to rearrange how they appear in the table.
   c. After you're finished, select **OK**.
   The fields on the remote table are updated.
5. Confirm that the fields appear correctly by selecting the **Remote table fields** tab.

Query a remote table using Zero Copy Connector for ERP

Query ERP (Enterprise Resource Planning) remote tables from an ERP system directly from the **All** menu using Zero Copy Connector for ERP.

Before you begin

Role required: sn_erp_integration.erp_user

About this task

You can query the ERP system to create an ERP model for your ERP processes. For more information, see Building and managing models to work with ERP data.

Note: Zero Copy Connector for ERP doesn't replicate data into the ServiceNow AI Platform. It mirrors data that lives in the ERP system of record, and remains protected there.

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the Remote tables page by selecting the remote tables icon in the side panel.
3. Select the remote table in the **Name** column, such as **SAP Country**.
4. Select **Open remote table list**.
5. Query the remote table using Glide for SAP.

   For example, you can select and hold (or right-click) on a column, such as **Storage location**, and select **Show Matching** records.

   The SAP data is accessible for you to work with using standard ServiceNow AI Platform searching, sorting, and filtering, such as the condition builder. For more information, see Condition builder.

Create a scheduled extraction in Zero Copy Connector for ERP

Schedule extraction of information for an ERP (Enterprise Resource Planning) extraction table to capture large amounts of data from the ERP system at a regular interval.

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Before you begin

Important:

If you have existing scheduled extractions and have upgraded to Zurich or Australia, run the **Scheduled Extraction V2 Move** fix script. The script places scheduled extractions in a new table where scheduling is done by the scheduled scripts engine. For detailed steps, see Run fix scripts.

You must have a standard or custom ERP extraction table in place to use. For more information, see Add an ERP extraction table in Zero Copy Connector for ERP.

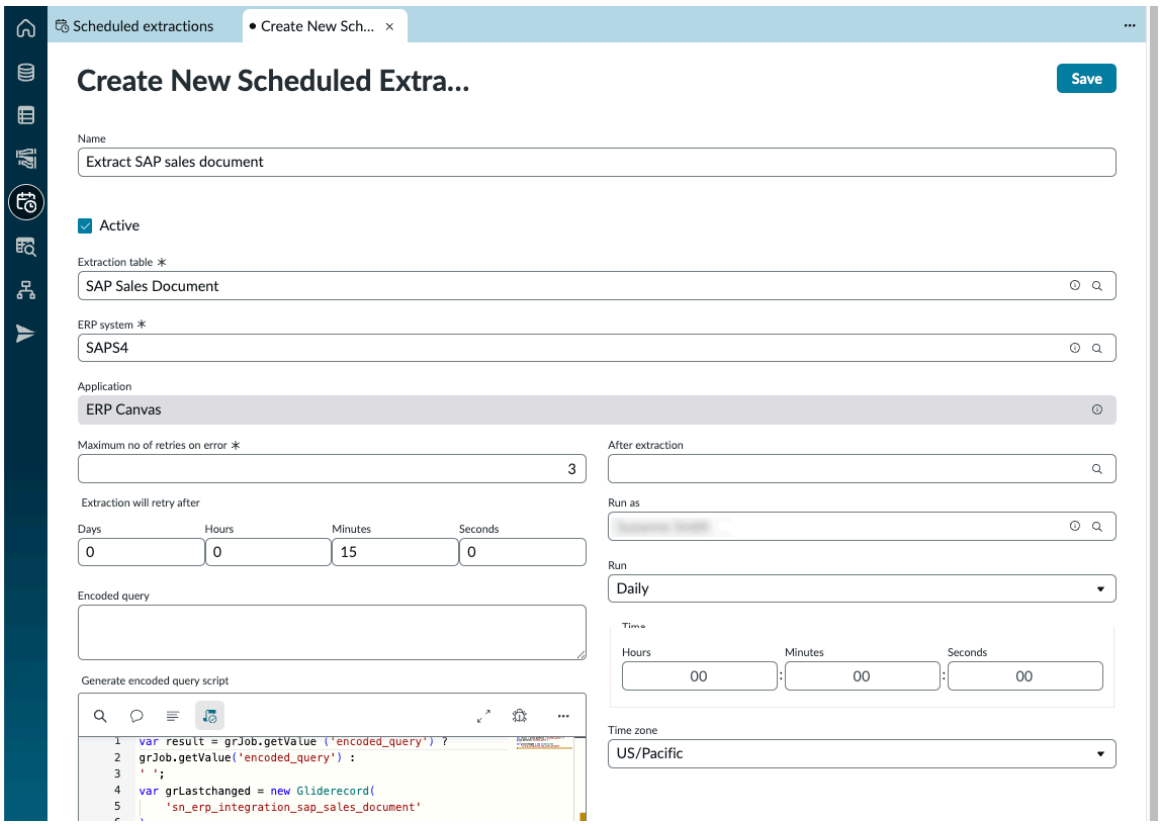
Role required: sn_erp_integration.erp_user

This video was recorded in the Zurich release.

https://player.vimeo.com/video/1056865072?h=48789d4730&badge=0&autopause=0&player_id=0&app_id=58479%22

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP scheduled extractions page by selecting the scheduled extractions icon in the side panel.
3. Select the **New** button.
4. On the form, fill in the fields.
   For a description of the field values, see Zero Copy Connector for ERP scheduled extraction field descriptions.



5. Select **Save**.

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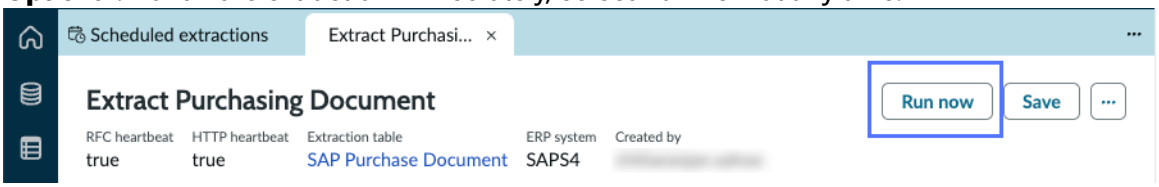
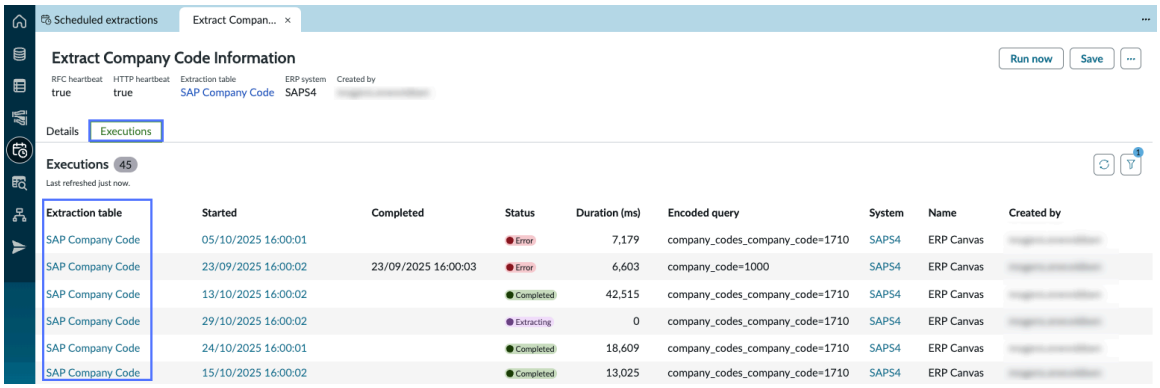
The scheduled extraction runs on the date and time specified.

6. **Optional:** To run the extraction immediately, select **Run now** at any time.



What to do next

Check the executions. After the scheduled job has run, select the **Executions** tab. For details about an extraction, select any line item in the **Extraction table** column.



API – getRowCount()

Returns the total number of rows that a Zero Copy Connector for ERP model operation would return, without retrieving the records themselves.

Use `getRowCount()` as a terminal method in place of `execute()` when you need only a count. You configure the query the same way you would for a normal run, then call `getRowCount()` instead.

How the count is determined

The count is protocol-specific:

Row count behavior by protocol

Protocol	Source of the count
Read table	Total record count reported in the connector response metadata.
OData	The OData count endpoint. Supported for both direct execution and execution through a MID Server.
BAPI	Uses the default fallback. SAP provides no native count capability for BAPI calls.
REST	Uses the default fallback.
Default fallback	Counts the items actually returned in the response, which is equivalent to counting the rows that would land in a remote table.

Note: Where the default fallback applies, the response is still retrieved to be counted. Only the read table and OData paths avoid fetching the records.

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Related methods

The same count behavior is available at two lower levels. The query engine exposes a row count method alongside its execute method. The API handler provides count methods that accept either an encoded query or a JSON filter, parallel to its existing query and filter methods.

Limitations

For REST services, designating a specific response field as the count is not supported.

Zero Copy Connector for ERP content packs

Use Zero Copy Connector for ERP content packs as examples to help you implement and deploy applications with less manual work.

Content packs

Note: Currently, content packs work only with SAP systems.

Zero Copy Connector for ERP (Enterprise Resource Planning) content packs are sets of predefined models and process extensions that are useful examples for developers with little or no SAP domain knowledge. For example, you're integrating a ServiceNow application with SAP, but it's taking a long time because of the complexity of the SAP data. Content packs accelerate the work so that building use cases involving SAP data becomes a faster process that more developers can accomplish.

After installing a content pack, the models it contains appear on the Zero Copy Connector for ERP models page with a prefix of **CP**. The process extensions in the content pack appear on the **Subflows** tab in Workflow Studio with a prefix of **ERP CP**.

Content pack models and process extensions are examples. Use them as accelerators that can be tailored to your requirements. You can view the models and process extensions, but you can't edit them. If you see a model similar to the integration you're trying to create, copy the model, give it a unique name, and edit it as needed. If you find a process extension to use, copy, rename, and edit the models it contains as needed.

Process extensions

Process extensions are subflows that can use one or more models. Process extensions enable you to use a model without needing to understand the model details. The process extensions are another abstraction layer on top of the models inside the content pack to make the models easier to use.

Process extensions in a content pack are read-only examples. To use a process extension, make a copy and edit it within Workflow Studio. For the steps to copy a process extension and add cloned models, see Using Zero Copy Connector for ERP process extensions.

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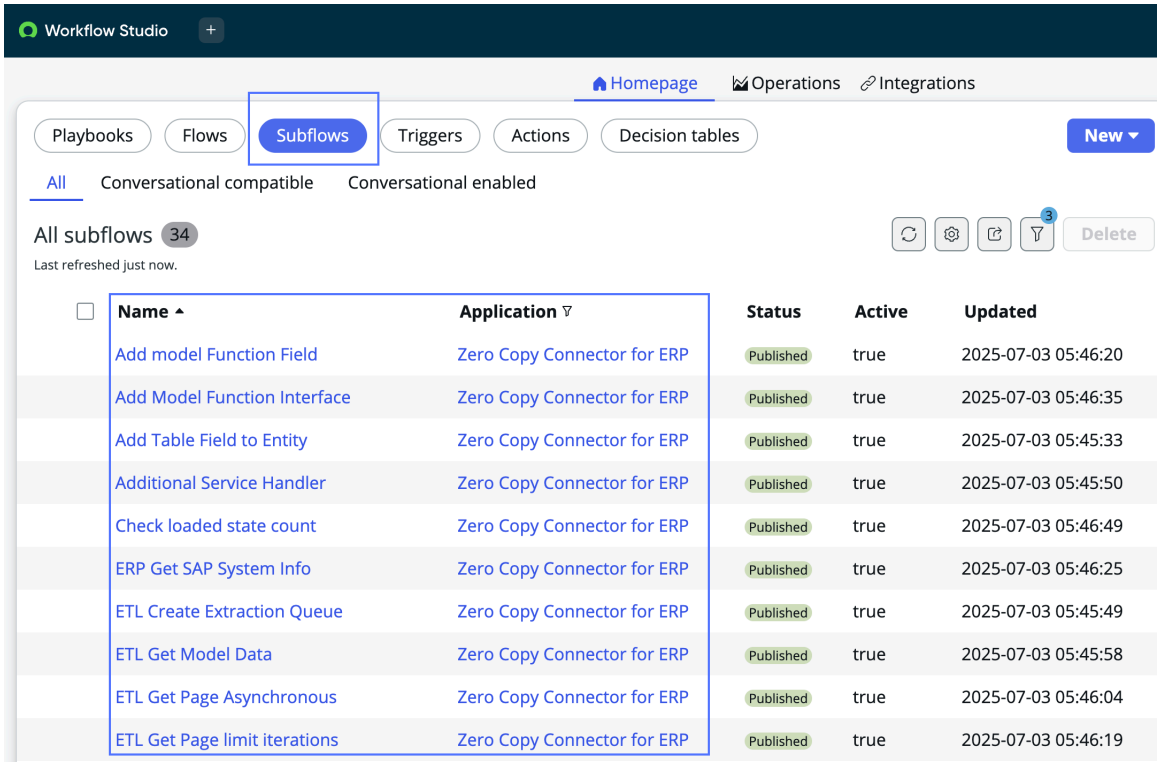

As an example for how to use process extensions, consider a scenario where there is a model for reading a sales order. You want to determine the sales orders that are blocked, but you don't know the SAP field that indicates whether an order is blocked. Instead of researching to get the field name or asking the SAP experts in your organization, use the process extension named **ERP CP: Read Blocked Sales Orders** to do the work. A process extension can filter or add data when reading, using the model to find exactly what you are looking for based on the process extension description. So, in this example, instead of reading all sales orders, the process extension finds only the blocked sales orders.

Content pack prerequisites

You must have:

- Zero Copy Connector for ERP installed
- A linked SAP system from which to pull data
- The sn_erp_integration.erp_admin role

Installation from the ServiceNow Store

For detailed information about buying and installing Zero Copy Connector for ERP content packs, see the ServiceNow Store Help page.

Explore a Zero Copy Connector for ERP content pack

Explore an Zero Copy Connector for ERP content pack to review its models and process extensions, which are read-only examples you can copy and customize.

Before you begin
Role required: sn_erp_integration.erp_admin

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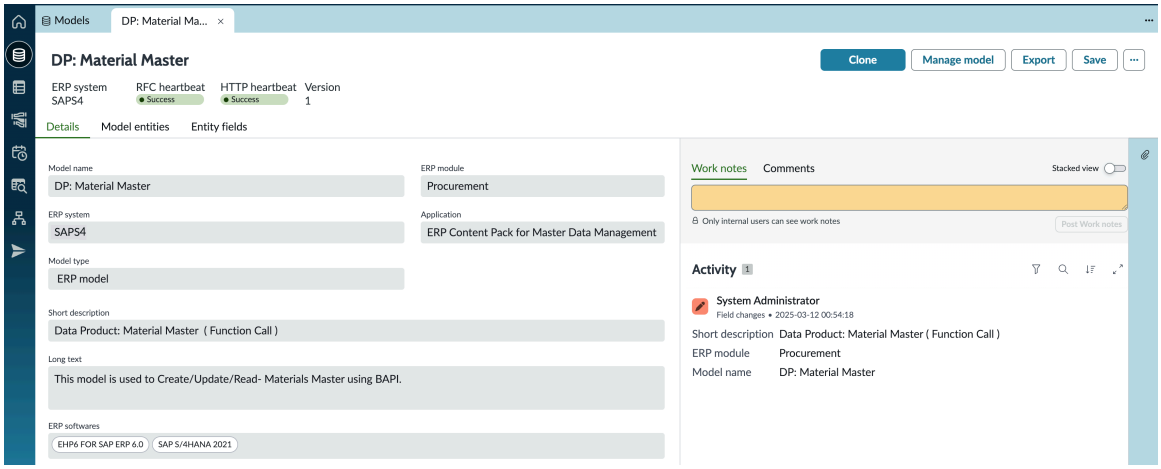
Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP models page by selecting the models icon in the side panel.
3. Review the list of ERP models.
   Models that are part of a content pack have **DP** at the beginning of their ERP model name.
4. Open a model from a content pack, for example **DP: Material Master**.

   Note: All fields are read only because content pack models can only be viewed, not edited.

5. Review the model record for details including the short description, long text, and ERP module.

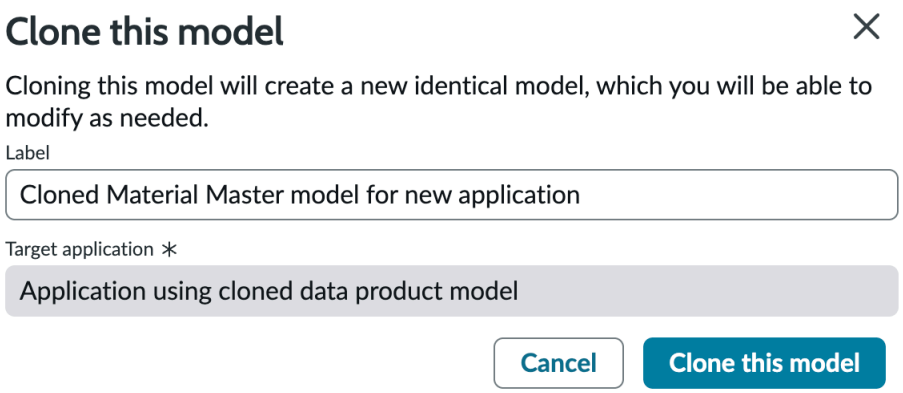


6. Select the **Model entities** and **Entity fields** tabs to review the information.
7. To use the content pack model, select **Clone**.

   a. Enter a label.

   b. Check that the correct target application is specified.

   c. Select **Clone this model**.



Depending on the size of the model, the cloning process may take a few minutes. When the clone is complete, a success message in green is displayed.

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d. Select the **Models** tab.

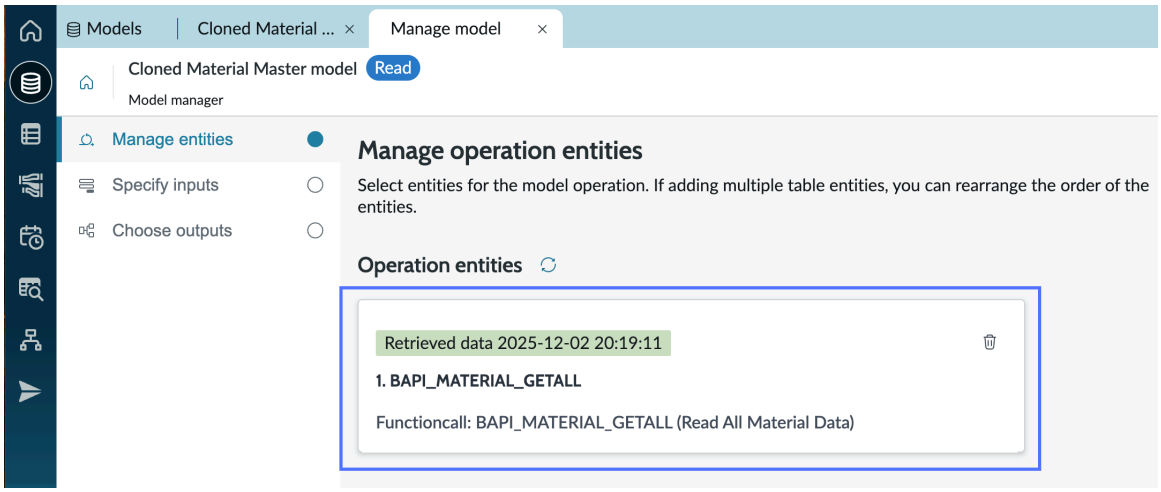
e. Select the refresh list model icon .

f. Confirm that the new cloned model is listed.

8. Select the new, cloned model to open the record.

> **Note:** If you receive a message stating you aren't in the correct application scope, change your scope.

9. Select **Manage model**.
10. Verify that three operations are included in the content pack: **Read**, **Update**, and **Create**.
11. Select the **Read** tile to see that an appropriate entity has been added.



12. Select **Specify inputs** to see that a mapping has been done with typical input parameters.

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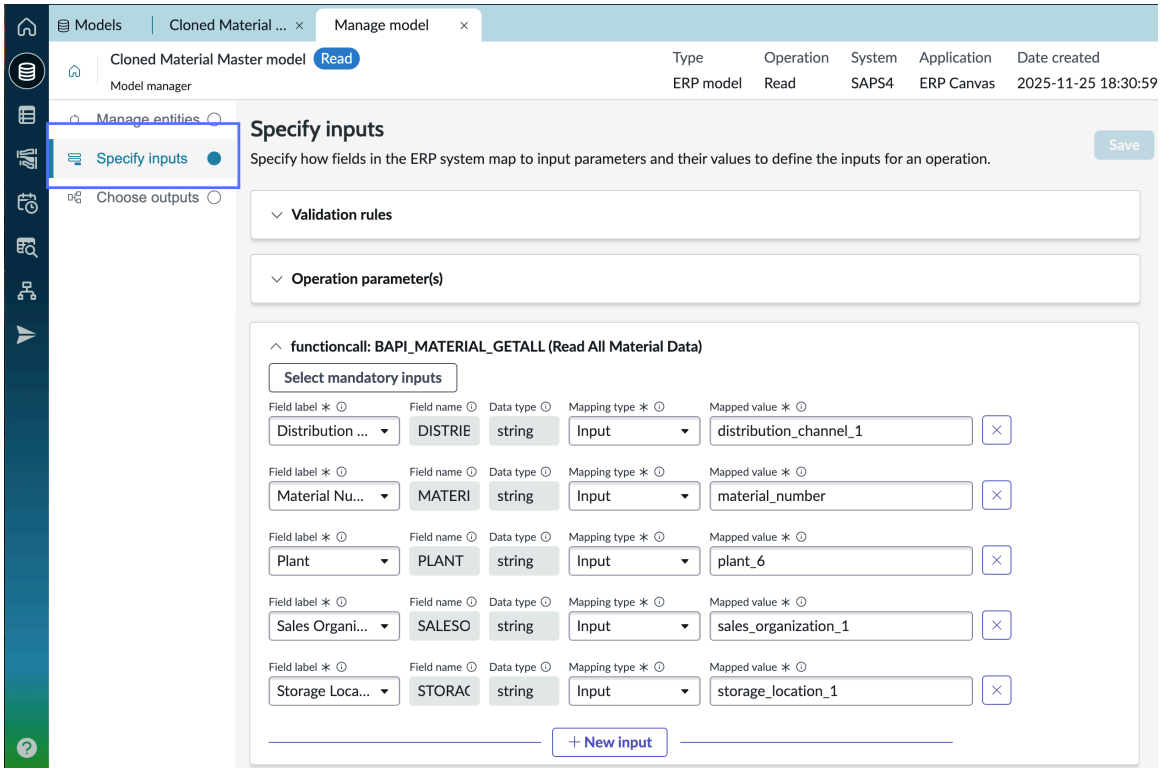
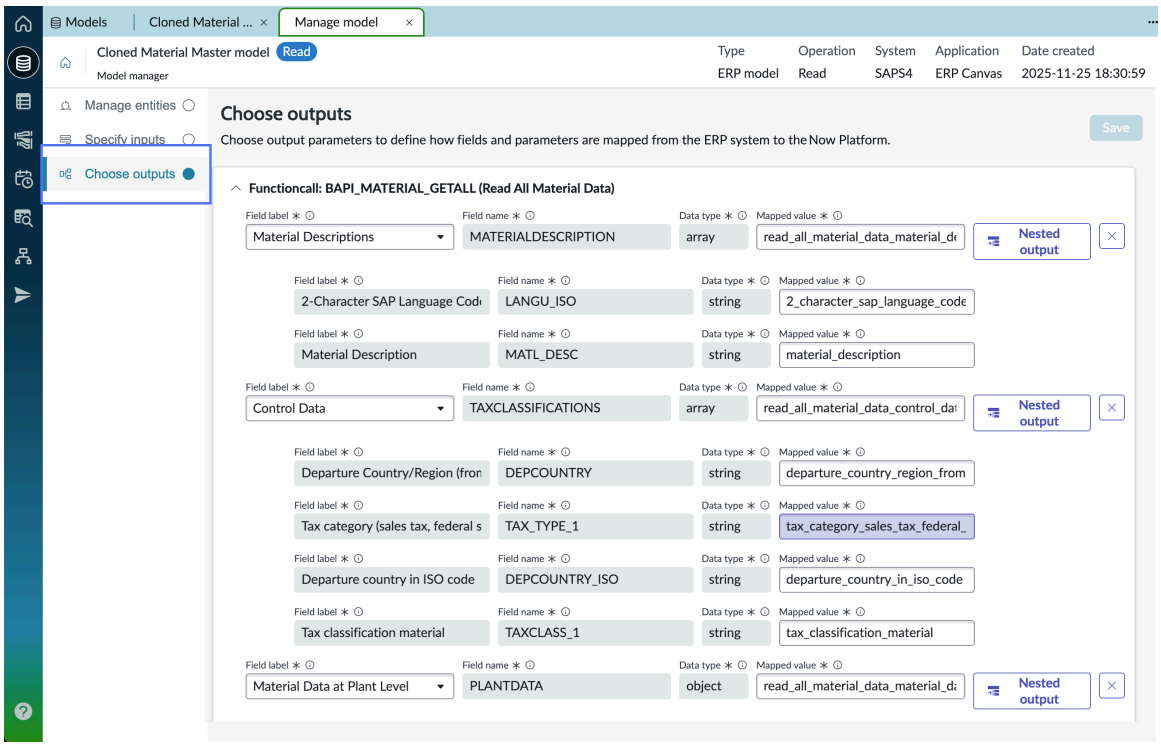


13. Select **Choose output** to see that a mapping has been done for the field or general information to send back when calling the model.



14. Select the back button on your browser three times to return to the model manager page.
15. Select the **Update** and **Create** tiles and repeat steps 12 through 14 for each tile to explore the predefined inputs and outputs.

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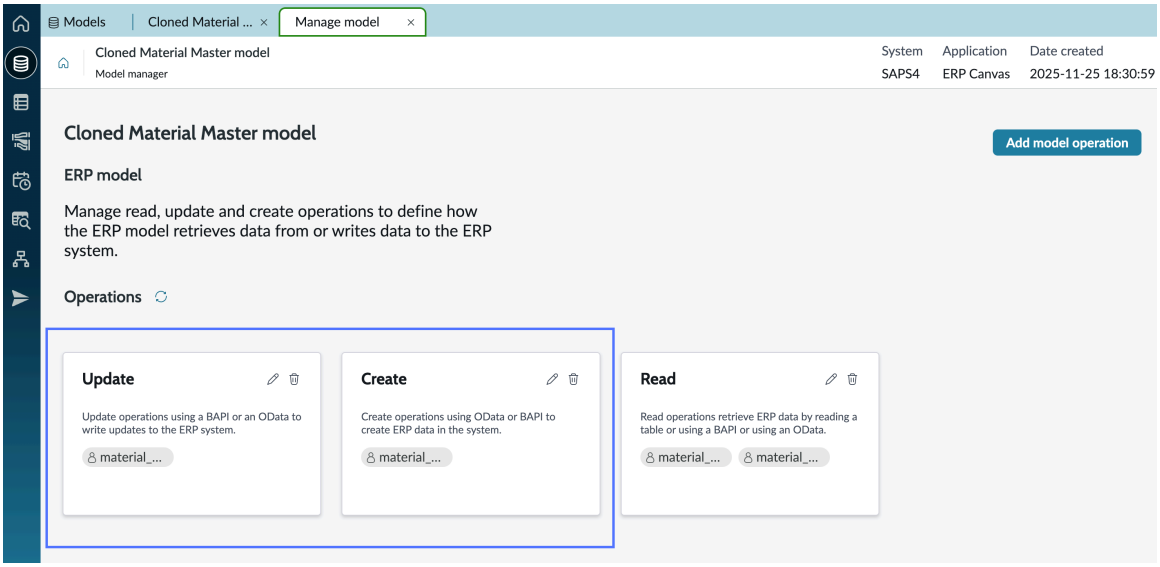
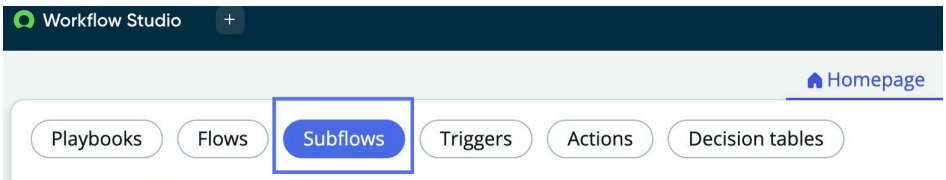
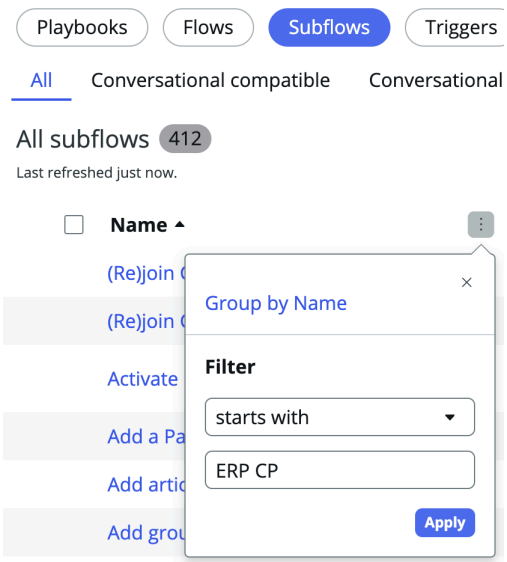


16. To see the process extensions in a content pack, navigate to **All** > *Workflow Studio* and select **Subflows**.



17. In the **Name** column, select the filter icon, set the filter to **starts with ERP DP**, and select **Apply**.



18. Select one of the material subflows, for example, **ERP DP: Material Update**.

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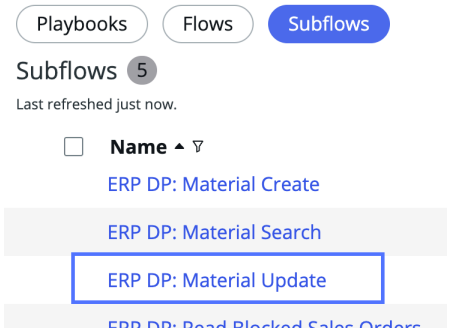
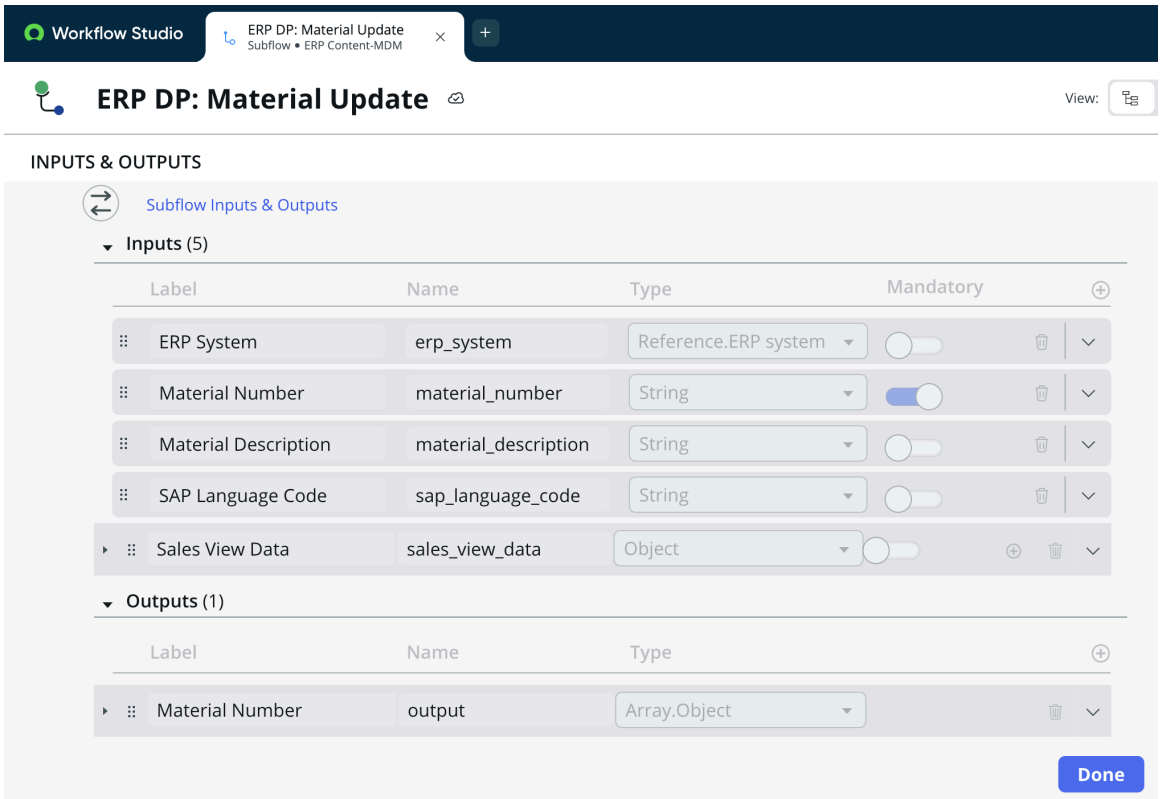


19. View the subflow actions.
20. In the **Inputs & Outputs** section, select **Subflow Inputs & Outputs**.
21. View the inputs and outputs the subflow contains.



22. Select the back button on your browser to return to the list of subflows.
23. Repeat steps 18 through 22 to explore more subflows.

What to do next

When you're ready to create an application with a content pack, see Using Zero Copy Connector for ERP content packs.

Using Zero Copy Connector for ERP content packs

Learn how to use Zero Copy Connector for ERP (Enterprise Resource Planning) content packs, from cloning a model to working within a scope. Content pack models and process extensions are examples.

Before you begin

Role required: sn_erp_integration.erp_admin

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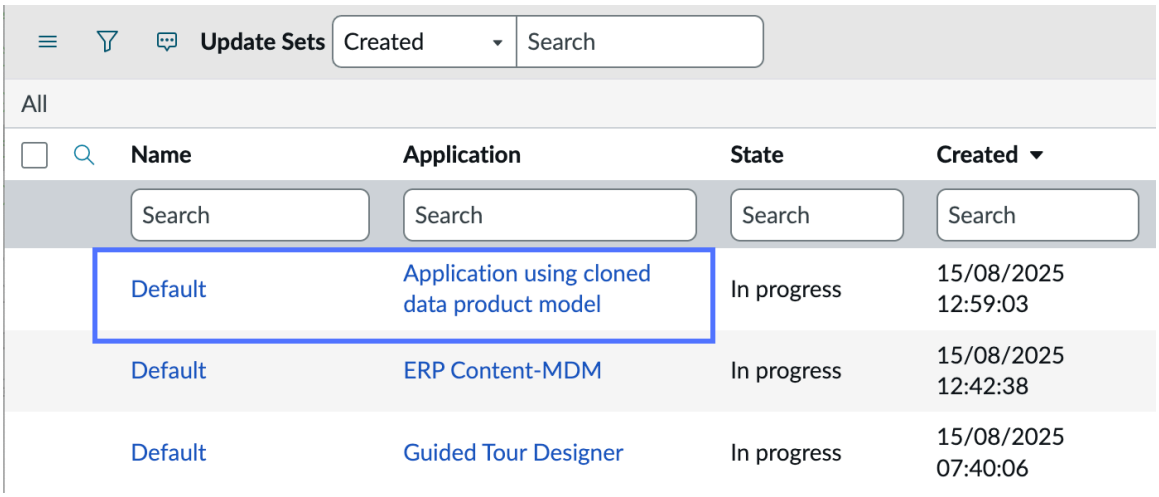
Follow these steps to create an application in a new application scope and clone a content pack model within that same scope. Using this process packages the application with its own scope and a cloned model that you can edit. Working in a scope creates ownership of the application and cloned model. The owner can give access to others to edit the application and cloned model as needed.

Before completing the procedure, it may be helpful to review the list of Available Zero Copy Connector for ERP content packs and to Explore a Zero Copy Connector for ERP content pack to review its contents.

Procedure

1. Create an application.
   Use a builder application, such as Creator Studio or ServiceNow Studio, to create an application in a new scope. For detailed information and steps, see:
   - Create the foundation of an app in Creator Studio
   - Create an application in ServiceNow Studio
   - Application scope
2. Confirm that an update set was created for the new application.
   a. Navigate to **All** > **System update sets** > **Local update sets**.
   b. Find the default update set created for the new application and select the name to open the record.



   If a default update set wasn't created for the new application, follow the instructions in Create and select an update set as the current set.
   c. In **Name**, enter a unique name for the update set.
   d. Select **Update**.
3. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
4. Open the ERP models page by selecting the models icon in the side panel.
5. Review the list of ERP models.

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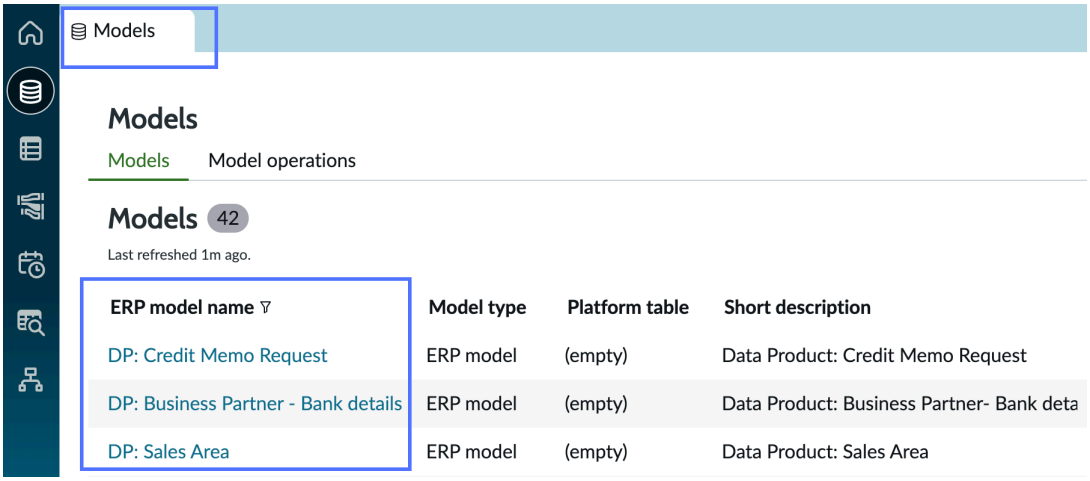
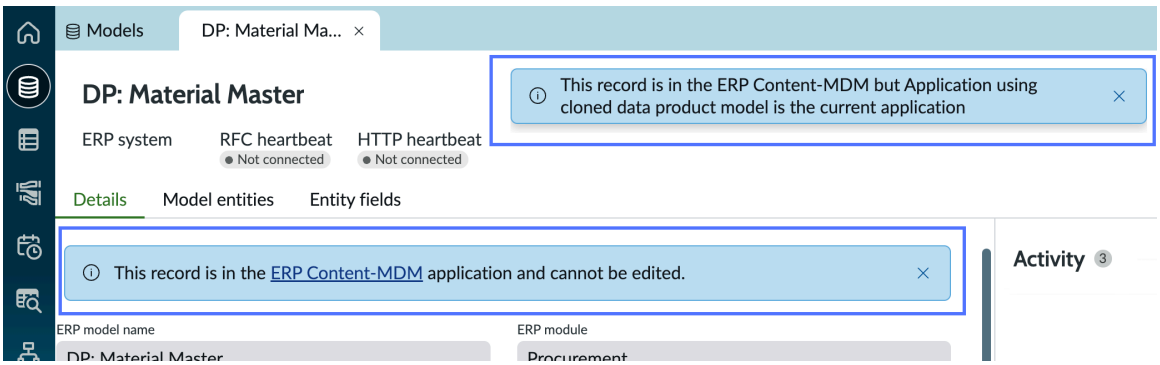


6. Select a content pack model to clone.
   Models that are part of a content pack have **DP** at the beginning of their ERP model name.
7. Confirm that you're still in the scope of your new application.

   Two messages in blue are displayed. The message in the record states the application in which the model resides and that the record can't be edited. Remember that models in a content pack are read only and that you must clone the model to take ownership and make changes.

   A second message states the current application scope, which should be the application you created earlier in this procedure.



8. Select **Clone**.

   a. Enter a new model name.

   b. Check that the correct target application is specified.

   c. Select **Clone this model**.

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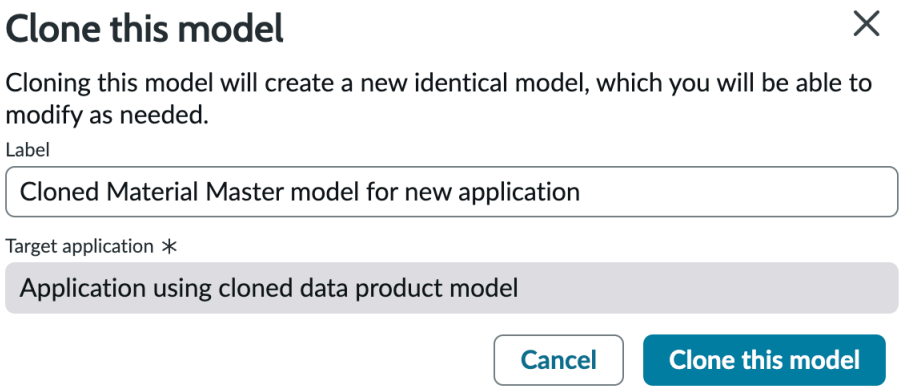

When the clone is complete, a success message is displayed.

For more information about cloning models, see Clone an ERP model in Zero Copy Connector for ERP.

d. Select the **Models** tab.

e. Select the refresh list model icon .

f. Confirm that the new cloned model is listed.

What to do next

Explore the new, cloned model and make changes as needed. For example, edit the mappings, inputs, or outputs. For more information, see Building and managing models to work with ERP data.

Using Zero Copy Connector for ERP process extensions

Learn how to use the process extensions (subflows) in Zero Copy Connector for ERP (Enterprise Resource Planning) content packs. Content pack models and process extensions are examples.

Before you begin

Role required: sn_erp_integration.erp_admin

Follow these steps to copy a process extension (subflow) and edit the copy to use the correct cloned model or models. Use the cloned version of the models or models inside your copy of the subflow.

Note: You must have a cloned model created within its own application scope. For more information, see Using Zero Copy Connector for ERP content packs.

Before completing the procedure, it may be helpful to review the following pages:

- Available Zero Copy Connector for ERP content packs
- Explore a Zero Copy Connector for ERP content pack

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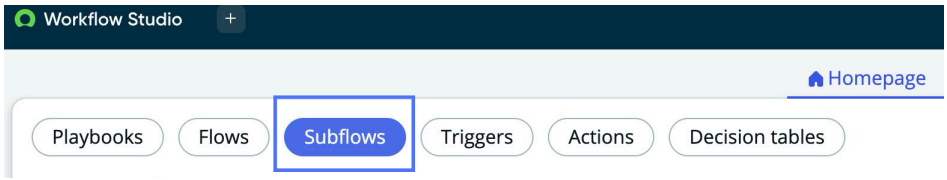
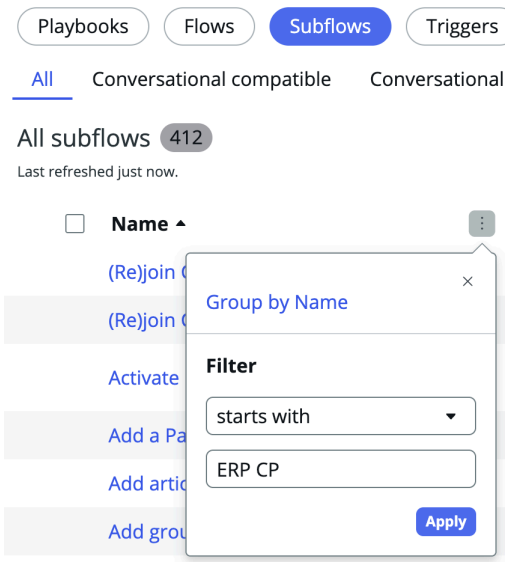
Procedure

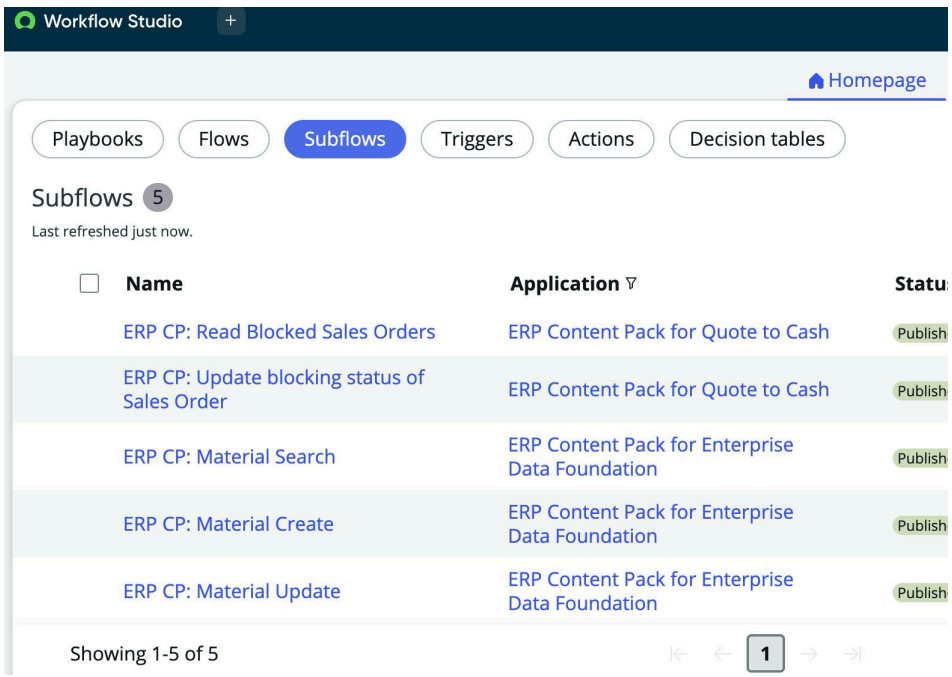
1. Navigate to **All** > *Workflow Studio* and select **Subflows**.



2. In the **Name** column, select the filter icon, set the filter to **starts with ERP CP**, and select **Apply**.



The list is filtered and only displays ERP content pack subflows.



3. Select a process extension to copy, for example, **ERP CP: Read Blocked Sales Orders**.
4. Select the more actions menu icon and select **Copy subflow**.

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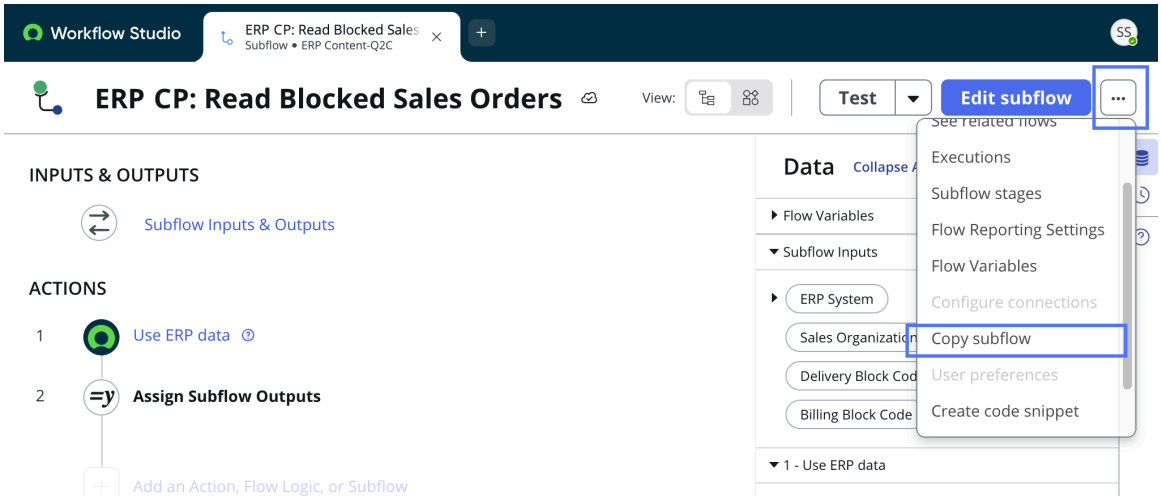
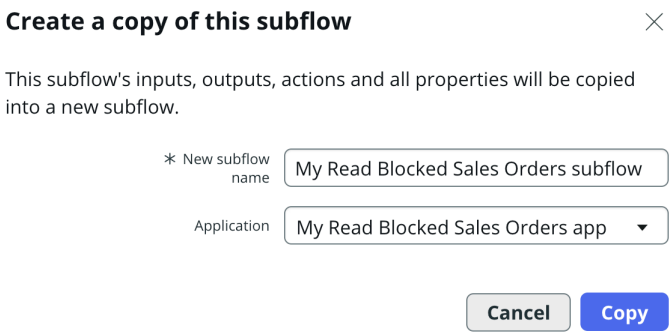
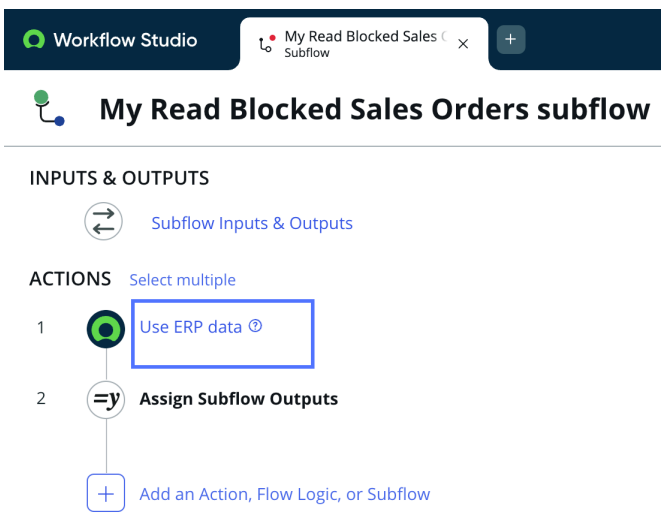


5. Specify a unique name for the subflow.
6. In **Application**, select the application scope containing the model you want to use in the subflow.



7. Select **Copy**.
8. In the new copied subflow record, select **Use ERP data** and replace the models used by the action to use cloned models instead.



For more information, see Use ERP Data action details for flows.

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Available Zero Copy Connector for ERP content packs

Content packs are available for use in Zero Copy Connector for ERP (Enterprise Resource Planning) to implement and deploy applications with less manual work.

ERP Content Pack for Enterprise Data Foundation

The ERP Content Pack for Enterprise Data Foundation contains the following:

- Master data models such as Read Cost Center, Read Customer Master, Read Vendor Data, Read Chart of Accounts, and Create/Update/Read Material Master.
- SAP Foundation models are foundational models that may not be tied to a specific module or specific area in SAP. Some might be more related to finance or sales distribution, but foundational models commonly go across modules or areas.
- Enterprise Data Foundation Process Extensions such as Material Master Management, Get Material based on type, and Extend Material (Sales). Process extensions are small subflows that can use one or more models.

Content pack contents	Target systems	Methods
Master data models	ECC and S/4	RFC/BAPI/OData V2
SAP Foundation models	ECC and S/4	RFC/BAPI/OData V2
Enterprise Data Foundation process extensions	ECC and S/4	RFC/BAPI/OData V2

ERP Content Pack for Hire to Retire

The ERP Content Pack for Hire to Retire contains models including Candidate, Job Application, and Position.

Content pack contents	Target systems	Methods
Models	ECC and S/4	OData V2

ERP Content Pack for Quote to Cash

The ERP Content Pack for Quote to Cash contains the following:

- Quote to Cash models including Create Sales Order, Update Sales Order, and Read Sales Order.
- Quote to Cash process extensions including Manage Delivery & Billing Block. Process extensions are small subflows that can use one or more models.

Content pack contents	Target systems	Methods
Models	ECC and S/4	RFC/BAPI/OData V2
Process extensions	ECC and S/4	RFC/BAPI/OData V2

ERP Content Pack for Source to Settle

The ERP Content Pack for Source to Settle contains models including Purchase Orders, Purchase Requisition, and Purchasing Info Record.

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Content pack contents	Target systems	Methods
Models	ECC and S/4	RFC/BAPI/OData V2

Zero Copy Connector for ERP Enterprise Data Foundation content pack

The Zero Copy Connector for ERP Enterprise Data Foundation content pack contains models and process extensions for SAP master data.

Zero Copy Connector for ERP Enterprise Data Foundation content pack models

The Zero Copy Connector for ERP (Enterprise Resource Planning) Enterprise Data Foundation content pack contains models that you might need when interacting with an SAP system.

Enterprise Data Foundation content pack models

Enterprise Data Foundation models and methods

Model name	Short description	Model type	Methods
Bank Master Data	Retrieve details about a specific banking relationship, such as bank name and country.	ERP	RFC/ BAPI
Bank Master Data - List	Retrieve a list of banking relationships.	ERP	RFC/ BAPI
Business Partner - Address	Retrieve all addresses for a business partner, including street, city, and country.	ERP	RFC/ BAPI
Business Partner - Bank Data	Retrieve general bank data for a business partner, including account number and bank key.	ERP	RFC/ BAPI
Business Partner - Bank details	• Create: Create detailed bank information for a business partner. • Update: Update detailed bank information, such as the bank account ID and payment methods, for a business partner. • Read: Retrieve detailed bank information for a business partner.	ERP	RFC/ BAPI
Business Partner - Central Data	• Create: Create a business partner. • Update: Update business partner information. • Read: Retrieve details about a specific business partner.	ERP	RFC/ BAPI
Business Partner - General Data	• Create: Create business partner general data. • Update: Update business partner general data. • Read: Retrieve general data about a specific business partner.	ERP	OData V2

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Enterprise Data Foundation models and methods (continued)

Model name	Short description	Model type	Methods
Business Partner - List	Retrieve a list of business partners.	ERP	RFC/ BAPI
Business Partner - Role	• Create: Create a business partner role. • Update: Update an existing business partner role, such as changing the required validity data. • Read: Retrieve details about business partner roles.	ERP	OData V2
Business Partner - Role	• Create: Create a business partner role. • Update: Update an existing business partner role, such as changing the required validity data. • Read: Retrieve details about business partner roles.	ERP	RFC/ BAPI
Chart of Accounts	Retrieve a chart of accounts list.	ERP	OData V2
Chart of Accounts	Retrieve a chart of accounts list.	ERP	RFC/ BAPI
Cost Center	Retrieve details about a specific cost center.	ERP	OData V2
Cost Center	• Create: Create a cost center. • Update: Update cost center information, such as description and category. • Read: Retrieve details about a specific cost center.	ERP	RFC/ BAPI
Cost Center - List	Retrieve a list of cost centers.	ERP	RFC/ BAPI
Customer	Retrieve all customer details.	ERP	RFC/ BAPI
General Ledger Accounts	Retrieve details about a specific general ledger account, such as account number and description.	ERP	OData V2
General Ledger Accounts	Retrieve details about a specific general ledger account, such as account number and description.	ERP	RFC/ BAPI
General Ledger Accounts - List	Retrieve a list of general ledger accounts.	ERP	RFC/ BAPI

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Enterprise Data Foundation models and methods (continued)

Model name	Short description	Model type	Methods
Material Master	• Create: Create a material. • Update: Update the description of an existing material. • Read: Retrieve all material details based on a requested material number.	ERP	RFC/ BAPI
Material Master - Basic Data	• Create: Create basic data. • Update: Update basic data. • Read: Retrieve basic data such as material description and base unit of measure.	ERP	OData V2
Material Master - Plant Data	• Create: Create plant data. • Update: Update plant data. • Read: Retrieve plant data such as safety stock and shipping processing time.	ERP	OData V2
Material Master - Sales Org Data	• Create: Create sales org data. • Update: Update sales org data. • Read: Retrieve sales org data, such as tax classification and item category group.	ERP	OData V2
Material Search	Retrieve material details based on a material number.	ERP	RFC/ BAPI
Profit Center	Retrieve details about a specific profit center, such as description and person responsible.	ERP	RFC/ BAPI
Profit Center - List	Retrieve a list of all profit centers.	ERP	RFC/ BAPI
Vendor	Retrieve a list of vendors.	Platform	OData V2
Vendor Bank Details	Retrieve a list of vendor bank information.	Platform	RFC/ BAPI
Vendor Bank Details	Retrieve a list of vendor bank information.	Platform	OData V2
Vendor - List	Retrieve a list of vendors.	Platform	RFC/ BAPI
Vendor Location Details	Retrieve a list of vendor location information.	Platform	RFC/ BAPI

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Enterprise Data Foundation models and methods (continued)

Model name	Short description	Model type	Methods
Vendor Location Details	Retrieve a list of vendor location information.	Platform	OData V2
Vendor Master Data	Retrieve all vendor details.	ERP	RFC/ BAPI

Zero Copy Connector for ERP Enterprise Data Foundation content pack process extensions

The Zero Copy Connector for ERP (Enterprise Resource Planning) Enterprise Data Foundation content pack contains process extensions that you might need when interacting with an SAP system.

Enterprise Data Foundation content pack process extensions

Enterprise Data Foundation process extensions

Process extension (subflow) name	Short description
Create a new material	Create a new material with basic data and, optionally, sales data.
Search for a material	Search for a material.
Update material details	Update the description of an existing material and, optionally, update attributes such as sales data.

Zero Copy Connector for ERP SAP Foundation content pack models

The Zero Copy Connector for ERP (Enterprise Resource Planning) SAP Foundation content pack contains models that you might need when interacting with an SAP system.

SAP Foundation content pack models

SAP Foundation models and methods

Model name	Short description	Model type	Methods
Address	Retrieve address details based on an address number.	ERP	RFC/ BAPI
Billing Block - List	Retrieve a list of billing blocks with descriptions. Billing blocks stop customer billing processes, for example, if the customer has credit or legal issues being resolved.	ERP	RFC/ BAPI
Business Area	Retrieve a list of business areas.	ERP	RFC/ BAPI
Company Code	Retrieve a list of company codes.	ERP	RFC/ BAPI
Controlling Area	Retrieve a list of controlling areas.	ERP	RFC/ BAPI

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SAP Foundation models and methods (continued)

Model name	Short description	Model type	Methods
Country	Retrieve a list of countries.	ERP	RFC/ BAPI
Currency	Retrieve a list of currency codes.	ERP	RFC/ BAPI
Delivery Block - List	Retrieve a list of delivery blocks with descriptions. Delivery blocks stop outbound delivery creation for a sales order, for example, if the customer has credit limit issues.	ERP	RFC/ BAPI
Incoterms	Retrieve a list of Inco terms.	ERP	RFC/ BAPI
Language	Retrieve a list of languages maintained in the ERP system.	ERP	RFC/ BAPI
Payment Terms	Retrieve a list of payment terms.	ERP	RFC/ BAPI
Plant	Retrieve a list of plants.	ERP	RFC/ BAPI
Plant Location	Retrieve a list of locations within a plant.	ERP	RFC/ BAPI
Purchasing Group	Retrieve a list of purchasing groups, along with communication details.	ERP	RFC/ BAPI
Purchasing Organization	Retrieve a list of purchasing organizations.	ERP	RFC/ BAPI
Sales Area	Retrieve a list of sales areas. A sales area is a combination of sales organization, distribution channel, and division.	ERP	RFC/ BAPI
Storage Location	Retrieve a list of storage locations.	ERP	RFC/ BAPI
Valuation Area	Retrieve a list of valuation areas.	ERP	RFC/ BAPI

Zero Copy Connector for ERP Quote to Cash content pack

The Zero Copy Connector for ERP Quote to Cash content pack contains models and process extensions for sales order processing.

Zero Copy Connector for ERP Quote to Cash content pack models

The Zero Copy Connector for ERP (Enterprise Resource Planning) Quote to Cash content pack contains models that you might need when interacting with an SAP system.

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Quote to Cash content pack models

Quote to Cash models and methods

Model name	Short description	Model type	Methods
Credit Memo Request	• Create: Create a credit memo request. • Update: Update credit memo request information. • Read: Retrieve details about a specific credit memo request.	ERP	RFC/ BAPI
Credit Memo Request - List	Retrieve a list of credit memo requests.	ERP	RFC/ BAPI
Customer Credit Limits	Retrieve a list of customer credit limits from an ECC system based on input parameters, such as customer or risk category.	ERP	RFC/ BAPI
Customer Credit Limits	Retrieve a list of customer credit limits from an SAP S/4HANA system based on input parameters, such as business partner or credit segment.	ERP	RFC/ BAPI
Customer Invoice	Retrieve a list of customer invoices.	ERP	RFC/ BAPI
Customer Invoice - Header	Retrieve an overview of a customer invoice based on a billing document number.	Platform	OData V2
Customer Invoice - Header	Retrieve an overview of a customer invoice based on a billing document number.	Platform	RFC/ BAPI
Customer Invoice - Item	Retrieve detailed information about a customer invoice based on a billing document number.	Platform	OData V2
Customer Invoice - Item	Retrieve detailed information about a customer invoice based on a billing document number.	Platform	RFC/ BAPI
Outbound Deliveries	• Create: Create an outbound delivery document. • Read: Retrieve details about an outbound delivery based on a 10-digit delivery document number.	ERP	RFC/ BAPI
Outbound Deliveries - List	Retrieve a list of outbound delivery documents.	ERP	RFC/ BAPI
Sales Order	• Create: Create a sales order with one or more items. • Update: Update a sales order, such as adding or removing a delivery block. • Read: Retrieve sales order details based on a sales order number.	ERP	RFC/ BAPI

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Quote to Cash models and methods (continued)

Model name	Short description	Model type	Methods
Sales Order - Search by Customer	Search sales orders using a specific customer number.	ERP	RFC/ BAPI
Sales Order - Search by Status	Search sales orders using a specific status, such as confirmed or billing block, on an ECC system.	ERP	RFC/ BAPI
Sales Order - Search by Status	Search sales orders using a specific status, such as confirmed or billing block, on an SAP S/4HANA system.	ERP	RFC/ BAPI
Service Notification - List	Retrieve a list of service notifications by customer.	ERP	RFC/ BAPI

Zero Copy Connector for ERP Quote to Cash content pack process extensions

The Zero Copy Connector for ERP (Enterprise Resource Planning) Quote to Cash content pack contains process extensions that you might need when interacting with an SAP system.

Quote to Cash content pack process extensions

Quote to Cash process extensions

Process extension (subflow) name	Short description
Manage Delivery and Billing Block	• Subflow 1: Read all sales orders that have a delivery block or a billing block. • Subflow 2: Update the delivery and billing blocking status for a sales order.

Zero Copy Connector for ERP Hire to Retire content pack

The Zero Copy Connector for ERP Hire to Retire content pack contains models and process extensions that manage the employee lifecycle.

Zero Copy Connector for ERP Hire to Retire content pack models

The Zero Copy Connector for ERP (Enterprise Resource Planning) Hire to Retire content pack contains models that you might need when interacting with an SAP SuccessFactors system. Hire to Retire is a process that manages the employee lifecycle.

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Hire to Retire content pack models

Hire to Retire models and methods

Model name	Short description	Model type	Methods
Candidate	Retrieve a list of candidates and information such as name, contact details, and location.	ERP	OData V2
Employment Information	Retrieve a list of employee profiles and information such as hiring date, position, and department.	ERP	OData V2
Employee Personal Information	Retrieve a list of employee profiles and information such as address and contact details.	ERP	OData V2
Job Application	Retrieve a list of job applications and information such as qualifications and experience.	ERP	OData V2
Job Requisition	Retrieve a list of job requisitions and information such as title, location, and description.	ERP	OData V2
Position	Retrieve a list of positions (approved job requisitions).	ERP	OData V2

Zero Copy Connector for ERP Source to Settle content pack

Obtain details about the models and process extensions in the Zero Copy Connector for ERP (Enterprise Resource Planning) Source to Settle content pack.

Zero Copy Connector for ERP Source to Settle content pack models

The Zero Copy Connector for ERP (Enterprise Resource Planning) Source to Settle content pack contains models that you may need when interacting with an SAP system.

Source to Settle models

Model name	Short description	Model type	Methods
Purchase Order	Retrieve information about a purchase order based on a purchase order number.	ERP	RFC/ BAPI
Purchase Order - Header	Retrieve purchase order header information such as vendor, currency, and payment terms, based on a purchase order number.	Platform	OData v2
Purchase Order - Header	Retrieve purchase order header information such as vendor, currency, and payment terms, based on a purchase order number.	Platform	RFC/ BAPI
Purchase Order - Item	Retrieve details about a specific line item on a purchase order based on a purchase order number and line item number.	Platform	OData v2
Purchase Order - Item	Retrieve details about a specific line item on a purchase order based on a purchase order number and line item number.	Platform	RFC/ BAPI

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Model name	Short description	Model type	Methods
Purchase Order - List	Retrieve a list of all items (along with their item numbers and details) on a purchase order based on a purchase order number.	ERP	RFC/ BAPI
Purchase Requisition	Retrieve information about a specific purchase requisition, such as the quantity of a material or service and the date needed.	ERP	RFC/ BAPI
Purchase Requisitions - List	Retrieve a list of purchase requisitions.	ERP	RFC/ BAPI
Purchasing Info Record	Retrieve details about a specific purchasing info record, such as prices, conditions, and sources for materials.	ERP	RFC/ BAPI

Zero Copy Connector for ERP troubleshooting

Zero Copy Connector for ERP provides several ways to troubleshoot issues.

You can test model inputs and outputs, debug models, monitor transactions, and export transaction data to help troubleshoot issues.

Related topics

Use ERP Data action details for flows

Use ERP Data action details for flows

After you're done creating and managing your model in Zero Copy Connector for ERP, go to Workflow Studio and use the Use ERP Data action to test your model's inputs and outputs. You can then build a flow with the action to incorporate ERP data into the ServiceNow AI Platform.

For information on using the Use ERP Data action to retrieve ERP data, see Building flows to read or update the ERP system.

Roles and availability

Available as part of Zero Copy Connector for ERP.

Role requirements

This action requires roles granted by delegated development or assigned to the user. For more information, see User access to Workflow Studio flows.

Inputs

Provide a value for each input that your action requires. To add dynamic values, you can also select data pills using the pill picker.

ModelName

Data type: *Dynamic Choice*

Name of the ERP model that contains the read or update operation. The model must already be created and have the read or update operation defined in Zero Copy Connector for ERP. For more information, see Exploring Zero Copy Connector for ERP models.

ModelOperation

Data type: *Dynamic Choice*

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Whether to **Read** or **Update** the ERP system. The read or update entity must already be defined in Zero Copy Connector for ERP. For more information, see Adding an entity to a model.

Required Fields

Data type: *Dynamic Template*

Fields that are required for the operation. Fields must already be defined as required input parameters when you manage the model in Zero Copy Connector for ERP. For more information, see Manage input parameters for a model operation.

Optional Fields

Data type: *Dynamic Template*

Fields that are optional for the operation. Fields must already be defined as optional input parameters when you manage the model. For more information, see Manage input parameters for a model operation.

System

Data type: *Reference*

Name of the connected ERP system. For more information, see Working with ERP systems in Zero Copy Connector for ERP.

Outputs

You can use these outputs as inputs for other items.

Action status

Data type: *Object*

Data pill that contains the current runtime details about the action. The **Action Status** object consists of a code and a message.

Don't Treat As Error

Data type: *True/False*

Option to report the Action Status as an error or a success when returned to a flow.

Error Message

Data type: *String*

String data pill containing the error message produced by the action, step, or system operation.

Response

Data type: *Dynamic Object*

Requested data that's returned from the ERP system. For more information, see Choose output parameters for a model.

Debug Zero Copy Connector for ERP models

Use the debug models option in Zero Copy Connector for ERP (Enterprise Resource Planning) to see a log capturing the probe payload, payload response, status, and other information.

Before you begin

Role required: sn_erp_integration.erp_admin

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About this task

View debug logs from within Zero Copy Connector for ERP to obtain information about requests, responses, and payloads without having to open Workflow Studio.

Keep the following guidance in mind when debugging Zero Copy Connector for ERP models:

- Turn debugging on and off as needed.
- Debug logs persist for the current session only.
- The system clears debug logs automatically each day.
- For probe executions triggered through **Use ERP Data** flows, the system stores flow context IDs.
- For probe executions outside of **Use ERP Data** flows, the system stores only transaction IDs, not flow context IDs.

Procedure

1. To turn on debugging, navigate to **All** > *Zero Copy Connector for ERP* > **Enable ERP Models Debugging**.
2. Select **Confirm**.
3. To view the logs, navigate to **All** > *Zero Copy Connector for ERP* > **Open Debug Logs**.

   Debug logs show flow engine context, probe communication, probe payload, payload response, status, and more.

   For details about the columns in debug logs, see Zero Copy Connector for ERP debug logs field descriptions.
4. To turn off debugging, navigate to **All** > *Zero Copy Connector for ERP* > **Disable ERP Models Debugging**.
5. Select **Confirm**.

Monitor Zero Copy Connector for ERP transactions and logged errors

Use the monitoring feature to track the progress of each ERP (Enterprise Resource Planning) transaction and view logged errors.

Before you begin

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP monitor page by selecting the monitor icon  in the side panel.
3. Select the **Asynchronous transactions**, **Synchronous transactions**, and **Logged errors** tabs to view information.

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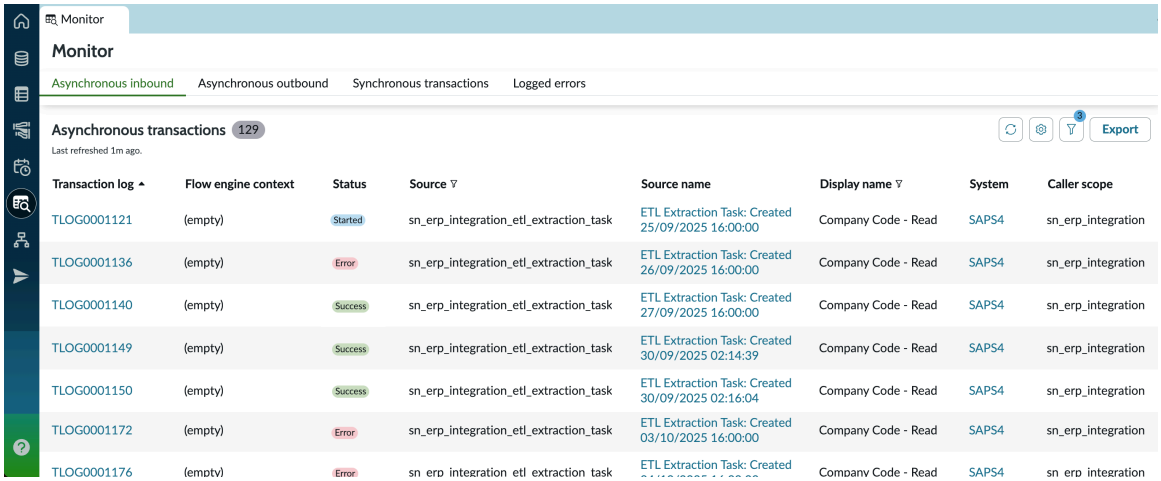

Filter the information as needed. For example, show only successes, failures, or information for a specific system.

For a description of the field values, see Zero Copy Connector for ERP Monitor field descriptions.

Export Zero Copy Connector for ERP transaction data

Export Zero Copy Connector for ERP (Enterprise Resource Planning) transaction information such as failures and usage. Filter the data as needed and then export to Excel, CSV, JSON, or PDF format.

Before you begin

Role required: sn_erp_integration.erp_admin

Procedure

1. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
2. Open the ERP monitor page by selecting the monitor icon in the side panel.
3. Select the **Asynchronous transactions** or **Synchronous transactions** tab.
4. **Optional:** Point to a column heading, select the filter icon , specify filter options, and select **Apply**.

   (Optional) For example, filter the **Status** column to only show errors. You can apply filters to multiple columns.

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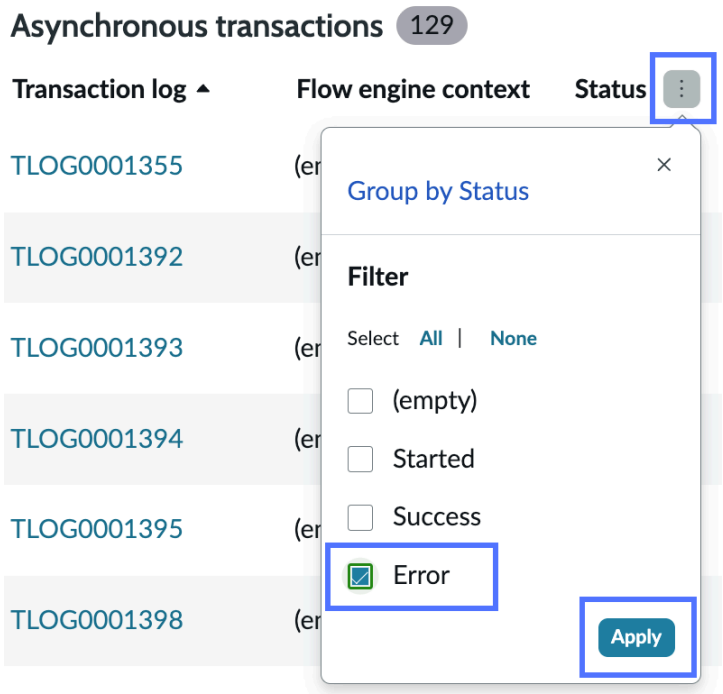

5. Select **Export**.
6. Specify a **File Type**: Excel, CSV, JSON, or PDF.
7. Select a **Delivery Type**: Download or Email.
8. Select **Export**.

Building with ERP data

Use data extracted from ERP systems, such as SAP, to build applications, workflows, playbooks, and more.

After you create models, use the extracted and transformed data as a foundation to build. For example, use ServiceNow Studio to build an application, or build flows within Workflow Studio.

Next steps after extracting data from your ERP system using Zero Copy Connector for ERP

After you identify and extract ERP (Enterprise Resource Planning) data with Zero Copy Connector for ERP, you can use that data on the ServiceNow AI Platform as the data source for products and apps.

Using retrieved ERP data in flows

Build flows in Workflow Studio to specify details for when you query or update the ERP (Enterprise Resource Planning) system.

For example, you can generate a record for each response from the ERP system, making that data available for use on the ServiceNow AI Platform. For more information, see Building flows to read or update the ERP system.

Building a ServiceNow app that consumes ERP data

Data from the ERP system is available in the remote tables and ERP extraction tables that you configure in Zero Copy Connector for ERP. You can also use table transform maps to put extracted ERP data into a Glide table.

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After ERP data is available on tables in the ServiceNow AI Platform, you can use those tables as the foundation for app builders. For example, you can use ERP tables when you create applications in ServiceNow Studio.

ServiceNow low- and pro-code builders

Use any of the following ServiceNow builders to create apps using custom data:

- ServiceNow Studio
- Flows in Workflow Studio
- Playbooks in Workflow Studio
- Table Builder
- UI Builder
- Workspace Builder

Using Glide to query ERP data

You can also access data from the system of record through the Glide API.

Managing ERP development pipelines in Zero Copy Connector for ERP

Move your ERP (Enterprise Resource Planning) systems, ERP models, tables, operations, and flows from a development instance to a production environment when they're ready.

Changes that you could promote from a development instance to a production instance include adding:

- Fields to tables
- Tables or BAPIs (business application programming interfaces) to ERP models
- Table joins and fields to link tables
- Create, read, and update operations
- Flows built with the **Use ERP Data** action to query and update the ERP system

Note: Do your development on a non-production instance. If you make changes on a production instance, then promote changes from a non-production instance to the production instance, changes previously made on the production instance are overwritten.

You can move changes to your production instance on the ServiceNow AI Platform in several ways:

- Use System Update Sets to transfer changes from a development instance to a non-production and then production instance. For more information, see System update sets.
- Add the changes to the ServiceNow Store and use the **Share with others** option to install the updates on the production instance. For more information, see Publish an application to an Update Set.

For more information about ways to publish your ERP updates, see Application sharing.

Building flows to read or update the ERP system

After you configure an operation in Zero Copy Connector for ERP (Enterprise Resource Planning), you can build a flow in Workflow Studio to specify details for querying the ERP system. For example, build a flow that filters by Order ID.

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Actions in Workflow Studio for calling the ERP system

The Use ERP Data action is automatically available in Workflow Studio after installing Zero Copy Connector for ERP.

The Use ERP Data action enables you to use ERP data outside of Zero Copy Connector for ERP for other processes. For example, you could create a task or an incident based on ERP data using the Use ERP Data action.

After you're done creating and managing your model in Zero Copy Connector for ERP, go to Workflow Studio and use the Use ERP Data action to test your model's inputs and outputs.

When you test the action, you must specify the model you're using, which fields to read or update, and the ERP system. For more information about the action, see Use ERP Data action details for flows.

Using parameters to filter data requests

After you successfully test the Use ERP Data action, build a flow that uses that action to retrieve or update the specified data in the ERP system.

When you add the Use ERP Data action to a flow, you can specify any **Mandatory Field(s)** and **Optional Field(s)** defined as inputs when you managed the model. Required and optional fields must already be configured as required and optional input parameters.

If you select a field that was defined as a parameter for the system query, you can then enter a value to filter on. For example, if you build a flow using the Use ERP Data action and specify the SAP Stock Movement model, you can select **iseg_fiscal_year** as a required field. Then, enter a year to filter the data returned, for example 2023.

Process for building flows to retrieve ERP data

To use ERP data for processes or tasks outside of Zero Copy Connector for ERP, use the following workflow:

1. In Workflow Studio, test the **Use ERP Data** action by selecting the model in the **System** field of the Test Action modal and then specifying the inputs.
   - For more information about testing actions, see Test an action.
   - For more details on inputs for the action, see Use ERP Data action details for flows.
2. After the test runs, view the action execution details. For more information, see Flow execution details.
3. The returned data from testing the action appears in the **Response** field of the output data.
   - For more information about outputs for the action, see Use ERP Data action details for flows.
   - For details on incorporating returned ERP data, see Specifying where ERP system data is saved.
4. Build a flow that runs the Use ERP Data action.

   The **Use ERP Data** action returns ERP data in an output data pill called **Response**. The **Response** pill is available when you build a flow in Workflow Studio with the **Use ERP Data** action. The **Response** data pill is available in the following places of the action:
   - The **Outputs** tab
   - The **Output** section in the **Data** pane

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You can then add the **Response** data pill or any of the child **record** data pills to a flow to parse the returned JSON.

For more information, see Building flows.

Note: Zero Copy Connector for ERP appears as **ERP Integration** when you work with it in Workflow Studio.

Zero Copy Connector for ERP reference

Reference information for Zero Copy Connector for ERP (Enterprise Resource Planning), including ERP table details.

Zero Copy Connector for ERP standard remote and extraction tables

Standard enterprise resource planning (ERP) remote tables and extraction tables are available in Zero Copy Connector for ERP.

Standard remote tables for Zero Copy Connector for ERP

Zero Copy Connector for ERP (Enterprise Resource Planning) accesses several standard remote tables for ERP models.

The following remote tables are available through Zero Copy Connector for ERP and ERP Semantic Mining.

Remote tables for Zero Copy Connector for ERP and ERP Semantic Mining

Label	Name	ERP module
SAP Company Code	sn_erp_integration_st_sap_company_code	Basis
SAP Country	sn_erp_integration_st_sap_country	Basis
SAP Currency	sn_erp_integration_st_sap_currency	Basis
SAP Language	sn_erp_integration_st_sap_language	Basis
SAP Material Stock	sn_erp_integration_st_sap_material_stock	Plant_maintenance
SAP Purchase Document	sn_erp_integration_st_sap_purchase_document	Purchase_document
SAP Purchasing Organization	sn_erp_integration_st_sap_purchasing_organization	Purchase_organization
SAP Customer Invoice	sn_erp_integration_st_sap_customer_invoice	Sales_invoice
SAP Distribution Channel	sn_erp_integration_st_sap_distribution_channel	Sales_organization
SAP Division	sn_erp_integration_st_sap_division	Sales
SAP Sales Customer	sn_erp_integration_st_sap_sales_customer	Sales_customer
SAP Sales Delivery	sn_erp_integration_st_sap_sales_delivery	Sales_delivery
SAP Sales Document	sn_erp_integration_st_sap_sales_document	Sales_document
SAP Sales Organization	sn_erp_integration_st_sap_sales_organization	Sales_organization
SAP Sales Revenue Recognition	sn_erp_integration_st_sap_sales_revenue_recognition	Sales_revenue_recognition
SAP Vendor	sn_erp_integration_st_sap_vendor	Sales
SAP Vendor Invoice	sn_erp_integration_st_sap_vendor_invoice	Sales_invoice

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Remote tables for Zero Copy Connector for ERP and ERP Semantic Mining (continued)

Label	Name	ERP module
SAP Transport	sn_erp_integration_st_sap_transport	Transport

For more details on working with remote tables, see Remote tables.

You can use any of the standard remote tables as data sources when building apps in ServiceNow products, such as:

- ServiceNow Studio
- Flows in Workflow Studio
- Playbooks in Workflow Studio
- Table Builder
- UI Builder
- Workspace Builder

You can also access data from the system of record through the Glide API.

The following is an example of a Glide query that fetches a customer name.

```
var sap_customer_gr = new
 GlideRecord('sn_erp_integration_st_sap_sales_customer');
sap_customer_gr.get('customer_number', '100032');
sap_customer_gr.getValue('name');
```

Standard Zero Copy Connector for ERP fields in remote tables

The standard ERP (Enterprise Resource Planning) remote tables available in Zero Copy Connector for ERP contain fields from additional SAP tables.

For details about the standard tables, see Standard remote tables for Zero Copy Connector for ERP. The standard remote tables contain the following additional fields:

Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables

Remote table	Source table	ERP field name	Mapped field name
SAP Sales Document	VBAK	VBELN	document_number
SAP Sales Document	VBAK	ERDAT	date_of_document
SAP Sales Document	VBAK	ERZET	time_of_document
SAP Sales Document	VBAK	VKORG	sales_organization
SAP Sales Document	VBAK	VBTYP	document_category
SAP Sales Document	VBAK	AUART	document_type
SAP Sales Document	VBAK	AUGRU	order_reason
SAP Sales Document	VBAK	LIFSK	delivery_block
SAP Sales Document	VBAK	FAKSK	billing_block

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Sales Document	VBAK	KUNNR	customer_number
SAP Sales Document	VBAK	AUFNR	order_number
SAP Sales Document	VBAK	NETWR	document_value
SAP Sales Document	VBAK	WAERK	currency_code
SAP Sales Document	VBUK	LFGSK	delivery_status
SAP Sales Document	VBAP	MATNR	material_number
SAP Sales Document	VBAP	ARKTX	material_description
SAP Sales Document	VBAP	KWMENG	ordered_quantity
SAP Sales Document	VBAP	KLMENG	confirmed_quantity
SAP Sales Document	VBAP	NETWR	item_value
SAP Sales Document	VBAP	VRKME	sales_unit
SAP Sales Document	VBAP	ROUTE	delivery_route
SAP Sales Document	MARA	MTART	material_type
SAP Sales Document	VBUP	GBSTA	overall_item_status
SAP Sales Customer	KNA1	KUNNR	customer_number
SAP Sales Customer	KNA1	LAND1	country_code
SAP Sales Customer	KNA1	NAME1	name
SAP Sales Customer	KNA1	ORT01	city
SAP Sales Customer	KNA1	PSTLZ	postal_code
SAP Sales Customer	KNA1	STRAS	street
SAP Sales Customer	KNA1	STKZU	vat_liable
SAP Sales Customer	KNA1	STCEG	vat_reg_number
SAP Sales Customer	KNVV	VKORG	sales_organization
SAP Sales Customer	KNVV	VTWEG	distribution_channel
SAP Sales Customer	KNVV	SPART	division
SAP Sales Customer	KNVV	INCO1	inco_terms
SAP Customer Invoice	VBRK	VBELN	document_number
SAP Customer Invoice	VBRK	FKART	billing_type
SAP Customer Invoice	VBRK	WAERK	currency_code
SAP Customer Invoice	VBRK	ZTERM	payment_terms
SAP Customer Invoice	VBRK	NETWR	document_value
SAP Customer Invoice	VBRK	KUNRG	payer

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Customer Invoice	VBUK	GBSTK	overall_document_status
SAP Customer Invoice	VBRP	MATNR	material_number
SAP Customer Invoice	VBRP	ARKTX	material_description
SAP Customer Invoice	VBRP	NETWR	item_value
SAP Customer Invoice	VBRP	FKLMG	billing_quantity
SAP Customer Invoice	VBRP	VRKME	sales_unit
SAP Customer Invoice	VBRP	SHKZG	is_returns_item
SAP Customer Invoice	VBUP	GBSTA	overall_item_status
SAP Sales Organization	TVKO	VKORG	sales_organization
SAP Sales Organization	TVKO	EKORG	purchase_organization
SAP Sales Organization	TVKO	BUKRS	company_code
SAP Purchase Document	EKKO	EBELN	document_number
SAP Purchase Document	EKKO	BUKRS	company_code
SAP Purchase Document	EKKO	BSTYP	document_category
SAP Purchase Document	EKKO	LIFNR	vendor_number
SAP Purchase Document	EKKO	ZTERM	payment_terms
SAP Purchase Document	EKKO	EKORG	purchase_organization
SAP Purchase Document	EKKO	WAERS	currency_code
SAP Purchase Document	EKKO	IHREZ	ext_reference
SAP Purchase Document	EKKO	RESWK	supplying_plant
SAP Purchase Document	EKKO	BEDAT	date_of_document
SAP Purchase Document	EKPO	MATNR	material_number
SAP Purchase Document	EKPO	EMATN	supplier_material_number
SAP Purchase Document	EKPO	MENGE	ordered_quantity
SAP Purchase Document	EKPO	MEINS	order_unit
SAP Purchase Document	EKPO	NETPR	item_value
SAP Purchase Document	EKPO	MWSKZ	vat_applicable
SAP Purchase Document	EKPO	ELIKZ	fully_delivered
SAP Purchase Document	EKPO	REPOS	fully_invoiced
SAP Material Stock	MARA	MATNR	material_number
SAP Material Stock	MARA	MTART	material_type
SAP Material Stock	MARA	MATKL	material_class

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Material Stock	MARA	NTGEW	net_weight
SAP Material Stock	MARA	EANNR	ean_number
SAP Material Stock	MARA	EAN11	ean11_number
SAP Material Stock	MARA	MSTAE	material_status
SAP Material Stock	MAKT	MAKTX	material_description
SAP Material Stock	MARD	WERKS	plant
SAP Material Stock	MARD	LGORT	storage_location
SAP Material Stock	MARD	LABST	quantity
SAP Material Stock	MARD	DLINL	date_of_count
SAP Vendor Invoice	RSEG	BELNR	document_number
SAP Vendor Invoice	RSEG	GJAHR	document_year
SAP Vendor Invoice	RSEG	EBELN	purchase_document_number
SAP Vendor Invoice	RSEG	EBELP	purchase_document_item
SAP Vendor Invoice	RSEG	MATNR	material_number
SAP Vendor Invoice	RSEG	BUKRS	company_code
SAP Vendor Invoice	RSEG	WERKS	plant
SAP Vendor Invoice	RSEG	WRBTR	amount
SAP Vendor Invoice	RSEG	SHKZG	credit_debit_indicator
SAP Vendor Invoice	RSEG	MWSKZ	vat_applicable
SAP Vendor Invoice	RSEG	MENGE	quantity
SAP Purchasing Organization	T024E	EKORG	purchase_organization
SAP Purchasing Organization	T024E	EKOTX	name
SAP Purchasing Organization	T024E	BUKRS	company_code
SAP Sales Delivery	LIKP	VBELN	document_number
SAP Sales Delivery	LIKP	KUNNR	customer_number
SAP Sales Delivery	LIKP	ERDAT	date_of_document
SAP Sales Delivery	LIKP	ERZET	time_of_document
SAP Sales Delivery	LIKP	VKORG	sales_organization
SAP Sales Delivery	LIKP	LFART	delivery_type
SAP Sales Delivery	LIKP	ROUTE	delivery_route
SAP Sales Delivery	VBUK	GBSTK	overall_document_status
SAP Sales Delivery	LIPS	MATNR	material_number

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Sales Delivery	LIPS	CHARG	batch_number
SAP Sales Delivery	LIPS	WERKS	plant
SAP Sales Delivery	LIPS	LFIMG	quantity
SAP Sales Delivery	LIPS	NTGEW	net_weight
SAP Sales Delivery	LIPS	GEWEI	delivery_unit
SAP Sales Delivery	LIPS	VOLUM	volume
SAP Sales Delivery	LIPS	VOLEH	volume_unit
SAP Sales Delivery	LIPS	ARKTX	material_description
SAP Vendor	LFA1	LIFNR	vendor_number
SAP Vendor	LFA1	NAME1	name
SAP Vendor	LFA1	ORT01	city
SAP Vendor	LFA1	PSTLZ	postal_code
SAP Vendor	LFA1	STRAS	street
SAP Vendor	LFA1	STCEG	vat_reg_number
SAP Vendor	LFA1	WERKS	plant
SAP Vendor	LFM1	EKORG	purchase_organization
SAP Vendor	LFM1	WEBRE	gr_invoice_indicator
SAP Sales Revenue Recognition	VBREVK	VBELN	document_number
SAP Sales Revenue Recognition	VBREVK	POSNR	document_item
SAP Sales Revenue Recognition	VBREVK	SAKRR	accr_val_clearing_account_number
SAP Sales Revenue Recognition	VBREVK	SAKRRK	offset_clearing_account_number
SAP Sales Revenue Recognition	VBREVK	ACC_VALUE	total_accrued_value
SAP Sales Revenue Recognition	VBREVK	WRBTR	amount
SAP Sales Revenue Recognition	VBREVK	RVAMT	revenue_amount
SAP Sales Revenue Recognition	VBREVK	WAERK	currency_code
SAP Country	T005	LAND1	country_code
SAP Country	T002	SPRAS	language_code

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Country	T002	LAISO	language_iso_code
SAP Country	T005T	LANDX	description
SAP Language	T002	SPRAS	language_code
SAP Language	T002	LAISO	language_iso_code
SAP Currency	TCURC	WAERS	currency_code
SAP Currency	TCURC	ISOCD	currency_iso_code
SAP Currency	TCURT	LTEXT	description
SAP Distribution Channel	TVTW	VTWEG	distribution_channel
SAP Distribution Channel	TVTWT	VTEXT	description
SAP Division	TSPA	SPART	division
SAP Division	TSPAT	VTEXT	description
SAP Company Code	T001	BUKRS	company_code
SAP Company Code	T001	BUTXT	description
SAP Company Code	T001	LAND1	country_code
SAP Company Code	T001	WAERS	currency_code
SAP Company Code	T001	SPRAS	language_code
SAP Transport	E071	AS4DATE	date_of_transport
SAP Transport	E071	AS4TIME	time_of_transport
SAP Transport	E071	AS4USER	user
SAP Transport	E071	TRFUNCTION	type
SAP Transport	E071	TRKORR	number
SAP Transport	E071	TRSTATUS	status
SAP Transport	E071	OBJECT	object_type
SAP Transport	E071	OBJ_NAME	object_name
SAP Transport	E071	PGMID	program_id

Standard extraction tables for Zero Copy Connector for ERP

Zero Copy Connector for ERP provides standard extraction tables that you can link to enterprise resource planning (ERP) models.

The following extraction tables are available through Zero Copy Connector for ERP.

Label	ERP module
SAP Company Code	Basis

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Label	ERP module
SAP Country	Basis
SAP Currency	Basis
SAP Language	Basis
SAP Material Stock	Procurement
SAP Purchase Document	Procurement
SAP Purchasing Organization	Procurement
SAP Customer Invoice	Sales
SAP Distribution Channel	Sales
SAP Division	Sales
SAP Sales Customer	Sales
SAP Sales Delivery	Sales
SAP Sales Document	Sales
SAP Sales Organization	Sales
SAP Sales Revenue Recognition	Sales
SAP Vendor	Sales
SAP Vendor Invoice	Sales
SAP Transport	Transport

For more information about working with extraction tables, see ERP data extraction and transformation.

Zero Copy Connector for ERP and domain separation

Domain separation is unsupported for Zero Copy Connector for ERP (Enterprise Resource Planning). Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

For more information on support levels, see Application support for domain separation.

Related topics

Domain separation for service providers

Flows installed with Zero Copy Connector for ERP

Zero Copy Connector for ERP (Enterprise Resource Planning) includes ERP flows that run automatically.

You don't need to do anything to activate the flows, but you can customize them in Workflow Studio, for example, to change the time that they run each day. For more information, see Edit a flow.

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Note: Zero Copy Connector for ERP appears as **ERP Integration** when you work with it in Workflow Studio.

The flows that Zero Copy Connector for ERP automatically runs are:

- Get SAP BAPIs and tables when system becomes active: This flow runs as soon as the heartbeat for an ERP system is live. It detects and retrieves the available BAPIs (Business Application Programming Interfaces) and tables for use when managing models. This flow also reads the OData catalog service if the OData heartbeat is successful.
- ETL SAP BAPIs and Tables From all systems: This flow calls the Get SAP BAPIs and tables when system becomes active flow every night to retrieve any changes to available BAPIs and tables on the ERP system.

The flows write data to the following tables:

- sn_erp_integration_sap_tables
- sn_erp_integration_sap_bapi_list

Zero Copy Connector for ERP system properties

System properties that control Zero Copy Connector for ERP behavior, including debug logging, OData connections, and ETL extraction settings.

Configure the following properties in the System Properties [sys_properties] table to control Zero Copy Connector for ERP behavior.

Note: To open the System Properties [sys_properties] table, enter `sys_properties.list` in the navigation filter.

Properties for Zero Copy Connector for ERP

Property	Type	Description
com.snc.uib.sn_erp_integration.debug.level	integer	Debug log level. • 0 is inactive • 1 is the least level of detail • 9 is the highest level of detail Logging occurs in the *`ERPIntegrationLog`* class.
glide.ui.sn_erp_integration_etl_extraction_source_activity.fields	string	Extraction tables activity fields.
glide.ui.sn_erp_integration_model_activity.fields	string	ERP Model activity formatter fields.
glide.ui.sn_erp_integration_remote_table_activity.fields	string	Remote table activity formatter fields.
glide.ui.sn_erp_integration_scheduled_extraction_activity.fields	string	ETL Scheduled Extraction formatter fields.
sn_erp_integration.catalog_service_path (this property must be created manually)	string	After the hostname and port, this path is used to connect with any SAP catalog service. The default

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Properties for Zero Copy Connector for ERP (continued)

Property	Type	Description
		is `/sap/opu/odata/iwfnd/CATALOGSERVICE;v=2/ServiceCollection`. After creating the property and setting it to active, a list of all services is retrieved from SAP. The information is stored in an XML file and attached to the system record. The XML can be used later. For example, parse the XML while offline with no connection to SAP. **Note:** To update the table catalog information after the catalog service changes, first remove the attachment displayed on the ERP Systems page. Then, run the retrieval process again to refresh the list.
sn_erp_integration.db_memory_limit_mb	integer	Database memory limit in megabytes per request. When the limit is reached, data is written to disk.
sn_erp_integration.debug.sapresponse.size	integer	Number of bytes of the reply from SAP probe to output from step that calls SAP.
sn_erp_integration.enableModelModification	true | false	Enables cloning and modification of models in the Zero Copy Connector for ERP application.
sn_erp_integration.heartbeat_enabled	true | false	Turns the heartbeat feature on or off.
sn_erp_integration.keep_pages_on_mid_on_error	true | false	Retains data on the MID Server when errors occur.
sn_erp_integration.max_in_loaded_state	integer	Maximum number of pages in loaded state per process. When more pages are in loaded state, the ETL process waits until fewer pages are in loaded state before sending the next batch.
sn_erp_integration.odata_max_record_fetch_limit	integer	Limits the number of records fetched for GET calls by adding the $top parameter to the OData calls. This reduces the number of records read from the OData endpoint.
sn_erp_integration.odata_service_path (this property must be created manually)	string	After the hostname and port, this path is used to connect with any

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Properties for Zero Copy Connector for ERP (continued)

Property	Type	Description
		SAP OData service. Add a URL in **Value** to specify the OData service. The default is `/sap/opu/odata/sap`.
sn_erp_integration.probe.paging.tech	choice list	Paging technology.
sn_erp_integration.response_timeout	integer	Specifies the timeout value for the OData response. If OData calls time out frequently, increase the timeout value. Specify the value in seconds. The default is 100 seconds. This value is used for responses both from external web and from a MID Server.
sn_erp_integration.result_page_size	integer	Number of records to retrieve from the external system. The default global property for all extractions is set to 50. To override the global property, specify an extraction-source-specific page size with the sn_erp_integration_result_page_size system property.
sn_erp_integration.sap_output_pagesize	integer	Page size of output from MID Server.
sn_erp_integration.sap_pagesize	integer	Page size for database requests from MID Server to SAP.
sn_erp_integration.save_erp_attachment	true | false	Set this property to true to save the latest response from your ERP system as an attachment on the ERP remote table. Updating the attachment setting on the ERP remote table to **use attachment** skips the request to the ERP system and shows the data stored in the attachment. Requires the sn_erp_integration.erp_admin role to change.
sn_erp_integration.storage_pagesize	integer	Size of each batch insert to storage after response from SAP.
sn_erp_integration.use_cookies	true | false	Specifies whether cookies must be used for the OData connection.

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Properties for Zero Copy Connector for ERP (continued)

Property	Type	Description
sn_erp_integration.use_csrf_token	true | false	Indicates whether a CSRF token is sent for OData calls in Zero Copy Connector for ERP operations.

Zero Copy Connector for ERP field descriptions

Field descriptions for larger ERP forms in Zero Copy Connector for ERP, including model, system, and remote table fields.

Zero Copy Connector for ERP connection and credentials field descriptions

The Connection and Credential Alias modal contains connection and credential details that specify how Zero Copy Connector for ERP connects to the enterprise resource planning (ERP) system.

For process details, see Configure an SNC connection in Zero Copy Connector for ERP.

Connection Information field descriptions

Connection Information fields

Field	Description
Connection Name	Label or alias for the connection.
Host name or IP Address to SAP Application server or the Load Balancer	Host name or IP address of the ERP system server or load-balancing host that connects to the ERP system.
Login Language	Two-character code for the language of the ERP server you're connecting to.
SAP Client	Client value of the connection host where the SAP instance is installed.
SAP System Number	System number of the connection host where the SAP instance is installed. Don't enter anything in this field if the connection you're specifying is for a load balancer.
Load Balancing: SAP Message Server Port number or logical name	Port number or name of the message server host. Enter this value only if the connection you're specifying is for a load balancer.
Load Balancing: SAP R3 Name	Three-character system ID of the target ABAP system. Enter this value only if the connection you're specifying is for a load balancer.
Load Balancing: SAP Load Balancing Group	Name of the load balancer. Enter this value only if the connection you're specifying is for a load balancer.

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Connection Information fields (continued)

Field	Description
The communication partner's SNC name	Canonical name. (Required if **SNC Connection** field is set to **true**.)
SNC Connection	Option to use SNC with a connection. Set to **true** to enable it.
The quality of protection (QoP) level for SNC	Protection level, entered as one of the following numbers without the accompanying text: • 1: Apply authentication only • 2: Apply authentication and integrity protection • 3: Apply authentication, integrity, and privacy protection (encryption) • 8: Apply global default protection • 9: Apply the maximum protection
The external security product's library	Absolute path of the SAP Cryptography library file. (Required if **SNC Connection** field is set to **true**.)
The SNC mode flag to indicate whether the communication should use SNC protection	Flag that indicates whether the connection uses SNC protection, entered as one of the following numbers without the accompanying text: • 0: Don't apply SNC to connections • 1: Apply SNC to connections
SNC: Client SNC Name	Client Personal Security Environment (PSE) name. (Required if **SNC Connection** field is set to **true**.)

Credential Information field descriptions

Credential Information fields

Field	Description
User Name	User name to log in to the ERP system to access ERP data.
Password	Password to authenticate and log in to the ERP system.
Credential Name	Alias or name for the login credential.

Zero Copy Connector for ERP system details field descriptions

The system details tab in Zero Copy Connector for ERP (Enterprise Resource Planning) contains connection information for an ERP system.

For process details, see Create an ERP system in Zero Copy Connector for ERP.

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Create ERP system fields

Field	Description
ERP system	Name of the ERP system to help identify the business area.
Short description	Brief description of what the ERP system is for.
Connection	Alias of the connection credential that you configured to connect to the ERP system. You can select only from connections in the Zero Copy Connector for ERP scope.
ERP software	The supported ERP software on the system. Select one or more options from the list, for example, ECC 7.5 and SAP S/4HANA 2021. For SAP, the list contains major SAP versions and doesn't include patch versions. The list also contains Oracle E-Business Suite (EBS), version 12.2 or later. Oracle E-Business Suite systems support REST only. For more information, see Oracle E-Business Suite support in Zero Copy Connector for ERP.
Virtual schema name	Identifier for the ERP system that you use to run a model through the API. This value is generated when the system record is first saved and can't be edited.
KB link (on heartbeat tabs after system record is first saved)	Link to a relevant knowledge base article, when an error occurs and an article is available.
Status (on heartbeat tabs after system record is first saved)	State of the heartbeat: **Success**, **Failed**, or **Not connected**.
Error text (on heartbeat tabs after system record is first saved)	Details about any errors that have occurred.
Updated (on heartbeat tabs after system record is first saved)	Date and time when the heartbeat was last changed.

Zero Copy Connector for ERP software info tab field descriptions

The software info tab in Zero Copy Connector for ERP (Enterprise Resource Planning) contains information about the selected ERP system.

For process details, see View Zero Copy Connector for ERP software information.

ERP system info details

Field	Description
ERP family	The ERP system, for example, SAP.
Generation	The ERP system version, for example, SAP ECC or SAP S/4HANA 2021.

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ERP system info details (continued)

Field	Description
Database type	Variety of database, for example, column store or row store.
CPU architecture	CPU design and instruction set, for example, x86_64.
Unicode	Option that indicates whether the system supports the international standard character set.

Zero Copy Connector for ERP partner profile field descriptions

The partner profile record in Zero Copy Connector for ERP (Enterprise Resource Planning) contains information that defines inbound and outbound communications with a partner.

For process details, see View Zero Copy Connector for ERP partner profile information.

ERP partner profile details

Field	Description
Partner class	Value used to group partners.
Partner status	Indicates whether the partner profile is active or inactive. Most often contains **A** for active.
Language	Specifies the language for the person who receives messages about technical problems with IDoc creation. For example, an **E** indicates English and **S** indicates Spanish.
Partner number	Number for which a master record is created in a system application, for example, S4LOCAL.
Partner type	Partner role or function. Common types include: • LS: Logical System • KU: Customer (for outbound messages) • LI: Vendor (for outbound messages)
User type	Most often contains **US** (for user), which notifies a specific person when the inbound message arrives.
Message type (Allowed message types column)	Type of business document allowed to be sent or received, for example, an order or invoice.
Message function (Allowed message types column)	A second level of differentiation of message type to assign additional process codes or actions.
Message code (Allowed message types column)	A third level of differentiation of message type.

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Zero Copy Connector for ERP partner profile tab column descriptions

The partner profile tab on a system record in Zero Copy Connector for ERP (Enterprise Resource Planning) contains information that defines inbound and outbound communications with a partner.

For process details, see View Zero Copy Connector for ERP partner profile information.

ERP partner profile tab details

Column	Description
Partner number	Number for which a master record is created in a system application, for example, S4LOCAL.
Partner type	Partner role or function. Common types include: • LS: Logical System • KU: Customer (for outbound messages) • LI: Vendor (for outbound messages)
Updated	Date and time the partner profile was most recently saved.

Zero Copy Connector for ERP system list field descriptions

The systems list in Zero Copy Connector for ERP (Enterprise Resource Planning) shows the connection and metadata retrieval status of each ERP system.

For process details, see View a list of Zero Copy Connector for ERP systems.

ERP system list details

Column	Description
ERP system	Name of the ERP system.
ERP heartbeat	Latest status of the SAP system connection, either **Success** or **Error**. The connection is checked every 5 minutes automatically.
Retrieval status	Status of the metadata retrieval that runs when the system first connects to the SAP system. • BAPI/RFC: For BAPI, a list of the functions available to call on the system is collected. For RFC, the system checks which tables are available on the database. • Table: The tables from the database are retrieved. • OData: The models are retrieved.

Zero Copy Connector for ERP ERP model table field descriptions

The **Entity fields** tab for an enterprise resource planning (ERP) model in Zero Copy Connector for ERP displays the table fields that are included in the ERP model.

For process details, see Adding an entity to a model.

Zero Copy Connector for ERP automatically scans the linked ERP system to retrieve the latest entity data. However, you can select the refresh icon to update the data on demand.

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Entity fields tab details

Column	Description
Field name	Name of the field on the ERP system.
Name	Name of the table on the ERP system that contains the field.
Field label	Natural language field name for the automatically mapped field on the ServiceNow AI Platform.
Is custom	Option to indicate whether the field on the ERP system is standard or customized.
ERP data type	Type of data the field contains. The options are: • char (character) • date • decimal • numc (number) • time
Is queryable	Option to indicate whether you can retrieve data from the field without querying the source table. Smaller tables, such as a currency table, can have data stored locally and thus don't require a query to retrieve fields.
Updated	Date and time the field was most recently saved.

Zero Copy Connector for ERP clone model field descriptions

The Clone ERP (Enterprise Resource Planning) model form in Zero Copy Connector for ERP enables you to clone an ERP model so you can edit the new model.

For process details, see Clone an ERP model in Zero Copy Connector for ERP.

ERP model fields

Field	Description
Model name	Name of the model.
ERP module	ERP module in the ERP system. For example, sales orders or inventory. ERP modules represent a distinct set of features and functionalities tailored to address business processes or activities.
ERP system	ERP system the ERP model connects to. The connected ERP system enables access to information about fields and tables and interaction between the model and the connected ERP system. For more information, see Create an ERP system in Zero Copy Connector for ERP and View a list of Zero Copy Connector for ERP systems.
Application	Application scope the ERP model is linked to. For example, if you create a custom model, the model is in that scope.

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ERP model fields (continued)

Field	Description
Model type	• Platform model: Model with input and output fields mapped to an already existing platform table. These models standardize ERP data by mapping it to ServiceNow standardized platform tables. • ERP model: New, custom ERP model. These models follow the data structures defined by the connected, external ERP system. ERP models accommodate the unique formats of each ERP system.
Short description	Brief description of what the ERP model represents.
Long text	Any longer description or information about the ERP data model.
ERP software	Supportability of the model. The value determines which models you can use with a system. When you create or update a model and specify an ERP system, the software linked to that system is automatically added to this field. You can select additional options from the list. For SAP, the list contains major SAP versions and doesn't include patch versions. When a model is exported, the ERP software information specified in this field is included.

Zero Copy Connector for ERP new model field descriptions

The new model form in Zero Copy Connector for ERP contains details for the enterprise resource planning (ERP) model.

For process details, see Create a model.

Field	Description
Model name	Name of the ERP model.
ERP module	ERP module in the ERP system, for example, sales orders or inventory. Select a module from the list. If the module you need is not listed, contact ServiceNow Technical Support. Each ERP module represents a distinct set of features and functions tailored to address business processes or activities.
ERP system	ERP system the ERP model connects to. The connected ERP system provides access to field and table information, and enables interaction between the model and the ERP system. For more information, see Create an ERP system in Zero Copy Connector for ERP and View a list of Zero Copy Connector for ERP systems.
Keep mapped values the same as ERP field name	Select this option if you don't need suggested mapped values for this model. For more information, see Edit input and output mapped value name in Zero Copy Connector for ERP.

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Field	Description
Application	Application scope the ERP model is linked to. For example, if you create a custom model, the model is in that scope.
Model type	• Platform model: Model with input and output fields mapped to an existing platform table. These models standardize ERP data by mapping it to ServiceNow AI Platform® standardized platform tables. • ERP model: New, custom ERP model. These models follow the data structures defined by the connected, external ERP system. ERP models accommodate the unique formats of each ERP system.
Platform table (only visible if Platform model is selected in **Model type**)	Table to use with this model.
Short description	Brief description of what the ERP model represents.
Long text	Longer description or more information about the ERP data model.
ERP software	Supportability of the model. This field determines which models can be used with a system. When you create or update a model and specify an ERP system, the software linked to that system is automatically added to this field. You can select additional options from the list. For SAP, the list contains major SAP versions and does not include patch versions. When a model is exported, the ERP software information specified here is included.

Zero Copy Connector for ERP debug logs field descriptions

The Zero Copy Connector for ERP (Enterprise Resource Planning) debug logs contain information about probe payloads, payload responses, and status.

For process details, see Debug Zero Copy Connector for ERP models.

Debug logs fields

Field	Description
Additional Info	Information from OData calls.
Flow engine context	If the transaction occurs in a flow, the specific flow is logged and displayed here.
Probe Communication	Communication method.
Probe Payload	Data that the probe collects and returns.
Probe Response	The data received from the probe's target.
Status	Value that indicates if the call was successful.
Transaction ID	Unique number that identifies each request and response exchange.

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Zero Copy Connector for ERP table join conditions field descriptions

The Table join condition form in Zero Copy Connector for ERP (Enterprise Resource Planning) enables you to create and edit join conditions for tables in an ERP model.

Table joins link different tables through shared fields. Joins enable you to access data from multiple tables based on logical relationships between them. The relationship can be conditional, which you specify using join conditions. Use inner joins or outer joins. An inner join returns records that have matching values in both tables. Outer joins combine left and right join results to return all rows with matches or NULLS.

Join fields defines the common attribute or key used to connect records in a child table with their corresponding parent records.

For process details, see Add joins between ERP tables.

Table join condition form fields

Field	Description
ERP model table field	Name of the join field on the ERP system, which represents an attribute or column in the table where data is stored.
ERP model	ERP model that the join condition applies to.
Field value	Value for the field in the ERP model table that triggers the join.
Order	Numerical value that indicates which part of the join occurs first. This number sets the position of the join condition relative to the other join conditions.
Operator	Operator that defines the conditions for your query. Operators determine how the values are evaluated and filtered in the query results. The following operators are supported: • equals • contains • greater than • greater than or equal • less than • less than or equal • not equals
Statement operator	Operator that defines the condition or comparison in your statement. The options are **AND** and **OR**.

Zero Copy Connector for ERP remote table form field descriptions

The Remote table form in Zero Copy Connector for ERP enables you to create and edit remote tables in the enterprise resource planning (ERP) model.

For process details, see View and edit ERP remote table details with Zero Copy Connector for ERP.

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Remote table details

Field	Description
Name	Name of the remote table on the ServiceNow AI Platform.
Application	Application scope: global or per application.
ERP module	ERP module in the ERP system, for example, sales orders or inventory. Select a module from the list. If the module you need isn't listed, contact ServiceNow Technical Support. Each ERP module represents a distinct set of features and functions tailored to address business processes or activities.
ERP model	ERP model connected to the remote table. The ERP model controls the available fields on the remote table. **Note:** Changing the ERP model removes any previously configured table fields that aren't available on the new model. To change the model for an ERP remote table, you must select the **Unlock ERP model field** button and then select the **Unlock model change** button in the confirmation dialog box.
Attachment setting	The remote table attachment is the cached response from the ERP system. If this field is set to **Use attachment**, Zero Copy Connector for ERP doesn't call the ERP system when you fetch data from the remote table. If this field is set to **None**, Zero Copy Connector for ERP does call the ERP system.
ERP system	ERP system that the remote table is linked to. The connected system represents the ERP instance that is linked to the model, enabling data flow and interaction between the model and the connected ERP system. For more information, see Create an ERP system in Zero Copy Connector for ERP.
Remote table link	Name of and link to the remote table on the ServiceNow AI Platform. Selecting the remote table link opens a new browser tab, where you can explore, query, and manage the remote table.
Page size	Amount of data to read from the ERP system at a time. The default is 1000. Increasing the size might impact MID Server memory space.
Short description	Brief description of the remote table.
Long text	Longer description or more information about the remote table.
Requires queryable field	Option to indicate whether you can retrieve data from the remote table without querying the source table. Smaller tables, such as a currency table, can have data stored locally and thus don't require a query to retrieve fields.

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Remote table details (continued)

Field	Description
Enable schedule	Option to specify a schedule for obtaining data using the remote table.

Zero Copy Connector for ERP extraction table field descriptions

The Extraction table form in Zero Copy Connector for ERP enables you to create and edit extraction tables in the enterprise resource planning (ERP) model.

For process details, see Add an ERP extraction table in Zero Copy Connector for ERP.

Extraction table fields

Field	Description
Name	Name of the ERP extraction table.
Table transform map	Map specifying the data relationships between the import set and the target table.
Target table link	Link to the table in which you want the transformed data to be added.
Application	Application scope: global or per application.
ERP model	ERP model for the extraction table source, which must be configured for you to select.
ERP module	ERP module in the ERP system, for example, sales orders or inventory. Select a module from the list. If the module you need isn't listed, contact ServiceNow Technical Support. Each ERP module represents a distinct set of features and functions tailored to address business processes or activities.
Page size	Amount of data to read from the ERP system at a time. The default is 1000. Increasing the size might impact MID Server memory space.
Table transform map link	Link to the Glide table that caches and stores the extracted ERP data. After you save the extraction table, when you select the link, the ServiceNow AI Platform table opens in a new browser tab.
Short description	Brief description of the extraction table.
Long text	Longer description or more information about the extraction table.

Zero Copy Connector for ERP scheduled extraction field descriptions

The Scheduled extraction form in Zero Copy Connector for ERP (Enterprise Resource Planning) enables you to create and edit jobs to extract data at regular intervals.

For process details, see Create a scheduled extraction in Zero Copy Connector for ERP.

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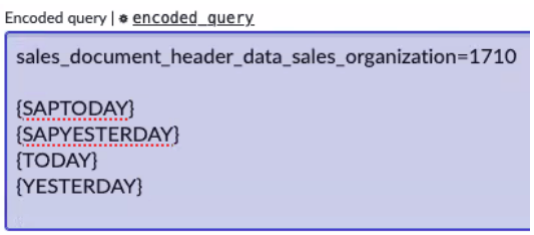
Scheduled extraction form

Field	Description
Name	A unique name that identifies this scheduled extraction.
Active	Option that, when selected, runs the scheduled extraction at the specified frequency and time.
Extraction table	Name of the ERP extraction table from which to pull data.
ERP system	ERP system that the extraction table is linked to. The system must already be configured.
Application	Application associated with the scheduled extraction. Filled in automatically with Zero Copy Connector for ERP.
Maximum no of retries on error	Maximum number of retries (from 0 through 10) that the scheduled job attempts before stopping after a failure. **Note:** Each retry uses the same query and retries the entire job. For example, if the total job contains 5000 records and the job fails after 2000 records are successfully processed, the entire job runs again on the next retry. For more information, see Import sets key concepts.
Extraction will retry after	Amount of time (in days, hours, minutes, and seconds) that the system waits before attempting the extraction again. Applies when the **Maximum no of retries on error** field is set to a number from 1 through 10.
Encoded query	Encoded query string, created by applying a filter on the extraction table list and pasting the result into this field. For example:  For more information, see Encoded query strings. Every field name in the encoded query must match a field on the model that the extraction table is built from. If a field name doesn't match, that condition isn't applied to the query sent to the ERP system, and the extraction returns more records than the filter specifies. Check the field names against the model before you save the scheduled extraction.
Generate encoded query script	Encoded query script that runs on the extraction table to fetch the data. For example:

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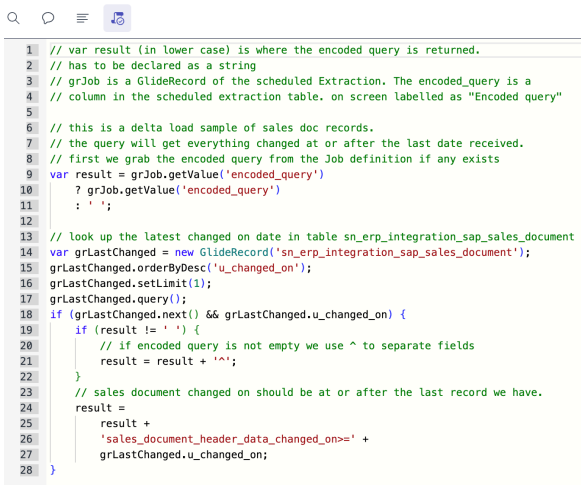
Scheduled extraction form (continued)

Field	Description
	 The script entered in **Generate encoded query script** takes precedence over information entered into the **Encoded query** field. You can append the encoded query to the script (as in the example).
After extraction	Existing active job that must complete before this scheduled extraction starts. **Note:** If you don't see the job that you want to use listed, check if the job is already scheduled before or after another job. Only jobs that won't create a loop are permitted.
Run as	User whose roles and permissions the scheduled extraction runs under.
Run	When to run the extraction. • **Daily**: Specify the next scheduled start in hours, minutes, and seconds to repeat daily. For example, adding 20:30:00 starts the scheduled extraction the next time the clock reaches 20:30:00 (9:30 p.m.) and every subsequent day at 20:30:00 in the time zone specified. • **Weekly**: In **Day**, select the day of the week to run the scheduled extraction. Specify the next scheduled start in hours, minutes, and seconds to repeat weekly. For example, selecting Sunday and specifying 03:00:00 starts the scheduled extraction the next Sunday at 3:00 a.m. and then every subsequent week on Sunday at 3:00 a.m. in the time zone specified. • **Monthly**: In **Day**, select the day of the month to run the scheduled extraction. Specify the next scheduled start in hours, minutes, and seconds to repeat monthly. For example, selecting 5 and specifying 03:00:00 starts the scheduled extraction the fifth day of the next month at 3:00 a.m. and then every subsequent fifth of the month at 3:00 a.m. in the time zone specified. • **Periodically**: In **Repeat Interval**, select the days, hours, minutes, and seconds to repeat periodically. For example, start the scheduled extraction every 3 days, 4 hours, 30 minutes, and 30 seconds. • **Once**: In **Starting**, select the field, select a day, and enter a time for the extraction to run once. • **On Demand**: Select the **Run now** button (next to the **Save** button) to run the extraction immediately.

```
// var result (in lower case) is where the encoded query is returned.
// has to be declared as a string
// grJob is a GlideRecord of the scheduled Extraction. The encoded_query is a
// column in the scheduled extraction table. on screen labelled as "Encoded query"

// this is a delta load sample of sales doc records.
// the query will get everything changed at or after the last date received.
// first we grab the encoded query from the Job definition if any exists
var result = grJob.getValue('encoded_query')
    ? grJob.getValue('encoded_query')
    : ' ';

// look up the latest changed on date in table sn_erp_integration_sap_sales_document
var grLastChanged = new GlideRecord('sn_erp_integration_sap_sales_document');
grLastChanged.orderByDesc('u_changed_on');
grLastChanged.setLimit(1);
grLastChanged.query();
if (grLastChanged.next() && grLastChanged.u_changed_on) {
    if (result != ' ') {
        // if encoded query is not empty we use ^ to separate fields
        result = result + '^';
    }
    // sales document changed on should be at or after the last record we have.
    result =
        result +
        'sales_document_header_data_changed_on>=' +
        grLastChanged.u_changed_on;
}
```

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Scheduled extraction form (continued)

Field	Description
	• **Business Calendar:Entry Start**: Runs on the starting entry dates for the business calendar that you select in the **Business Calendar** field. A scheduled job runs for the starting date of each of the business entries that you defined for the business calendar. For example, the business calendar represents a fiscal year and the starting date of each entry is a fiscal month. Then the scheduled job runs on the first day of each month. • **Business Calendar:Entry End**: Runs for the ending date for the business calendar that you select in the **Business Calendar** field. This selection runs in the same manner as **Business Calendar:Entry Start**, but for the end dates of the associated business calendar entries. **Note:** To learn more about creating and using business calendars and defining business calendar entries, see Creating business calendars. This field is automatically set to **On Demand** and becomes read-only when the **After extraction** field is set.
Time	Time, in 24-hour format, when the scheduled extraction runs.
Time zone	Time zone for the scheduled extraction.

Zero Copy Connector for ERP Monitor field descriptions

The Zero Copy Connector for ERP (Enterprise Resource Planning) Monitor enables you to track ERP transactions and their progress.

For process details, see Monitor Zero Copy Connector for ERP transactions and logged errors.

Zero Copy Connector for ERP Monitor fields

Field	Description
Transaction log	A unique, system-assigned transaction log identification number. Select the number for details.
Flow engine context	Flow in which the transaction occurs, if the transaction is part of a flow. Select the context name to open the flow in Workflow Studio and obtain more information. **Note:** System-provided flows are logged. Custom flows aren't logged.
Status	Extraction or remote lookup state: **Started**, **Success**, or **Error**.
Source	Source table in Zero Copy Connector for ERP. For example, sn_erp_integration_remote_table.
Source name	System ID of the source identified in the **Source** field. Select the name to obtain more information.
Display name	The ERP model operation.
System	ERP system on which the transaction takes place.

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Zero Copy Connector for ERP Monitor fields (continued)

Field	Description
Caller scope	Application that performs the transaction. For ERP transactions, the caller scope is sn_erp_integration.
Duration (ms)	Amount of time (in milliseconds) that the transaction takes to process.
Response item count	Number of records read.
Updated	The date and time the transaction was last changed.

Outbound message configuration fields

The add new outbound message configuration record in Zero Copy Connector for ERP (Enterprise Resource Planning) contains information that defines IDoc outbound messages.

For process details, see Create an IDoc outbound message configuration in Zero Copy Connector for ERP.

ERP add new outbound message configuration details

Field	Description
Name	Unique name for the new outbound message configuration.
Operation	The action, function, or process used to send data.
Receiver partner number	Number for which a master record is created in a system application, for example, S4LOCAL.
Receiver partner type	Partner role or function. Common types include: • LS: Logical System • KU: Customer (for outbound messages) • LI: Vendor (for outbound messages)
System	Name of the ERP system on which the new configuration should be stored.
Partner Profile	Identifier for the partner. Automatically added based on the specified system.
Message type	The IDoc message type, for example, ORDERS.

Outbound message errors tab fields

The outbound message errors tab in Zero Copy Connector for ERP contains error details and links to relevant knowledge base articles for troubleshooting.

For process details, see View and troubleshoot IDoc messages.

Explore the API for interacting with Zero Copy Connector for ERP models. For details and examples of using the API, see sn_erp_integration API - Scoped, Global.

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ERP outbound message errors tab columns

Field	Description
KB link	Link to a relevant knowledge base article, when one is available for the error.
Error text	Details about any errors that have occurred.
Created	Date and time that the error occurred.

Outbound message IDoc status for IDoc log tab fields

The outbound message IDoc status for IDoc log tab in Zero Copy Connector for ERP contains detailed information about an individual message.

For process details, see View and troubleshoot IDoc messages.

Explore the API for interacting with Zero Copy Connector for ERP models. For details and examples of using the API, see sn_erp_integration API - Scoped, Global.

ERP outbound message IDoc status for IDoc log tab columns

Field	Description
Message ID	Unique ID number assigned when an error or event occurs during IDoc processing.
Message number	Unique number within a message class, for example, 099.
Message type	Type of business document in an SAP system, for example, ORDERS.
Status	Processing state of an outbound message sent via IDoc at a specific time.
Status code	Numerical value stored in the IDoc status record, for example: • 03: Data passed to port (outbound success) • 20: Delivery to external system failure (outbound error)
Status code text	Text description of the current state of the IDoc.
Parameter 1	Specified parameter to filter information, such as No filters, No conversion, or No version change.
Parameter 2	Additional specified parameter.
Parameter 3	Additional specified parameter.
Parameter 4	Additional specified parameter.
Created	Date and time the message was created.

Outbound message transaction details tab fields

The outbound message transaction details tab in Zero Copy Connector for ERP contains information about the transaction, including ID numbers, transaction time, and source.

For process details, see View and troubleshoot IDoc messages.

Explore the API for interacting with Zero Copy Connector for ERP models. For details and examples of using the API, see sn_erp_integration API - Scoped, Global.

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ERP outbound message transaction details tab fields

Field	Description
Transaction log	Unique, system-assigned transaction log identification number. Select the number for details.
Flow engine context	If the transaction occurs in a flow, the specific flow is logged and displayed here. Select the context name to open the flow in Workflow Studio and obtain more information. **Note:** System-provided flows are logged. Custom flows aren't logged.
Source	Source of the transaction.
ERP system	ERP system on which the transaction took place.
Duration (ms)	Amount of time (in milliseconds) that the transaction took to process.
Status	State of an IDoc at a specific time, such as Started, Success, or Error.
Caller scope	Application that performed the transaction. For ERP transactions, the caller scope is sn_erp_integration.
Encoded query	Filter for obtaining the IDoc information, for example, idoc_type=ORDERS01.
EDI transaction ID	Unique ID for an electronic exchange of a business document.
IDOC message parameter 1	Specified parameter to filter information.
SAP Document	Document sent via IDoc.
IDOC status	Processing state of an outbound message sent via IDoc at a specific time.
IDOC message parameter 2	Specified parameter to filter information.
IDOC payload	Data sent from the SAP system via IDoc.
IDOC message type	Type of business document in an SAP system, for example, ORDERS.
IDOC number	Unique number identifying the specific message.
IDOC message parameter 3	Specified parameter to filter information.
IDOC message parameter 4	Specified parameter to filter information.

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ERP outbound message transaction details tab fields (continued)

Field	Description
IDOC status text	Text description from SAP enhanced with additional information to describe the current state of the IDoc.
IDOC create error	Not currently used.

REST API connector tables for Zero Copy Connector for ERP

The REST API connector in Zero Copy Connector for ERP (Enterprise Resource Planning) uses these tables to store service definitions, endpoint definitions, and model metadata.

For an overview of the REST API connector, see REST API for Zero Copy Connector for ERP.

For process details, see Add a REST entity to a model operation.

For information about adding a service, see Add a REST service manually in Zero Copy Connector for ERP.

Oracle E-Business Suite services described by WADL documents use their own set of tables.

REST API connector tables

Table	Description
sn_erp_integration_rest_service_catalog	Stores imported REST API service definitions (name, version, base URL).
sn_erp_integration_rest_service_endpoint	Stores individual endpoint definitions (path, HTTP method, inputs, outputs, return type).
sn_erp_integration_model_operation	Stores model operations, including the **rest** operation type, the pagination_type choice field, and the http_method column.
sn_erp_integration_model_entity	Stores model entities, including the **rest** entity type used for REST API operations. A WADL entity type is also available for Oracle E-Business Suite services.
sn_erp_integration_input_mapping	Stores input mappings, including the pagination_type field and the pagination_operator field used for offset and limit tracking.
sn_erp_integration_model_table_field	Stores field metadata parsed from service definitions, whether OpenAPI specifications or WADL and XML Schema Definition documents.

Oracle E-Business Suite connection field descriptions

The Oracle E-Business Suite connection in Zero Copy Connector for ERP contains endpoint, credential, and Oracle context values that determine which data the connection can read.

For process details, see Create an Oracle E-Business Suite connection.

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Connection field descriptions

Oracle E-Business Suite connection fields

Field	Description
ISG base URL	Base URL of the Oracle Integrated SOA Gateway (ISG) REST endpoint. HTTPS is required.
MID Server	MID Server that routes requests to the Oracle E-Business Suite instance.

Oracle context parameter descriptions

These values are sent with each request so that Oracle E-Business Suite evaluates the request in the correct business context.

Oracle E-Business Suite context parameters

Parameter	Description
Org ID	Identifier of the Oracle E-Business Suite operating unit that the request applies to.
Ledger ID	Identifier of the Oracle E-Business Suite ledger that the request applies to.
Responsibility	Oracle E-Business Suite responsibility that determines which functions and data the request can access.
NLS Language	Language that Oracle E-Business Suite uses for the response, set using the Oracle National Language Support value.

Guided tours in Zero Copy Connector for ERP

Zero Copy Connector for ERP guided tours are interactive walkthroughs that show you how to use product features, such as configuring a connection or working with models.

Guided tours overview

Guided tours are part of the default ServiceNow platform. Some guided tours are available to take, and you can use the Guided Tours application to create custom tours in your own instances.

Tours contain interactive steps to help train and teach users. Some tours show various features in the user interface, such as an overview of a home page. Other tours help complete a task, such as configuring a connection or working with candidate details. For more information about what guided tours are and how to create them, see Exploring Guided Tours.

Accessing and using Zero Copy Connector for ERP guided tours

To start a tour, select the show help icon  , and then select **Take a Tour**.

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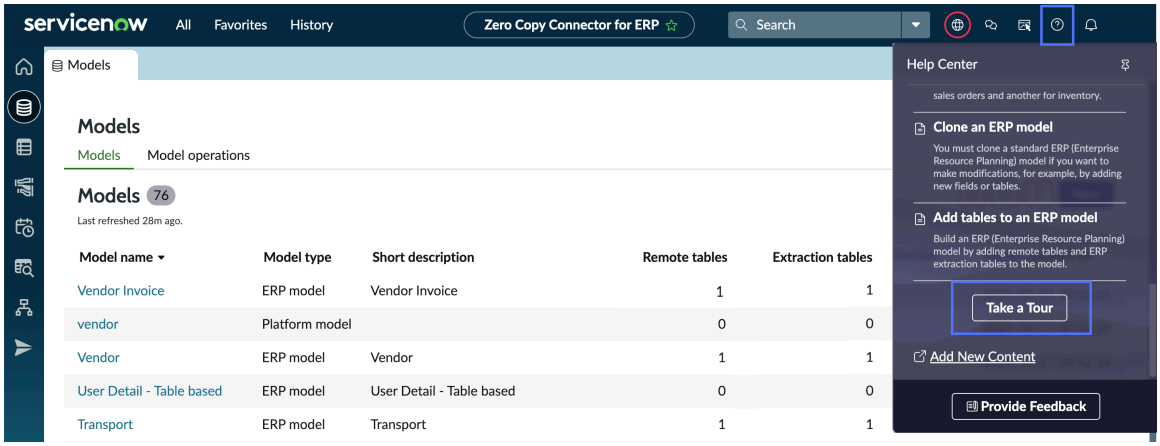
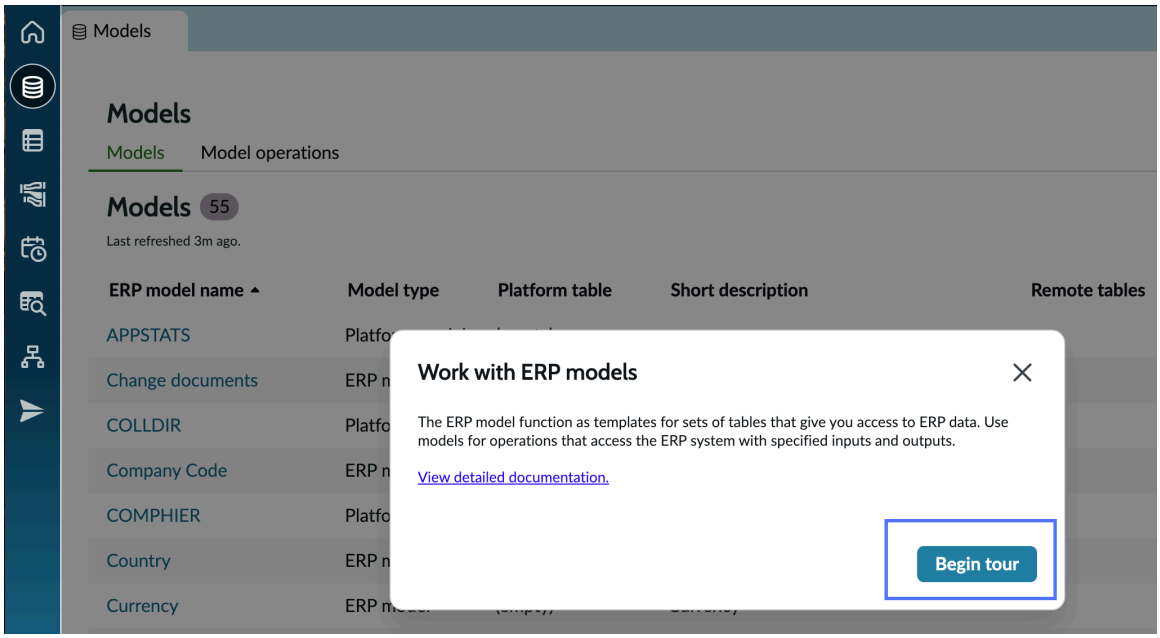


You're led through a series of steps. Read the text for each step and perform the required action or select a button such as **Begin Tour** or **Next**.



To stop a tour at any time, select the **X** on a tour step.

For more information, select the **View detailed documentation** link on any tour step.

At the end of the guided tour, select **Complete**.

Zero Copy Connector for ERP guided tour locations

Guided tours available in Zero Copy Connector for ERP

Guided tour name	Start page	Path to start page
How to use Zero Copy Connector for ERP	Zero Copy Connector for ERP home page	Navigate to *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
How to use and manage ERP models	Zero Copy Connector for ERP individual model page	Navigate to *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**, select the

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Guided tours available in Zero Copy Connector for ERP (continued)

Guided tour name	Start page	Path to start page
		models icon, and select a model.
Add model operation	Zero Copy Connector for ERP manage model page	Navigate to *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**, select the models icon, select a model, and select **Manage Model**.
Add entity **Note:** In this tour, move through the steps fairly quickly as the view might change during the guided tour. Delays in selecting the **Next** button could cause the tour to end.	Zero Copy Connector for ERP manage model page	Navigate to *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**, select the models icon, select a model, and select **Manage Model**.
How to use remote tables	Zero Copy Connector for ERP individual remote table page	Navigate to *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**, select the remote tables icon, and select a remote table.
How to use extraction tables	Zero Copy Connector for ERP individual extraction page	Navigate to *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**, select the extraction tables icon, and select an extraction table.
Work with ERP models	Zero Copy Connector for ERP models list page	Navigate to *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home** and select the models icon.

Zero Copy Connector for ERP glossary

Learn about the terms and concepts used in Zero Copy Connector for ERP.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

BAPI

A Business Application Programming Interface (BAPI) is a standard interface to the business object models in SAP products, similar to an API.

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candidate

A candidate is a group of recommended remote tables that you can use to create an application based on a custom transaction (ERP root) in the system. Candidates can also be existing applications that sit on top of the legacy ERP system of record.

Good candidates for replatforming tend to be smaller applications that use data from the system of record.

candidate score

A metric for how well a custom application (ERP root) fits to a remote table in ERP Semantic Mining.

connection and credential alias

The credential alias is the system connection access enabler that's maintained in the ServiceNow credential alias. The credential alias is used to access the ERP system of record.

entity

The table or Business Application Programming Interface (BAPI) function call that Zero Copy Connector for ERP uses to read or update the system of record.

ERP application

The ERP (Enterprise Resource Planning) custom application that you choose to replatform using ERP Semantic Mining is an ERP root in the ERP system.

ERP model

The model represents a distinct set of features and functionalities tailored to address specific business processes or activities. A model encompasses multiple tables from the system of record, as well as APIs and ETL processes, to create a holistic dataset. For example, you can have one model for sales orders and another for inventory.

ERP module

The functional business area on the ERP system. The ERP root can only have one selected business area.

ERP system

An ERP system represents a connection to a section of your ERP system of record. The Zero Copy Connector for ERP system plays a crucial role in data synchronization, sharing, and collaboration, enabling seamless integration and operation between the model and the connected ERP system.

ERP table

Individual tables (both custom and standard) in the ERP system are part of the remote tables. For example, in sales, ERP tables could include VBAK, VBAP, VBFA, VBPA, VBEP, MKPF, or MSEG.

extraction table

Extraction tables retrieve large amounts of data using a scheduled query, and use transform tables to process data for use on the ServiceNow AI Platform.

mapped value

A mapped value refers to a value that has been assigned or transformed based on a predefined mapping or correspondence between two sets of data. It is commonly used in programming, databases, and data processing to associate one value with another.

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odata

In Zero Copy Connector for ERP, create an OData connection to link to SAP via HTTP so data can be extracted for use in remote tables and extraction tables.

operation

Individual maintenance task performed to read or update the system of record.

remote table

A remote table is an aggregation of the system of record tables that provide value when gathered in one table. The remote table is the foundation of the model. A candidate can consist of several remote tables.

system of record

The ERP system of record is where the data lives and is distributed from, for example, SAP.

ERP Semantic Mining

The ServiceNow® ERP Semantic Mining (formerly named ERP Customization Mining) product enables you to find application candidates with customized code your their ERP (Enterprise Resource Planning) system. ERP Semantic Mining ranks the candidate suitability for replatforming onto the ServiceNow AI Platform.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Zero Copy Connector for ERP and ERP Semantic Mining help organizations modernize and orchestrate legacy code, complimenting processes and integrations that are underserved with the existing system of record, such as SAP. Together, Zero Copy Connector for ERP and ERP Semantic Mining make it faster and easier for you to build applications on the ServiceNow AI Platform using data from a legacy ERP system.

Replatforming is the process of scanning legacy ERP system code to find potential candidates to move onto your ServiceNow AI Platform instance as new apps. You can use data from the ERP system as a source for apps built on the ServiceNow AI Platform, improving performance, enhancing security, and reducing maintenance.

The replatforming of legacy code enables innovation on top of the system of record without knowledge of the legacy system. Administrators and developers are then relieved of time-consuming efforts to create database views or endpoints in the system of record and can work on other projects, such as migration.

Explore



Learn about ERP Semantic Mining concepts and features.

Configure



Install and configure ERP Semantic Mining connections.

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Work



Use ERP Semantic Mining to identify candidates to replatform.

Reference



Get details about ERP Semantic Mining components, such as tables and terminology.

Learning resources for ERP Semantic Mining

Learn more about ERP Semantic Mining	ServiceNow resources
ERP Semantic Mining has a number of training and learning resources for you to get started. (Some of these resources require logging in to the ServiceNow University site.)	 Partner Essentials: Clean Core for App Engine  ERP Semantic Mining Overview  App Engine for ERP Fundamentals  Get to a clean ERP core with ServiceNow ERP Semantic Mining

Request ERP Semantic Mining on the store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Before you can use ERP Semantic Mining, you must first download ERP Semantic Mining from the ServiceNow Store. After you have completed the download, you may need to clear your local cache before ERP Semantic Mining appears on your instance.

After you download ERP Semantic Mining, install it on your instance. For more information, see Install ERP Semantic Mining.

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Exploring ERP Semantic Mining

ERP Semantic Mining enables you to identify candidates for replatforming. These candidates can be custom applications that were built on legacy ERP (Enterprise Resource Planning) systems that you want to quickly replatform.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Identifying candidates to replatform with ERP Semantic Mining

Legacy ERP systems can contain old tables with custom fields that are difficult to maintain. Use Zero Copy Connector for ERP and ERP Semantic Mining to identify candidates with custom fields to extract onto their instance as remote tables or extraction tables. Low-code developers can then use the legacy ERP fields as data sources for apps created on the ServiceNow AI Platform, using a builder such as ServiceNow Studio, to replatform them.

You can use a combination of remote tables and extraction tables to retrieve data from your legacy ERP system.

- Remote tables get their records from running an associated script against an external data source.
- Extraction tables retrieve large amounts of data using a scheduled query, and use transform tables to process data for use on the ServiceNow AI Platform.

Replatforming is the process of scanning legacy ERP system code to find potential candidates to move onto your ServiceNow AI Platform instance as new apps. You can use data from the ERP system as a source for apps built on the ServiceNow AI Platform, improving performance, enhancing security, and reducing maintenance.

When you find ERP candidates to replatform, ERP Semantic Mining also provides suggestions for next actions and similar candidates. ERP Semantic Mining supports any ERP modules, or functional areas that admins configure in Zero Copy Connector for ERP. Some example modules are Finance, Procurement, and Sales. For more information, see Building and managing models to work with ERP data.

Replatformed data is immediately available, mirrored in easy-to-manage tables and apps. Users no longer must request information from database administrators, which can take weeks. Replatformed apps use the ERP system of record as the live data source.

Workflow for replatforming customized ERP applications

Complete the following workflow to replatform legacy ERP data with custom code from the system of record. All the work is done on the ServiceNow AI Platform using ERP Semantic Mining.

1. Run an analysis with ERP Semantic Mining on the ERP system of record.
2. Connect the ERP system of record to the ServiceNow instance with Zero Copy Connector for ERP.

   ERP Semantic Mining uses the system connections configured in Zero Copy Connector for ERP. For more information, see Working with ERP systems in Zero Copy Connector for ERP.
3. Use Zero Copy Connector for ERP to build ERP models from fields on the available remote tables. For more information, see the following topics:
   - Building and managing models to work with ERP data
   - Using ERP remote tables in Zero Copy Connector for ERP

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4. Run ERP Semantic Mining to find candidates. Candidates are custom code in the system of record that you can replace with ServiceNow apps. For more information, see Browse an overview of candidates in ERP Semantic Mining.
5. Choose the candidate to replatform. For more information, see Save potential candidates to replatform.
6. Use the candidate details in ERP Semantic Mining as a central place to enter comments and save attachments relating to the candidate. For more information, see View and work with candidate details in ERP Semantic Mining.
7. In the candidate details, identify any similar candidates that you could combine into a single replatformed app. For more information, see Determining candidate score and potential.
8. Return to Zero Copy Connector for ERP to continue building data models with remote tables and extraction tables. Confirm that all the necessary data is available in the ServiceNow AI Platform. For more information, see Building and managing models to work with ERP data.
9. In ServiceNow Studio or another ServiceNow application, build a scoped app by using the replatformed data as a source.
10. Measure and monitor the performance of the new app using applicable metrics and parameters with your preferred analytic tools.

Benefits of ERP Semantic Mining

Benefits of ERP Semantic Mining

Benefit	Feature	Role
Quickly identify candidates with custom code to replatform without waiting for your ERP administrator	Save potential candidates to replatform	sn_erp_mining.erp_admin, sn_erp_mining.erp_user
View suggestions for next steps and actions to guide you in replatforming	Check candidate recommendations in ERP Semantic Mining	sn_erp_mining.erp_admin, sn_erp_mining.erp_user
Compile selected candidates in a list by saving them	Save potential candidates to replatform	sn_erp_mining.erp_admin, sn_erp_mining.erp_user

Additional resources for ERP Semantic Mining

Learn more about ERP Semantic Mining	ServiceNow resources
ERP Semantic Mining enables you to find application candidates with customized code in your ERP system.	App Engine for ERP Overview on ServiceNow University **Note:** You must log in to ServiceNow University to access this resource.

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Learn more about ERP Semantic Mining	ServiceNow resources
	ServiceNow Community site
	Video: Unlock the full potential of your ERP system



How ERP Semantic Mining extracts and processes data

ERP Semantic Mining retrieves data from the ERP (Enterprise Resource Planning) system using extractors and processes it before the data is available on the ServiceNow AI Platform.

> **Important:** Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Use an SAP extractor to analyze the ERP data sources and validate the syntax. The following extractors are available to retrieve data from the ERP system:

- APPstats
- COMPHIER
- SQLM

The supported extractors process data using ServiceNow AI Platform tables.

SAP data extractors

Extractor	Full name	Description	ServiceNow AI Platform processing tables	Populated ServiceNow AI Platform tables
APPstats	Application Statistics	Collects and analyzes system-level statistics and performance metrics from the ERP application.	sn_erp_mining_erp_app_stat_data_staging sn_erp_mining_erp_app_stat_data_agg	sn_erp_mining_erp_app_stat_data_agg_application sn_erp_mining_erp_app_stat_data_agg_user
COMPHIER	Component Hierarchy	Analyzes the hierarchy and relationships among different components at SAP, including business processes and module configurations.	sn_erp_mining_erp_comp_hier_data_staging sn_erp_mining_erp_comp_hier_data_agg	sn_erp_mining_erp_comp_hier_data_agg_application sn_erp_mining_erp_comp_hier_data_agg_module

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SAP data extractors (continued)

Extractor	Full name	Description	ServiceNow AI Platform processing tables	Populated ServiceNow AI Platform tables
SQLM	SQL Monitor	Enables the monitoring of all SQL statements and operations that are executed by running ABAP applications. The data collected by SQLM provides aggregated performance indicators (such as the number of executions, execution time, or number of effected rows) for all executed database operations.	sn_erp_mining_erp_sqlm_data_staging sn_erp_mining_erp_sqlm_data_agg	sn_erp_mining_erp_application sn_erp_mining_erp_table sn_erp_mining_erp_application_ta sn_erp_mining_erp_application_us

Determining candidate score and potential

ERP Semantic Mining generates a score to rank the potential for replatforming legacy ERP (Enterprise Resource Planning) candidates onto the ServiceNow AI Platform.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Every candidate has an ERP module specified in the candidate details in ERP Semantic Mining. The ERP module is used to evaluate the potential score of the candidate for replatforming, as well as the remote tables and extraction tables the model contains.

- Remote tables get their records from running an associated script against an external data source.
- Extraction tables retrieve large amounts of data using a scheduled query, and use transform tables to process data for use on the ServiceNow AI Platform.

Note:

Admins must first configure the connection to the ERP system in Zero Copy Connector for ERP. For more information, see Working with ERP systems in Zero Copy Connector for ERP.

High and low scores for candidate potential

ERP Semantic Mining evaluates candidates based on how well their tables and fields are supported by the ServiceNow AI Platform.

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- A high potential indicates that ERP Semantic Mining can immediately use remote tables and extraction tables that match the ERP model for the application candidate without making additional changes.
- A low potential indicates that the application candidate matches few of the remote tables and extraction tables in the ERP models in Zero Copy Connector for ERP.

How scores are calculated

The candidate potential score is calculated using the following metrics:

- ERP models: The number of ERP models that the candidate uses remote tables and extraction tables from.
- Similar candidates: The number of candidates with a similarity score above the threshold, which accounts for both table-based similarity and model-based similarity.

  The threshold can be adjusted in the System Properties [sys_properties] table, and the default `OR` condition can be changed to `AND`.

- Supported table score: The ratio of the number of custom app tables that are supported by any ERP model relative to the number of custom app tables.

  Note: Tables from either the Technical or ServiceNow table clusters are ignored from these computations.

- Supported table usage: The ratio of tables supported by the relevant ERP models that are used by the custom app.
- Unsupported model penalty: A penalty for the number of unsupported operations on tables in ERP models. The number of unsupported operations is passed through a sigmoid function, so it ranges from 0.0 and 1.0.
- Unsupported table extensions: The number of custom app tables that are also suggested as model extensions.
- Model inaccuracy: The number of tables supported by relevant ERP models that aren't used by custom apps, and are passed through a sigmoid function.

How ERP Semantic Mining works with Zero Copy Connector for ERP and remote tables

Zero Copy Connector for ERP enables you to connect to your ERP (Enterprise Resource Planning) system of record, and to organize its data.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

ERP Semantic Mining enables you to find good candidates for replatforming from the system of record to the ServiceNow AI Platform.

ERP Semantic Mining suggests candidates and possible next steps, such as updating remote tables and extraction tables to access ERP data. Remote tables send data to the ServiceNow instance as an attachment, which is then analyzed using AI/ML to identify similar candidates to replatform.

After you have identified candidates to replatform and taken the recommended action in ERP Semantic Mining, you must only use Zero Copy Connector for ERP to access the remote tables and extraction tables. These tables are data sources for building apps, flows, and workspaces.

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Using remote tables and extraction tables with Zero Copy Connector for ERP and ERP Semantic Mining

You can use a combination of remote tables and extraction tables to retrieve data from your legacy ERP system.

- Remote tables get their records from running an associated script against an external data source.
- Extraction tables retrieve large amounts of data using a scheduled query, and use transform tables to process data for use on the ServiceNow AI Platform.

Remote tables describe the schema for the data that you want to retrieve from an external source, such as the system of record. Use remote tables to connect the ServiceNow AI Platform to third-party sources, or to another instance, so that you can retrieve external data and optionally cache it in the memory. You can view external data in lists or forms and process it with standard Glide scripts. You can also group, sort, aggregate, and filter the data just like you would for standard internal tables.

By using a remote table, you can retrieve the data from external sources or from another instance with REST or SOAP services. The external data lives in the memory in read-only mode, which makes the data temporary, or transient, within the ServiceNow AI Platform. You can then view and manipulate the external data without importing or storing it. For more information, see Remote tables.

Use an extraction table to work with large amounts of ERP data. ERP extraction tables regularly save data to a local transform table on the ServiceNow AI Platform, which you can then process and use as the data foundation of a replatformed app.

Recommendations and similar candidates in ERP Semantic Mining

The record for each candidate in ERP Semantic Mining displays information on suggested next steps and similar candidates to help you in replatforming an ERP (Enterprise Resource Planning) app.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Recommended actions for candidates

When you view a candidate, ERP Semantic Mining displays the number of recommended actions or next steps to take. The candidate details also have a **Recommendations** tab where you can view the suggested actions, and select them to open the associated app on the ServiceNow AI Platform.

For example, you may have to create a workflow in Workflow Studio for one candidate, update an integration spoke for another, and read an extraction table for a third candidate.

Each recommended action has an estimated effort, which is a numerical score that assesses how well the ServiceNow AI Platform has matching functionality. Green actions require little-to-no effort, while red actions are more difficult.

For more information on recommended actions, see Check candidate recommendations in ERP Semantic Mining.

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Similar candidates in candidate details

For each candidate, ERP Semantic Mining displays a **Similar candidates** tab, which lists each similar candidate, a numerical score to represent how closely the two candidates are related, and a link to other similar candidates.

Similar candidates are helpful when planning how to best replatform a legacy app. When you replatform a custom app from the system of record, you don't have to replicate the old app exactly. Use the replatforming process to design a better app. For example, an app that addresses the needs of multiple similar candidates in a single, new app built using low-code tools on the ServiceNow AI Platform.

Next steps when replatforming apps to ServiceNow using ERP Semantic Mining

After you use ERP Semantic Mining to identify legacy ERP (Enterprise Resource Planning) candidates, use additional ServiceNow AI Platform products and resources to replatform your app.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

First, identify the customization you want to replatform from the ERP system with ERP Semantic Mining.

Then, use the remote tables and extraction tables linked in the candidate mining results for fast access to ERP data.

That ERP data can be used as a data source when you build new apps on the ServiceNow AI Platform, for example, with ServiceNow Studio.

Build a ServiceNow app that consumes ERP data

The next step in replatforming with ServiceNow Studio for ERP (Enterprise Resource Planning) is to build an app on the ServiceNow AI Platform that consumes the ERP data.

As you plan to replatform a legacy app on the ServiceNow AI Platform, consider where the data is coming from. For example, an old app may retrieve data from a third party into the system of record. When you build a new, replatformed app on the ServiceNow AI Platform, you can configure the new app to pull data directly from that third party. Using that method, the Zero Copy Connector for ERP model no longer pulls the data from the ERP system, which adds an extra step of retrieval.

Working with similar candidates when replatforming apps

If ERP Semantic Mining shows that a candidate has a number of similar candidates, consider building one app that meets the needs of some or all similar candidates when you replatform.

When you replatform a custom app from the system of record, you don't have to replicate the old app exactly. Use the replatforming process to design a better app. For example, an app that addresses the needs of multiple similar candidates in a single, new app built using low-code tools on the ServiceNow AI Platform. ServiceNow Studio is the quickest app to use, but there are other builders available to you, depending on your licensing.

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ServiceNow low- and pro-code builders

After you identify ERP data to replatform, citizen developers can use ServiceNow builders to create apps quickly from the data. Any custom fields that exist in the ERP system of record, such as SAP, can be leveraged by the apps you build using the ServiceNow AI Platform.

Use any of the following ServiceNow builders to create apps using custom data:

- ServiceNow Studio
- Flows in Workflow Studio
- Playbooks in Workflow Studio
- Table Builder
- UI Builder
- Workspace Builder

For example, use in ServiceNow Studio, use a template (or build the app from the ground up) and incorporate remote tables using ERP models and remote tables. You can combine legacy data from the ERP models and remote tables with other ServiceNow data in tables.

Using Glide to query ERP data

You can also access data from the system of record through the Glide API.

For more information, see Sample Glide query for ERP data in ERP Semantic Mining.

After you replatform custom code to a ServiceNow app

Replatformed apps on the ServiceNow AI Platform use live data from the system of record without writing any code back to it.

After you have identified candidates to replatform and taken the recommended action in ERP Semantic Mining, you must only use Zero Copy Connector for ERP to access the remote tables and extraction tables. These tables are data sources for building apps, flows, and workspaces.

If you're sure that legacy code on the system of record isn't referenced elsewhere, you can remove it from the system after it's replatformed.

Guided tours in ERP Semantic Mining

Learn about ERP Semantic Mining guided tours, including how to access and take them to build your knowledge of ERP Semantic Mining.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

What guided tours are

Guided tours are part of the default ServiceNow platform. There are guided tours available to take and you can use the Guided Tours application to create custom tours yourself in your own instances.

Tours contain interactive steps to help train and teach users. Some tours show various features in the user interface, such as an overview of a home page. Other tours help complete a task, such as configuring a connection or working with candidate details. For more information about what guided tours are and how to create them, see Exploring Guided Tours.

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How to access and use ERP Semantic Mining guided tours

To start a tour, select the show help icon and then select a tour.

You're led through a series of steps. Read the text for each step and perform the required action or select **Next** to continue the tour.

To stop a tour at any time, select the **X** on any tour step.

For more information, select the **View detailed documentation** link on any tour step.

At the end of the guided tour, select **Complete**.

ERP Semantic Mining guided tour locations

Guided tours in ERP Semantic Mining

Guided tour name	Start page	Path to start page
Exploring mining results and candidates	ERP Semantic Mining home page	Navigate to ERP Semantic Mining
ERP Semantic Mining Candidates	ERP Semantic Mining Candidates page	Navigate to ERP Semantic Mining and select the candidates icon.
Configuring ERP Semantic Mining	ERP Semantic Mining Configuration page	Navigate to ERP Semantic Mining and select the configuration icon.
Export snapshot	ERP Semantic Mining Configuration page	Navigate to ERP Semantic Mining and select the configuration icon.
Import snapshot	ERP Semantic Mining Configuration page	Navigate to ERP Semantic Mining and select the Configuration icon.

Get help with ERP Semantic Mining

For help with ERP Semantic Mining, contact the ServiceNow admin who works in your organization.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Helpful resources

Some ServiceNow resources that can provide you with helpful information are:

ServiceNow Community

ERP Semantic Mining Community

Configuring ERP Semantic Mining

Set up ERP Semantic Mining to enable the app to scan the system of record for candidates to replatform. Administrators can also quickly check the health of the ERP (Enterprise Resource Planning) connection and investigate any issues, and view knowledge articles related to errors.

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Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

You must install Zero Copy Connector for ERP and configure connections and ERP data models before you can install ERP Semantic Mining.

Server requirements

For the credentials, use an SAP service type user account in your system of record that requires the following S_RFC SAP authorization objects:

- S_RFC with Activity = 16 (Execute) for the following Function Modules:
  - SAPWL_WORKLOAD_GET_STATISTIC
  - SWNC_COLLECTOR_GET_AGGREGATES
  - SWNC_COLLECTOR_GET_DIRECTORY
  - SQLM_API_GET_NEXT_DATA_PACKAGE
- S_TABU_NAM with Activity 03 (Display) for the following table: TRNSPACET

There are additional authorizations needed for Zero Copy Connector for ERP. For more information, see Configuring Zero Copy Connector for ERP.

Note: The credentials you specify for the Zero Copy Connector for ERP connection must match the service user credentials in the system of record.

Types and number of available connections

Zero Copy Connector for ERP and ERP Semantic Mining currently support ECC (minimum SAP Netweaver 7.31) and SAP S/4HANA systems.

Note: Each installation of ERP Semantic Mining supports adding up to 10 systems. However, ERP Semantic Mining can connect to only one live ERP system at a time.

You should install Zero Copy Connector for ERP and add credentials there before you install and configure ERP Semantic Mining. For more information, see Connect to SAP with RFC or BAPI.

The number of ERP connections you can have per ServiceNow instance depends on your license.

For details on Connections and Credentials, see Connections and Credentials.

Plugins for ERP Semantic Mining

You must have the following plugins installed:

Plugins for ERP-CM

Plugin	Full name	Dependencies
Zero Copy Connector for ERP	com.snc.sn_erp_integration	com.glide.script.vtable
ERP Semantic Mining	com.snc.uib.sn_erp_mining	• com.snc.sn_erp_integration • com.glide.platform_ml

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Request apps on the Store

Visit the ServiceNow Store to view all the available apps, and for information about submitting requests to the store. For cumulative release notes information for all released apps, see the ServiceNow Store version history release notes.

Configure SAP for ERP Semantic Mining

Enable SQLM (SQL Monitor) on the productive system and confirm that ST03 (Workload Monitor) is collected for daily workloads before you can install ERP Semantic Mining.

Before you begin

Role required: none

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

About this task

Warning: You must perform the SAP configurations in this procedure and have data in SAP for ERP Semantic Mining to work correctly.

Procedure

1. Collect SQLM information from the productive environment by enabling SQLM in the SAP system.
   a. In the production system, start the transaction SQLM.
   For more information, refer to the SAP SQL Monitor documentation.
   b. Confirm that the **Activation state** field is set to **Globally active**.
   c. If SQLM isn't active, start the transaction SQLM again.
   d. Navigate to **SQL Monitor** > **Setting** > **General Settings**.
   e. Confirm that the **Delete Older Than [Days]** option is set to a minimum of `365` days, and select **Confirm**.
   f. Activate the setting by selecting **All Servers**.
2. Verify that ST03 is collected for daily workloads from the productive environments.
   a. In the production system, start the transaction ST03.
   b. Verify that the **Workload data** field is set to **Daily**.

Install ERP Semantic Mining

Install the ERP Semantic Mining application (sn_erp_mining) if you have the admin role from the ServiceNow Store.

Before you begin

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

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You must:

- Have a license and get entitlement to ERP Semantic Mining before you can install the application.
- Install Zero Copy Connector for ERP. Use the application to configure connections to the system of record, as well as ERP (Enterprise Resource Planning) data models.
- Configure the JCO connector before you install ERP Semantic Mining. See the SAP documentation for more information.

The following plugins are required:

- Zero Copy Connector for ERP
- Predictive Intelligence

Role required: admin

About this task

Procedure

1. In the ServiceNow Store, confirm that you have entitlements (or licenses) to the product and dependent applications.
   You can access the Store by navigating to **System Applications** > **All Available Applications** > **Available To Obtain From Store**.
2. Search for ERP Semantic Mining and select **Install**.
3. **Optional:** Select **Load demo data** to create demo data in the app.
4. Select **Install** to confirm the installation of ERP Semantic Mining.

Result
The installation is complete. Select **Close** to return to the ServiceNow Store.

What to do next
After you install ERP Semantic Mining, ERP data from the connected system of record populates the ERP extraction tables in Zero Copy Connector for ERP. For example, ERP application activity, Collector directory data, and Namespace data. You can then incorporate extracted data into ERP data models and remote tables for use as a data source when building apps on ServiceNow. For more information, see the following topics:

- View ERP extraction tables
- Standard extraction tables for Zero Copy Connector for ERP

Run Guided Setup for ERP Semantic Mining

Run the Guided Setup to configure ERP Semantic Mining.

Before you begin

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

You must first download and install ERP Semantic Mining from the ServiceNow Store.

Role required: sn_erp_integration.erp_admin, sn_erp_mining.erp_admin

About this task
For more information on using Guided Setup, see Guided Setup.

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Alternatively, you can configure ERP Semantic Mining without Guided Setup. For more information, see Configure a new ERP Semantic Mining connection.

Procedure

1. Navigate to **All** > **ERP Foundation** > *ERP Semantic Mining* > *ERP Semantic Mining* **Guided Setup**.
2. Navigate to **All** > *Zero Copy Connector for ERP* > *Zero Copy Connector for ERP* **Home**.
3. Complete the Guided Setup for Zero Copy Connector for ERP by selecting **Configure** *Zero Copy Connector for ERP*.

   Zero Copy Connector for ERP is required by ERP Semantic Mining to connect to systems.

   Follow the steps to configure Zero Copy Connector for ERP, and select **Continue**.
4. Connect ERP Semantic Mining to the ERP system.
   a. Select **Select the ERP system to connect**, follow the steps, and select **Continue**.
   b. Select **Validate the connection status**, follow the steps, and select **Continue**.

Configure a new ERP Semantic Mining connection

Specify the Connections and Credentials alias for ERP Semantic Mining to connect to the ERP (Enterprise Resource Planning) system.

Before you begin

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

You should install Zero Copy Connector for ERP and add credentials there before you install and configure ERP Semantic Mining. For more information, see Connect to SAP with RFC or BAPI.

Role required: sn_erp_integration.erp_admin, sn_erp_mining.erp_admin

Procedure

1. Navigate to **All** > **ERP Foundation** > *ERP Semantic Mining*.
2. Select the configuration icon in the side panel.
3. Select the **Select connection** button.
   If you have already configured a system connection and want to use a different connection and credential, see Update an ERP Semantic Mining connection.
4. In the Connections and Credentials alias box, choose the credentials you configured in Zero Copy Connector for ERP from the **Select connection & credential alias** field.
5. Select **Connect**.
   ERP Semantic Mining begins extracting data from the connection.
6. Refresh the Issues to review list and the Executed tasks list by selecting their respective refresh icons  .

What to do next

After the system is connected, you can check the connection status and investigate errors at any time on the Connection status page. For more information, see Check and troubleshoot the data refresh status for ERP Semantic Mining.

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Update an ERP Semantic Mining connection

Update the Connections and Credentials alias for ERP Semantic Mining to change the connection to the ERP (Enterprise Resource Planning) system. For example, you may want to change from a non-production system to a production system.

Before you begin

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

You should install Zero Copy Connector for ERP and add credentials there before you install and configure ERP Semantic Mining. For more information, see Connect to SAP with RFC or BAPI.

Role required: sn_erp_integration.erp_admin, sn_erp_mining.erp_admin

About this task

Warning: Changing the system and credential alias deletes all existing data in the ERP Semantic Mining workspace and restarts the data integration process.

Procedure

1. Navigate to **All** > **ERP Foundation** > *ERP Semantic Mining*.
2. Select the connection status icon in the side panel.
3. Select the **Change system** button.
4. In the **Change system & delete data** box, choose the system you configured in Zero Copy Connector for ERP from the **Select system to change to** field.
5. Confirm your choice by selecting the **Yes, I am sure I want to change system and delete data** option.
6. Select the **Change and delete data** button.
   ERP Semantic Mining begins to delete current data and restarts the data integration process.
7. Refresh the Issues to review list and the Executed tasks list by selecting their respective refresh icons .

What to do next

After the system is connected, you can check the connection status and investigate errors at any time on the Connection status page. For more information, see Check and troubleshoot the data refresh status for ERP Semantic Mining.

Check and troubleshoot the data refresh status for ERP Semantic Mining

Check the data refresh status to find out when ERP Semantic Mining most recently loaded ERP (Enterprise Resource Planning) data from the system of record.

Before you begin

Role required: sn_erp_mining.erp_admin and sn_erp_mining.erp_user

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

About this task

To verify that ServiceNow AI Platform® is synchronized with the ERP system of record, ServiceNow AI Platform reloads data every 24 hours from the system of record.

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You can receive email notifications for connection task success and failures. For more information, see Getting notifications for ERP Semantic Mining connection updates.

Procedure

1. Navigate to **All** > **ERP Foundation** > *ERP Semantic Mining*.
2. In the side panel, select the connection status icon.
   The **Overview** tab displays a summary of connection issues to review, as well as a list of the most recent active connection tasks.
3. Check the most important connection details in the **Connection status** page header.

Connection status header details

Field	Definition
Credential alias	Alias of the connection credentials configured in Zero Copy Connector for ERP.
Updated by	Name of the last account to update the connection credentials.
ERP heartbeat	Indicates whether a ping to the connection is successful.
Task execution	Indicates whether ServiceNow AI Platform® is attempting to connect to the instance.

4. **Optional:** View a refined subset of connection tasks by selecting one of the following tabs.

Tab	Description
All tasks	Log list of all connection tasks.
Task issues	Log list of all connection tasks that have an **Error** or **Warning** status.
Snapshots	(Optional) List of scan results that have been saved, exported, and imported.

5. Troubleshoot any system connection issues using the **Change system** button.

Trouble?

- Pause the task execution by selecting **Stop task execution**.
- Restart the ETL (extract, transform, and load) process by selecting **Retry ETL process**.
- Delete all data in ERP Semantic Mining and start over by selecting **Delete data**. On the confirmation dialog, you must select the **Yes, I am sure I want to delete data** option and select the **Delete data** button.

  ⚠ **Warning:** This action deletes all existing data in the ERP Semantic Mining workspace and restarts the data integration process.

- Share and back up data at any time by selecting **Export data**. A downloadable zip file is created.
- After exporting data, use the created zip file **Import data** for sharing and back up.

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- Use **Run AI/ML analysis** when changing existing models or importing new models, to verify that the ML training in the mining process is based on the relevant data.
- Use **Reset AI/ML analysis** to reset the analysis so the flow can run again. This reset enables you to control the ML training in the mining process.

6. View the information for each task and note actions that you must take by scrolling to the task list.
   For a description of the field values, see ERP Semantic Mining task list field descriptions.

   For any column, you can select the more options icon ··· to perform additional actions, such as **Show matching** and **Filter out**.

7. **Optional:** Update the status of any open task in error to indicate changes to its status.
   You can't resolve errors directly in ERP Semantic Mining, but you can mark them as resolved or irrelevant.
   a. Select the **Task** tab.
   b. On the **Task** tab, select the task that you want to update.
   c. Update the **Status** on the task record to **Resolved** or **Irrelevant**.
8. Refresh the Issues to review list and the Executed tasks list by selecting their respective refresh icons.

Create a snapshot to share and save data in ERP Semantic Mining

Export and import ERP Semantic Mining base data to save and share.

Before you begin

Role required: admin

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Procedure

1. Navigate to **All** > **ERP Foundation** > *ERP Semantic Mining*.
2. In the side panel, select the configuration icon.
3. Select the **Change system** button.
4. Select **Export data**.

   A check is performed automatically before exporting. For details about the process, see ERP Semantic Mining snapshot prerequisite check.

   If another export is in progress, an export unavailable message is displayed. Select **OK** and view the **Snapshots** tab to monitor the progress.

   a. On the pop-up window, review the message and select **Export data**.

      An automatic export is only performed before an import because an import overwrites the existing data. An export saves the data for a later import. An automatic export saves the data as a backup.

      In the **Snapshots** tab, the automatic export is **Pending**. Select the refresh icon to see the **Status** change to **In progress** and then **Complete**.

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For more execution details, open Workflow Studio, select **Operations**, and select **Flows**. The flow named **Export snapshot** calls the sub flow **Check set Snapshot to in progress**, and then calls the sub flow **Create Snapshot**. For more information about viewing flows in Workflow Studio, see Workflow Studio.

b. When the export is finished, go to the **Snapshots** tab on the **Configuration** page and select the completed export.

c. On the snapshot record, in **Attachments**, select the actions icon and then select **Download**.

5. In the side panel, select the configuration icon.
6. Select the **Change system** button, and then select **Import data**.

a. On the pop-up window, review the message and select the **I understand and want to import** option.

b. Select **+ Add file**.

c. Navigate to your downloads folder, select the ERP mining snapshot zip file, and select **Open**.

The zip process is done using the ServiceNow Integration Hub Professional Pack Installer plugin. If the plugin isn't installed, the process uses the existing zip functionality on the MID Server.

d. In the pop-up window, select **Upload**.

Validation is done automatically, for example, determining if there's an incomplete import job or an export job in progress.

e. When validation is complete, select **Import data**.

f. Check the status on the **Snapshots** tab.

g. When the import is complete, manually run AI/ML to obtain candidates out of the new imported data by selecting the **Change system** button and **Run AI/ML analysis**.

AI/ML runs once a day automatically, but you can initiate the process manually at any time using the **Run AI/ML analysis** option. The manual and automatic process are the same and identify technical clusters, then candidate identification, and, lastly, model extensions.

View the **All tasks** tab to check the status.

Getting notifications for ERP Semantic Mining connection updates

ERP Semantic Mining can email you about the success and failures of ERP (Enterprise Resource Planning) system connections.

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Notifications for success and failure

ERP Semantic Mining jobs run to find candidates for replatforming. With notifications, you can get an email when a mining task succeeds or fails.

- Success notifications indicate that all the mining tasks have finished running with no errors.
- Failure notifications indicate that one or more of the mining tasks are in error status.

The notification email that you receive contains a link that takes you to the record for the job. You can view the progress of its tasks by selecting the **Show training progress** Related Link. The tasks there also appear in the Connection tasks overview lists on the **Overview** tab of the Connection status page. You could then select to **Show matching** on a day's **Task period** value in the Connection tasks overview list to see the status of all tasks for that day.

Selecting your email notifications

Notification emails aren't enabled by default, and you must configure them for yourself in your ServiceNow AI Platform preferences. For details on configuring notifications, see Configure notifications for ERP Semantic Mining tasks.

Before you can set up notifications for yourself, your admin must add you to the ERP Semantic Mining Notification group. For more information, see Add a user to a group.

Notifications also appear in the Notifications table

Notifications appear in the Notifications table, which you can access by navigating to **All** > **System Notification** > **Notifications**.

Flow that runs notifications

The ECM Statistical Data Extractor flow in Workflow Studio runs automatically to power notifications. You can customize the flow in Workflow Studio. For more information, see Edit a flow.

Configure notifications for ERP Semantic Mining tasks

Enable notifications to find out when ERP Semantic Mining succeeds or fails in a mining job for the ERP (Enterprise Resource Planning) system of record.

Before you begin

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Before you can set up notifications for yourself, your admin must add you to the ERP Semantic Mining Notification group.

Role required: sn_erp_mining.erp_admin, sn_erp_mining.erp_user

About this task

For general information on preferences, see System and custom notification and delivery channel preferences in Next Experience.

Procedure

1. From your user profile, navigate to **Preferences**.
2. Select the **Notifications** card.

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3. Enable the toggle for **Custom Notifications** in **General Settings**.
4. Select the open in new tab icon for **Custom Notifications**.
5. Select the **Create notification** button.
6. Enter the basic details for the notification in the **Select notification** section of the **Create Notification** modal.

Basic notification fields

Field	Description
Personal notification name	Descriptive name for the notification you're setting up. For example, `Ann's ERP failure email notification`.
Notification	Select the notification that you want. The options are: ○ **ERP Extraction Completion Notification** ○ **ERP Extraction Failure Notification**

7. Select the **Next** button.
8. Select the delivery channel.
   a. Expand the method for how you want to be notified, such as **Email**.
   b. Enable the toggle for the email address that you want to receive the notification.
   Email addresses must already be associated with your ServiceNow AI Platform user account.
   c. Select the **Next** button.
9. Select the **Schedule** for your notification.
10. Finish setting up the notification by selecting the **Save** button.

Result
The notification email that you receive contains a link that takes you to the record for the job. You can view the progress of its tasks by selecting the **Show training progress** Related Link. The tasks there also appear in the Connection tasks overview lists on the **Overview** tab of the Connection status page. You could then select to **Show matching** on a day's **Task period** value in the Connection tasks overview list to see the status of all tasks for that day.

ERP Semantic Mining roles

Administrators assign roles to give team members permission to configure or use ERP Semantic Mining.

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Note: When you assign ERP Semantic Mining roles to a user, you must include the scope. For example, assign the `sn_erp_mining.erp_admin` role, not just `erp_admin`.

For more on assigning roles, see Assign a role to a user.

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To learn more about managing per-user subscriptions, see Managing per-user subscriptions in Subscription Management and contact your account representative.

ERP Semantic Mining roles

Role	Description	Additional access
sn_erp_mining.erp_admin	Grants the user access to updating application setup.	Contains sn_erp_mining.erp_user.
sn_erp_mining.erp_user	Grants the user read access on all tables needed for ERP Semantic Mining, as well as some field-level write access in the sn_erp_mining_app_candidate table.	Contains the following roles: • sn_erp_integration.erp_data_pill • sn_erp_integration.erp_user

ERP Semantic Mining and security

In addition to role-based security and access control, ERP Semantic Mining protects personally identifiable ERP (Enterprise Resource Planning) data in other ways.

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Personally identifiable data is secured with Zero Copy Connector for ERP in several ways.

- You can customize models and remote tables to exclude personal data in a specified field, such as email address.
- All remote tables are secured using access control rules (ACLs). If you have a remote table that contains sensitive data, use ACLs to restrict that table from ServiceNow users. For more information, see ServiceNow® access control.

Finding and working with candidates to replatform

Use ERP Semantic Mining to identify potential ERP (Enterprise Resource Planning) app candidates for replatforming.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Replatforming is the process of scanning legacy ERP system code to find potential candidates to move onto your ServiceNow AI Platform instance as new apps. You can use data from the ERP system as a source for apps built on the ServiceNow AI Platform, improving performance, enhancing security, and reducing maintenance.

ERP Semantic Mining evaluates application candidates and presents a numeric score. The higher the score, the better the candidate is for replatforming.

- A high potential indicates that ERP Semantic Mining can immediately use remote tables and extraction tables that match the ERP model for the application candidate without making additional changes.
- A low potential indicates that the application candidate matches few of the remote tables and extraction tables in the ERP models in Zero Copy Connector for ERP.

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Good candidates for replatforming tend to be smaller applications that use data from the system of record.

Note:

If you delete a candidate from ERP Semantic Mining, the candidate automatically reappears the next time the ERP system is scanned. Instead of deleting candidates, use the **Save as potential candidate** feature to organize your candidates.

If ERP Semantic Mining shows that a candidate has a number of similar candidates, consider building one app that meets the needs of some or all similar candidates when you replatform.

Obtaining ERP Semantic Mining statistics and mining analysis

Use the ERP Semantic Mining home page dashboard to obtain statistics about candidates and info to help you troubleshoot.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

View statistics, metrics, and debug information for ERP Semantic Mining on the dashboard. Open links to related ERP Semantic Mining properties, logs, events, and editors.

You must have the sn_erp_mining.erp_user role to view the dashboard.

To view the dashboard, navigate to **All** > **ERP Foundation** > *ERP Semantic Mining*.

Select the charts, graphs, and lists on the dashboard to view the underlying records. For example, select a section of a donut chart to see a list of the records for that section.

The dashboard contains three tabs.

Custom applications results tab

This tab contains information about candidates.

Data visualizations

Title	Type	Description
Application candidates per module	Donut	Number of application candidates for each module by number and percentage.
Application candidates by potential	Donut	Number of application candidates for each module by number and percentage.
Users of application candidates per module	Bar	Type of user of application candidates by module. User type is based on the number of different application candidates accessed. Users are defined as Light (uses few apps), Moderate (uses multiple apps), and Power (uses the most apps).

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Data visualizations (continued)

Title	Type	Description
		Frequency of use isn't part of the calculation.
Application candidates per model	Bar	Number of application candidates that have a matching model in Zero Copy Connector for ERP.
Application candidates per CRUD operation type	Column	Number of application candidates by CRUD (create, update, read, delete) type for different models.
Application types	Column	Candidates by model type, such as a standard ERP model (which you work with in Zero Copy Connector for ERP), a workflow, or a custom business area.

Selected potential candidates tab

This tab contains information about candidates that have been identified as potential candidates for replatforming.

List report columns

Column	Description
Name	Name of the potential candidate, which is the record number on the ServiceNow AI Platform.
Short description	Brief information on what tables the potential candidate accesses
ERP application	Record for the ERP application of the potential candidate.
ERP module	Name of the ERP functional area in the system of record. For example, logistics, procurement, or sales.
Potential number	Evaluation of how well a potential candidate is suited for replatforming. The value represents how well the remote tables and extraction tables for the potential candidate match an application.
Similar candidates	Number of similar potential candidates. Similarity is based on the remote tables.
ERP models	Number of ERP models the potential candidate belongs to. ERP models are configured in Zero Copy Connector for ERP. An ERP model functions as a staging area that contains all potential fields

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List report columns (continued)

Column	Description
	you can add to remote and extraction tables, and read and update operations. You can then use the tables and queried data as a data source. For more information, see Building and managing ERP models to work with ERP data.
Updated	Date and time the candidate record was last edited.

All applications results tab

This tab contains system-wide information that is useful to view after importing data.

Data visualizations

Applications per module	Donut	Number of applications for each module by number and percentage.
Users per module	Donut	Number of users for each module by number and percentage.
Users of applications per module	Bar	Type of application users by module. User type is based on the number of different applications accessed. Users are defined as Light (uses few apps), Moderate (uses multiple apps), and Power (uses the most apps). Frequency of use isn't part of the calculation.

Browse an overview of candidates in ERP Semantic Mining

View the ERP Semantic Mining home page for a summary of ERP (Enterprise Resource Planning) app candidates to replatform onto the ServiceNow AI Platform.

Before you begin

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Admins must first configure the connection to the ERP system in Zero Copy Connector for ERP. For more information, see Working with ERP systems in Zero Copy Connector for ERP.

Role required: sn_erp_mining.erp_user

Procedure

1. Navigate to **All** > **ERP Foundation** > *ERP Semantic Mining*.
2. In the side panel, select the candidates icon.

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3. View the list of potential candidates.

   For a description of the field values, see ERP Semantic Mining candidate list field descriptions.

4. View and edit the details for a candidate by selecting the candidate.
   For more information, see Save potential candidates to replatform.

View and work with candidate details in ERP Semantic Mining

View and edit candidate details and recommended actions in ERP Semantic Mining. Analyze ERP (Enterprise Resource Planning) system scan results, linked ERP models, usage, and similar candidates.

Before you begin

Role required: sn_erp_mining.erp_user

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Procedure

1. Navigate to **All** > **ERP Foundation** > *ERP Semantic Mining*.
2. In the side panel, select the candidates icon.
3. View and edit basic candidate details by selecting the candidate **Name** in the list.

   Alternatively, you can select a candidate directly on the ERP Semantic Mining home page. For more information, see Browse an overview of candidates in ERP Semantic Mining.

   The **Details** tab of the candidate is where you can review and update any basic details, as well as work with comments, attachments, and the Activity stream.

Basic candidate details

Field	Description
Name	Record number of the potential candidate, which is automatically generated.
Status	Status of the candidate, either **Draft** or **Potential**. When you evaluate a draft candidate and decide the candidate is good to replatform, you can change the status from **Draft** to **Potential**.
ERP application	Name of the ERP application on the ERP system.
ERP module	Functional business area of the ERP system, such as **Sales**.
Short description	Brief description of the candidate, what the application does.
Long text	Additional information about the candidate.

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4. Work with the next steps by selecting the **Recommendations** tab.
   For more information, see Check candidate recommendations in ERP Semantic Mining.
5. View details about tables relevant to the candidate and the ERP system scan details by selecting the **ERP scan results** tab.
   For a description of the field values, see ERP Semantic Mining candidate scan results field descriptions.
6. Check and note which ERP models are ERP Semantic Mining identified as being related to the candidate by selecting the **Models** tab.

Models tab details

Field	Description
Model type	ERP model relevant to the candidate. This model can be a standard ERP model (which you work with in Zero Copy Connector for ERP), a workflow, or a custom business area.
Relevant for implementation	Whether the ERP model is required for replatforming.
Module	ERP business area for the model on the system of record, such as **Sales**.
Table names	Names of the tables in the ERP model on the ERP system.
Updated	Date and time the list was most recently updated.

   You can note which ERP models to work with in Zero Copy Connector for ERP.
7. **Optional:** Check the number of system users that use the candidate application by selecting the **Usage** tab.
8. Research candidates related to the current candidate and their tables by selecting the **Similar candidates** tab.

   Similar candidates are helpful when planning how to best replatform a legacy app. When you replatform a custom app from the system of record, you don't have to replicate the old app exactly. Use the replatforming process to design a better app. For example, an app that addresses the needs of multiple similar candidates in a single, new app built using low-code tools on the ServiceNow AI Platform.

   For a description of the field values, see ERP Semantic Mining similar candidates field descriptions.
9. Select the **Save** button and save any changes you made to the candidate details.

What to do next

After you work with the candidate details and identify similar candidates, you can:

- Check candidate recommendations in ERP Semantic Mining.
- Save potential candidates to replatform.
- Continue building remote table and extraction tables in the relevant ERP model in Zero Copy Connector for ERP, making the data available on the ServiceNow AI Platform. For more information, see Using Zero Copy Connector for ERP.

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Note:

If you delete a candidate from ERP Semantic Mining, the candidate automatically reappears the next time the ERP system is scanned. Instead of deleting candidates, use the **Save as potential candidate** feature to organize your candidates.

Check candidate recommendations in ERP Semantic Mining

Check the actions that ERP Semantic Mining suggests for improving the ease of replatforming an ERP (Enterprise Resource Planning) candidate.

Before you begin

Role required: sn_erp_mining.erp_user

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

About this task

When you view a candidate, ERP Semantic Mining displays the number of recommended actions or next steps to take.

For example, you may have to create a workflow in Workflow Studio for one candidate, update an integration spoke for another, and read an extraction table for a third candidate.

Procedure

1. Navigate to **All** > **ERP Foundation** > *ERP Semantic Mining*.
2. In the side panel, select the candidates icon.
   Alternatively, you can select a candidate directly on the ERP Semantic Mining home page. For more information, see Browse an overview of candidates in ERP Semantic Mining.
3. Select the candidate that you want to view the recommended next actions for.
4. Select the **Recommendations** tab, which summarizes each suggested action.

   For a description of the field values, see ERP Semantic Mining candidate recommendations field descriptions.

5. Select a **Recommended action URL** to open the relevant destination on the ServiceNow AI Platform in a new browser tab.
   For example, if the recommendation is to read an extraction table, select the **Recommended action** link to open the ERP model in Zero Copy Connector for ERP, where you can add the suggested table.

Save potential candidates to replatform

Use ERP Semantic Mining to save ERP (Enterprise Resource Planning) app candidates to replatform.

Before you begin

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

Admins must first configure the connection to the ERP system in Zero Copy Connector for ERP. For more information, see Working with ERP systems in Zero Copy Connector for ERP.

Role required: sn_erp_mining.erp_user

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About this task

Candidates are custom applications in your ERP system. ERP Semantic Mining scans your system of record to build a profile based on application logs and database activity logs. ERP Semantic Mining also scans for custom applications based on customized namespaces and other criteria. Replatformed apps use the ERP system of record as the live data source.

Note:

If you delete a candidate from ERP Semantic Mining, the candidate automatically reappears the next time the ERP system is scanned. Instead of deleting candidates, use the **Save as potential candidate** feature to organize your candidates.

Procedure

1. Navigate to **All** > **ERP Foundation** > *ERP Semantic Mining*.
   ERP Semantic Mining accesses the remote table that calls the system of record instance, and temporarily mirrors that data in the ServiceNow AI Platform.
2. Select the candidates icon in the side panel.
3. Select the candidate that you want to save as potential.
   Alternatively, you can select a candidate directly on the ERP Semantic Mining home page. For more information, see Browse an overview of candidates in ERP Semantic Mining.
4. Select the **Select as potential candidate** button.

   If you change your mind and want to remove the candidate from the potential candidates list, select the **Change to draft candidate** button.

Result

Selecting a candidate as a potential candidate changes the candidate status from Draft to Potential. The selected candidate is added to the Your selected potential candidates list on the home page.

What to do next

After you identify candidates, use Zero Copy Connector for ERP to view custom fields in remote and extraction tables, and add them to your ERP model. For more information, see Building and managing models to work with ERP data.

ERP Semantic Mining also recommends possible next steps for each candidate. For more information, see Check candidate recommendations in ERP Semantic Mining.

ERP Semantic Mining reference

Find ERP (Enterprise Resource Planning) reference information for ERP Semantic Mining, including table details.

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ERP Semantic Mining and domain separation

Domain separation is unsupported for ERP Semantic Mining. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

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Support level: No support

- The domain field may exist on data tables but there is no business logic to manage the data.
- This level is not considered domain-separated.

For more information on support levels, see Application support for domain separation.

Related topics

Domain separation for service providers

Sample Glide query for ERP data in ERP Semantic Mining

Access data from the ERP (Enterprise Resource Planning) system of record through the Glide API.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

The following is an example of a Glide query that fetches a customer name.

```
var sap_customer_gr = new
 GlideRecord('sn_erp_integration_st_sap_sales_customer');
sap_customer_gr.get('customer_number', '100032');
sap_customer_gr.getValue('name');
```

ERP Semantic Mining system connection tasks

ERP Semantic Mining runs a number of tasks when connecting to the ERP (Enterprise Resource Planning) system.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

- Aggregating daily extract of ERP activity
- Candidate identification
- Carveout Finalize import and prepare viewdata
- Extraction of Collector Directory Data
- Extraction of daily ERP Application activity
- Extraction of daily ERP Application SQL activity
- Extraction of daily ERP Module activity
- Extraction of Namespace Data
- Running ML similarity analysis

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ERP Semantic Mining snapshot prerequisite check

Before snapshot import and export in ERP Semantic Mining, a check is performed automatically to confirm that other related processes aren't in progress.

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For process details, see Create a snapshot to share and save data in ERP Semantic Mining.

Snapshot prerequisite checks

Prerequisite check	Description
System not connected	If you chose to import another snapshot, or attach a system, the 'table flush trigger' flow immediately starts to delete data. Once data is deleted, the selected snapshot is imported, or the system is attached.
System Connected and attach new system	The 'table flush trigger' flow cancels Tasks that are currently executing. After tasks have been stopped, the 'table flush trigger' flow deletes data, and attaches the new system.
System Connected and import snapshot	The 'table flush trigger' flow starts by scheduling the creation of a snapshot. It waits for the snapshot to be created. Snapshot is created when all tasks for all Collector entries are completed. Different flows execute subflow 'Check set Snapshot to in progress'. This subflow checks whether a record in the snapshot table should be completed with data. The 'table flush trigger' flow resumes and deletes all data. Subsequently, snapshot is imported.
System Connected and export snapshot triggered	Snapshot is created when all tasks for all Collector entries are completed. Different flows execute subflow 'Check set Snapshot to in progress'. This subflow checks whether a record in the snapshot table should be completed with data. If you want\ to delete all data, or attach a new system, 'table flush trigger' flow waits for the snapshot to be created.

ERP Semantic Mining standard tables and fields

Find details on standard ERP (Enterprise Resource Planning) remote tables, extraction tables, and fields in ERP Semantic Mining.

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Standard remote tables for ERP Semantic Mining

ERP Semantic Mining accesses several standard remote tables for ERP (Enterprise Resource Planning) data.

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The following remote tables are available through Zero Copy Connector for ERP and ERP Semantic Mining.

Remote tables for Zero Copy Connector for ERP and ERP Semantic Mining

Label	Name	ERP module
SAP Company Code	sn_erp_integration_st_sap_company_code	Basis
SAP Country	sn_erp_integration_st_sap_country	Basis
SAP Currency	sn_erp_integration_st_sap_currency	Basis
SAP Language	sn_erp_integration_st_sap_language	Basis
SAP Material Stock	sn_erp_integration_st_sap_material_stock	Material management
SAP Purchase Document	sn_erp_integration_st_sap_purchase_document	Purchasing
SAP Purchasing Organization	sn_erp_integration_st_sap_purchasing_organization	Purchasing
SAP Customer Invoice	sn_erp_integration_st_sap_customer_invoice	Sales
SAP Distribution Channel	sn_erp_integration_st_sap_distribution_channel	Sales
SAP Division	sn_erp_integration_st_sap_division	Sales
SAP Sales Customer	sn_erp_integration_st_sap_sales_customer	Sales
SAP Sales Delivery	sn_erp_integration_st_sap_sales_delivery	Sales
SAP Sales Document	sn_erp_integration_st_sap_sales_document	Sales
SAP Sales Organization	sn_erp_integration_st_sap_sales_organization	Sales
SAP Sales Revenue Recognition	sn_erp_integration_st_sap_sales_revenue_recognition	Sales
SAP Vendor	sn_erp_integration_st_sap_vendor	Sales
SAP Vendor Invoice	sn_erp_integration_st_sap_vendor_invoice	Sales
SAP Transport	sn_erp_integration_st_sap_transport	Transport

For more details on working with remote tables, see Remote tables.

You can use any of the standard remote tables as data sources when building apps in ServiceNow products, such as:

- ServiceNow Studio
- Flows in Workflow Studio
- Playbooks in Workflow Studio

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- Table Builder
- UI Builder
- Workspace Builder

You can also access data from the system of record through the Glide API.

The following is an example of a Glide query that fetches a customer name.

```
var sap_customer_gr = new
 GlideRecord('sn_erp_integration_st_sap_sales_customer');
sap_customer_gr.get('customer_number', '100032');
sap_customer_gr.getValue('name');
```

Standard ERP Semantic Mining fields within remote tables

The standard ERP (Enterprise Resource Planning) remote tables available for use in ERP Semantic Mining contain fields from additional SAP tables.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

The standard remote tables contain the following additional fields. For details on the standard tables, see Standard remote tables for ERP Semantic Mining.

Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables

Remote table	Source table	ERP field name	Mapped field name
SAP Sales Document	VBAK	VBELN	document_number
SAP Sales Document	VBAK	ERDAT	date_of_document
SAP Sales Document	VBAK	ERZET	time_of_document
SAP Sales Document	VBAK	VKORG	sales_organization
SAP Sales Document	VBAK	VBTYP	document_category
SAP Sales Document	VBAK	AUART	document_type
SAP Sales Document	VBAK	AUGRU	order_reason
SAP Sales Document	VBAK	LIFSK	delivery_block
SAP Sales Document	VBAK	FAKSK	billing_block
SAP Sales Document	VBAK	KUNNR	customer_number
SAP Sales Document	VBAK	AUFNR	order_number
SAP Sales Document	VBAK	NETWR	document_value
SAP Sales Document	VBAK	WAERK	currency_code
SAP Sales Document	VBUK	LFGSK	delivery_status
SAP Sales Document	VBAP	MATNR	material_number
SAP Sales Document	VBAP	ARKTX	material_description

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Sales Document	VBAP	KWMENG	ordered_quantity
SAP Sales Document	VBAP	KLMENG	confirmed_quantity
SAP Sales Document	VBAP	NETWR	item_value
SAP Sales Document	VBAP	VRKME	sales_unit
SAP Sales Document	VBAP	ROUTE	delivery_route
SAP Sales Document	MARA	MTART	material_type
SAP Sales Document	VBUP	GBSTA	overall_item_status
SAP Sales Customer	KNA1	KUNNR	customer_number
SAP Sales Customer	KNA1	LAND1	country_code
SAP Sales Customer	KNA1	NAME1	name
SAP Sales Customer	KNA1	ORT01	city
SAP Sales Customer	KNA1	PSTLZ	postal_code
SAP Sales Customer	KNA1	STRAS	street
SAP Sales Customer	KNA1	STKZU	vat_liable
SAP Sales Customer	KNA1	STCEG	vat_reg_number
SAP Sales Customer	KNVV	VKORG	sales_organization
SAP Sales Customer	KNVV	VTWEG	distribution_channel
SAP Sales Customer	KNVV	SPART	division
SAP Sales Customer	KNVV	INCO1	inco_terms
SAP Customer Invoice	VBRK	VBELN	document_number
SAP Customer Invoice	VBRK	FKART	billing_type
SAP Customer Invoice	VBRK	WAERK	currency_code
SAP Customer Invoice	VBRK	ZTERM	payment_terms
SAP Customer Invoice	VBRK	NETWR	document_value
SAP Customer Invoice	VBRK	KUNRG	payer
SAP Customer Invoice	VBUK	GBSTK	overall_document_status
SAP Customer Invoice	VBRP	MATNR	material_number
SAP Customer Invoice	VBRP	ARKTX	material_description
SAP Customer Invoice	VBRP	NETWR	item_value
SAP Customer Invoice	VBRP	FKLMG	billing_quantity
SAP Customer Invoice	VBRP	VRKME	sales_unit
SAP Customer Invoice	VBRP	SHKZG	is_returns_item

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Customer Invoice	VBUP	GBSTA	overall_item_status
SAP Sales Organization	TVKO	VKORG	sales_organization
SAP Sales Organization	TVKO	EKORG	purchase_organization
SAP Sales Organization	TVKO	BUKRS	company_code
SAP Purchase Document	EKKO	EBELN	document_number
SAP Purchase Document	EKKO	BUKRS	company_code
SAP Purchase Document	EKKO	BSTYP	document_category
SAP Purchase Document	EKKO	LIFNR	vendor_number
SAP Purchase Document	EKKO	ZTERM	payment_terms
SAP Purchase Document	EKKO	EKORG	purchase_organization
SAP Purchase Document	EKKO	WAERS	currency_code
SAP Purchase Document	EKKO	IHREZ	ext_reference
SAP Purchase Document	EKKO	RESWK	supplying_plant
SAP Purchase Document	EKKO	BEDAT	date_of_document
SAP Purchase Document	EKPO	MATNR	material_number
SAP Purchase Document	EKPO	EMATN	supplier_material_number
SAP Purchase Document	EKPO	MENGE	ordered_quantity
SAP Purchase Document	EKPO	MEINS	order_unit
SAP Purchase Document	EKPO	NETPR	item_value
SAP Purchase Document	EKPO	MWSKZ	vat_applicable
SAP Purchase Document	EKPO	ELIKZ	fully_delivered
SAP Purchase Document	EKPO	REPOS	fully_invoiced
SAP Material Stock	MARA	MATNR	material_number
SAP Material Stock	MARA	MTART	material_type
SAP Material Stock	MARA	MATKL	material_class
SAP Material Stock	MARA	NTGEW	net_weight
SAP Material Stock	MARA	EANNR	ean_number
SAP Material Stock	MARA	EAN11	ean11_number
SAP Material Stock	MARA	MSTAE	material_status
SAP Material Stock	MAKT	MAKTX	material_description
SAP Material Stock	MARD	WERKS	plant
SAP Material Stock	MARD	LGORT	storage_location

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Material Stock	MARD	LABST	quantity
SAP Material Stock	MARD	DLINL	date_of_count
SAP Vendor Invoice	RSEG	BELNR	document_number
SAP Vendor Invoice	RSEG	GJAHR	document_year
SAP Vendor Invoice	RSEG	EBELN	purchase_document_number
SAP Vendor Invoice	RSEG	EBELP	purchase_document_item
SAP Vendor Invoice	RSEG	MATNR	material_number
SAP Vendor Invoice	RSEG	BUKRS	company_code
SAP Vendor Invoice	RSEG	WERKS	plant
SAP Vendor Invoice	RSEG	WRBTR	amount
SAP Vendor Invoice	RSEG	SHKZG	credit_debit_indicator
SAP Vendor Invoice	RSEG	MWSKZ	vat_applicable
SAP Vendor Invoice	RSEG	MENGE	quantity
SAP Purchasing Organization	T024E	EKORG	purchase_organization
SAP Purchasing Organization	T024E	EKOTX	name
SAP Purchasing Organization	T024E	BUKRS	company_code
SAP Sales Delivery	LIKP	VBELN	document_number
SAP Sales Delivery	LIKP	KUNNR	customer_number
SAP Sales Delivery	LIKP	ERDAT	date_of_document
SAP Sales Delivery	LIKP	ERZET	time_of_document
SAP Sales Delivery	LIKP	VKORG	sales_organization
SAP Sales Delivery	LIKP	LFART	delivery_type
SAP Sales Delivery	LIKP	ROUTE	delivery_route
SAP Sales Delivery	VBUK	GBSTK	overall_document_status
SAP Sales Delivery	LIPS	MATNR	material_number
SAP Sales Delivery	LIPS	CHARG	batch_number
SAP Sales Delivery	LIPS	WERKS	plant
SAP Sales Delivery	LIPS	LFIMG	quantity
SAP Sales Delivery	LIPS	NTGEW	net_weight
SAP Sales Delivery	LIPS	GEWEI	delivery_unit
SAP Sales Delivery	LIPS	VOLUM	volume
SAP Sales Delivery	LIPS	VOLEH	volume_unit

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Sales Delivery	LIPS	ARKTX	material_description
SAP Vendor	LFA1	LIFNR	vendor_number
SAP Vendor	LFA1	NAME1	name
SAP Vendor	LFA1	ORT01	city
SAP Vendor	LFA1	PSTLZ	postal_code
SAP Vendor	LFA1	STRAS	street
SAP Vendor	LFA1	STCEG	vat_reg_number
SAP Vendor	LFA1	WERKS	plant
SAP Vendor	LFM1	EKORG	purchase_organization
SAP Vendor	LFM1	WEBRE	gr_invoice_indicator
SAP Sales Revenue Recognition	VBREVK	VBELN	document_number
SAP Sales Revenue Recognition	VBREVK	POSNR	document_item
SAP Sales Revenue Recognition	VBREVK	SAKRR	accr_val_clearing_account_number
SAP Sales Revenue Recognition	VBREVK	SAKRRK	offset_clearing_account_number
SAP Sales Revenue Recognition	VBREVK	ACC_VALUE	total_accrued_value
SAP Sales Revenue Recognition	VBREVK	WRBTR	amount
SAP Sales Revenue Recognition	VBREVK	RVAMT	revenue_amount
SAP Sales Revenue Recognition	VBREVK	WAERK	currency_code
SAP Country	T005	LAND1	country_code
SAP Country	T002	SPRAS	language_code
SAP Country	T002	LAISO	language_iso_code
SAP Country	T005T	LANDX	description
SAP Language	T002	SPRAS	language_code
SAP Language	T002	LAISO	language_iso_code
SAP Currency	TCURC	WAERS	currency_code
SAP Currency	TCURC	ISOCD	currency_iso_code
SAP Currency	TCURT	LTEXT	description

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Standard Zero Copy Connector for ERP and ERP Semantic Mining tables within remote tables (continued)

Remote table	Source table	ERP field name	Mapped field name
SAP Distribution Channel	TVTW	VTWEG	distribution_channel
SAP Distribution Channel	TVTWT	VTEXT	description
SAP Division	TSPA	SPART	division
SAP Division	TSPAT	VTEXT	description
SAP Company Code	T001	BUKRS	company_code
SAP Company Code	T001	BUTXT	description
SAP Company Code	T001	LAND1	country_code
SAP Company Code	T001	WAERS	currency_code
SAP Company Code	T001	SPRAS	language_code
SAP Transport	E071	AS4DATE	date_of_transport
SAP Transport	E071	AS4TIME	time_of_transport
SAP Transport	E071	AS4USER	user
SAP Transport	E071	TRFUNCTION	type
SAP Transport	E071	TRKORR	number
SAP Transport	E071	TRSTATUS	status
SAP Transport	E071	OBJECT	object_type
SAP Transport	E071	OBJ_NAME	object_name
SAP Transport	E071	PGMID	program_id

ERP Semantic Mining field descriptions

Some tables of field descriptions in ERP Semantic Mining are too large to maintain in task topics. Find information on those large tables in this section.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

ERP Semantic Mining task list field descriptions

The task list in ERP Semantic Mining displays information on connection tasks for the ERP (Enterprise Resource Planning) system.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

For process details, see Check and troubleshoot the data refresh status for ERP Semantic Mining.

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Task list details

Column	Definition
Task	Name of the task in the ServiceNow AI Platform, such as a background script for extraction, an ETL task, or an analysis training script.
Short description	Brief description of the connection task error. **Note:** This column appears on the **Task issues** tab only.
Code no.	Error code number for errors or warnings. **Note:** This column appears on the **Task issues** tab only.
Category	The type of issue, either **Error** or **Warning**.
Status	Status of the task, such as **New** or **Insufficient data**.
Current step	Step of the connection task that ServiceNow AI Platform is being performed.
Total steps	Number of total steps required to complete the connection task.
Task period	Date when the connection task was most recently updated.
Started	Date and time when the connection task started running.
Finished	Date and time when the connection task finished running.

ERP Semantic Mining candidate list field descriptions

The candidate list in ERP Semantic Mining displays information on the basic details for each candidate.

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For process details, see Browse an overview of candidates in ERP Semantic Mining.

Candidate list details

Column	Description
Name	Name of the application candidate, which is the record number on the ServiceNow AI Platform.
Short description	Brief information on what tables the candidates access.

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Candidate list details (continued)

Column	Description
Potential	Evaluation of how well a candidate is suited for replatforming. The value represents how well the remote tables and extraction tables for the candidate match an application. • A high potential indicates that ERP Semantic Mining can immediately use remote tables and extraction tables that match the ERP model for the application candidate without making additional changes. • A low potential indicates that the application candidate matches few of the remote tables and extraction tables in the ERP models in Zero Copy Connector for ERP. **Note:** This column is available only on the candidates list on the Candidates page, not on the home page.
ERP application	Record for the ERP application of the candidate.
ERP module	Name of the ERP functional area in the system of record. For example, logistics, procurement, or sales.
ERP models	Number of ERP models the candidates belongs to. ERP models are configured in Zero Copy Connector for ERP. A model functions as a staging area that contains all potential fields you can add to remote and extraction tables, as well as, create, read, and update operations. You can then use the tables and queried data as a data source on the ServiceNow AI Platform. For more information, see Building and managing models to work with ERP data. **Note:** This column is available only on the candidates list on the Candidates page, not on the home page.
Similar candidates	Number of similar candidates. Similarity is based on the remote tables.

ERP Semantic Mining candidate scan results field descriptions

On a candidate record in ERP Semantic Mining the **ERP scan results** tab displays information about the latest scan of the ERP (Enterprise Resource Planning) system.

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For process details, see View and work with candidate details in ERP Semantic Mining.

ERP scan results tab details

Field	Description
ERP model	Relevant ERP model that the candidate uses, which is configured in Zero Copy Connector for ERP. Select an ERP model to open the model in Zero Copy Connector for ERP.
Closest ERP model/Extensible model	The suggested closest matching ERP model that you can add the table to in Zero Copy Connector for ERP. This column is helpful for custom tables, which aren't part of a standard ERP model and therefore don't have a table listed in the **ERP model** column. Select an ERP model to open the model in Zero Copy Connector for ERP.
Technical cluster	If the field is empty, the table is an ordinary, non-technical table. If the field contains a value, the table belongs to a technical group and is disregarded in the candidate identification analysis.
ERP table name	Name of the table on the ERP system.
Table operation	Action that ERP Semantic Mining took on the scanned table: Create, Read, Update, or Delete.
Max number of rows (DB)	Maximum number of rows on the scanned table, which is useful for knowing candidate limitations.
Updated	Date and time the table was most recently scanned.

ERP Semantic Mining candidate recommendations field descriptions

On a candidate record in ERP Semantic Mining, the **Recommendations** tab displays information about suggested next actions for replatforming ERP (Enterprise Resource Planning) candidates.

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For process details, see Check candidate recommendations in ERP Semantic Mining.

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Recommendations list details

Field	Description
Recommended action URL	Link to the recommended action. Select the recommendation link to open the relevant destination on the ServiceNow AI Platform. For example, the **Build a workflow** recommended URL would link to the flow in Workflow Studio.
Recommended action	Brief description of the action that ERP Semantic Mining suggests you take on a candidate when replatforming.
Effort estimation	Numerical score for how much effort the recommended action should require. Each recommended action has an estimated effort, which is a numerical score that assesses how well the ServiceNow AI Platform has matching functionality. Green actions require little-to-no effort, while red actions are more difficult.
Score improvement	The possible increase in the overall potential for a candidate if you implement the recommendation. Each time the AI/ML workflow is triggered, either automatically or manually, score improvements are calculated.
Table operation	The action you should take on the table, such as **Read** or **Update**.
Recommended technology	App or product on the ServiceNow AI Platform where you take the recommended action.
Max number of rows (DB)	The maximum number of database rows on the system of record that the recommended action allows.
Updated	Date and time the recommended action was most recently updated.

ERP Semantic Mining similar candidates field descriptions

On a candidate record in ERP Semantic Mining the **Similar candidates** tab displays information about similar candidates for replatforming ERP (Enterprise Resource Planning) apps.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

For process details, see View and work with candidate details in ERP Semantic Mining.

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Similar candidates tab details

Field	Description
Candidate	Name of the application candidate, which is the record number on the ServiceNow AI Platform.
Similar candidate	Record number of the similar candidate, which is automatically generated by the ServiceNow AI Platform.
Short description	Brief description of the similar candidate. For example, the tables the similar candidate reads.
ERP application	Name of the ERP application on the ERP system.
ERP module	Functional business area of the ERP system, such as Sales.
Similarity	Numeric score representing how similar the candidates are, from 0 through 1. A higher score, for example 0.94, indicates very similar candidates. For more information, see Recommendations and similar candidates in ERP Semantic Mining.
Similar candidates	Number of similar candidates. Select the value in this column to view a list of the additional similar candidates.
Updated	Date and time the similar candidate details were most recently updated.

ERP Semantic Mining snapshot field descriptions

In ERP Semantic Mining, the **Configuration** page **Snapshots** tab displays information about import and export snapshots.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

For process details, see Create a snapshot to share and save data in ERP Semantic Mining.

Snapshot list details

Column	Definition
Name	Unique, read-only name of snapshot. The name is created automatically.
Type	Classification of snapshot. The options are **Export** and **Import**.

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Snapshot list details (continued)

Column	Definition
Status	Current processing state. Options are **pending**, **in progress**, and **complete**.
Error message	If the import or export fails, an error message is displayed to explain the issue.
Created by	User that created the snapshot.
Updated	Date and time the snapshot was most recently updated.

Zero Copy Connector for ERP glossary

Learn about the terms and concepts used in Zero Copy Connector for ERP.

Important: Starting with the Zurich release, ERP Semantic Mining is being prepared for future deprecation. It will be hidden and no longer activated on new instances but will continue to be supported.

BAPI

A Business Application Programming Interface (BAPI) is a standard interface to the business object models in SAP products, similar to an API.

candidate

A candidate is a group of recommended remote tables that you can use to create an application based on a custom transaction (ERP root) in the system. Candidates can also be existing applications that sit on top of the legacy ERP system of record.

Good candidates for replatforming tend to be smaller applications that use data from the system of record.

candidate score

A metric for how well a custom application (ERP root) fits to a remote table in ERP Semantic Mining.

connection and credential alias

The credential alias is the system connection access enabler that's maintained in the ServiceNow credential alias. The credential alias is used to access the ERP system of record.

entity

The table or Business Application Programming Interface (BAPI) function call that Zero Copy Connector for ERP uses to read or update the system of record.

ERP application

The ERP (Enterprise Resource Planning) custom application that you choose to replatform using ERP Semantic Mining is an ERP root in the ERP system.

ERP model

The model represents a distinct set of features and functionalities tailored to address specific business processes or activities. A model encompasses multiple tables from

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the system of record, as well as APIs and ETL processes, to create a holistic dataset. For example, you can have one model for sales orders and another for inventory.

ERP module

The functional business area on the ERP system. The ERP root can only have one selected business area.

ERP system

An ERP system represents a connection to a section of your ERP system of record. The Zero Copy Connector for ERP system plays a crucial role in data synchronization, sharing, and collaboration, enabling seamless integration and operation between the model and the connected ERP system.

ERP table

Individual tables (both custom and standard) in the ERP system are part of the remote tables. For example, in sales, ERP tables could include VBAK, VBAP, VBFA, VBPA, VBEP, MKPF, or MSEG.

extraction table

Extraction tables retrieve large amounts of data using a scheduled query, and use transform tables to process data for use on the ServiceNow AI Platform.

mapped value

A mapped value refers to a value that has been assigned or transformed based on a predefined mapping or correspondence between two sets of data. It is commonly used in programming, databases, and data processing to associate one value with another.

odata

In Zero Copy Connector for ERP, create an OData connection to link to SAP via HTTP so data can be extracted for use in remote tables and extraction tables.

operation

Individual maintenance task performed to read or update the system of record.

remote table

A remote table is an aggregation of the system of record tables that provide value when gathered in one table. The remote table is the foundation of the model. A candidate can consist of several remote tables.

system of record

The ERP system of record is where the data lives and is distributed from, for example, SAP.

Reverse Tunnel

Establish secure private connectivity between your private cloud data sources and Workflow Data Fabric without having to open inbound firewall ports by using Reverse Tunnel.

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Get started

Explore



Learn about the components, users, setup workflow, and benefits of Reverse Tunnel.

Configure



Configure Reverse Tunnel to establish secure private connectivity between private cloud or on-premises data sources and Workflow Data Fabric.

Use



Monitor the connection health and registration status of private relays registered with Reverse Tunnel.

Reverse Tunnel overview

Reverse Tunnel routes encrypted traffic between Workflow Data Fabric and private relays deployed in your private network without decrypting that traffic. Reverse Tunnel supports deployment and management of gateway infrastructure for private connectivity to data sources.

Exploring Reverse Tunnel

Reverse Tunnel enables Zero Copy Connectors to reach private or on-premises data sources through encrypted outbound connections without having to open inbound firewall ports.

Reverse Tunnel overview

Reverse Tunnel extends Zero Copy Connectors access to data sources hosted in private cloud networks or on-premises networks. Because it accepts outbound connections from private relays deployed in the customer network and routes encrypted traffic to the correct data source without decrypting it, Zero Copy Connectors can reach data sources that aren't publicly accessible.

Key components

Gateway

The central infrastructure component hosted on the ServiceNow platform that accepts authenticated connections from private relays, enforces registration and hostname authorization, and routes encrypted traffic to customer-side data sources.

Private relay

A component deployed in the customer network that connects outbound to the gateway and proxies traffic between the gateway and the customer's private cloud

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data source. The relay is deployed in the customer network and operates like a MID Server in placement and connectivity.

Note: Private relays authenticate with the gateway automatically by using certificates. ServiceNow issues and renews the certificates, so you don't need to configure or manage them.

Gateway Controller

Manages gateway instances on the ServiceNow platform. Handles gateway creation and assignment to private relays.

Reverse Tunnel users

Users

User	Description
Relay manager	Registers and manages private relays and monitors relay connection and registration health. Requires the sn_zc_tunnel.relay_manager role.
Relay user	A service account that the private relay uses to authenticate with the instance and fetch its configuration.

Reverse Tunnel workflow

The setup workflow involves the following primary activities:

1. Install the `sn_zc_tunnel` (Zero Copy Reverse Tunnel), which provides the interface to manage relays and services.
2. Service account creation: The relay manager creates a service account in User Administration with the sn_zc_tunnel.relay_user role and notes the password for relay configuration.
3. Relay setup: The relay manager downloads the relay artifact `Reverse Tunnel Relay` from the store app, extracts the files, and configures and starts the relay.
4. Relay record configuration: After the relay starts, the relay registers with the instance and a new record is created in the `Relay [sn_zc_tunnel_relay]` table.

   Gateway records are automatically added to the Gateways field, tied to the instance name.
5. Backend services registration: The relay manager adds a service endpoint to the relay record for each data source to be accessed through the tunnel. For details, see Manage relay service endpoints through Reverse Tunnel.
6. Zero Copy Connectors connection setup: The relay manager configures the connector in Zero Copy Connectors with the required credentials and tests the connection.

Reverse Tunnel benefits

Benefits of Reverse Tunnel

Benefit	Feature
Connect to private cloud or on-premises data sources without having to open inbound firewall ports.	Reverse Tunnel
Establish encrypted connections between your private network and Workflow Data Fabric without exposing data source credentials or IP addresses.	Reverse Tunnel

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Benefits of Reverse Tunnel (continued)

Benefit	Feature
Manage and monitor private relay registrations and connection health from your ServiceNow instance.	Monitoring relay connectivity

What to explore next

To learn more about configuring and using Reverse Tunnel, see:

- Configuring Reverse Tunnel
- Monitoring relay connectivity

Private Relay navigation

Access Private Relay to manage private relays and service endpoints within your ServiceNow instance.

Navigation

Area	Role	Navigation
Relay management	Relay manager	**All** > **Private Relay** > **Relays**

Reverse Tunnel architecture

A private relay opens outbound connections to your instance and to the gateway. Knowing the ports and their purposes helps you configure firewall rules.

Reverse Tunnel requires outbound access on port 443 and on two gateway ports, a data port and an admin port. Use the information in this topic to explain the purpose of each host and port when you request firewall changes.

For descriptions of the gateway, private relay, and Gateway Controller, see Exploring Reverse Tunnel.

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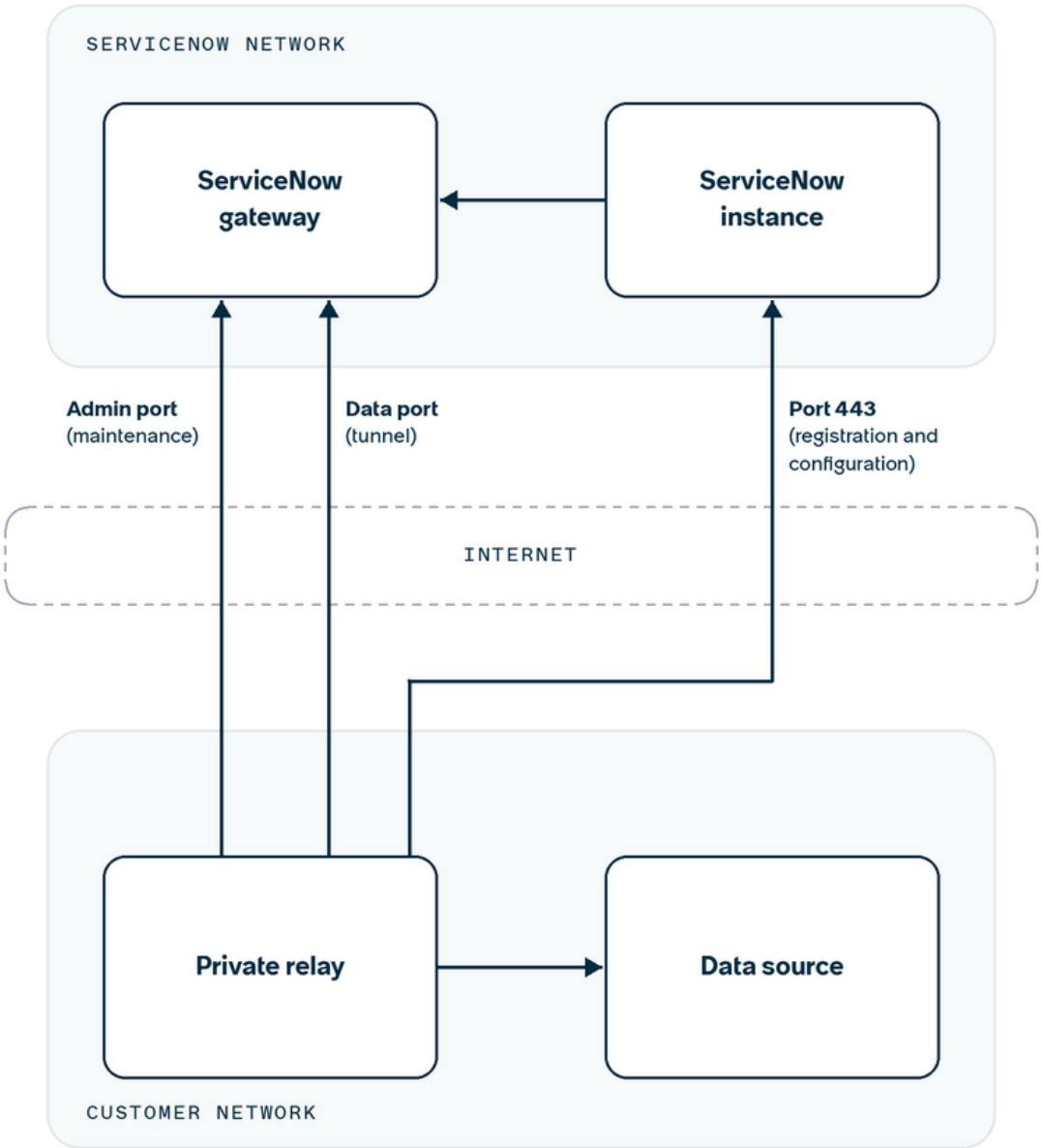
How it works

The figure shows the connections between the customer network and the ServiceNow



network.

Reverse Tunnel components communicate in the following sequence:

1. The private relay connects to your ServiceNow instance on port 443 to register, request its certificate, and retrieve its relay and tunnel configuration.
2. When the relay registers, the instance attaches gateway records to the relay record, creating them if they don't already exist.
3. The relay opens outbound connections to each gateway host on the admin port and the data port, and uses its certificate to authenticate with the gateway.
4. When Zero Copy Connectors sends a request for a data source in your network, the gateway routes the request through the data port connection to the relay.
5. The relay forwards the request to the data source registered as a service endpoint on the relay record.

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For details about how the gateway authenticates the relay, see Reverse Tunnel mTLS authentication.

Hosts and ports the relay connects to

The relay host machine requires outbound access to the hosts and ports in the following table. For gateway hosts, the **Data Port** and **Admin Port** fields in each gateway record are the source for the port numbers. The table lists the values currently in use.

Hosts and ports for the private relay

Host	Port	Purpose
ServiceNow instance	443	Relay registration, certificate signing requests, retrieval of relay and tunnel configuration, and periodic checks for configuration updates
Each gateway host	4281 (**Data Port** field)	Requests from the instance to data sources in your environment
Each gateway host	4290 (**Admin Port** field)	Tunnel-related activities, such as health checks

To find the gateway hostnames for your relay, see Verify outbound network access for a private relay.

Considerations

- Gateway hostnames aren't available until the relay registers with the instance. Your network administrator must open port 443 to the instance first. After the gateways appear on the relay record, open the data port and admin port to each gateway host.
- The relay connects to multiple gateway hosts for redundancy and reliability. ServiceNow determines the number of gateway hosts, and the number can change. Each gateway host requires access on both the data port and the admin port.
- How you configure outbound firewall rules depends on your network environment and is managed by your network administrator.

Related topics

Verify outbound network access for a private relay

Connect a private relay to the Reverse Tunnel gateway

Configuring Reverse Tunnel

Configure Reverse Tunnel to establish secure, private connectivity between your private cloud data sources and Workflow Data Fabric.

Configuration overview

Private relays authenticate with the gateway automatically by using certificates. ServiceNow issues and renews the certificates, so you don't need to configure or manage them.

1. Connect a private relay to the Reverse Tunnel gateway — Configure and register a private relay to establish an encrypted connection to the Reverse Tunnel Gateway.
2. Configure relay behavior — Set relay behavior using the `Relay Property [sn_zc_tunnel_relay_prop]` table or the `config.yaml` file.

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Reverse Tunnel mTLS authentication

Reverse Tunnel uses mutual TLS (mTLS) to authenticate private relays before any data is exchanged. Both the gateway and the relay verify each other's identity using X.509 certificates issued by the ServiceNow iPKI service.

Why mTLS is required

Only relays that present a valid iPKI-issued certificate can register with the gateway, which helps prevent unauthorized data access.

Certificate issuance

When a private relay starts up for the first time, a certificate signing request (CSR) is generated and submitted to the instance. The instance processes the request and returns a signed certificate. The certificate is stored locally and used to authenticate with the gateway on every subsequent connection.

ServiceNow iPKI issues and renews relay certificates automatically; you don't manage them.

Certificate expiration is checked on startup and daily. If the certificate expires within 30 days, a new CSR is generated, submitted to the instance, and the connection is re-established using the renewed certificate.

Connect a private relay to the Reverse Tunnel gateway

Configure and register a private relay to establish an encrypted connection to the Reverse Tunnel gateway.

Before you begin

- The host machine must be running Linux x86-64 or Windows x86-64.
- The host machine must have outbound network access to the ServiceNow instance on port 443.
- After the relay registers, the host machine must also have access to each gateway host on its data port and admin port. For the purpose of each port, see Reverse Tunnel architecture.
- A user account must be available to create a service account for the relay.

Role required: sn_zc_tunnel.relay_manager

Procedure

1. Download the relay artifact Reverse Tunnel Relay from the ServiceNow Store.
2. Extract the artifact files.
3. Verify outbound network access from the host machine to your ServiceNow instance on port 443.

   Replace `<instance>` with the name of your ServiceNow instance.

   On Windows, run the following command:

   ```
   Test-NetConnection -ComputerName <instance>.service-now.com
    -Port 443
   ```

   On Linux, run the following command:

   ```
   nc -zv <instance>.service-now.com 443
   ```

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For examples of the output, see Verify outbound network access for a private relay.

4. Configure and start the relay following the README instructions included in the extracted artifact.
5. Navigate to **All** > **Private Relay** > **Relays** and verify a relay record was created.

   Note: After successful registration, a record ID is stored in the `config.yaml` file. Do not modify or remove this value.

6. Verify outbound network access from the relay host machine to each gateway host.

   Outbound firewall rules must permit access to each gateway host on its data port and admin port. For the required steps, see Verify outbound network access for a private relay.

7. Register backend services to the relay.

   a. Note the fully qualified domain name (FQDN) and port number of the data source you want to access through the tunnel.
   For example: `acme.snowflakecomputing.com:443`.

   b. In the relay record, select **Unlock Services**.

   c. Select Lookup using list icon  to open the Service Endpoints list.

   d. Select **New**.

   e. Enter a name for the service endpoint and the FQDN and port number.

   f. Select **Submit**.

   g. Save the record.

   Assigned services are reported to the gateway, which routes incoming traffic to the correct relay. To add or update service endpoints after initial setup, see Manage relay service endpoints through Reverse Tunnel.

8. Set up the zero copy connection.

   a. Navigate to **All** > **Zero Copy Connectors** (Workflow Data Fabric).

   b. Select the connector you want to configure with the relay.

   c. Enter the credentials for the connector.

      Note: The connection URL hostname must exactly match the FQDN registered as a service endpoint. If the backend data source has an IP allowlist restriction, verify the relay is running on the same machine that is on the allowlist.

   d. Select **Test Connection**.
   If the connection test succeeds, the private tunnel setup is complete.

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Verify outbound network access for a private relay

Verify that the relay host machine can reach each Reverse Tunnel gateway host on the data port and the admin port.

Before you begin

- The private relay must be registered with the instance, and gateways must appear in the **Gateways** field of the relay record.
- Outbound firewall rules must permit the relay host machine to connect to each gateway host on its data port and admin port. For the purpose of each port, see Reverse Tunnel architecture.
- PowerShell on a Windows host machine or a terminal on a Linux host machine must be available.

Role required: sn_zc_tunnel.relay_manager

About this task

Each check tests the connection to a host and port and reports whether the connection succeeded. The check doesn't send data. The commands use `Test-NetConnection` on Windows and netcat (`nc`) on Linux, but you can use a different connectivity tool.

The relay connects to multiple gateway hosts, so each gateway host requires two checks, one for the data port and one for the admin port.

Procedure

1. Navigate to **All** > **Private Relay** > **Relays**.
2. Open the relay record.
3. Open each gateway record in the **Gateways** field and note the **Controller**, **Data Port**, and **Admin Port** values.

   The Controller value is the gateway host. Use only the hostname, without the `https://` prefix.

4. Open a command shell on the relay host machine.
   - On Windows, open PowerShell.
   - On Linux, open a terminal.
5. For each gateway host, test the connection on the data port and the admin port.

   Note: Replace *`gateway-host`* with the hostname from a Controller value. If the data port or admin port values in the record differ from 4281 and 4290, use the values from the record.

   On Windows, run the following commands:

   ```
   Test-NetConnection -ComputerName <gateway-host> -Port 4281
   Test-NetConnection -ComputerName <gateway-host> -Port 4290
   ```

   On Linux, run the following commands:

   ```
   nc -zv <gateway-host> 4281
   nc -zv <gateway-host> 4290
   ```

Example

For example, a relay with two gateway hosts requires the following commands:

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Windows:

```
Test-NetConnection -ComputerName <gateway-host-1> -Port 4281
Test-NetConnection -ComputerName <gateway-host-1> -Port 4290
Test-NetConnection -ComputerName <gateway-host-2> -Port 4281
Test-NetConnection -ComputerName <gateway-host-2> -Port 4290
```

Linux:

```
nc -zv <gateway-host-1> 4281
nc -zv <gateway-host-1> 4290
nc -zv <gateway-host-2> 4281
nc -zv <gateway-host-2> 4290
```

6. Review the output of each command.

   Each command reports whether the connection succeeded or failed.

   On Windows, a successful check ends with `TcpTestSucceeded : True`, as in the following example:

```
ComputerName     : gateway-host.example.com
RemoteAddress    : 192.0.2.50
RemotePort       : 4281
InterfaceAlias   : Ethernet
SourceAddress    : 192.0.2.15
TcpTestSucceeded : True
```

   On Linux, a successful check returns a message similar to the following example:

```
Connection to gateway-host.example.com 4281 succeeded!
```

Result
If every command reports success, the relay host machine can reach all gateway hosts.

Trouble?

If a command doesn't report success, the connection to that hostname and port failed. A failed connection can have several causes, including a missing or incorrect outbound firewall rule. Share the hostname and port with your network administrator.

What to do next
Register backend services to the relay. For details, see Connect a private relay to the Reverse Tunnel gateway.

Configure relay behavior

Configure relay behavior by setting properties in the Relay Property [sn_zc_tunnel_relay_prop] table on your instance.

Before you begin

- The Reverse Tunnel store app must be installed.
- The private relay must be deployed and registered. For more information, see Connect a private relay to the Reverse Tunnel gateway.

Role required: sn_zc_tunnel.relay_manager

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About this task

Properties set in the Relay Property [sn_zc_tunnel_relay_prop] table are retrieved dynamically during the relay configuration polling cycle and applied without restarting the relay. Use the instance table for most configuration changes.

The relay also supports a `config.yaml` file shipped with the relay artifact. Properties set in `config.yaml` take precedence over instance properties. Modify `config.yaml` only when instance-level configuration is not sufficient. For example, to set properties before the relay registers with the instance for the first time.

Procedure

1. Navigate to **All** > **Private Relay** > **Relays**.
2. Open the relay record.
3. In the Relay Properties related list, select **New**.
4. Enter the property name and value.
   For example, to enable debug logging, set the property name to `debug` and the value to `true`.

   For a list of available properties and their defaults, see Relay properties.

   Invalid property values fall back to defaults, and a warning is logged. Configuration polling is not affected.
5. Select **Submit**.

Result

The new property value is applied during the next configuration polling cycle without requiring a restart.

Monitoring relay connectivity

Monitor the connection health and registration status of private relays registered with Reverse Tunnel.

Available monitoring options

After a private relay is registered and connected, use the relay record to verify connectivity and diagnose issues.

- Monitor relay connection health

  View real-time connection status, heartbeat data, and reconnection activity for a registered relay.

- Manage relay service endpoints through Reverse Tunnel

  Add or update the service endpoints assigned to a relay.

Monitor relay connection health

View the heartbeat status of a private relay to verify connectivity.

Before you begin

The private relay must be deployed and registered. The registration status in the Relay [sn_zc_tunnel_relay] table must be Successful.

Role required: sn_zc_tunnel.relay_manager

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Procedure

1. Navigate to **All** > **Private Relay** > **Relays**.
2. Open the relay record to monitor.
3. Review the health monitoring table on the relay record.

Relay health fields

Field	Description
Last Seen	Date and time of the last successful heartbeat from the relay, shown with relative age. Updated in real time.

Manage relay service endpoints through Reverse Tunnel

Add or update the service endpoints assigned to a private relay to control which data sources are accessible through Reverse Tunnel.

Before you begin

The private relay must be deployed, registered, and connected. The registration status in the Relay [sn_zc_tunnel_relay] table must be Successful.

Role required: sn_zc_tunnel.relay_manager

About this task

Service endpoints specify the hostname and port of each data source routed through the relay.

Procedure

1. Navigate to **All** > **Private Relay** > **Relays**.
2. Open the relay record.
3. In the relay record, select **Unlock Services** to unlock the Services field.
4. Select **Lookup using list** to open the Service Endpoints list.
5. Select **New**.
6. Enter a name for the service endpoint and the FQDN and port number of the data source. For example: `acme.snowflakecomputing.com:443`.

   When creating a Zero Copy Connectors connection, the connection URL hostname must exactly match the fully qualified domain name (FQDN) registered as a service endpoint.
7. Select **Submit**.
8. Save the relay record.

Result

The new service endpoint is reported to the gateway, which routes incoming traffic from Zero Copy Connectors to the correct relay.

What to do next

If the backend data source has an IP allowlist restriction, verify that the relay is running on a machine whose IP address is on the allowlist.

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Classic Orchestration

ServiceNow® Orchestration extends the workflow engine to manage processes and to automate things outside of a ServiceNow instance.

Orchestration is available as a separate subscription from the rest of the ServiceNow platform. See Activate Orchestration for details.

Explore

- Introduction to Orchestration
- Orchestration applications
- Orchestration ROI
- Orchestration examples
- Domain separation and Orchestration

Set up

- Activate Orchestration
- MID Servers for Orchestration
- Available activity packs
- Setup Client Software Distribution

Administer

- List of Orchestratio plugins
- Orchestratio Runtime plugin

Use

- Orchestration activity packs
- Password Reset
- Client Software Distribution

Develop

- Orchestration activity designer
- Orchestration custom activity templates
- Client software distribution extension framework
- Developer training

Troubleshoot and get help

- Ask or answer questions in the Orchestratio community
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Introduction to Orchestration

Orchestration automates simple or complex multi-system tasks on remote services, servers, applications, and hardware.

An Orchestration process can cross all management disciplines and interact with hosted services and all types of infrastructure elements. These capabilities provide a powerful system for managing IT and Business processes quickly and reliably.

Orchestrated solutions aide collaboration among teams by providing reusable data and versioning for both the workflows and the activities within them. Subject matter experts can create activities that are reusable to numerous workflow developers. When an activity requires a change, developers can see the downstream implication of the change immediately by knowing

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which workflows use the activity. Well-designed orchestrations never fail and apply human tasks to address errors as they arise.

Orchestration tools

Orchestration can make calls outside of a ServiceNow instance, directly to web services or through a MID Server to systems within corporate firewall. Orchestration also enables the creation reusable activities that wrapper Java Script functions for manipulating things inside the platform. Orchestration extends the Workflow editor by providing these features:

- Activity packs containing ready-to-use activities.
- Activity Designer, which enables developers to create custom activities without an over dependence to create scripts to orchestrate to third-party systems.
- Ability to create activity packs using Scoped Applications.
- A Databus for following the flow of data across orchestration activities.

Orchestration Core provides entitlements to use specific applications:

Client Software Distribution

An application that automates software delivery from the Service Catalog. Provides OOB support for SCCM. Partner solutions support Macs using JAMF. Other third-party solutions provide support through the extension framework.

Configuring Password Reset

An application for users to reset their password in Active Directory. It can expand to communicate with other third-party systems.

Orchestration ROI

Enables users to evaluate estimated costs and actual costs for tasks, automate these tasks, and track the ROI of these tasks.

Systems that Orchestration can automate

Orchestration can automate tasks such as employee onboarding, user access rights, server management, managed file transfers, and Security Operations Orchestration activities . For example, you might use the Active Directory and Exchange activities provided in the base Orchestration system to set up network accounts and mailboxes for new employees.

If Orchestration does not provide the activities you need for an integration, create the necessary activities using the templates in the Orchestration Activity Designer. The external systems that Orchestration can automate for:

- Any system exposing web services (SOAP, REST)
- Any system accessible from the command line (such as a UNIX system accessible through SSH, a Windows system enabled for PowerShell remoting or WMI)
- Numerous proprietary services: Windows Active Directory, Microsoft Exchange mail servers, InfoBlox, and F5 Networks.

> **Note:** For a full list of Activity Pack service offerings, see Orchestration Core Activity Packs.

- Any filesystem accessible by SFTP
- Any database with a compliant JDBC driver
- Additional Activity Packs are also available with other ServiceNow products, such as Security Operations

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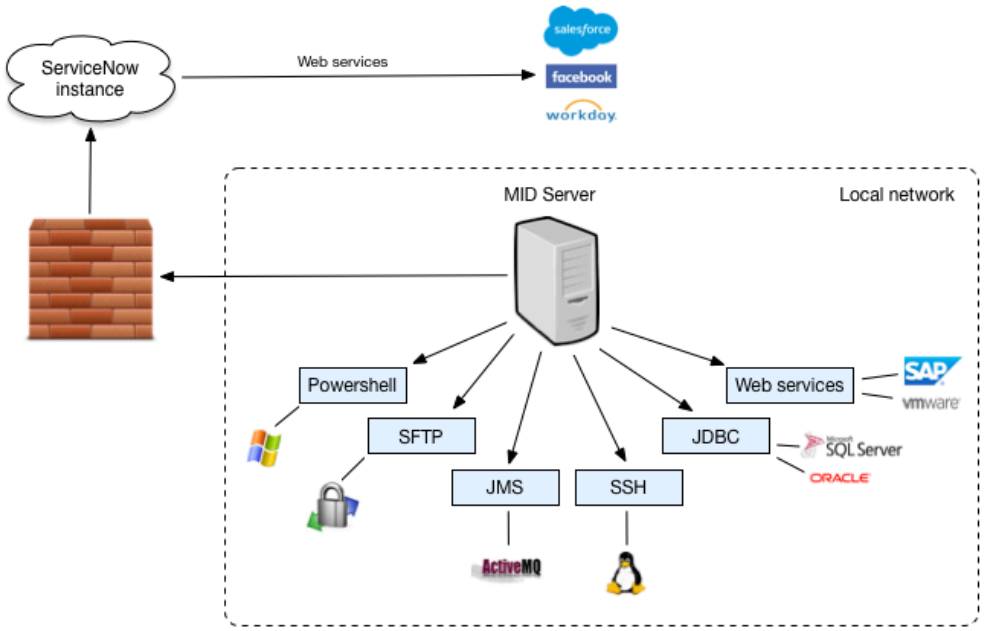
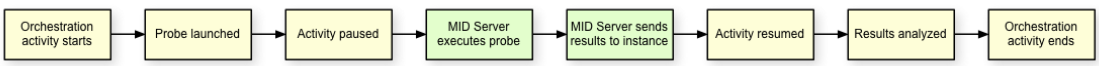
Orchestration capabilities



Orchestration workflow

When an Orchestration activity starts within a workflow, Orchestration launches a Discovery probes and sensors and writes a probe record to the ECC Queue. The workflow pauses as the MID Server picks up the request and executes the probe. When the probe reports back, the workflow resumes as the results are analyzed. The workflow can exit or continue at this point.

Orchestration workflow



Domain separation and Orchestration

Domain separation is supported in Orchestration. Domain separation enables you to separate data, processes, and administrative tasks into logical groupings called domains. You can control several aspects of this separation, including which users can see and access data.

Support level: Standard*

- Includes **Basic** level
- Business logic: Processes can be created or modified per customer by the service provider. The use cases reflect proper use of the application by multiple service provider customers in a single instance.
- The owner of the instance needs to be able to configure MVP business logic and data parameters per tenant as expected for the specific application.

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Use case: As an admin, I need the ability to make comments mandatory on close of a record for one tenant, but not for another.

Related topics

Domain separation for service providers

Activate Orchestration

The Orchestration (com.snc.runbook_automation) plugin is available within a separate subscription from the rest of the ServiceNow platform.

Before you begin

To purchase a subscription, contact your ServiceNow account manager. The account manager can arrange to have the plugin activated on your organization's production and subproduction instances, generally within a few days.

If you don't have an account manager, decide to delay activation after purchase, or want to evaluate the product on a subproduction instance without charge, follow these steps.

Role required: none

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

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4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

List of Orchestration plugins

This table lists all plugins available for Orchestration and their dependencies.

These Orchestration plugins are available for purchase or can be requested as part of your Orchestration subscription. Contact your account representative for details.

Name	Description	Dependencies
Orchestration [com.snc.runbook_automation]	Main plugin for the Orchestration feature. This plugin extends Workflow to automate operations with external systems. Use this plugin to orchestrate business services, applications, and infrastructure.This plugin automates operations such as deployments, configurations, and information gathering. Orchestration can automate Web Services and uses MID Servers to execute commands on devices inside an enterprise's network.	• Orchestration - ROI • Orchestration - Runtime
Orchestration - Active Directory [com.snc.orchestration.ad]	Installs the Active Directory activity pack. These activities create, delete, and manage objects in Windows Active Directory.	Orchestration
Orchestration - Asset Lease Management [com.snc.orchestration.asset_lease_management]	Provides the software lease functionality for Client Software Distribution. Allows users to select the start and end dates of software leases and to request an extension of a lease. **Note:** This plugin is not automatically enabled when Orchestration is active.	None
Orchestration - Azure Active Directory [com.snc.orchestration.azure.ad]	Installs the Azure AD activity pack. These activities automate employee onboarding and offboarding functions on Azure Active Directory and manage Office 365 licensing.	Orchestration
Orchestration - Client Software Distribution [com.snc.orchestration.client_sf_distribution]	Allows the distribution of software from the service catalog using third party management systems, such as Microsoft System Center Configuration Manager (SCCM) **Note:** This plugin is not automatically enabled when Orchestration is active.	• Orchestration - System Center Configuration Manager • Orchestration - Asset Lease Management

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Name	Description	Dependencies
		• Service Catalog Scoped API • Software Asset Management
Orchestration - Exchange [com.snc.orchestration.exchange]	Installs the Exchange activity pack. These activities manage Microsoft Exchange mail systems.	Orchestration
Orchestration - F5 network management [com.snc.orchestration.f5]	Installs the F5 Network Management activity pack. These activities configure elements of an F5 load balancer, including pools, pool members, and the virtual servers contained in the pool.	Orchestration
Orchestration - Infoblox DDI Activity Pack [com.snc.orchestration.infoblox]	Installs the Infoblox DDI activity pack. These activities support Infoblox DDI management.	Orchestration
Orchestration - PowerShell [com.snc.orchestration.powershell]	Installs the PowerShell activity pack. These activities control and automate the administration of Windows machines and applications, using the Windows .NET Framework.	Orchestration
Orchestration - Probe [com.snc.orchestration.probe]	Installs the Probe activity pack. These activities run ServiceNow® probes on target hosts to return specific information.	Orchestration
Orchestration - ROI [com.snc.runbook_automation.roi]	Installs an Orchestration application that estimates savings resulting from automated tasks in an instance and computes actual savings. Orchestration - ROI is activated automatically with a base Orchestration subscription.	• Performance Analytics • Cost Management
Orchestration - ROI Premium [com.snc.runbook_automation.roi_premium]	Installs a premium dashboard that displays detailed reports on calculated savings for automated tasks over time. The Orchestration - ROI Premium plugin requires purchase and activation of the Performance Analytics - Premium plugin to display its reports. **Note:** This plugin is not automatically enabled when Orchestration is active.	• Orchestration - ROI • Performance Analytics - Premium
Orchestration - Runtime [com.snc.runbook_automation.runtime]	Enables other applications on the ServiceNow® platform to distribute and use orchestration content without requiring an Orchestration subscription. The Orchestration - Runtime plugin displays the Orchestration activities shipped with these applications in the	• Workflow Runtime Engine • Core Automation

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Name	Description	Dependencies
	Workflow Editor and allows customers to modify the activities without requiring an Orchestration license.	
Orchestration - SFTP [com.snc.orchestration.sftp]	Installs the SFTP File Transfer activity pack. These activities manage files and directories on an SFTP server and move files from one SFTP server to another.	Orchestration
Orchestration - SSH [com.snc.orchestration.ssh]	Installs the SSH activity pack. These activities read, write, and copy files, and reset user passwords on Linux computers.	Orchestration
Orchestration - System Center Configuration Manager [com.snc.orchestration.sccm_mgmt]	Installs the System Center Configuration Manager (SCCM) activity pack. These activities manage software deployments and collections on an SCCM server.	Orchestration

Orchestration Runtime plugin

The Orchestration – Runtime plugin enables other applications on the ServiceNow® platform to automate tasks, without requiring an Orchestration subscription.

The Orchestration – Runtime plugin can be activated as part of another plugin or application. It is used by strategic technology partners and ServiceNow applications to distribute activity packs to customers who may not own Orchestration. For example, the Security Incident Response Management (SIRM) application provides orchestration content, which includes activities that are available from the **Packs** tab in the Workflow Editor. Customers who purchase SIRM can consume and modify the activities that SIRM ships without having to purchase an Orchestration license.

Included with the plugin

The Orchestration – Runtime plugin provides access to the **Packs** and **Data** tabs in the Workflow Editor. This plugin gives users access to custom activities for their applications and enables them to reuse data from the Databus. This plugin does not provide access to custom Orchestration activity packs or to the activity designer. The **Custom** tab in the Workflow Editor is not available without an Orchestration subscription.

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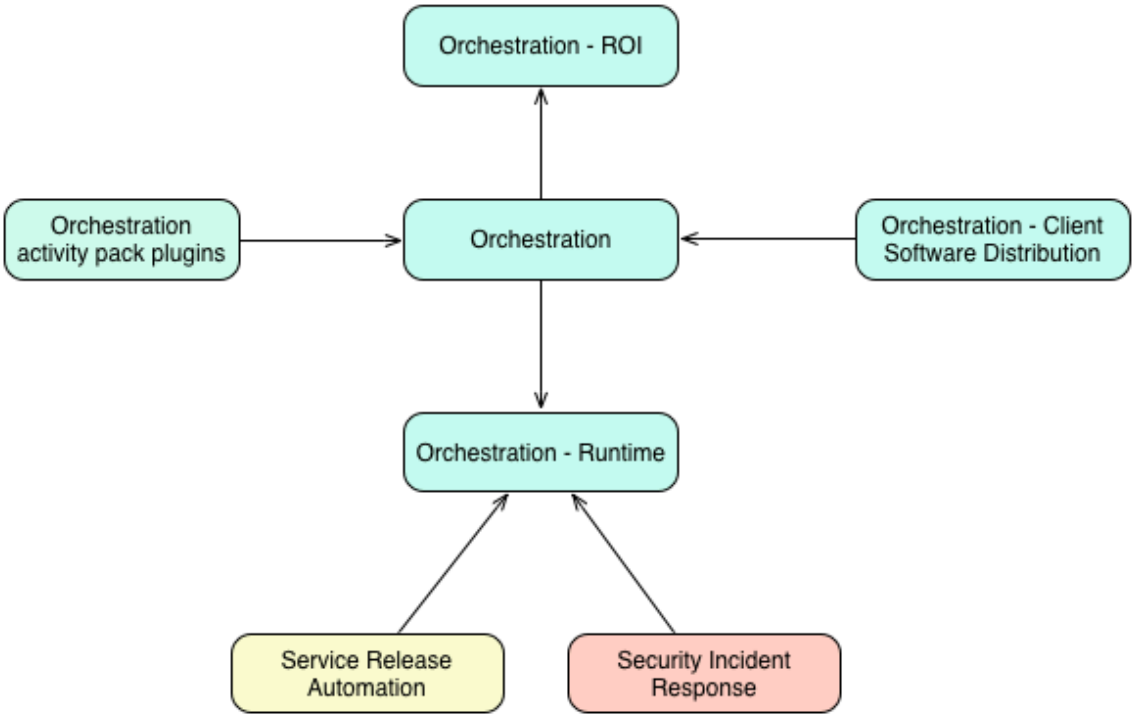
Orchestration plugin relationships



Dependencies

The Orchestration – Runtime plugin activates these application plugins:

- Security Incident Response Orchestration
- Service Release Automation

.

Access to activities

Custom activities shipped with ServiceNow® applications are available in the **Packs** tab of the Workflow Editor for use in workflows. To edit these activities, navigate to **Orchestration** > **Activity Designer Activities** and select the activity you want to modify. For information about the provider templates used to create these activities, see Orchestration custom activity templates.

List of Orchestration activities

Use Orchestration activities in a Workflow to integrate with third-party systems.

Several Orchestration activities have been rewritten as Application scope activities using the activity designer and grouped into activity packs. Other non-scoped activities are deprecated and may or may not appear in the Workflow Editor. However, all deprecated activities still function in existing workflows that use them.

Global activities

These activities run in the global scope only. Any activities you create in the global scope are organized in the Global category in the **Packs** and **Custom** tabs in the Workflow Editor.

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Activity	Description
Test Server Alive	Runs a command (including shell scripts) on a Linux or UNIX computer via SSH to validate whether the target system is alive.

Active Directory (AD) activities

All AD Orchestration activities were rewritten in the Geneva release as scoped activities and are available in the Active Directory activity pack. All previous version AD activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Create AD Object	Creates a user account in Windows Active Directory when a user account is created in a ServiceNow instance.
Disable AD User Account	Marks a Windows Active Directory user account disabled, making it inactive.
Enable AD User Account	Enables a Windows Active Directory user account, making it active.
Query AD	Retrieves entries from the Windows Active Directory based on a search filter.
Remove AD Object	Deletes a user account from Windows Active Directory.
Reset AD User Password	Resets the password of a user account in Windows Active Directory.
Change AD User Password	Changes the password of a user account in Windows Active Directory.
Update AD Object	Updates a user account in Windows Active Directory.
Is AD Account Locked	Determines if an Active Directory user account is locked.
Unlock AD Account	Unlocks a locked Active Directory user account.

Azure AD

All these activities are scoped and part of the Azure AD activity pack. They do not have legacy versions.

Activity	Description
Add User to Group	Adds a user to an existing security group in Azure Active Directory.
Assign User License	Assigns an extra Office 365 software license to the named user.
Create User	Creates a user for the Azure Active Directory tenant.

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Activity	Description
Delete User	Deletes the named user's account from the Azure Active Directory tenant.
Get User Info	Returns the named user's information from the Azure Active Directory.
Remove User from Group	Removes an existing user from a security group in Azure Active Directory.
Remove User License	Revokes the specified Office 365 software license for the named user.
Reset User Password	Changes the named user's Azure Active Directory password.

F5 Network Management activities

All these activities are scoped and part of the F5 Network Management activity pack. They do not have legacy versions.

Activity	Description
Add F5 Pool	Creates the load balancer pool.
Check F5 Pool	Checks the status of a pool to validate whether it is available to accept traffic.
Delete F5 Pool	Deletes an F5 pool.
Add F5 Pool Member	Adds a member to an F5 pool.
Get F5 Pool Member	Returns the pool members and verifies the pool status.
Delete F5 Pool Member	Deletes an F5 pool member.
Add F5 Virtual Server	Adds a virtual server.
Modify F5 Virtual Server	Configures a virtual server assigned to an F5 pool with irules and a vlan.
Delete F5 Virtual Server	Deletes a virtual server from an F5 pool.
Add F5 Profile to Virtual Server	Adds a profile to a virtual server assigned to an F5 pool.

Infoblox activities

All these activities are scoped and part of the Infoblox DDI activity pack. They do not have legacy versions.

Activity	Description
DHCP Reserve IP v4 Address Range	Reserves an IP address range for DHCP use.
DHCP Delete IP Reservation	Deletes IP reservations in DHCP using either an IPv4 or IPv6 address range.
DHCP List IP Reservations	Generates a list of all the DHCP range reservations on a specific Infoblox server.

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Activity	Description
List DNS C-records	Retrieves all canonical (CNAME) records from a specified Infoblox server.
Register DNS A-record	Creates a DNS A record on a specified Infoblox server.
Register DNS C-Record	Creates a DNS canonical (CNAME) record on a specified Infoblox server.
List DNS Record	Generates a list of all the DNS entries on a specific Infoblox server.
DNS Delete	Deletes DNS records of any type from in Infoblox server, such as C and A records.
IPAM Register IP Address	Registers an IP address in a network using Infoblox IPAM.
IPAM Reserve IP Address	Reserves an IP address in a network using Infoblox IPAM.
IPAM List IP Reservations	Returns an array of all IP Address within the named Infoblox Server.
IPAM Delete	Deletes an IP Address within a named Infoblox server.
Create Network	Creates networks on a specified Infoblox server.
Get Network Details	Retrieves the information about a specific network on an Infoblox server.
Delete Network	Deletes a network from an Infoblox server.
List Registered Networks	Retrieves all the networks associated with an Infoblox server.

Microsoft Exchange activities

All Exchange Orchestration activities were rewritten in the Geneva release as scoped activities and are available in the Exchange activity pack. All previous version Exchange activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Create Address List	Creates an address list that acts as an alias for emailing all users in the group. This alias cannot be used to manage user permissions.
Delete Address List	Removes an existing address list from an Exchange server.
Get Address List	Retrieves all attributes from the specified Exchange address list.
Move Address List	Moves an Exchange address list to another location in the address hierarchy.
Set Address List	Modifies an Exchange address list.
Update Address List	Adds or removes users from the specified address list and immediately applies any cached address list changes to the server.
Create Mailbox	If a user does not exist, creates a new Active Directory user and associated Exchange mailbox.

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Activity	Description
Delete Mailbox	Deletes the Exchange mailbox of an Active Directory user.
Disable Mailbox	Disables the mailbox associated with a specified Active Directory account.
Enable Mailbox	Creates a mailbox for an existing Active Directory user.
Get Mailbox	Gets the mailbox for the specified user or all mailboxes on an Exchange server.
Set Mailbox	Modifies the settings of an existing Exchange mailbox.

PowerShell activities

These PowerShell activities were rewritten as scoped activities and are available in the PowerShell activity pack. All previous version PowerShell activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Install Windows App	Installs an application on a Windows target machine.
Join Domain	Joins a Windows machine to a domain.
Restart Windows Server	Restarts a Windows server using PowerShell.
Uninstall Windows App	Uninstalls an application from a Windows target machine.
Change Service State	Starts or stops a Windows service on a remote system.

Probe activities

These probe activities were rewritten as scoped activities and are available in the Probe activity pack. All previous versions of these activities that were built on activity definitions are deprecated and are unavailable for use in new workflows.

Activity	Description
Resolve DNS Name	Resolves an IP address or a fully qualified domain name (FQDN) into one or more IP addresses.
SNMP Query	Queries an SNMP device.

SCCM activities

All these activities are scoped and part of the SCCM activity pack. They do not have legacy versions.

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Activity	Description
Add to Device Collection	Adds a device to a Microsoft System Center Configuration Manager (SCCM) device collection.
Add to User Collection	Adds a user to a Microsoft System Center Configuration Manager (SCCM) user collection.
Get Applications	Returns a list of all the applications available on a Microsoft System Center Configuration Manager (SCCM) server.
Get Deployments	Returns the list of deployments performed by Orchestration using a Microsoft System Center Configuration Manager (SCCM) server.
Get Device Collections	Returns the list of available device collections on a Microsoft System Center Configuration Manager (SCCM) host.
Get User Collections	Returns the list of available user collections on a Microsoft System Center Configuration Manager (SCCM) host.
Remove from Device Collection	Removes a device from a Microsoft System Center Configuration Manager (SCCM) device collection.
Remove from User Collection	Removes a user from a Microsoft System Center Configuration Manager (SCCM) user collection.

SSH activities

These SSH activities were rewritten as scoped activities and are available in the SSH activity pack. The SSH activities not converted to scoped activities were moved to the Orchestration - Deprecated category, but are still available for all workflows.

Activity	Description
File Copy	Copies a file on a Linux or Unix computer, via SSH.
File Read	Reads a file on a Linux or Unix computer, via SSH.
File Write	Writes a file on a Linux or UNIX computer.
File Replace String	Finds and replaces a string in a file on a Linux or UNIX computer.
Files Compare	Compares two files on a Linux or Unix computer, via SSH.

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Activity	Description
Reset Linux User Password	Resets the password for a given user on a Linux computer.
Secure Copy	Copies a file from one host to another, without storing the copied file on the MID Server.

SFTP activities

All these activities are scoped and part of the SFTP File Transfer activity pack. They do not have legacy versions.

Activity	Description
Copy File	Copies a file from an SFTP server (source host) to another SFTP server (target host).
Create Directory	Creates a directory on an SFTP server.
Get File List	Returns a list of files from a given directory and its subdirectories on an SFTP server (source host).
Remove File or Directory	Removes a file or a directory on an SFTP server, including subdirectories, when configured.
Rename File or Directory	Renames a file or directory to a new name on an SFTP server.
Set File Attributes	Sets common file attributes, such as timestamps, size, permissions, and UID/GID, for a file or directory on an SFTP server.

Deprecated activities

These activities have been removed from the Workflow Editor and are not available for new workflows, but continue to work normally in existing workflows. You can reactivate the deprecated activity or duplicate the functionality of a deprecated activity as a scoped activity by recreating it using the activity designer.

Activity	Description
Run Probe	Launches a MID Server probe on behalf of a document.
SOAP Request	Executes a SOAP request on a target server. The SOAP Message activity replaces this activity.
Run Command	Runs a command (including shell scripts) on a Linux or UNIX computer.
Run SCP	Uses Secure Copy Protocol (SCP) to copy a file from one computer to another, including the directory in which the file resides. The Secure Copy activity replaces the Run SCP activity.
Run Powershell	Executes Windows PowerShell commands on a MID Server.

Available activity packs

Activity packs are available with your subscription to Orchestration.

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Before you begin
Role required: admin

About this task
The following activity packs are available and active with your Orchestration subscription:

- Orchestration - Active Directory (com.snc.orchestration.ad)
- Orchestration - Azure Active Directory (com.snc.orchestration.azure.ad)
- Orchestration - Exchange (com.snc.orchestration.exchange)
- Orchestration - SFTP (com.snc.orchestration.sftp)
- Orchestration - Infoblox DDI Activity Pack (com.snc.orchestration.infoblox)
- F5 Network Management activity pack (com.snc.orchestration.f5)
- Orchestration - SSH (com.snc.orchestration.ssh)
- Orchestration - PowerShell (com.snc.orchestration.powershell)
- Orchestration - System Center Configuration Manager (com.snc.orchestration.sccm_mgnt)

Procedure
1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

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Deprecated Orchestration activities

These Orchestration activities have been deprecated.

Run Probe

The Run Probe activity launches a MID Server probe on behalf of a document. All Orchestration activities that launch a probe on a target machine are based on the Run Probe activity. Your ServiceNow instance must have access to a MID Server configured to use SSH to run this activity.

Important: This activity is deprecated and is unavailable for new workflows. To replace the functionality of this probe, use the Probe activity template to create a custom activity. Workflows from a previous release that use the Run Probe activity can continue to do so.

Run Probe input variables

Field	Description
Probe	Select a MID Server probe from the list. This is the name of the probe as it appears in the *discovery_probes* table.
Source for probe	Enter the IP address of the host system against which the probe runs (the probe's target).
Sensor script	The script to run using the results of the probe. The output from the probe is contained in a variable called *output*. Any error from the probe is contained in a variable called *error*.

SOAP Request

The SOAP Request activity executes a SOAP request on a target server.

Important: This activity is deprecated and is replaced by the SOAP Message workflow activity activity. Workflows from a previous release that use the SOAP Request activity can continue to do so. However, this activity is not available for new workflows.

SOAP Request input variables

Field	Description
SOAP URL	The SOAP endpoint.
Username	User name for basic authentication credentials.
Password	Password for basic authentication credentials.
Envelope Script	Script for setting up parameters for the web service.
Sensor Script	The script to execute after the request has been made and a response has been received.

Reactivate a deprecated activity

Orchestration activities that were converted to activity packs are deprecated for upgraded and new instances but can be reactivated for use in new workflows.

Before you begin
Role required: workflow_admin, admin

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Note: Reactivation of deprecated activities for use in new workflows is discouraged. Legacy activities cannot use the unique features of the scoped applications, such as reuse of data from the databus and input variable testing.

Procedure

1. Navigate to **All** > **Workflow** > **Administration** > **Activity Definitions**.
2. In the list of activities, clear the condition **Category !=deprecated** from the filter.
3. Open the definition record for the activity you want to reactivate.
4. Select the **What to Display** tab.
5. In the **Category** field, replace the value **deprecated** with another category.
   This can be an arbitrary string.
6. Click **Update**.
   The system creates a new category using the value provided and reactivates the activity, which becomes available in the **Core** tab of the Workflow Editor.

SOAP Message workflow activity

The **SOAP Message** activity uses SOAP messages defined in the System Web Services plugin and can call the messages using a MID Server.

Your instance must have access to a MID Server configured to use SOAP.

Input variables

SOAP Message activity input variables

Field	Parameter	Description
SOAP Message	soap_message	The SOAP Message defined under the System Web Services plugin's Outbound SOAP Message [sys_soap_message] table. (**System Web Services** > **Outbound** > **SOAP Message**)
SOAP Message Function	soap_message_function	The function to call that is defined in the SOAP Message. Functions are listed in the **SOAP Message Functions** related list in each SOAP Message record.
SOAP Endpoint	soap_endpoint	Endpoint to use instead of the **SOAP endpoint** value in the SOAP Message Function record. Leave this field blank to use the defined endpoint in the SOAP Message Function record.
Variables	variables	Variables to substitute into the SOAP **Envelope** defined in the SOAP Message Function record. Use this format for the string: `name1=value1, name2=value2, . . .` If either the name or value contains a comma or equal sign, escape these characters with a backslash.
Use MID Server	use_midserver	Check box for using a MID Server to send the SOAP message. A MID Server might be necessary to reach an endpoint within a firewall or a sub-network that is not visible from the instance. If this check box is selected

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SOAP Message activity input variables (continued)

Field	Parameter	Description
		(true), but no MID Server is defined in the **MID Server** field, workflow automatically attempts to find a MID Server.
MID Server	midserver	Name of the MID Server to use. This field appears when you select the **Use MID Server** check box. The workflow ignores this parameter if the *`use_midserver`* parameter is disabled. **Note:** You can only select a specific MID Server in the legacy SOAP message activity and REST messages. These legacy activities do not use the MID Server selection available starting with the Istanbul release.
Sensor Script	sensor_script	The script to execute after the request has been made and a response has been received. You can access the full XML response body from the *`activity.output`* object.

Probes used by Orchestration

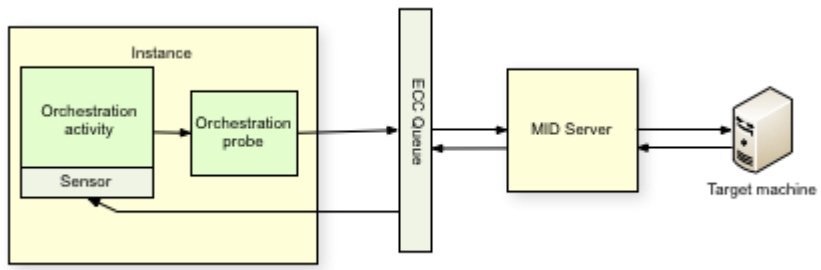
Certain probes, controlled by MID Servers, perform Orchestration tasks on remote computers, such as restarting a server or creating virtual machines from templates.

How Orchestration probes work

When a Workflow executes an Orchestration activity, that activity launches a probe, which writes an *output* record to the ECC Queue. The MID Server selected for the activity checks the ECC Queue for assignments, and then executes the appropriate probe to do the work on the target machine. The information about the activity (machine restarted, files copied, etc.) that is returned from the target machine by the probe is written to the ECC Queue as an *input* record. This information is then sent from the ECC Queue to a sensor that is built into the Workflow activity. The Workflow is updated, and the next activity is executed.

Note: The probe parameters are set by the activities that launch the probe.

How Orchestration uses probes



Probe List

The base system includes the following Orchestration probes (**Orchestration** > **Definition** > **Probes**).

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Probe List

Probe Name	ECC Queue Topic	ECC Queue Name	Description
Command	Command		A probe that runs a local command on the MID server.
DNS Name Resolver	DNSNameResolver		A probe that resolves a fully qualified domain name (FQDN) into an IP address. The probe executes MID Server queries in parallel. It utilizes DNS lookup by the MID Server host OS to make use of the OS maintained DNS cache. It also leverages the hosts file on the OS.
SCPCommand	SCPCommand		A probe that copies files securely from one machine to another. The copy function is performed using the MID Server as a tunnel.
Shazzam	Shazzam		A probe that identifies active devices.
SNMPProbe	SNMP	SNMP Query	This is a generic SNMP probe.
SOAPProbe	SOAPProbe		A probe that sends a SOAP request to target machine.
SSHCommand	SSHCommand		A probe that executes shell scripts from a command line after logging in to a target machine via SSH.
SSHCommandLong	SSHCommandLong		A probe that executes long running shell scripts from a command line after logging in to a target machine via SSH.
VMWare	VMWareProbe		A generic VMware probe that executes the MID Server script include in the *ECC queue name* that is set by a VMware Orchestration activity. This probe can run any MID Server script include.
Windows - PowerShell	PowerShell	Windows - PowerShell	A probe that runs a Windows PowerShell script on the MID Server. The PowerShell script is provided as the value of a parameter with name ending in `.ps1`. Two variables are available to the script: • `$computer`: The computer pointed to as the source for this probe • `$cred`: A PowerShell credential, using a user name and password from the Credentials table, that logs into `$computer` successfully.

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PowerShell activities

PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications.

PowerShell must be installed on any MID Server that uses these activities. MID Servers using PowerShell must be installed on a supported Windows operating system. ServiceNow supports PowerShell 3.0 to 5.1.

The ServiceNow Orchestration plugin adds these basic PowerShell activities to workflows. For instructions on using activities from the PowerShell activity pack, see PowerShell activity pack

Legacy Run PowerShell activity

The Run PowerShell activity executes Windows PowerShell commands on a MID Server.

Important: This activity is deprecated and is unavailable for new workflows. To replace the functionality of this activity, use the Powershell activity template to create a custom, scoped activity. Workflows from a previous release that use the Run PowerShell activity can continue to do so.

Result Values

The workflow designer can assign a result value using activity.result from within a script field of the activity. By default, the success or failure of the PowerShell commands used determines the result value of the Run PowerShell activity. Possible result values are:

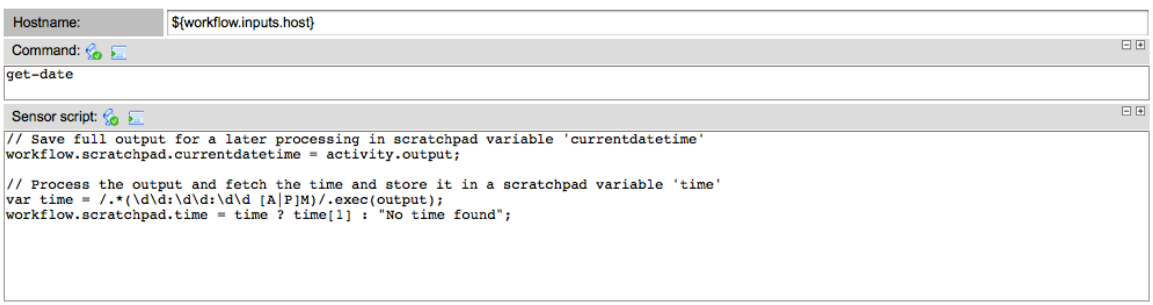
- Success
- Failure

Scratchpad Entries

Information written to *stdout* by the executing script is captured and returned to the activity in the *activity.output* variable. This information can be parsed, processed, or saved (to a scratchpad variable, for example) for future processing in the activity's sensor script.

An example would be to run the get-date command to get the MID Server's current time. This sensor script saves the full output received, but we can process it to return and save only the time.

PowerShell activity



Note: This is an over-simplified example. In most cases, the script operates against some remote Windows computer. However, the principal is the same – whatever is written to `stdout` is returned in `activity.output` and available to process.

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Input Variables

Input Variables

Field	Description
Hostname	IP address of the target Windows machine. This value is mapped to the *$computer* variable for use in commands (see the example in the **Command** field). A PowerShell credential variable called *$cred* that is based on information in the ServiceNow Credentials table will authenticate on the computer pointed to by **Hostname**.
Command	Enter the PowerShell command to run. For example, to execute a simple WMI query against a remote machine pointed to by the *hostname* variable, the command is: `get-wmiobject <class> -computer $computer -credential $cred` If no credentials authenticate on the computer, the command runs in the context of the MID Server user. You cannot run both a command and a script file. Specifying a command hides the *Script file* variable.
Sensor script	The script to run using the results of the probe. The output from the probe is contained in a variable called *output*. Any error from the probe is contained in a variable called *error*.
Script file	The Enable script file synchronization for Windows enhanced security. You cannot run both a script file and a command. Selecting a script file hides the *Command* variable.
PowerShell script variables	Additional parameters, in JSON format, used by the specified script file.

States

The activity state tells the workflow engine what to do with the activity.

States

State	Description
Executing	The workflow engine knows to start the onExecute function of the activity.
Finished	The activity finished running. See the result value for the outcome of the activity.
Cancelled	This activity, or the workflow that contains this activty, was cancelled.

Add workflow variables for the command line using the normal workflow variable syntax. In the example above, if the <class> was in a workflow input variable called *myclass*, the command would look like:

```
get-wmiobject $ {workflow. inputs. myclass } -computer $computer
 -credential $cred
Similarly  if the variable  is a scratchpad variable named
 myclass , the command would look like :
```

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```
get -wmiobject $ {workflow. scratchpad. myclass } -computer
 $computer –credential $cred
```

HResult codes

When a PowerShell script encounters an error, the Windows machine may return an HResult code as part of the error message.

PowerShell activities can read and interpret this code. Not all PowerShell errors include an HResult code. In the event of a failed PowerShell script, you can use the HResult code to move the workflow through a specific condition.

For example, when resetting an Active Directory password to a password that does not meet policy requirements, such as minimum length or complexity, the PowerShell script returns the HResult code -2146022651. To use this code, create an activity condition with the **Condition** value of *`activity.hresult = -2146022651`*. If the PowerShell script returns this code when the activity runs, the workflow transitions through this new condition.

SSH activities

SSH activities allow workflows to perform operations on Linux and Unix computers.

Your ServiceNow instance must have access to a MID Server configured to use SSH to run these Orchestration activities.

Run Command activity

The *Run Command* activity runs a command (including shell scripts) on a Linux or UNIX computer.

Important: The Run Command activity is deprecated in this release. If you have a workflow created in a previous version that uses this activity, your workflow will continue to work normally after upgrading to Helsinki. However, to use this functionality in a new workflow, you must create a custom activity using the SSH activity template in the ServiceNow® activity designer.

Input variables

Run command input variables

Field	Description
Long running	Select this check box to disable the SSH connection timeout if you think the command will take longer to run than the default 60 seconds. Orchestration periodically checks the running process to determine its status until it is finished.
Hostname	Hostname or IP address of destination server for SSH activity.
Directory	Name of the working directory.
Command	The command to run from this activity.
Sudo	Select this check box to use sudo to run the command on the host machine.
Sensor script	The script to run using the results of the probe. The output from the probe is contained in a variable called *`output`*. Any error from the probe is contained in a variable called *`error`*.

Run SCP activity

The Run SCP activity uses Secure Copy Protocol (SCP) to copy a file from one computer to another, including the directory in which the file resides.

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Note: This activity is deprecated in the Geneva release and is not available for use in new workflows. If you have a workflow created in a previous version that uses this activity, your workflow will continue to work normally after upgrading. The custom Secure Copy activity replaces the Run SCP activity in the Geneva release.

Input variables

Run SCP input variables

Field	Description
From Host	Hostname or IP address of the source computer.
From File	Absolute path to the file to copy. This value can be a directory.
To Host	Hostname or IP address of the target computer.
To File	Path to the target file. This path can be absolute or relative to the logged in user's home directory. The specified directory must already exist on the target computer.
Copy Directory	Check box to copy a directory defined in the **From File** variable and all files contained in that directory.

Orchestration applications

Orchestration provides several applications with your subscription.

Orchestration ROI

The Orchestration ROI application allows you to estimate and compute cost savings for tasks in your system that could be automated with Orchestration.

After you automate the tasks, you can track cost savings by associating Orchestration workflows with corresponding task areas. Configuration in the application allows you to select the hourly rate for performing the task manually, the rules the system uses to select tasks for evaluation, and the time period of the evaluation. Orchestration ROI estimates your savings by multiplying the cost of performing repetitive tasks manually by the estimated number of times the system performs those tasks automatically during a specific date/time range. The system also calculates the actual savings of your automations. Orchestration ROI is included with the base Orchestration subscription.

Orchestration ROI reports offer a number of views of the comparative data and allow you to access the associated records directly from the reports. The standard reports included with the Orchestration - ROI plugin provide summaries, estimated costs, and calculated costs for automated processes. The ROI premium dashboard uses Performance Analytics to provide detailed reports on calculated savings over time. Performance Analytics requires a different plugin and subscription.

Note: When Orchestration ROI is activated as a dependent plugin of Orchestration, demo data is not installed. If you want to use demo data as a template for your own ROI evaluation, submit a request to ServiceNow® technical support for an Orchestration ROI plugin upgrade with demo data selected.

To set up Orchestration ROI, complete the configuration tasks in the order shown here.

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Create Orchestration ROI labor rate cards

Before calculating your Orchestration ROI, you must create labor rate cards for the manual work that would be required to complete the tasks correlated to the ROI calculations.

Before you begin
Role required: orchestration_manager

About this task
The hourly rates defined in the rate cards are used to determine the savings from your orchestrated tasks.

Procedure

1. Navigate to **All** > **Orchestration** > **ROI** > **Labor Rate Cards**.
2. Complete the fields in the form using the descriptions in Manage a labor rate card.
3. Click **Submit**.
4. Create additional rate cards as needed.

Create an Orchestration ROI automation entry record

The ROI automation entry record couples the cost of performing a task with the specific workflow that automates the task, for the purpose of calculating the resulting savings.

Before you begin
Role required: orchestration_manager
Before starting this procedure, verify that the appropriate labor rate cards were created.

About this task
Use this record to apply a manual hourly rate to a task that is performed automatically by your instance. To determine the savings realized from orchestrating a task, the system can evaluate whether those savings were estimated or calculated.

- **Estimated savings**: Uses the labor rate, the time estimates for completion of the task, and the number of automations that have been run to determine savings.
- **Calculated savings**: Uses the labor rate, the time calculated for completion of the task, based on the configured evaluation period, and the number of automations that have been run to determine savings.

Procedure

1. Navigate to **All** > **Orchestration** > **ROI** > **Automation Entry Form**.
2. Fill in the fields on the form, as appropriate.

Automation Entry Form

Field	Description
Category	Category of the selected workflow automation. The following categories are provided in the base Orchestration - ROI system: ○ **Access & Identity Management** ○ **Datacenter Automation** ○ **IT Service Management** ○ **Other**

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Field	Description
	Note: To create a category, open the dictionary record for the Automation Entry Form [automation_entry_form] table and add an option to the choice list.
Item	Unique name for the specific task within the category. This value represents the work to which the labor rate card applies, such as **Password Reset**.
Resource	Labor rate card to apply to this automation entry. You must have IT Cost Management active on the instance for this field to appear.
Associated Workflows	Workflow automations created to automate this manual task. The system uses this field to identify the number of automations that have been run.
Estimated Duration (min) per Task	Estimated time to perform this task manually.
Estimated Volume per Month	Estimated number of times needed to perform this task manually per month.
Read-only fields	
Start time	Start time for the evaluation period. Configure this value in the Time Range for Calculated Averages module.
End time	End time of the evaluation period. Configure this value in the Time Range for Calculated Averages module.
Calculated average duration per task (min)	Actual time required to perform this task manually.
Calculated average volume per month	Actual average number of times this task is performed manually per month.

3. Select one of these submission options:
   - **Submit**: Saves the record to the table without running any calculations.
   - **Submit and process now**: Saves the record and calculates the savings based on the hourly rate and the number of workflow contexts for this automation entry.

Create an Orchestration ROI correlated task rule

The correlated task rule applies configurable conditions to fields in a selected table that tell the instance which manual tasks correspond to an automation entry record.

Before you begin

Role required: orchestration_manager

Before starting this procedure, make sure you have created labor rate cards and the appropriate automation entry records for the automated tasks you want to evaluate.

About this task

Create conditions that the system can use to correlate manual tasks to the automation entry. For example, a rule on the Incident [incident] table uses these conditions to correlate the employee on-boarding task to values configured in the Employee OnBoarding automation entry record:

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- **[Subcategory] [is] [Employee OnBoarding]**
- **[Sort description] [contains] [new employee]**

When a new employee opens an incident to request services or assets which are typically handled manually, Orchestration applies the usual labor rate for the manual work to the potential automated solution, and then computes the actual savings.

Procedure

1. Navigate to **All** > **Orchestration** > **ROI Task Correlation** > **Correlated Tasks Rules**.
2. Click **New**.
3. Fill in the fields on the form, as appropriate.

Automation entry form

Field	Description
Automation entry	Automation entry record that correlates to the manual task defined by these conditions. The entry record names the workflow used to automate the task and defines the labor rate used to calculate the cost of the task.
Table	Table to filter, using these conditions. The rule selects records from this table that match the conditions. Information from these records is used to calculate the actual time to perform a manual task and the actual volume for that manual task.
Condition	Condition builder to use to filter records for this table. Use these conditions to identify all manual tasks correlated to this automation entry.
Read-only fields	
Processed on	Date and time that the system performs the matching records lookup. The system automatically searches for new manual tasks matching these conditions.

4. Select one of these submission options:
   - **Submit**: Saves the record to the table without running any calculations.
   - **Submit and process now**: Saves the record, looks up all matching tasks, and saves matching record information to the Correlated Tasks [manual_mapping_records] table.
5. To view a rule, select the link in the **Table** column of the **Correlated Tasks Rules** related list for the automation entry you want to see.
6. To view the list of tasks that match all correlated rules in the system, navigate to **Orchestration** > **ROI Task Correlation** > **Correlated Tasks**.
7. To view the list of tasks that match this rule in the system, click **Correlated Tasks** under **Related Links** in this form

Configure the time range for Orchestration ROI calculations

Select a date range to calculate the average number of tasks and the duration per month for the correlated tasks.

Before you begin

Role required: orchestration_manager

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About this task

By default, the system creates a range ending at the current date and time and extending back over the previous month. You can change this range at any time and recalculate the ROI instantly.

Procedure

1. Navigate to **All** > **Orchestration** > **ROI Task Correlation** > **Time Range for Calculated Averages**.
2. Enter a new start or end date and time or click the icon to select a date using the calendar.
3. Click **Calculate** to recalculate the ROI based on the new time range and to save your settings.

Installed with Orchestration ROI

Several types of components are installed with the Orchestration - ROI plugin (com.snc.runbook_automation.roi).

Tables installed with Orchestration ROI

Tables are added with activation of Orchestration ROI.

Table	Description
Expense and Savings [run_rate_predicted_savings]	Contains the data for the reports in **Orchestration** > **ROI Reports** > **Predicted Savings**.
Savings Report [savings_report]	Contains the number of automations that have been run before the date specified in the **Processed On** column, based on: • Each automation entry's associated workflows • Estimated savings based on the estimated duration per task. • Calculated savings based on calculated duration.
Detailed Savings Report [detailed_savings_report]	Contains a detailed list for the Savings Report [savings_report] table. This list contains each automation's run date and savings for that automation.
Automation Entries [automation_entry_form]	Contains automation entries that couple labor resources to specific manual tasks. You can specify the estimated duration to perform a task manually and the estimated number of times that a task is performed per month. If this automation entry already has workflow automations implemented, you can specify the associated workflows. The system calculates the savings, based on the labor rate card and the number of workflow automations that have been performed.
Roadmap Planning [roadmap_planning]	Contains roadmap planning for each automation entry to be implemented. You can provide estimated hours to implement a workflow automation, the automation percentage anticipated by the end of the year, and the starting month to implement the workflow.
Correlated Tasks [manual_mapping_records]	Contains all matching manual tasks for each automation entry. Each tasks's information is stored in this table for the system to use to calculate the actual duration and volume for each manual task.

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Table	Description
Correlated Tasks Rules [manual_mapping_conditions]	Contains the correlated task rules the system uses to look up manual tasks corresponding to each automation entry.

Plugins installed with Orchestration ROI

Plugins are installed with activation of Orchestration ROI, if they are not already active.

Plugin	Description
Cost Management [com.snc.cost_management]	Provides the labor rate cards Orchestration ROI uses to determine the savings for each automated task. See Cost Management for more information.

Roles installed with Orchestration ROI

Roles are added with activation of Orchestration ROI.

Role title [name]	Description	Contains Roles
Orchestration manager [orchestration_manager]	Manages all activities in the Orchestration ROI module.	• pa_admin • report_admin

UI actions installed with Orchestration ROI

UI actions are added with activation of Orchestration ROI.

UI actions for Orchestration - ROI

UI action	Table	Description
Savings Report	Automation Entry Form [automation_entry_form]	Displays the savings report specific to this automation entry, if the associated workflows are not empty.
Estimated and Projected Savings	Automation Entry Form [automation_entry_form]	Displays the estimated savings, based on the estimated duration of the task, and calculated savings, based on the calculated duration of the task.
Show Workflow Context	Detailed Savings Report [detailed_savings_report]	Shows the related workflow context.
Submit AND process now	Automation Entry Form [automation_entry_form]	Processes this new entry
Correlated Tasks	Correlated Tasks Rules [manual_mapping_conditions]	Displays all matching tasks from the Correlated Tasks [manual_mapping_records] table.

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UI actions for Orchestration - ROI (continued)

UI action	Table	Description
Detailed Savings Report	Automation Entry Form [automation_entry_form]	Displays the list of automations that have been run, based on associated workflows.
Task	Correlated Tasks [manual_mapping_records]	Displays the task record.
Submit AND process now	Correlated Tasks Rules [manual_mapping_conditions]	Processes a correlated task rule. This action performs matching on the specified table and the filter conditions.

Script includes installed with Orchestration ROI

Script includes are added with activation of Orchestration ROI.

Script include	Description
OrchestrationROIAjax	Script that calculates the actual duration and volume of a task.
OrchestrationROI	Script that calculates the number of workflow contexts, looks up all matching tasks, calculates savings, and other functions used in the UI actions.
ROIDemoDataUtil	Script that updates demo data timestamps.

Client scripts installed with Orchestration ROI

Client scripts are added with activation of Orchestration ROI.

Client script	Table	Description
Display info for processing rules	Correlated Tasks Rules [manual_mapping_conditions]	Displays annotation on the Correlated Task Rule form advising that new task rules are not evaluated until the time specified in the ROI schedule.

Business rules installed with Orchestration ROI

Business rules are added with activation of Orchestration ROI.

Business rule	Table	Description
Delete corresponding records	Automation Entry Form [automation_entry_form]	When a record is deleted from the Automation Entry Form [automation_entry_form] table, this business rule deletes all records in other ROI tables that reference this entry.
Insert into Run Rate & Savings	Automation Entry Form [automation_entry_form]	When a new automation entry is provided, this business rule calculates the estimated savings, based on the estimated duration of a task and its associated labor rate card.

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Business rule	Table	Description
Insert into Savings Reports	Automation Entry Form [automation_entry_form]	When a new automation entry is provided, this business rule inserts a new record into the Savings Report [savings_report] table with the**automations_run** field set to **0**.

Orchestration ROI reports

Orchestration ROI provides a collection of standard and premium reports to help you calculate savings from automating services in your organization.

The ROI standard reports are included with Orchestration ROI. The premium reports provide enhanced views generated with Performance Analytics and require the Orchestration - ROI Premium plugin.

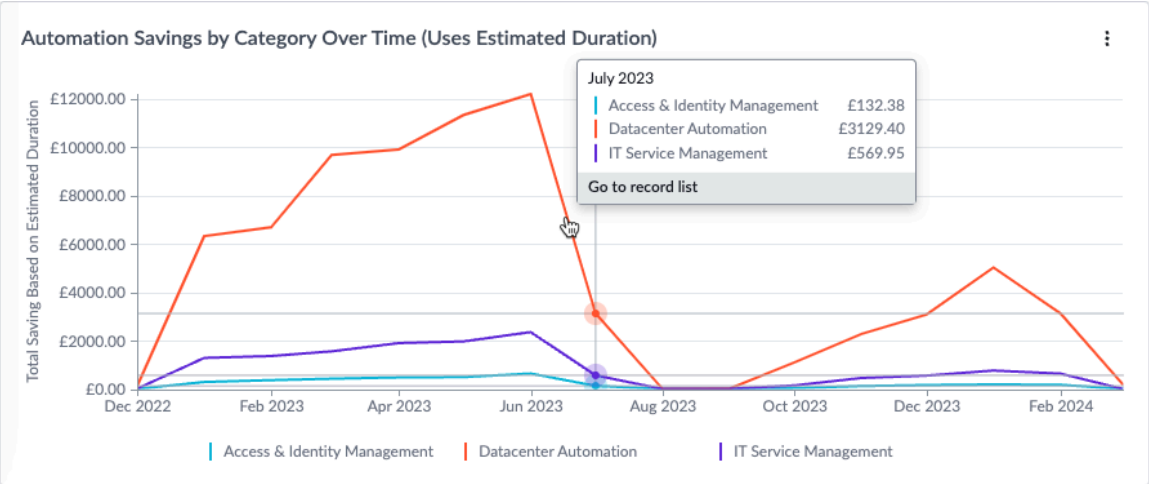
Orchestration ROI standard reports

The dashboard of standard ROI reports provides summaries, estimated costs, and calculated costs for automated processes. To access the ROI standard dashboard, navigate to **Orchestration** > **ROI Reports** > **Dashboard**.

Summary tab

The Summary tab contains four reports on automation categories.

ROI summary report sample



Standard ROI summaries by category

Report	Description
Manual Tasks by Category Over Time	Trend of manual tasks by category over time. For example, if you use automations to perform a portion of the necessary tasks, the report shows the number of tasks still executed manually, decreasing over time. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]
Automations by Category Over Time	Trend of automated tasks by category over time. For example, this chart can show the increase in the number of automated tasks as a workflow automation rolls out slowly over time.

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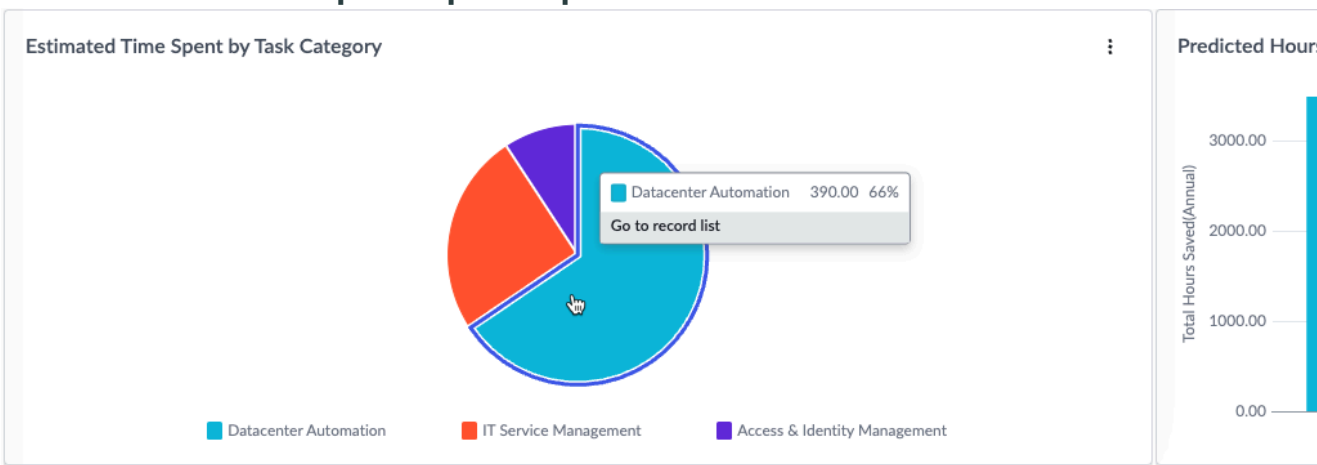
Standard ROI summaries by category (continued)

Report	Description
	• **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]
Automation Savings by Category Over Time (Uses Estimated Duration)	Amount of savings from automated tasks over time, based on the estimated duration of the task, the number of automations performed, and the cost from the labor rate card. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]
Automation Savings by Category Over Time (Uses Calculated Duration)	Amount of savings from automated tasks over time, based on the calculated duration of the task, the number of automations performed, and the cost from the labor rate card. • **Type**: Line chart • **Table**: Detailed Savings Report [detailed_savings_report]

Estimated Costs tab

The Estimated Costs tab contains eight reports on estimated time and expense for automations.

ROI estimated time and expense report samples



Standard ROI time and expense estimates

Report	Description
Estimated Time Spent by Task Category	Total estimated time spent, in minutes, on all tasks by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Estimated Volume of Manual Tasks per Month by Category	Total estimated volume of all tasks per month by task category.

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Standard ROI time and expense estimates (continued)

Report	Description
	• **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Predicted Hours Spent Monthly by Category (Uses Estimated Duration & Volume)	Total predicted hours spent monthly on all manual tasks by category, using the estimated duration of each task and the estimated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Monthly Expense by Category (Uses Estimated Duration & Volume)	Total predicted monthly expense for all manual tasks by category, using the estimated duration of each task, estimated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Hours Spent Quarterly by Category (Uses Estimated Duration & Volume)	Total predicted hours spent quarterly on all manual tasks by category, using the estimated duration of each task and the estimated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Quarterly Expense by Category (Uses Estimated Duration & Volume)	Total predicted quarterly expense for all manual tasks by category, using the estimated duration of each task, estimated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Hours Spent Annually by Category (Uses Estimated Duration & Volume)	Total predicted hours spent annually on all manual tasks by category, using the estimated duration of each task and the estimated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Predicted Annual Expense by Category (Uses Estimated Duration & Volume)	Total predicted annual expense for all manual tasks by category, using the estimated duration of each task, estimated volume of each task per month, and the cost from the labor rate card.

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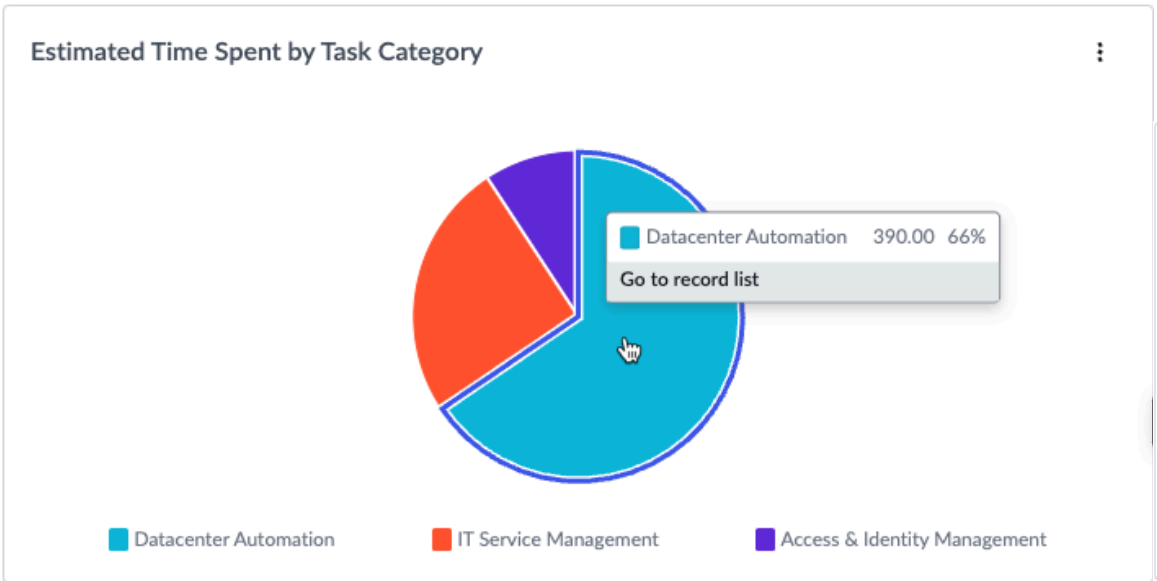
Standard ROI time and expense estimates (continued)

Report	Description
	Note: This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]

Costs from Correlated Tasks tab

The Costs from Correlated Tasks tab contains eight reports on time and expense for automations based on actual calculations.

ROI calculated time and expense report samples



Standard ROI calculated time and expense of automations

Report	Description
Time Spent by Task Category	Total actual time spent, in minutes, on all tasks by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Volume of Manual Tasks per Month by Category	Total actual volume of all tasks per month by task category. • **Type**: Pie chart • **Table**: Automation Entry Form [automation_entry_form]
Projected Hours Spent Monthly by Category (Uses Calculated Duration & Volume)	Total projected hours spent monthly on all manual tasks by category, using the calculated duration of each task and the calculated volume of each task per month.

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Standard ROI calculated time and expense of automations (continued)

Report	Description
	• **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Monthly Expense by Category (Uses Calculated Duration & Volume)	Total projected monthly expense for all manual tasks by category using the calculated duration of each task, the calculated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Hours Spent Quarterly by Category (Uses Calculated Duration & Volume)	Total projected hours spent quarterly on all manual tasks by category, using the calculated duration of each task and the calculated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Quarterly Expense by Category (Uses Calculated Duration & Volume)	Total projected quarterly expense for all manual tasks by category using the calculated duration of each task, the calculated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Hours Spent Annually by Category (Uses Calculated Duration & Volume)	Total projected hours spent annually on all manual tasks by category, using the calculated duration of each task and the calculated volume of each task per month. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]
Projected Annual Expense by Category (Uses Calculated Duration & Volume)	Total projected annual expense for all manual tasks by category using the calculated duration of each task, the calculated volume of each task per month, and the cost from the labor rate card. **Note:** This report uses negative numbers to express an expense. • **Type**: Bar chart • **Table**: Expense and Savings [run_rate_predicted_savings]

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Schedule Orchestration ROI calculations for standard reports

The scheduled job that calculates Orchestration ROI standard reports is active by default and controlled by system properties.

Before you begin

Role required: orchestration_manager, admin

About this task

The system provides a default scheduled job called Processing ROI Schedule that allows you to configure when Orchestration calculates the ROI for standard reports. This schedule allows scripting for advanced conditions. To modify the schedule or write a script to run, open Processing ROI Schedule from **System Scheduler** > **Scheduled Jobs** > **Scheduled Jobs** and click **Configure Job Definition**. To execute the schedule directly from the job definition, click **Execute Now**

To control the running of the schedule job with the Orchestration properties.

Procedure

1. Navigate to **Orchestration ROI** > **Properties**.
2. Configure the following properties:

ROI schedule properties

Property	Description
roi.processing.active	Activate scheduled job for ROI processing. This property activates the Processing ROI Schedule scheduled job. ○ **Type**: true | false ○ **Default**: true
roi.processing.interval	Scheduled ROI processing interval (hours). This property sets the repeat interval for the scheduled job that processes savings reports and correlated tasks. ○ **Type**: integer ○ **Default**: 24

3. Click **Save** to save your changes.

Orchestration ROI premium reports

The premium dashboard provides detailed reports on calculated savings over time.

The ROI premium reports require the Orchestration - ROI Premium plugin and are built using Performance Analytics. The Orchestration - ROI Premium plugin is dependent on the Performance Analytics - Premium plugin which requires a separate subscription.

Important: You must activate the Performance Analytics scheduled collection job before Orchestration ROI premium can display data.

To access the ROI premium dashboard, navigate to **Orchestration** > **ROI Reports** > **Premium Dashboard**.

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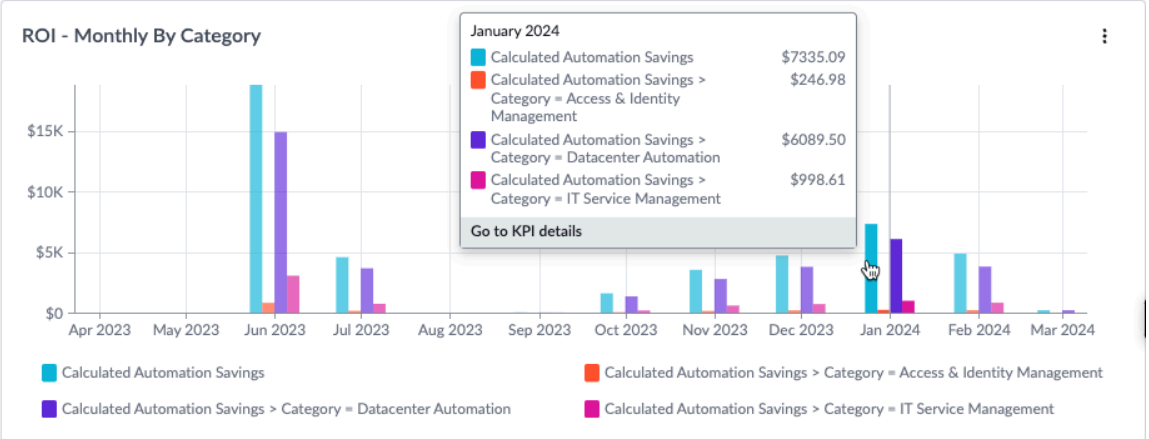
ROI By Category tab

The ROI By Category tab contains three reports showing the calculated savings over time by category.

Calculated savings monthly by category



Premium reports for calculated savings over time by category

Report	Description
ROI - Monthly By Category	Shows the calculated savings each month by category. The chart displays the total calculated savings against the calculated savings for each category. • **Type**: Column chart • **Table**: Detailed Savings Report [detailed_savings_report]
ROI - By Category	Shows the trend of calculated savings by category. • **Type**: Spline chart • **Table**: Detailed Savings Report [detailed_savings_report]
ROI - Running Sum 12 month period	Shows the running sum of calculated savings for all categories in the last 12 months. • **Type**: Area chart • **Table**: Detailed Savings Report [detailed_savings_report]

ROI By Automation Entry

The ROI By Automation Entry tab contains two reports showing the calculated savings over time by automation entry.

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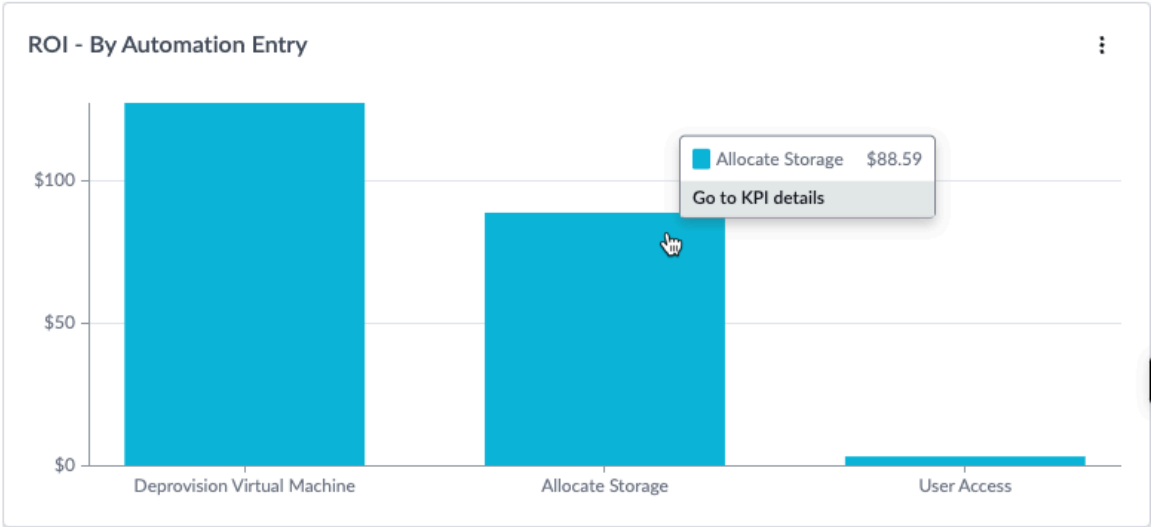
Calculated savings for the current month by automation entry



Calculated savings over time by automation entry

Report	Description
ROI By Automation Entry	Shows the current month's calculated savings for each automation entry. • **Type**: Column • **Table**: Detailed Savings Report [detailed_savings_report]
ROI - By Automation Entry Top 10 List	Shows the top 10 automation entries that have the most calculated savings in the current month. • **Type**: Scorecard • **Table**: Detailed Savings Report [detailed_savings_report]

Request Orchestration ROI premium reports

To view the Orchestration ROI premium reports, you must request activation of the Orchestration - ROI Premium (com.snc.runbook_automation.roi_premium) plugin. The Orchestration - ROI Premium plugin is included with an Orchestration subscription, but must be activated by request.

Before you begin

The Orchestration - ROI Premium plugin requires the Performance Analytics - Premium plugin, which must be purchased separately.

Role required: admin

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

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Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Schedule Orchestration ROI calculations for premium reports

Orchestration ROI premium reports use a Performance Analytics job that must be activated before premium reports can be generated.

Before you begin

Role required: orchestration_manager, admin

About this task

The scheduled job required to calculate premium ROI reports is called [PA ROI] Historic Data Collection and is installed with the Orchestration - ROI Premium [com.snc.runbook_automation.roi_premium] plugin. This job is not active by default.

Procedure

1. Navigate to **All** > **Performance Analytics** > **Data Collector** > **Jobs**.
2. Search for the [PA ROI] Historic Data Collection job.
3. Select the **Active** check box.
4. The scheduling options appear for the value selected in the **Run** field.
   For instructions on creating a schedule, see Create or schedule a data collection job.
5. To execute the schedule directly from the job definition, click **Execute Now**.
6. Click **Update**.

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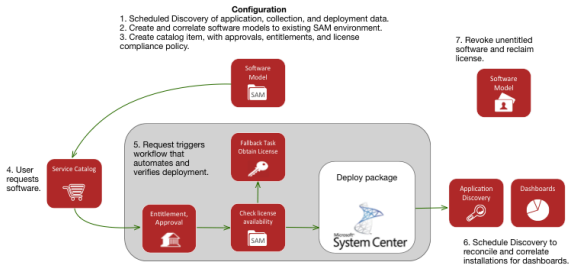
Client Software Distribution

The Client Software Distribution (CSD) application allows administrators to distribute software from the service catalog using third-party management systems.

CSD allows an administrator to create all the records necessary to deploy software from service catalog requests, including software models and catalog items. You can use the CSD application to automate the deployment and revocation of software from an SCCM host using the custom SCCM activity pack. You can define lease periods for software distributed from the Service Catalog and allow lease extensions in some cases, pending approvals. Deployment is accomplished using Orchestration activities and workflows.

CSD also integrates with Software Asset Management to manage license counts for deployed software.

CSD process flow using SCCM



Request client software distribution

Client software distribution requires the Orchestration - Client Software Distribution plugin (com.snc.orchestration.client_sf_distribution), which is available by request with a subscription to Orchestration.

Before you begin

Role required: admin

About this task

The Orchestration - Client Software Distribution plugin activates the Orchestration - System Center Configuration Manager plugin that contains the custom SCCM activities used to deploy or revoke software using an SCCM server. For additional plugin dependencies, see Plugins installed with client software distribution.

Note: The Orchestration - Client Software Distribution plugin runs in its own application scope.

Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

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Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Installed with client software distribution

Several types of components are installed with client software distribution (CSD).

Tables installed with client software distribution

These tables are installed with the Orchestration - Client Software Distribution plugin (com.snc.orchestration.client_sf_distribution).

Client software distribution tables

Table	Description
Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item]	Contains all catalog items created for client software distribution. This table extends the Catalog Item [sc_cat_item] table.
Client Software Distribution Software Request [sn_client_sf_dist_req_software]	Contains all requested software, and their statuses.
Client Software Distribution Application [sn_client_sf_dist_application]	Contains all discovered CSD applications.
Client Software Distribution Provider [sn_client_sf_dist_provider]	Contains all software distribution providers.

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Client software distribution tables (continued)

Table	Description
Client Software Distribution Extension Key [sn_client_sf_dist_extension_key]	Contains the predefined CSD extension keys.
Client Software Distribution Extension Point [sn_client_sf_dist_extension_point]	Contains the customization script for the extension keys.
Client Software Distribution Software Configuration [sn_client_sf_dist_software_config]	Base table for all software provider configurations.
SCCM Server Instance [sn_client_sf_dist_cmdb_ci_sccm_server]	Contains all SCCM server instances. This table extends the Configuration Item [cmdb_ci] table.
SCCM Application [sn_client_sf_dist_sccm_application]	Contains all discovered SCCM applications. This table extends the Client Software Distribution Application [sn_client_sf_dist_application] table.
SCCM Application Catalog Item [sn_client_sf_dist_sccm_app_cat_item]	Contains all catalog items created for SCCM applications. This table extends the Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item] table.
SCCM Collection [sn_client_sf_dist_sccm_collection]	Contains all discovered SCCM collections. Contains all discovered SCCM collections.
SCCM Deployment [sn_client_sf_dist_sccm_deployment]	Contains all discovered SCCM deployments. Contains all discovered SCCM deployments.
SCCM Configuration [sn_client_sf_dist_sccm_sf_config]	Contains the SCCM application, install and uninstall collections, and Discovery model. This table extends the Client Software Distribution Software Configuration [sn_client_sf_dist_software_config]

Plugins installed with client software distribution

These plugins are installed with the Orchestration - Client Software Distribution plugin, if they are not already active.

For instructions on requesting activation of Client Software Distribution (CSD) see Request client software distribution.

Plugins for Orchestration - Client Software Distribution

Plugin	Description
Orchestration - System Center Configuration Manager [com.snc.orchestration.sccm_mgnt]	Installs the custom SCCM Orchestration activities that do work on the SCCM target host.
Orchestration - Asset Lease Management [com.snc.orchestration.asset_lease_management]	Installs the lease functionality for software distributed through the Service Catalog. This includes starting, stopping, and extending leases.
Service Catalog Scoped API	Installs the API to support application creation in the Service Catalog.

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Plugins for Orchestration - Client Software Distribution (continued)

Plugin	Description
[com.glideapp.servicecatalog.scoped.api]	
Software Asset Management [com.snc.software_asset_management]	Provides the ability to manage software assets, including the reconciliation of entitlements to licenses for named users, workstation, and enterprise software agreements.

Roles installed with client software distribution

These roles are installed with the Orchestration - Client Software Distribution plugin.

Roles for Orchestration - Client Software Distribution

Role title [name]	Description	Contains Roles
Client software distribution admin [sn_client_sf_dist.csd_admin]	Administrator role for managing client software distribution application.	• sam • agent_admin • report_admin • catalog_admin • itil • workflow_admin

Script includes installed with client software distribution

These script includes are installed with the Orchestration - Client Software Distribution plugin

Script includes for Orchestration - Client Software Distribution

Script include	Description
CSDExtensionPoint	Execute the CSD provider's specific code
CSDUtil	Utility functions for the CSD application.
RefQualsCSD	Reference qualifier filter. This script provides the filter functrions for the CSD providers, devices, SCCM application, install collections, and uninstall collections.
SCCMCatItemHandler	Sets the field values of specific SCCM catalog items. These values are the SCCM catalog item table name, catalog item name, SCCM provider, and SCCM software configuration.
SoftwareCatItemCreator	Creates software catalog items
CSDCatItemHandler	Base class for CSD catalog item creation. This script is used by the Create Catalog Item UI action to create and application catalog.
CSDDemoDataUtil	Populates demo data.
CSDDemoDataUtilAjax	Populates demo data.

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Properties installed with client software distribution

Properties for client software distribution (CSD) manage the installation status of requested software deployments and configure scheduled Discoveries.

To access CSD properties, navigate to **Client Software Distribution** > **Properties**. The following properties are available:

Client software distribution properties

Property	Name	Description
Status check expiration interval (days)	sn_client_sf_dist.softwareInstallExpDays	Controls how many days the system waits before ignoring the software installation status. The default time limit for installing software is 30 days before the system stops checking the installation status of a deployment. Installation statuses are: • **Not installed**: User has not installed requested software prior to the expiration of the configured time limit. • **Installed**: Software was installed within the configured time limit. • **Status check expired**: Time limit has expired for the user to install the requested software. The system no longer checks the status of this deployment. • **Revoked**: Software was revoked by the administrator. • **Type**: integer • **Default value**: 30
Reconcile software installation status interval (hours)	sn_client_sf_dist.softwareInstallIntervalHour	Determines when the scheduled job runs that determines the installation status. By default, the system checks the installation status every hour. • **Type**: integer • **Default value**: 24
Set scheduled application Discovery interval (days).	sn_client_sf_dist.discoveryExeDay	Sets the repeat interval for the scheduled job that runs application Discovery. By default, Discovery runs at midnight on the day set with this value. • **Type**: integer • **Default value**: 5

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Client software distribution properties (continued)

Property	Name	Description
Set lease execution schedule job interval (minutes)	sn_client_sf_dist.lease_execution_interval	Interval in which the CSD Lease Schedule scheduled job checks for requested software leases to start, stop, or extend. • **Type**: integer • **Default value**: 1
Set time prior to lease end to notify requester (days)	sn_client_sf_dist.lease_end_notification	Determines how many days prior to the end of a software lease to notify the requester. If lease extensions are allowed, ensure that this period provides enough time for the approval process to complete before the lease expires. • **Type**: integer • **Default value**: 5

Workflows installed with client software distribution

These workflows are installed with the Orchestration - Client Software Distribution plugin

Workflows installed with client software distribution

Workflow	Description
Discover SCCM	Retrieves lists of applications, collections, and deployments from SCCM servers using custom CSD orchestration activities. An administrator runs this workflow from a UI action in a SCCM Server Instance record.
Order Client Software	Runs automatically when a user orders software from the service catalog.
Deploy SCCM Application	Triggered by the Order Client Software workflow to deploy software through SCCM server. This workflow adds either the user or the device into the SCCM collection.
Revoke Client Software	Begins the software revocation process for software deployed by an external provider. Administrators run this workflow from a UI action on the Requested Software record and the Installed Software Not Entitled record. This workflow triggers the appropriate provider workflow that performs the actual recovation. For example, this workflow triggers the Revoke SCCM Application workflow for applications in SCCM uninstall collections.
Revoke SCCM Application	Revokes SCCM applications that are members of an uninstall collection. The Revoke Client Software workflow triggers this workflow to revoke software deployed by an SCCM server. This workflow moves either the user or the device from the SCCM collection into the appropriate uninstall collection.

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Related topics

- Using extension points to extend application functionality
- Using scripted extension points in server-side scripts
- Using UI extension points in server-side UI macros
- Using client extension points in client-side UI scripting

Create licenses and counters for distributed software

Licenses and software counters are associated with the software model and must be created if you want to track the license for software deployed by client software distribution (CSD).

Before you begin

Role required: sam or admin

You can create software licenses and counters in Software Asset Management for software items deployed from the service catalog by CSD. CSD depends on the software counter result to determine if the license is available for the requested software. If the license **Valuation** is greater than 0, and the license type is **Not allocated**, CSD assumes that the license is available for the software.

Procedure

1. Navigate to **All** > **Software Asset** > **Software Licenses**.
2. Add a new software license for the software model you used in CSD.
3. Navigate to **Software Asset** > **Reconciliation** > **Software Counters**.
4. Create a software counter for the software model you created.
5. Run the counter to retrieve the software license information.

Client software distribution ordering process

Software deployed by Client Software Distribution (CSD) can be ordered from the service catalog by individual users or by approved users on behalf of others.

Client Software Distribution catalog items have different options, depending on how ordering is configured.

Lease start and end dates

All software deployed by CSD requires users to specify the beginning date for the lease. This is enforced by the Orchestration - Asset Lease Management plugin that is activated automatically with CSD. The system prepopulates the **Lease start** field with the current date and time.

If the catalog item is configured for revocation (uninstall), the form displays the **Lease end** field, which allows the requester to define an end date and time for the lease. The system validates user input in these fields to ensure that the dates selected define a future window. The **Lease end** field is not mandatory and can be left blank to order software with no end date.

Note: For systems deploying software from Microsoft System Center Configuration Management (SCCM), the **Lease end** field is only available if the SCCM configuration specifies an uninstall collection.

Software offered only to the logged in user

If the software catalog item is configured with the **Order on behalf of** check box cleared, the **User** field does not appear on the order form. The logged in user selects the device on which

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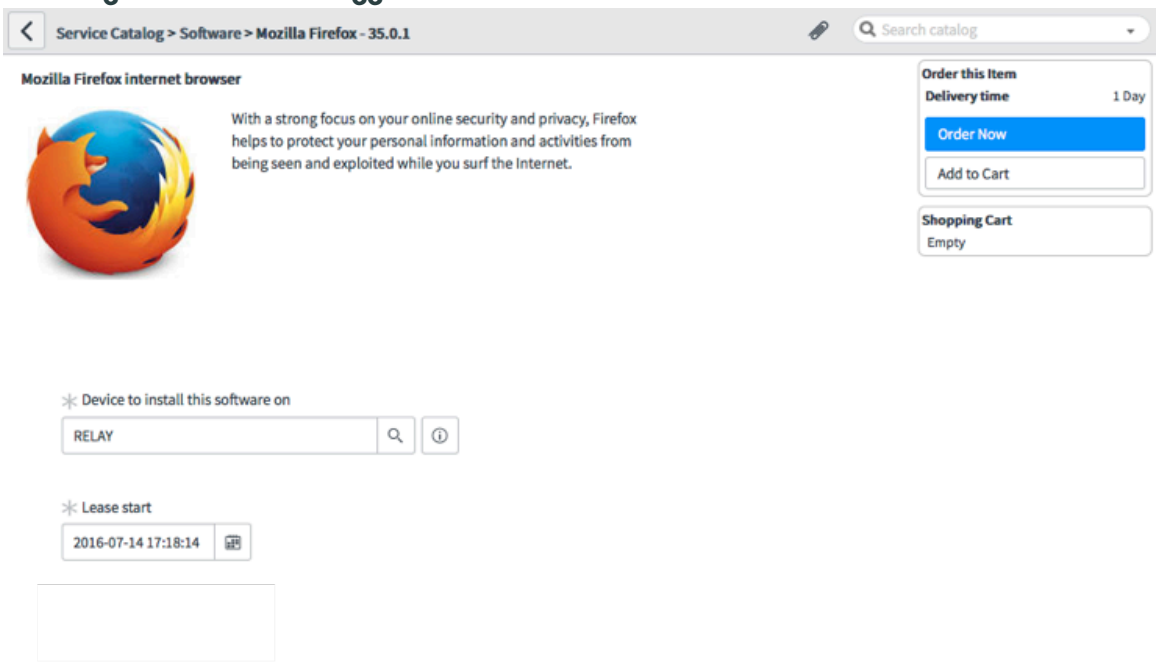
to deploy the software from the **Device to install this software on** field. Only those devices assigned to the logged in user appear in the list.

In this example, a user has logged into the service catalog to order Firefox for a computer that is assigned to the user. User selects the machine from a list of owned devices and selects the date and time the lease should begin. This software is deployed through Microsoft System Center Configuration Management (SCCM), but does not have an uninstall collection configured and cannot be revoked automatically by the system. As a result, the **Lease end** field is not available.

Ordering software as the logged in user



Software ordered on behalf of another user

If the software catalog item is configured with the **Order on behalf of** check box selected, the **User** field appears on the form. The logged in user can select any user from this field. The **Device to install this software on** field only lists the devices assigned to the user selected in the **User** field. If an approval is required for software ordered on behalf of another user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requester is the named user's manager.

In this example, a manager is ordering Google Chrome for a contractor. The manager selects the contractor from the **User** field and then chooses a computer from the list of devices assigned to the contractor. This software has an SCCM uninstall collection configured, which allows the manager to select an end date for the lease that coincides with the end of the user's contract. When the lease expires, SCCM automatically uninstalls the software from the device.

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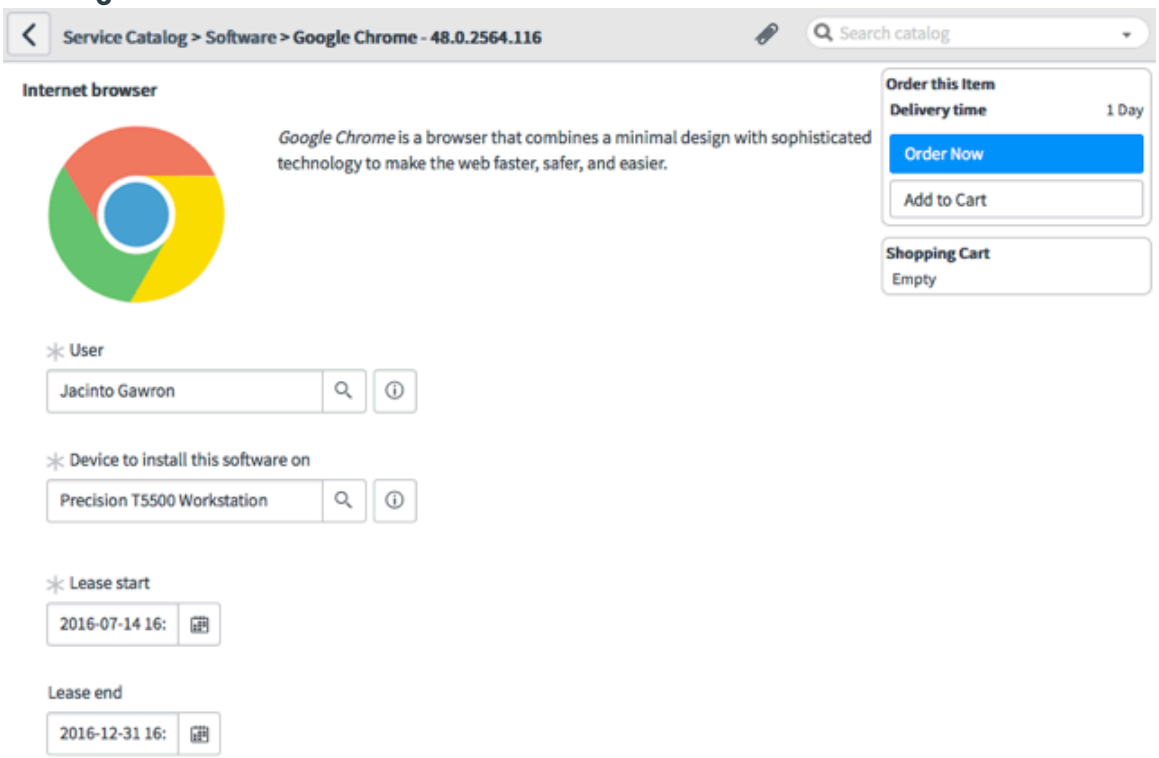
Defining software lease window



Extend a software lease

Users of software deployed by Client Software Distribution (CSD) can request the extension of a lease window, if the software is revocable by a software distribution system.

Before you begin

Role required: Any system user

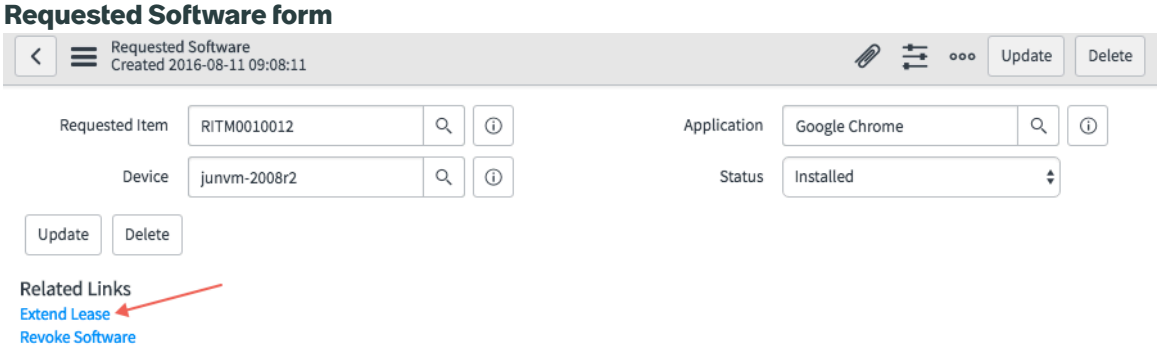
About this task

If your software has a lease end date defined, and the software status is **Installed**, you can request an extension of the lease, pending any approvals your organization requires.

Procedure

1. Navigate to **All** > **Service Catalog** > **My Requested Software**.
   The list shows only the software you have requested from the service catalog.
2. Select the record for the installed software whose lease you want to extend.
3. Under **Related Links** click **Extend Lease**.

Requested Software form



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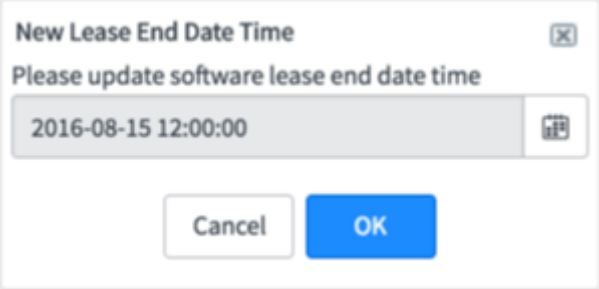
4. In the dialog box that appears, select a new lease end date in the calendar and click **OK**. You must select a date later than the current date.



If the lease extension is subject to manager approval, you are notified of the decision. If the request is approved, a notification shows the new lease end date. If the new end date is within 5 days (the default notification period) of the date when you made the request, CSD sends an immediate end-of-lease notification.

Important: If lease extensions in your organization require approval, make sure the approver is available and has enough time to process your extension request. If the extension cannot be approved before the original end date expires, the software is revoked.

Client software distribution from SCCM

You can use Client Software Distribution (CSD) to deploy and revoke software deployments from Microsoft System Center Configuration Management (SCCM) and manage distributions on SCCM hosts.

The SCCM activity pack contains Orchestration activities that CSD uses to deploy software from a service catalog request and manage user and device collections on SCCM servers. In addition, CSD can manage license counts for deployed software using ServiceNow Software Asset Management, revoke software deployed by SCCM without user interaction, and manage lease periods.

Configuring SCCM

Follow the SCCM configuration procedures in the order shown.

Configure the Application Administrator role on the SCCM server

To deploy software using ServiceNow® Client Software Distribution (CSD), ensure that an SCCM administrative user has the correct permissions to deploy software and that PowerShell is properly configured.

Before you begin

SCCM role required: Application Administrator

About this task

These instructions are for Microsoft 2012 R2 Server.

Procedure

1. In the System Center Configuration Manager console, navigate to **Administration** > **Security** > **Administrative Users**.
2. Right-click the user to whom you want to grant the Application Administrator role.
3. Select **Properties** from the drop-down menu.
4. In the Properties dialog box, select the **Security Roles** tab.

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5. Ensure that the user has the Application Administrator role.
6. If the user does not already have this role, click **Add**, select this role from the list, and click **OK**.
7. Log into SCCM as the user with the Application Administrator role.
8. Open the menu from the upper left corner of the console and select **Connect via Windows PowerShell**.
9. Ensure that the user can access the CM console.
   This action establishes the environment path to PowerShell for the logged in Application Administrator user.

Update the SCCM cmdlet libraries

Ensure that the System Center Configuration Manager SCCM Cmdlet Library is up-to-date.

Before you begin

Role required: Either current user or system administrator, depending on settings.

About this task

The System Center Configuration Manager SCCM Cmdlet Library installs and updates the Windows PowerShell module for SCCM. SCCM checks for library updates on a daily basis. Out-of-date libraries can cause Discovery of the SCCM server to fail, because the system cannot parse the SCCM activity output. This warning message appears in the ECC queue input records for the SCCM GET activities:

```
WARNING: An update to the System Center 2012 Configuration
 Manager Cmdlet
Library is available. Please go to
'http://go.microsoft.com/fwlink/?LinkId=528947' to download the
 latest version.
Running cmdlet version: 5.0.8231.1004 Latest cmdlet version:
 5.0.8328.1155
```

Download the latest version of the cmdlet library from Microsoft. For installation instructions, see https://learn.microsoft.com/en-us/fabric/enterprise/powerbi/service-admin-reference.

If you elect to use an earlier version library, use this procedure to disable the CM update check, which allows Discovery to prodeed without issues.

Procedure

1. Log into the SCCM console as an adminstrator.
2. Open the menu from the upper left corner of the console.
3. Select **Connect via Windows PowerShell**.
4. Run one of these commands to disable the update check:
   - **Per-user**: *`Set-CMCmdletUpdateCheck -CurrentUser -IsUpdateCheckEnabled 0`*
   - **Per-system**: *`Set-CMCmdletUpdateCheck -System -IsUpdateCheckEnabled 0`*

   Important: The per-system cmdlet must run in an elevated Windows PowerShell session.

5. Run the *`Get-CMCmdletUpdateCheck`* command to refresh the console and check the settings.

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6. Ensure that the value of the *IsEnabled* configuration variable has changed to **False**. This indicates that the warning for an out of date cmdlet library is disabled for the users specified.
7. To re-enable the update check, run the *-IsUpdateCheckEnabled 1* command for either the current user or for the system.

Configure the MID Server for SCCM activities

To use a MID Server with Microsoft System Center Configuration Management (SCCM) activities, configure it to communicate with the SCCM server.

Before you begin

Role required: admin

Procedure

1. In the navigation filter, enter **cmdb_ci_dns_name.list**.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of the SCCM server in the **Name** field.
4. Right-click in the form header and select **Save**.
5. In the **IP Address** related list, click **New**.
6. In the **IP Address** field, enter the IP address of the SCCM server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.
8. Leave the **Netmask** field blank.
9. Click **Submit**.

Create Windows credentials for SCCM deployments

Microsoft System Center Configuration Manager (SCCM) requires the appropriate credentials to deploy applications using the Client Software Distribution application.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin

About this task

Client software distribution requires Windows credentials that have administrative rights on the SCCM server.

Procedure

1. Navigate to **All** > **Orchestration** > **Credentials**.
2. Click **New**.
3. In the list of credential types, select **Windows Credentials**.
4. Provide a user name and password with administrative rights on the SCCM server.

> **Important:** Ensure the following:
>
> - This user must have the Application Administrator role on the SCCM server.
> - Use the credentials to log into the SCCM Server and connect via Windows PowerShell from the System Center Configuration Manager console at least once to set the path variable for that credential.

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5. Fill in the other fields on the form, as appropriate.

   For details, see Windows credentials.

6. Click **Submit**.

Retrieve SCCM data for client software distribution

Retrieve the collections and the list of applications available for deployment from your SCCM servers.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin

Before starting this procedure:

- Set up your Microsoft System Center Configuration Manager (SCCM) server, create the applications and collections, and configure the deployments you need. For information, see your SCCM documentation.
- Configure a user with the Application Deployment Manager role on the SCCM server.
- Set up the MID Server to communicate with the SCCM server.
- Add Powershell credentials to the ServiceNow Credentials [discovery_credentials] table for the SCCM user who has the Application Deployment Manager role.

About this task

To populate the Client Software Distribution application with SCCM data:

Procedure

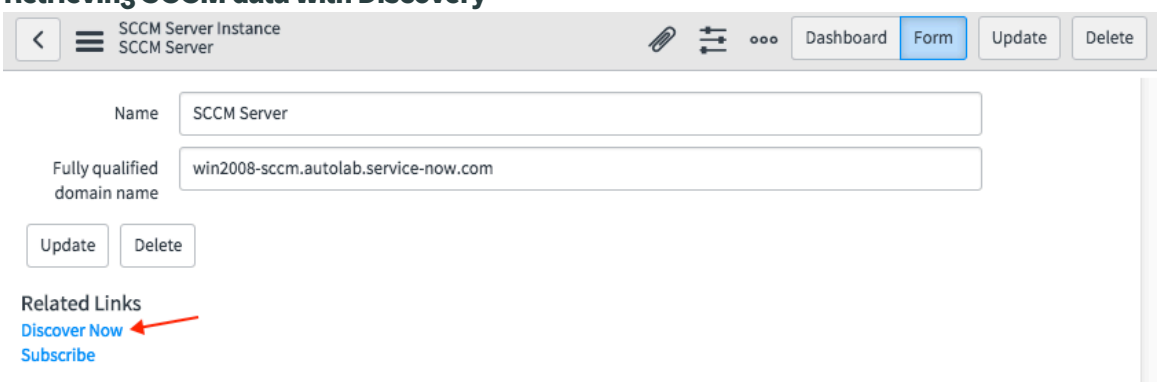
1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Server Instance**.
2. Click **New**.
3. In the SCCM Server Instance form, identify the server by name and provide the fully qualified domain name.
4. Click **Submit**.

   The new SCCM server appears in the list.

5. Open the new SCCM record and click **Discover now** under **Related links**.

   The system runs the Discover SCCM workflow that retrieves the application, collection, and deployment data from the SCCM server.

Retrieving SCCM data with Discovery



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SCCM server Discovery for client software distribution

A Discovery workflow populates ServiceNow tables with collection, application, and deployment data retrieved from SCCM servers.

Users run the **Discover SCCM** workflow from an SCCM Server Instance record to populate the following ServiceNow tables:

SCCM data populated in ServiceNow tables

Table	Fields
SCCM Application [sn_client_sf_dist_sccm_application]	• name • publisher • version • model • sccm_server
SCCM Collection [sn_client_sf_dist_sccm_collection]	• name • type • sccm_server
SCCM Deployment [sn_client_sf_dist_sccm_deployment]	• application • collection • type

Note: For details about the custom activities used in this workflow to extract data from an SCCM server, see Orchestration SCCM activity pack.

Set up a software model for an SCCM application

Using the applications discovered on the SCCM server, set up a software model used by the Software Asset Management application to manage licenses.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin

Before creating software models, you must discover the applications available for deployment on the SCCM server. See Retrieve SCCM data for client software distribution for details.

About this task

You can link an SCCM application to an existing software model or create a new model.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
   A list of applications discovered on the SCCM server appears.
2. Open an SCCM application record.
3. To link to an existing model, click the magnifying glass icon in the **Model** field and select a model from the list.

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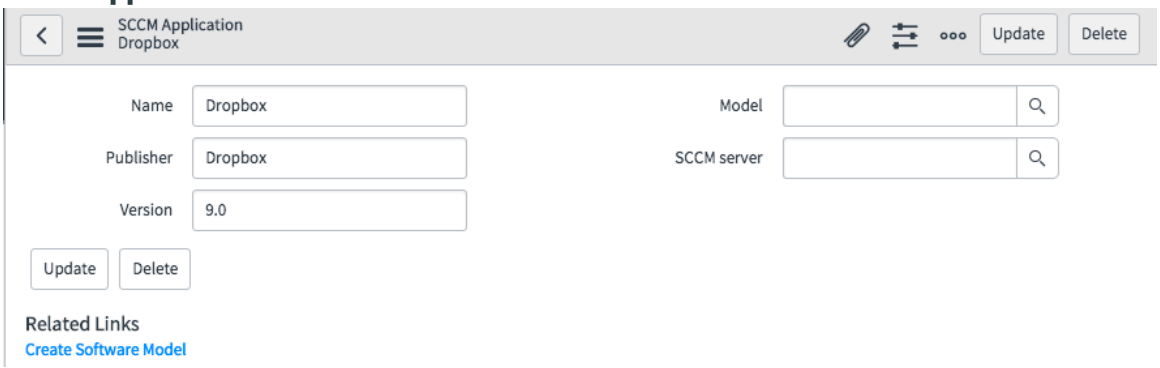
SCCM application record



4. To create a model, click **Create Software Model** under **Related Links**.

   a. Complete the software model fields.
   See for details.

   b. Click **Submit**.
   The view returns to the SCCM Applications form.

Define an SCCM configuration

To create catalog items for SCCM software deployment or to configure your instance to revoke software through SCCM, you must first associate that software with a collection through an SCCM configuration.

Before you begin

Before you create an SCCM configuration record, make sure you have discovered the SCCM applications, collections, and deployments and set up the necessary software models.

Role required: sn_client_sf_dist.csd_admin or admin

About this task

The SCCM configuration process associates software with SCCM collections. To deploy software from an SCCM server, the user or device must be a member of an SCCM collection associated with an **install** deployment. Client Software Distribution (CSD) allows you to revoke unentitled software using an SCCM server when that software can be removed using an **uninstall** collection. Users requesting revokable software from the Service Catalog also have the ability to define lease start and stop dates and request lease extensions.

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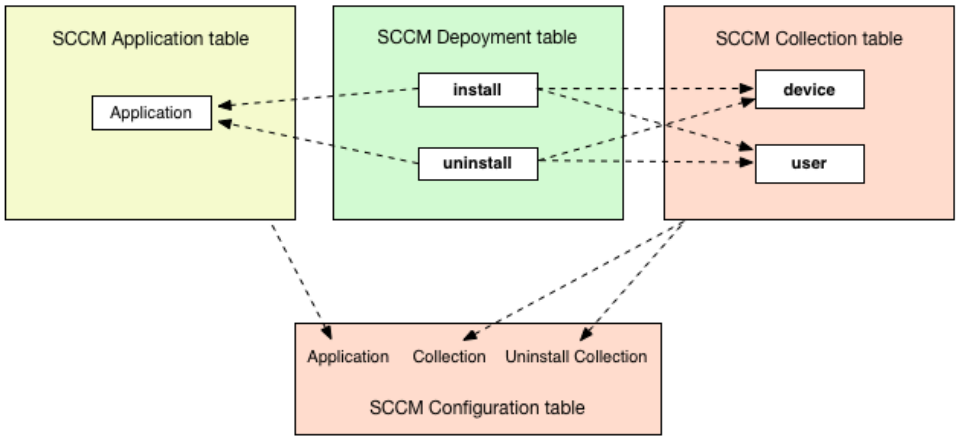
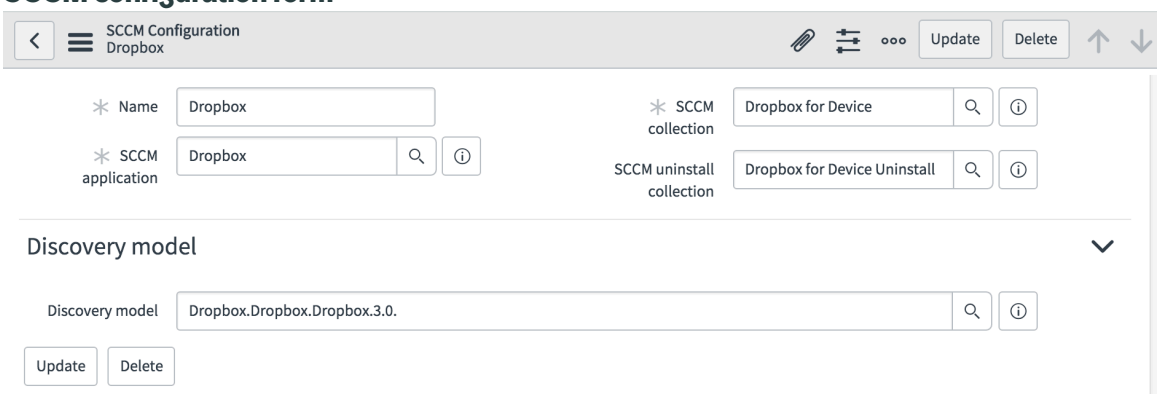
SCCM table references



Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
2. Open an application that has a configured software model.
3. Under **Related Links**, click **Create Software Configuration**.
4. Complete the form, using the fields in the table.

SCCM configuration form



SCCM configuration fields

Field	Description
Name	Recognizable name for this SCCM software configuration.

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Field	Description
SCCM application	Name of an application hosted on the SCCM server.
SCCM collection	Name of the collection associated with the **install** deployment for the selected application on the SCCM server. Only those collections associated with the application are available for selection.
SCCM uninstall collection	Name of the collection associated with the **uninstall** deployment for the selected application on the SCCM server. You must specify an uninstall collection to: ○ Define a lease end date for deployed software. ○ Allow lease extensions. ○ Revoke software from a user's machine.
Discovery model	Discovery model that links the unentitled software installation with the SCCM configuration. From the SCCM configuration record, Client Software Distribution can determine which collection to use to revoke the software. Unentitled software is software found on the user's machine that the user is not entitled to use.

Create a catalog item for an SCCM application

Using the applications discovered on the SCCM server, create a catalog item for an application you want to offer for distribution from the service catalog.

Before you begin

Role required: sn_client_sf_dist.csd_admin or admin
Before creating a catalog item, you must link the application to a software model and create at least one software configuration.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **SCCM** > **SCCM Applications**.
   A list of applications discovered on the SCCM server appears.
2. Open a record for an SCCM application.
3. Under **Related Links**, click **Create Catalog Item**.
   A new SCCM Application Catalog Item record appears with preconfigured information. .

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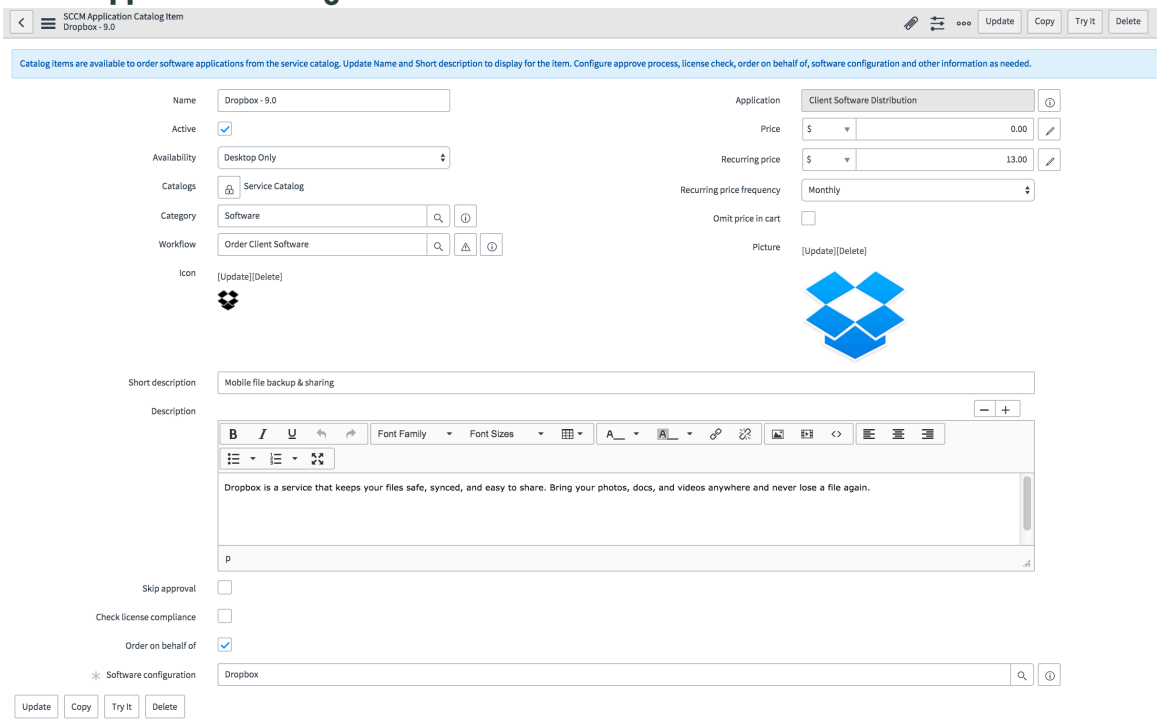
SCCM application catalog item



4. Add price information and complete the following fields added to the Client Software Distribution Catalog Item [sn_client_sf_dist_cat_item] table by the Orchestration - Client Software Distribution plugin:

SCCM fields in the catalog item form

Field	Description
Skip approval (skip_approval)	Check box that allows skipping approval for this item by the requester's manager when a user orders it from the service catalog. Use this field in conjunction with the **Order on behalf of** field to ensure that software ordered by a logged in user on behalf of another user is subject to approval. By default, this check box is cleared, requiring manager approval for all new catalog items. **Note:** There are two levels of approval possible. By default, all category items require group approval for items in excess of $1000. If that approval is given or skipped, the system evaluates the **Skip approval** check box to determine if the software item requires approval by the requester's manager.
Check license compliance (check_license_compliance)	Check box that forces the system to determine if deploying this item is allowed under the current license.
Order on behalf of	Check box that allows the logged-in user to order this software from the service catalog for another user. This permits service desk personnel to order SCCM deployments for other users in the system. By default, this feature is enabled. To prevent unauthorized users from ordering software, ensure that

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Field	Description
	approvals are required for this type of deployment by clearing the **Skip approval** check box. If an approval is required for software ordered on behalf of a user, the system automatically sends an approval request to the manager of the user receiving the software. The approval is skipped if the requestor is the named user's manager. Software items requested from the service catalog on behalf of a different user require the following information: ○ **User**: User selected for deployment. This field is automatically populated with the name of the logged in user. You can select another user from the list. ○ **Device to install this sofware on**: Device belonging to the selected user on which to deploy the software. Only devices belonging to that user appear in the choice list. ○ **Lease start**: Date and time to deploy the software. This is the start time for the lease. A lease can be open-ended or have a lease end time.
SCCM configuration	Name of the SCCM configuration record for this application. This record defines the collection and uninstall collection for this application. This configuration is required for all deployments, revocations, and leases performed by the SCCM server.

5. If the catalog item requires approval because of cost, be sure to configure an approval group in the**Approved By Group** related list.
   By default, the Service Catalog Request workflow runs when an item costing more than $1000 is ordered and looks for an appropriate approval group. If no approval group is configured for the item, this workflow skips approval altogether and ends. The system then runs the Order Client Software workflow, which evaluates the **Skip approval** check box to determine if approval by the requester's manager is required.
6. Click **Update**.
   The view returns to the SCCM Applications list.
7. To see all client software distribution (CSD) catalog items, navigate to **Client Software Distribution** > **Maintain Items** > **Software Items**.

SCCM deployment

Ordering an SCCM application from a client software distribution (CSD) catalog item in the service catalog triggers the Order Client Software workflow.

This process deploys an SCCM application to a user or device through a service catalog order:

1. If the **Skip approval** check box is cleared in the software catalog item, the Order Client Software workflow sends the catalog request to the requesting user's manager for approval.
2. If the **Check license compliance** check box is selected in the software catalog item, the workflow performs a software license check. If there is no license available, the workflow creates a catalog task to procure more licenses and assigns the task to the Client Software Distribution Administrators group.

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3. The Order Client Software workflow triggers the Deploy SCCM Application workflow as a subflow. This workflow adds either the user or the device to the SCCM collection using the Add to User Collection or Add to Device Collection SCCM activity.
4. If the software configuration specifies SCCM uninstall collection in the software catalog item, the Deploy SCCM Application workflow checks if the user or device exists in the uninstall collection. The workflow uses the Is Device in Collection or Is User in Collection SCCM activity. If the user or device exists in the uninstall collection, the workflow removes the device or user. The workflow uses the Remove from Device Collection or Remove from User Collection SCCM activity before adding it to the SCCM install collection.

Client software distribution validation process

After SCCM deploys software to a target computer, client software distribution (CSD) detects the installation and validates its status.

Client software distribution uses the following methods for detecting software installed on the target machine:

- **Discovery**: CSD is configured to leverage Discovery to detect software installations. You can run Discovery manually at any time, or by a scheduled job.
- **Microsoft SCCM Integration**: You can import SCCM data into the CMDB using the features in the Integration - Microsoft SCCM plugin if Discovery is not active on the instance.

The instance uses the data gathered by Discovery or the SCCM integration plugin to populate the Software Installation [cmdb_sam_sw_install] table. To validate installations using this data, CSD runs a scheduled job called Reconcile Requested Software that uses Properties installed settings. This process reconciles the software installation data accumulated in the CMDB and makes these status updates:

- **Not installed** to **Installed**: The user has installed the requested software within the time limit configured in the *sn_client_sf_dist.softwareInstallExpDays* property.
- **Not installed** to **Status check expired**: The time limit has expired for the user to install the requested software. The system stops checking for installation when the time limit expires.

SCCM software revocation

An administrator can revoke software without any user interaction using Microsoft System Center Configuration Manager (SCCM) if the software configuration specifies an SCCM uninstall collection, even if the software was installed by some other process or user.

Revoke software deployed through the service catalog

Software deployed by SCCM can be revoked, but only when the software's status is **Installed** and the application associated with the software configuration has an uninstall collection configured.

Before you begin

- Create an SCCM configuration record for the application that names an appropriate uninstall collection.
- Associate the CSD catalog item for the application with the SCCM configuration that specifies the uninstall collection.

Role required: sn_client_sf_dist.csd_admin or admin

A workflow called Revoke SCCM Application moves either the user or the device from its respective collection and adds it to the appropriate uninstall collection. When SCCM performs

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an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Reports** > **Requested Software**.
2. Open the record for the SCCM software package you want to revoke.
   The package must have a **Status** of **Installed** to be revocable.
3. Under **Related Links**, click **Revoke software**.

   This action runs the Revoke Client Software workflow, which triggers the Revoke SCCM Application subflow that moves the user or device from the install collection to the uninstall collection. When SCCM performs an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Revoke unentitled software

An administrator can revoke software using Microsoft System Center Configuration Manager (SCCM) that a user is not entitled to use even if the software was installed by some other process or user.

Before you begin

To revoke software using SCCM, you must create an SCCM configuration record for the application, in which the appropriate software Discovery model is defined. See Software discovery models.

Role required: sn_client_sf_dist.csd_admin or admin

Client Software Distribution (CSD) uses Software Asset Management to identify unentitled software installations. Discovery detects the software on the user's machine, and SAM determines if the user or device is entitled to use that software. This might include software that was not installed through a catalog request or software that the user installed without approval. If the software installation's Discovery model is associated with an SCCM software configuration that has an uninstall collection defined, then an administrator can use CSD to revoke that software from the user's machine without involving the user.

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Reports** > **Installed Software Not Entitled**.
2. Select the record for the installation that has unentitled users.
3. Under **Related Links**, click **Revoke software**.

   This action runs the Revoke Client Software workflow, which triggers the Revoke SCCM Application subflow that moves the user or device from the install collection to the uninstall

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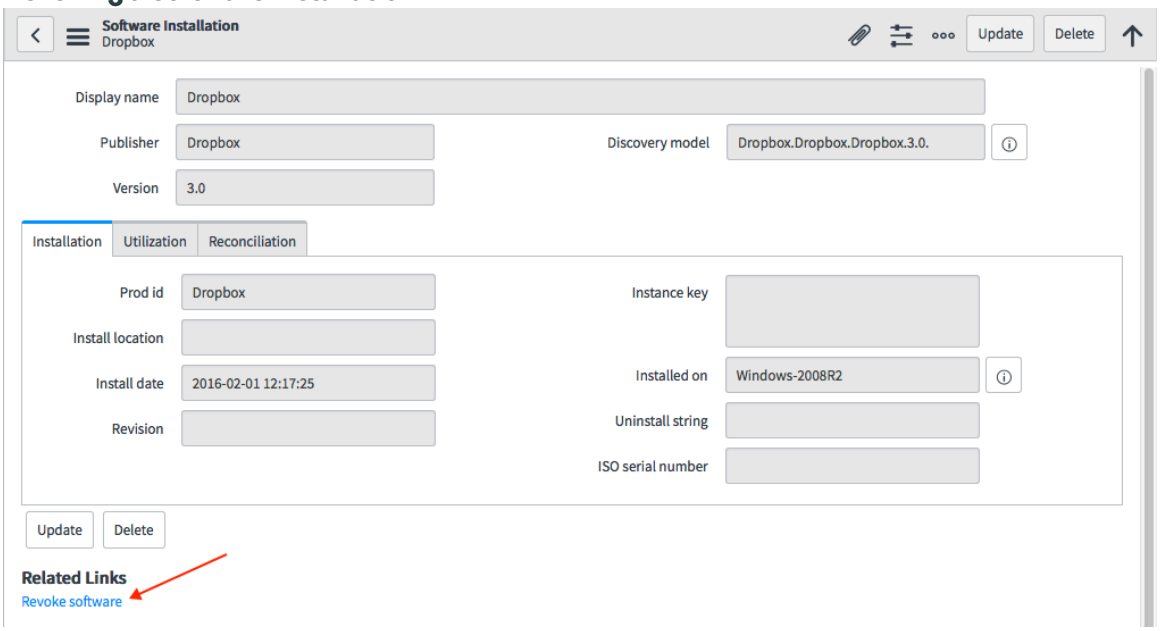
collection. When SCCM performs an internal policy check and finds the user or device in the uninstall collection, SCCM removes the related software package from the client computer.

Revoking a software installation



SCCM software revocation workflow

The Revoke SCCM Application workflow moves a user or device from an install collection to an uninstall collection to revoke software installed from Microsoft System Center Configuration Manager (SCCM).

For the revocation workflow to run, the software package must have a status of **Installed** and must be pre-configured for an appropriate uninstall collection. See Revoke software deployed through the service catalog for configuration instructions. When an administrator initiates the revocation process, the system launches the Revoke SCCM Application workflow to move the user or device collection associated with installation to the appropriate SCCM uninstall collection. When the SCCM server performs a policy check, it finds the additions to the user or device uninstall collection and revokes the software package associated with that collection.

The workflow employs two custom activities, Remove from User Collection and Remove from Device Collection, to remove either the user or the device from its original collection. The workflow then adds the user or device to the appropriate uninstall collection on the SCCM server with the Add to User Collection or Add to Device Collection activity.

Note: This workflow is triggered by the Revoke Client Software workflow as a subflow.

Client software distribution dashboard

The CSD dashboard provides a collection of visual reports for the Client Software Distribution application.

CSD dashboard

To access the CSD dashboard, navigate to **Client Software Distribution** > **Requested Software** > **Dashboard**.

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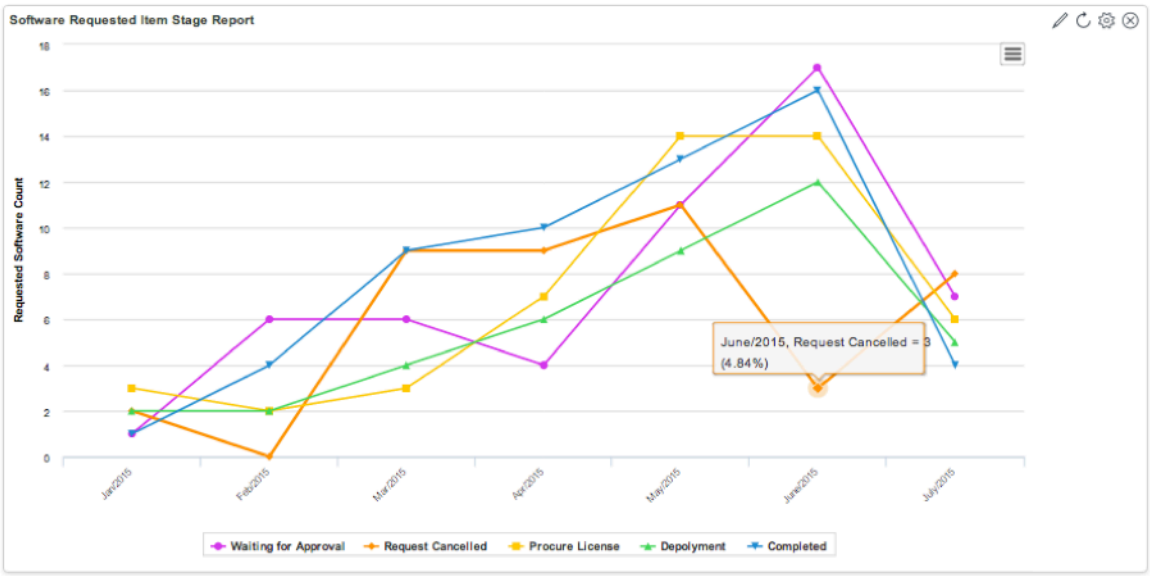
Sample report from CSD dashboard



Client software distribution reports

Report	Description
Open Tasks	Displays all open tasks grouped by the requested item's stage value. • *Type*: Create a basic list report • *Table:* Catalog Task [sc_task]
Top 10 Applications Installed	Displays the top 10 applications installed by request count. • **Type**: Create a bar report • **Table**: Requested Software [sn_client_sf_dist_req_software]
Total Software Request Item Over Time	Displays the total software items requested each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Requests Completed Report	Displays the total of software requests completed each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Installed Software Not Entitled	Displays installed software that users or devices are not entitled to use. This can be software deployed through CSD or by another process that does not comply with licensing. This report is on a Software Asset Management table. • **Type**: Create a basic list report • **Table**: Software Installation [cmdb_sam_sw_install]
Software Installation Status	Displays the count of requested software, grouped by installation status, for each month.

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Client software distribution reports (continued)

Report	Description
	• **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
Software Requested Item Stage Report	Displays the sum of all requested items, grouped by the requested item's stage, for each month. • **Type**: Line reports • **Table**: Requested Software [sn_client_sf_dist_req_software]
License Counts Available	Displays the license counts for all available applications. • **Type**: Create a basic list report • **Table**: SCCM Application Catalog Item [sn_client_sf_dist_sccm_app_cat_item]

Usage Overview dashboard

Navigate to **Client Software Distribution** > **Usage Overview** to view the current transaction count for your instance.

Client software distribution extension framework

Client software distribution (CSD) provides built-in extension points for integrating a ServiceNow instance with client software distribution providers, such as Casper, Altiris, or LANDesk.

Important: The use of CSD extension points is an advanced procedure intended for use by experienced ServiceNow AI Platform developers only. Instructions for customizing your instance to deploy and revoke software from a software distribution provider can be found in the CSD Extension Implementation Guide.

Configure client software distribution providers

Identify the provider and specify the workflows and extension points for a customized software distribution process.

Before you begin

Perform the development tasks described in the CSD Extension Implementation Guide before attempting this procedure.

Role required: sn_client_sf_dist.csd_admin, admin

Procedure

1. Navigate to **All** > **Client Software Distribution** > **Extensions** > **Providers**.
2. Click **New**.
3. Complete the form using the fields in the table.

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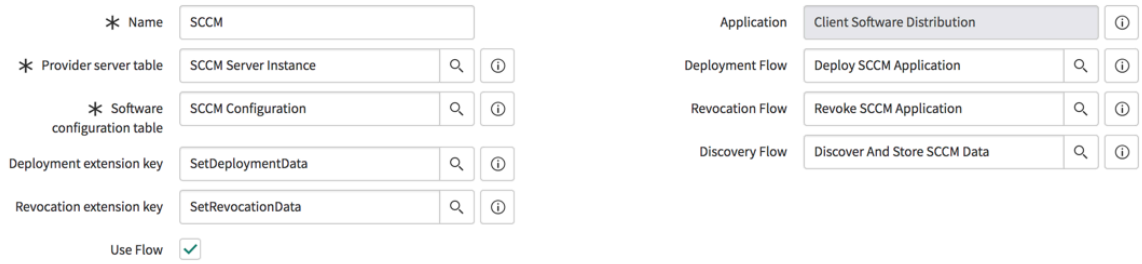

Client software distribution provider fields

Field	Description
Name	Descriptive name of the provider.
Provider server table	Table name of the provider server. You must create this table as an extension of the Configuration Item [cmdb_ci] table. For example, you might call your table Casper Server Instance [cmdb_ci_casper_server_instance].
Discovery flow	Flow that discovers the provider server and returns the data from that server back to the instance. This is the flow you create with custom activities that query the provider server.
Software configuration table	Table name of the software configuration for this provider. You create this table as an extension of the Client Software Distribution Software Configuration [sn_client_sf_dist_software_config] table. For example, you might create a table called Casper Software Configuration [sn_client_sf_dist_casper_sf_config].
Deployment extension key	The **SetDeploymentData** key provided with CSD. This key sets up the data for the software ordering and deployment workflow.
Deployment flow	Flow that deploys software from the provider server. This is the flow you created with custom activities that tells the provider where to deploy an application requested from the service catalog.
Revocation extension key	The **SetRevocationData** key provided with CSD. This key sets up the data for installation revocation.
Revocation flow	Flow that revokes an installation from a provider server. This is the flow you created with custom activities that tells the provider which application to remove from a device.
Use Flow	Option to use Integration Hub flows for client software distribution. When this option isn't

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Field	Description
	selected, Orchestration workflows are used for client software distribution. **Note:**

Client software distribution extension keys

Client software distribution (CSD) extension keys allow you to customize the deployment and revocation of software from distribution providers.

These pre-defined keys allow you to generate input variables for workflows that deploy and revoke software from external distribution providers:

- **SetDeploymentData**: Sets the software order information and generates the input variables for the deployment workflow.
- **SetRevocationData**: Generates the input variables for the revocation workflow.
- **CheckRevocable**: Specifies the conditions that determine if an installation can be revoked. If the software configuration associated with the installed software allows uninstallation, the installed software can be revoked.

Client software distribution extension points

The client software distribution (CSD) extension points create the customization code for the specific provider and the extension keys.

The purpose of the extension points is to associate extension keys with a specific provider, and then create a script that sets input variables for your custom deployment and revocation workflows. Another extension point script tells CSD if the provider has the capability to revoke software. If this is the case, CSD enables the UI action that triggers revocation from the provider.

SetDeploymentData

The script associated with this extension key must set the *csdExtensionResult* object with these attributes:

- *deploymentWorkflowInputs*: Object that specifies the deployment workflow input variables.
- *softwareModel*: Software model sys_id.
- *deploymentType*: An integer. Use **1** for deployment to a user and **2** for deployment to a device.
- *softwareApplication*: Software application sys_id.

CheckRevocable

The script associated with this extension key gets the input parameter *csdExtensionInputs.softwareConfiguration*, which is a Client Software Distribution record in the Software Configuration [sn_client_sf_dist_software_config] table. All providers' software configurations are extended from this table, but may have different attributes.

This script must set the *csdExtensionResult* object to **true** or **false**, depending on whether the software configuration specifies uninstallation.

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SetRevocationData

The script associated with this extension key gets the input parameter *csdExtensionInputs.softwareConfiguration*, which is a Client Software Distribution record in the Software Configuration [sn_client_sf_dist_software_config] table. All providers' software configurations are extended from this table, but may have different attributes.

The script must set the *csdExtensionResult* object with these attributes:

- *revocationWorkflowInput*: Object that specifies the revocation workflow input variables.
- *softwareModel*: Software model sys_id.
- *deploymentType*: An integer. Use **1** for deployment to a user and **2** for deployment to a device.

Related topics

Using extension points to extend application functionality

Using scripted extension points in server-side scripts

Using UI extension points in server-side UI macros

Using client extension points in client-side UI scripting

Orchestration examples

These examples demonstrate how Orchestration can be used to automate common tasks.

Active Directory automation example

A set of six Orchestration Active Directory activities enables organizations to automate their on-boarding/off-boarding processes with auditable, self-documenting workflows that save time and eliminate mistakes.

The activities in the Active Directory activity pack are designed to manage user accounts and reset user passwords. The following activities cover the most common use cases administrators encounter when managing Active Directory user accounts:

- Create AD User Account
- Update AD User Account
- Remove AD User Account
- Disable AD User Account
- Query AD
- Reset AD User Password.

These activities share a common design, have complementary functionality, and share a common set of parameters. They can be used singly or together to create consistent workflows for provisioning and de-provisioning user accounts.

Update Active Directory with Orchestration

An organization plans to make their ServiceNow instance the single system of record for user account data and wants to update Active Directory with the latest changes.

About this task

The solution is to create an Orchestration workflow that pushes changes from the ServiceNow user record down to the Active Directory to create a new user record or update an existing

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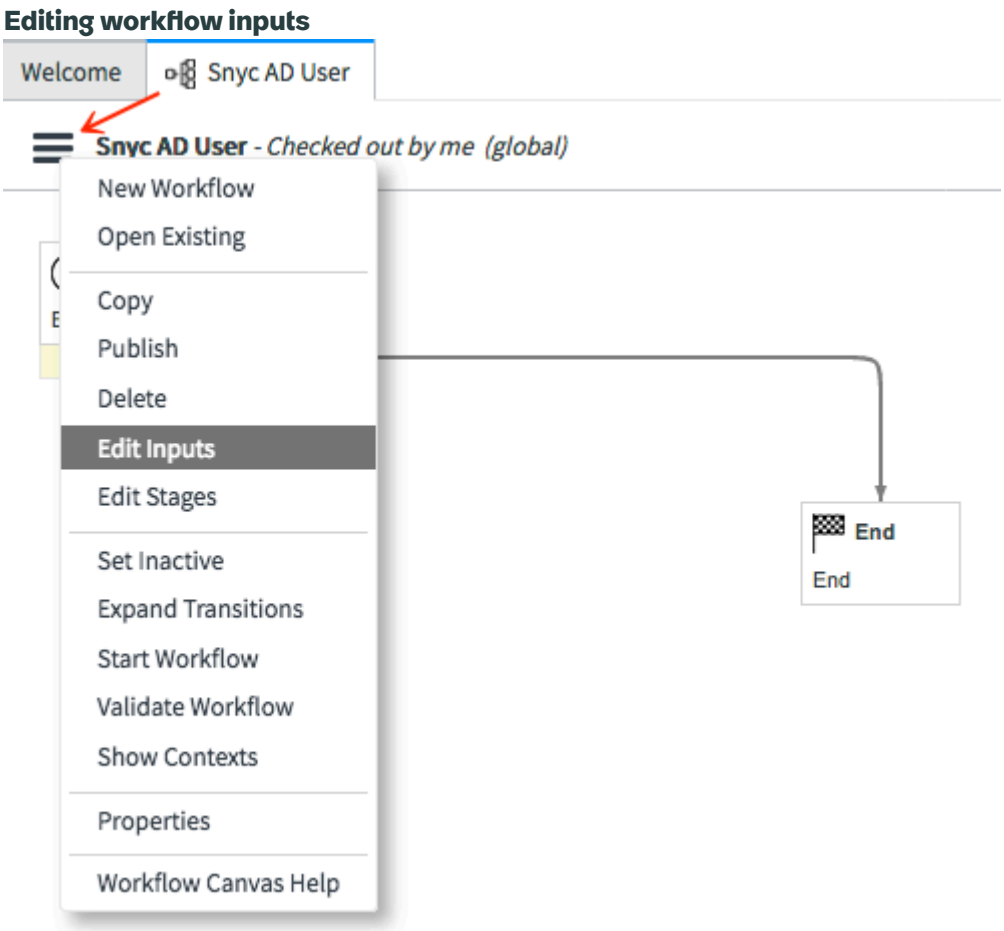
record. This is accomplished by creating an Orchestration workflow that can create and update records in Active Directory based on the data in the ServiceNow User [sys_user] table.

Note: This example workflow assumes that ServiceNow is configured for LDAP and an LDAP server is configured to accept the new user accounts. The Active Directory user management activities are not dependent on LDAP, but the presence of LDAP makes this example workflow much easier. You must provide the domain controller's IP address to the workflow, either by hardcoding it, adding another workflow input, or using a script to look it up from the CMDB.

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. In the **Workflow** tab, click the **+** icon to create a new workflow using these variables:
   - *Name*: Sync AD User
   - *Table*: Global [global]
3. Click **Submit**.
   A basic workflow with a Begin and End point appears on the canvas.
4. Click the menu icon in the upper left corner of the canvas and select **Edit Inputs** from the context menu.



5. In the Workflow Inputs form, click **New** in the **Variables** record list, and create a new variable, using the fields in the table.

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Field	Value
Type	Reference
Label	User
Column name	u_user
Reference Specification > Reference	User (sys_user)

6. Click **Submit**.
7. In the **Custom** tab, expand **Custom Activities** > **Active Directory**.
8. Drag and drop the Update AD Object activity onto the transition line between the Begin and End points of the new workflow.
   This action automatically links the activity with the end point and opens the Workflow Activity property form.
9. Complete the form using the fields in the table.

Field	Value
Name	Enter a logical name such as **Update user data**.
Domain controller	The ServiceNow LDAP integration adds a reference to the LDAP server to which the user's account is linked. To identify the LDAP server, enter the following statement: `${workflow.inputs.u_user.ldap_server.server_url}`
Type	Type of AD object. In this case, the type is **User**, which is the default.
Object name	This example assumes that the ServiceNow user name matches the Active Directory sAMAccountName. Enter the following: `${workflow.inputs.u_user.user_name}`
Object data	Updates the user's account in Active Directory, if the user exists. In this example, the user's title is updated: `{"title" : "QA"}`

10. Click **Submit**.
    The workflow looks like this:

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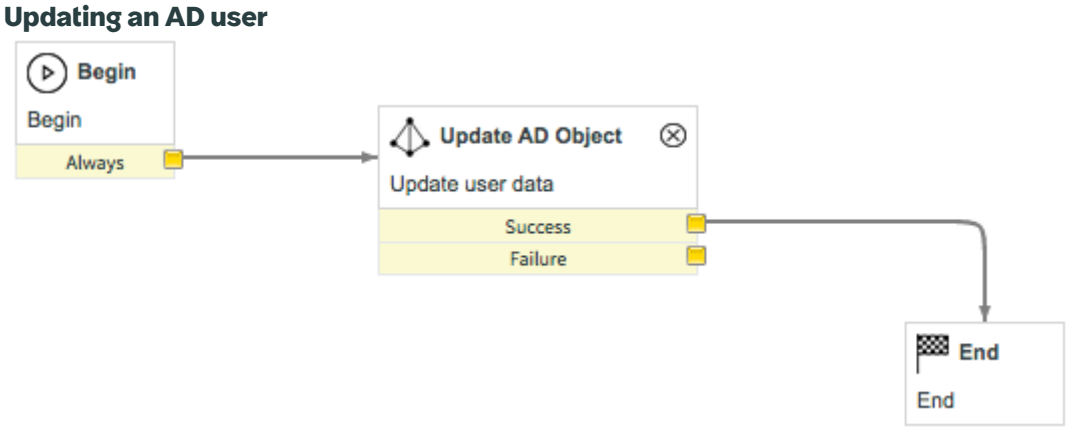

11. Attach both activity outcomes (Success and Failure) to the end point.
At this point, the workflow takes a ServiceNow user record as input and updates the First Name, Last Name, and Title of the corresponding Active Directory account. If the account does not exist in Active Directory, the workflow fails.

> **Note:** In a normal workflow, some type of alternate action is desirable upon failure. For example, you might send an Email and SMS notifications if the workflow failed to update the record.

12. To prevent the workflow from failing, add a Create AD Object activity to the transition lines between Begin and the Update AD Object activity.
13. Complete the Workflow Activity property form using the fields in the table.

Field	Value
Name	Enter a logical name such as **Create user data**.
Domain controller	Same as for the update activity. `${workflow.inputs.u_user.ldap_server.server_url}`
Ou	The organizational unit to which this object belongs. For the purpose of this example, you can enter **OU=HQ,OU=Managed Objects**
Object name	Same as for the update activity. `${workflow.inputs.u_user.user_name}`
Object data	Creates an account with only the user name in it. For the purpose of this example, you can enter `{"givenName" : "${workflow.inputs.u_user.first_name}", "SN" : "${workflow.inputs.u_user.last_name}" }`

14. Click **Submit**.
15. Connect the Failure outcome of the Create AD Object activity to End.
For this example, we are ignoring errors. The workflow now looks like this:

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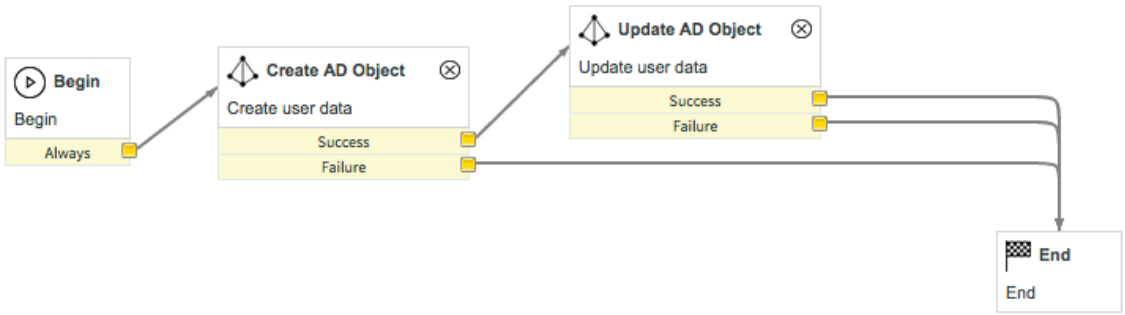
Creating an AD user



This procedure builds a simple workflow that creates a bare-bones Active Directory account consisting of a user name only. The workflow then updates that account with additional information provided by the ServiceNow User [sys_user] table. However, we do not want to execute the Create AD Object activity if the user account already exists. The workflow needs to query Active Directory for matching user records and then branch the workflow based on the results of the query. If an account already exists, then the workflow should update the account. If the account does not exist, then the workflow should create the account in Active Directory.

16. Drag and drop the Query AD activity onto the transition between Begin and Create AD Object.
17. Complete the Workflow Activity property form using the fields in the table.

Field	Definition
Name	Enter a logical name such as **Search for existing account**.
Domain controller	`${workflow.inputs.u_user.ldap_server.server_url}`
Properties	A comma-separated list of Active Directory properties to return. For example, givenName, SN, title. If the parameter field is blank, then all properties are returned. In this workflow, we leave the field blank.
Search filter	An LDAP filter string that defines the search parameters. Use any valid LDAP filtering criteria. To find user accounts matching the input record, we use: `(samaccountname=${workflow.inputs.u_user.user_name})`

18. Click **Submit**.
19. Connect the Failure outcome for the query activity to the End point.
Remember that we are ignoring errors in this workflow.
20. Connect the Success outcome of the query activity to the Update AD Object activity.
The workflow now looks like this:

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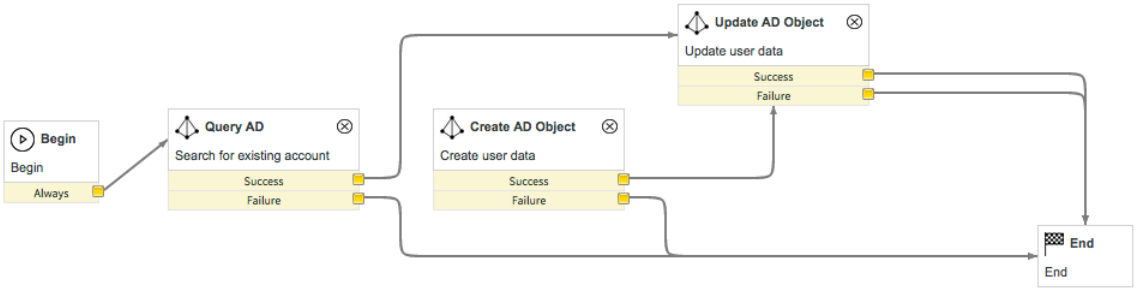
Querying AD for user accounts



The Query AD activity returns its results as a JSON string in the workflow data bus. This JSON string is always an array of objects. Each object corresponds to an Active Directory entry that matched the query. Our workflow should branch, whether that array is empty or not.

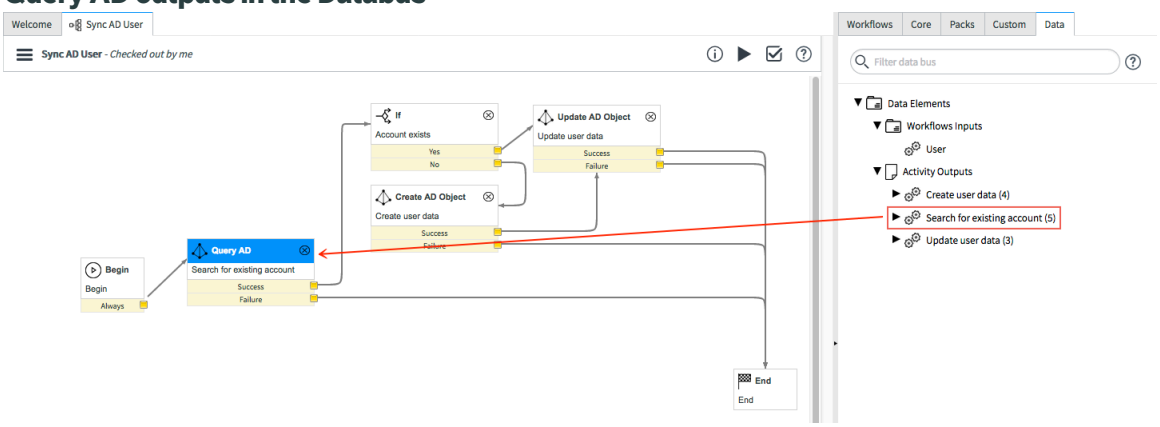
21. Drag a standard *If* activity from the *Conditions* folder in the **Core** tab and drop it onto the transition between Query AD and Update AD Object.
22. Complete the Workflow Activity properties form using the fields in the table.

Field	Value
Name	Enter a logical name such as **Account exists**.
Advanced	Select this check box to open the *Script* field.

Script	For the If activity to work correctly, we must return a **yes** or **no** in the answer variable (var) which corresponds to the Yes and No outcomes of the query activity. Line 1 converts the Query AD results from a JSON string into a Javascript array called queryResults. Line 2 checks the length of that array. If the array is more than 0, a match to the account was found, and we set our answer to yes. Otherwise, the answer is no.
	`var queryResults=new JSON().decode(data.get(5).output);`
	`answer = ( queryResults.length>0 ? 'yes' : 'no' );`

Note: The expression `data.get(5)` in this script identifies the Query AD output in the Databus by order number, since it was the fifth activity added to the workflow.

Query AD outputs in the Databus



23. Click **Submit**.

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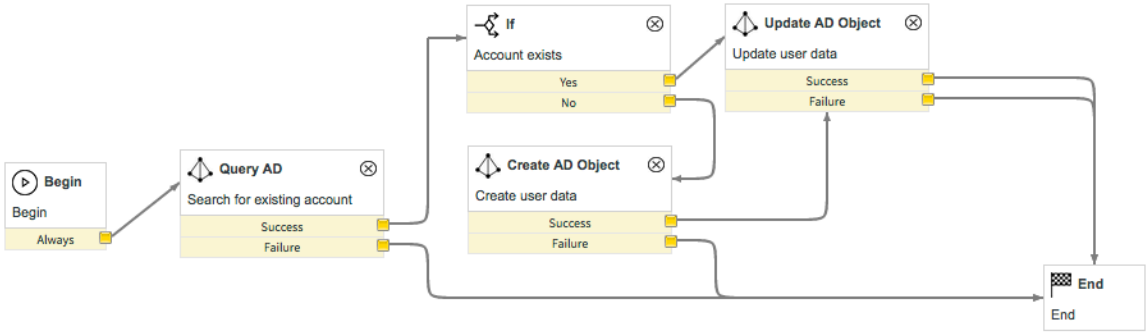
24. In the canvas, create a transition from the Yes outcome of the If activity to the Update AD Object activity.
25. Create a transition from the No outcome of the If activity to the Create AD Object activity. This is the final step. This workflow will query Active Directory to determine if an account already exists. If an account exists, the workflow updates that account. If an account does not exist, the workflow creates the account and then updates the Active Directory with the configured user data set.

Creating the conditional paths



Orchestration activity packs

The base Orchestration system includes packs of custom activities you can use to automate typical IT and business processes in your network.

Activity packs allow you to automate several common business processes, such as managing Active Directory accounts and Exchange server mailboxes. Activity packs can also automate IT functions such as starting and stopping Windows servers, joining domains, assigning IP addresses, and configuring load balancers.

Use an activity pack

The **Packs** tab of the Workflow Editor contains any activity packs downloaded from the ServiceNow Store and any activity packs that you create.

Before you begin

Roles required: admin, activity_admin, activity_creator

About this task

You can organize custom activities into packs and upload them to the ServiceNow Store. Your custom packs do not appear in the tree until at least one activity in the pack is published. Activities added to an existing pack are not displayed until they are published. Activity packs from any Application scope can appear in the **Packs** tab, regardless of the current scope setting for the instance.

Procedure

1. In the Workflow Editor palette, select the **Packs** tab.
2. Click the download icon.

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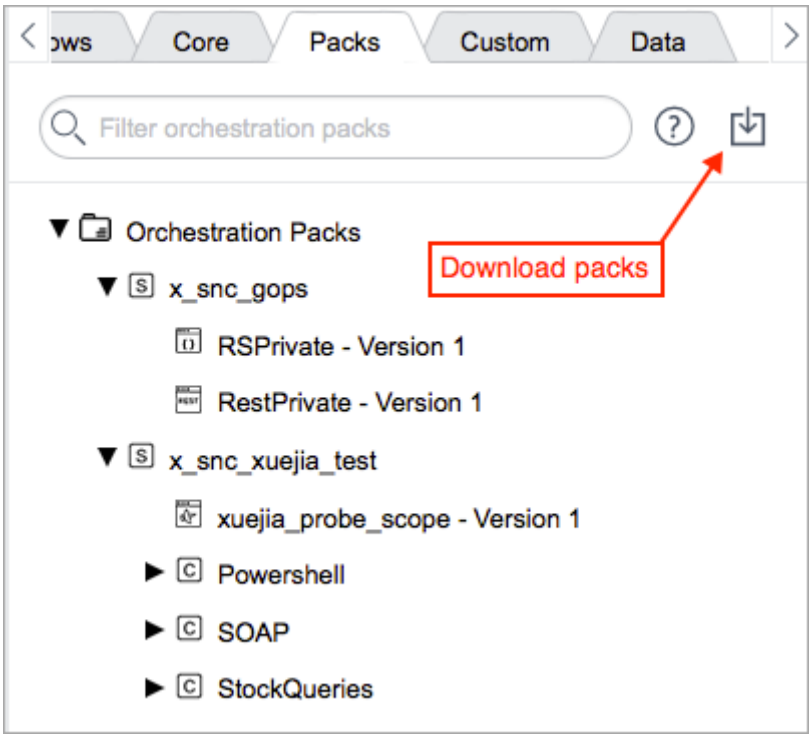
The hierarchy in the tab organizes packs by vendor, scope, category, and activity.



Active Directory activity pack

The Active Directory (AD) activity pack enables an administrator to create, delete, and manage objects in Windows Active Directory, such as users, groups, and computers, using a ServiceNow Orchestration workflow.

Activities in this pack can reset a password automatically from a user request or manage any user account in Active Directory, whether or not it was created by a Orchestration workflow.

Domain controllers are identified by the IP address of the host machine. To use the hostname of the domain controller, add the Resolve DNS Name activity to resolve the hostname into an IP, and then pass the IP into the Active Directory activity.

Your instance must have access to a MID Server configured to use PowerShell to run these activities.

Note: All Active Directory activities pass through error messages returned from Active Directory. To view these error messages, point to the failed activity in the workflow canvas or select the **Workflow Log** tab in a Workflow Context record.

Custom Active Directory activities

Orchestration provides custom Active Directory activities that were created with the Orchestration Create a PowerShell activity, starting with the Geneva release. These activities perform the same functions as AD activities by the same name from previous releases and replace those activities for all new workflows. Existing workflows from earlier versions that were created with legacy AD activities continue to function normally after an upgrade to Istanbul. However, all new workflows must use these custom AD activities. The Powershell activity template gives workflow administrators the ability to store input and output variables from the Query AD activity in the Databus.

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Note: To use the Active Directory custom activities, you must request activation of the Orchestration - Active Directory plugin.

Active Directory credentials with LDAP

If you are using an LDAP Server with MID Servers, note that Orchestration and Active Directory activities do not use the user name and password configured on LDAP Servers. You must create a Windows type orchestration credential record Windows credentials. The username and password in the credentials record is used for LDAP queries that Orchestration and workflow activities perform.

Connection port used by AD Orchestration activities

All Active Directory activities use port 389 for LDAP access. If you are using AD activities with Oracle Virtual Directory (OVD) as a proxy, set up pass-through on port 389 only.

Add User to Group AD activity

The Add User to Group activity adds a user to a group in Windows Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Input variables

Add User to Group input variables

Variable	Description
DomainController	IP address of the domain controller machine.
UserName	Name of the user to add to the group.
GroupName	Name of the group to which this user is added.

Output variables

Add User to Group output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Add User to Group conditions

Condition	Description
Success	User was successfully added to group.
Failure	An error occurred while attempting to add the user to the group. Additional details may be available in the workflow log.

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Change AD User Password activity

The Change AD User Password activity changes the password for an Active Directory user account.

This activity requires the user's current password to run, unlike the **Reset AD User Password** activity. If the new password violates any Active Directory password requirements, such as length or character combinations, the activity fails and returns the appropriate error message. This error message appears in the ECC queue and in hint text when a user points to the activity in the Workflow Editor.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note: This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Change AD User Password input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.
New_password	The new password to assign this user.
Old_password	The user's current password.

Output variables

Change AD User Password output variables

Variable	Description
result	One of the following outcomes: • **failure** • **success** • **Policy Failure** • **Incorrect old password**
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.
hresult	Powershell command result.

Conditions

The activity provides the following conditions:

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Change AD User Password conditions

Condition	Description
Success	Password successfully reset.
Policy Failure	Password does not comply with the organization's Active Directory requirements.
Incorrect old password	Password being changed was not entered correctly.
Failure	An error occurred while attempting to change the password. Additional details may be available in the workflow log.

Active Directory credentials with LDAP

If you are using an LDAP Server with MID Servers, note that Orchestration and Active Directory activities do not use the user name and password configured on LDAP Servers. You must create a Windows type orchestration credential record Windows credentials. The username and password in the credentials record is used for LDAP queries that Orchestration and workflow activities perform.

Create AD Object activity

The Create AD Object activity creates an object in Windows Active Directory.

This activity fails if it finds an existing object with matching input variables.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note: This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Create AD Object input variables

Variable	Description
DomainController	IP address of the domain controller machine.
Type	The object type to create: user, group, or computer.
OU	The organizational unit to which this object belongs.
ObjectName	The sAMAccountName of the Active Directory object. **Object name** is also used for the **name** attribute in Active Directory. This behavior is available in **ActiveDirectory.psm1**. Whatever is passed as the **Object name** becomes both the **samAccountName** and the **name** of the new user in Active Directory.

ObjectData	A JSON object containing Active Directory property names and their corresponding values. For example:
	`{`
	`"givenName" : "John",`
	`"SN" : "Doe",`

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Create AD Object input variables (continued)

Variable	Description
	<pre> "title" : "Sr. Account Specialist", "allowLogin" : true }</pre> This example sets the first name (givenName), last name (SN), and title on the Active Directory user account and allows that user to log in (allowLogin). This field allows expression evaluation via the ${} variable substitution syntax.

Output variables

Create AD Object output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Create AD Object conditions

Condition	Description
Success	A Windows Active Directory object was created successfully.
Failure	An error occurred while attempting to create the AD object. Additional details may be available in the workflow log.

Disable AD User Account activity

The Disable AD User Account activity disables a Windows Active Directory user account, making it inactive.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note: This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Disable AD User Account input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.

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Output variables

Disable AD User Account output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Disable AD User Account conditions

Condition	Description
Success	AD user account was successfully disabled.
Failure	An error occurred while attempting to disable the account. Additional details may be available in the workflow log.

Enable AD User Account activity

The Enable AD User Account activity enables a Windows Active Directory user account, making it active.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note: This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Enable AD User Account input variables

Variable	Description
User	The sAMAccountName of the Active Directory user account.
DomainController	IP address of the domain controller machine.

Output variables

Enable AD User Account output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

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Conditions

Enable AD User Account conditions

Condition	Description
Success	AD user account was successfully enabled.
Failure	An error occurred while attempting to enable the AD user account. Additional details may be available in the workflow log.

Is AD Account Locked activity

The Is AD Account Locked activity determines whether an Active Directory user account is locked.

An account may be locked automatically if a user enters an incorrect password more times than allowed by the Active Directory security policy. You can unlock an account using the Unlock AD User Account activity.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note: This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Is AD Account Locked input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.

Output variables

Is AD Account Locked output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.
output	The query result.

Conditions

Is AD Account Locked conditions

Condition	Description
Locked	The AD account is locked.

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Is AD Account Locked conditions (continued)

Condition	Description
Unlocked	The AD account is unlocked.
Failure	An error occurred while processing the query. Additional details may be available in the workflow log.

Query AD activity

The Query AD activity retrieves entries from the Windows Active Directory based on an LDAP search filter and stores the results as a JSON string that can be used in the data bus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory** > **.**

Note: This activity replaces an AD activity by the same name available in releases prior to Geneva. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul and will continue to save query results to the scratchpad. However, all new workflows must use the custom version of this activity. This activity was built with the Create a PowerShell activity, which stores input and output variables in the databus instead of the scratchpad.

Input variables

Query AD input variables

Variable	Description
DomainController	IP address of the domain controller machine.
Properties	A comma-separated list of Active Directory properties to return. For example, *`givenName,SN,title`*. If this field is blank, then all properties are returned.
SearchFilter	An LDAP filter string that defines the search parameters. Use any valid LDAP filtering criteria. For example, to find user accounts matching the ServiceNow input record, use: `(samaccountname=${workflow.inputs.u_user.user_name})`

Output variables

Query AD output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.
output	The query result.

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Conditions

Query AD conditions

Condition	Description
Success	The query completed as expected.
Failure	An error occurred while processing the query. Additional details may be available in the workflow log.

Remove AD Object activity

The Remove AD Object activity deletes an object from Windows Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note: This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Remove AD Object input variables

Variable	Description
DomainController	IP address of the domain controller machine.
ObjectName	The sAMAccountName of the Active Directory object.
Type	The object type to remove: • **user** • **group** • **computer**

Output variables

Remove AD Object output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

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Conditions

Remove AD Object conditions

Condition	Description
Success	AD object was successfully removed.
Failure	An error occurred while attempting to remove the AD object. Additional details may be available in the workflow log.

Remove User from Group AD activity

The Remove User from Group activity removes a user from a group in Windows Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Input variables

Remove User from Group input variables

Variable	Description
DomainController	IP address of the domain controller machine.
UserName	Name of the user to remove from the group.
GroupName	Name of the group from which this user is removed.

Output variables

Remove User from Group output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Remove User from Group conditions

Condition	Description
Success	User was successfully removed from the group.
Failure	An error occurred while attempting to remove the user from the group. Additional details may be available in the workflow log.

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Reset AD User Password activity

The Reset AD User Password activity resets the password of a user account in Windows Active Directory.

If the new password violates any Active Directory password requirements, such as length or character combinations, the reset activity fails and returns the appropriate error message. This error appears in the ECC Queue and when you point to the activity in the Workflow Editor.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note: This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Reset AD User Password input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.
Password	The new password for the user. This password must comply with the organization's Active Directory requirements.
ForceChange	Makes this password temporary by forcing the user to change it at the next login.
Unlock	Unlock the account if the account is locked.

Output variables

Reset AD User Password output variables

Variable	Description
result	One of the following outcomes: • **failure** • **success** • **Policy Failure**
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.
hresult	Powershell command result.

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Conditions

Reset AD User Password conditions

Condition	Description
Success	Password was successfully reset.
Policy Failure	New password does not comply with the organization's Active Directory requirements.
Failure	An error occurred while attempting to reset the password. Additional details may be available in the workflow log.

Unlock AD Account activity

The Unlock AD Account activity unlocks a locked Active Directory user account.

You can use the Is AD Account Locked activity activity to determine if an account is locked.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note: This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Unlock AD Account input variables

Variable	Description
DomainController	IP address of the domain controller machine.
User	The sAMAccountName of the Active Directory user account.

Output variables

Unlock AD Account output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

Unlock AD Account conditions

Condition	Description
Success	The account was successfully unlocked.

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Unlock AD Account conditions (continued)

Condition	Description
Failure	An error occurred while attempting to unlock the account. Additional details may be available in the workflow log.

Update AD Object activity

The Update AD Object activity updates an object in Windows Active Directory.

This activity only replaces existing values with new values. It cannot add new values to AD records such as adding a new group member to an AD group. For complex AD operations, use the Run PowerShell activity instead. The activity fails if it cannot find an existing account with matching object name and data.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

Note: This activity replaces an AD activity by the same name available in prior releases. If you have a workflow that uses the deprecated activity, your workflow will continue to work normally after upgrading to Instanbul. However, all new workflows must use the custom version of this activity, which was built with the PowerShell activity designer.

Input variables

Update AD Object input variables

Variable	Description
DomainController	IP address of the domain controller machine.
ObjectName	The sAMAccountName of the Active Directory object.
ObjectData	A JSON object containing Active Directory properties and their values. For example, to set the first name, last name, and title of a user, clear the user's manager, and set the VIP flag to true, the Object Data specifies: `{ "givenName" : "John", "SN" : "Doe", "title" : "Sr. Account Specialist", "manager" : null, "msTSAllowLogon" : false }`
Type	The object type to update: user, group, or computer.

Output variables

Update AD Object output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

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Conditions

Update AD Object conditions

Condition	Description
Success	AD object was successfully updated.
Failure	An error occurred while attempting to update an AD object. Additional details may be available in the workflow log.

Azure AD activity pack

The Azure AD activity pack enables an administrator to automate employee onboarding and offboarding functions on Azure AD and manage Office 365 licensing.

Use the Azure AD activities to add and remove users to Azure Active Directory, manage security group membership, and assign or remove Office 365 licenses for individual users.

The Azure AD activities were created with the Orchestration REST Web Service activity template.

Add User to Group Azure AD activity

The Add User to Group activity adds a user to an existing security group in Azure Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important: The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Add User to Group input variables

Variable	Description
user_id	Object ID (GUID) of the member to be added.
group_id	Object ID (GUID) of the target group.

Output variables

Add User to Group output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

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Conditions

Add User to Group conditions

Condition	Description
Success	Activity successfully added the object ID to the security group.
Failure	Activity failed to update the group's membership, or the activity failed to connect to Azure AD.

Assign User License Azure AD activity

The Assign User License activity assigns an additional Office 365 software license to the named user.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important: The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Assign User License input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.
sku_id	Subscription SKU ID associated with the tenant's enterprise agreement.

Output variables

Assign User License output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

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Conditions

Assign User License conditions

Condition	Description
Success	Activity successfully assigned an Office 365 license to a user.
Failure	Activity failed to assigned an Office 365 license to a user, or the activity failed to connect to Azure AD.

Create User Azure AD activity

The Create User activity creates a user for the Azure Active Directory tenant.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important: The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Create User input variables

Variable	Description
display_name	Name of the Azure AD user in the accepted display format, such as **jacinto.gawron**.
user_principal_name	User principal name (UPN) in an email format. For example, you might enter **jacinto.gawron@khitomer.com**.
mail_nickname	User's email alias that redirects to the user's full address.
password	User's Azure AD password. This password must be passed as a workflow input with a type of **Password (2 Way Encrypted)** and must meet the password policy set in Azure AD.
change_password	Control that requires the user to change their password at the next login, if set to true.
account_enabled	Control that sets the user's account is enabled, if set to true.
given_name	First name of the user.
surname	Last name of the user.
other_mails	List of additional email addresses for the user. For example, you might enter `["jac@home.com", "jgawron@fabrikam.com"]`.

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Create User input variables (continued)

Variable	Description
country	The country or region in which the user is located. For example, you might enter **US** or **UK**. The default value is set to**US**.
city	City in which the user is located.
department	Name of the department in which the user works.
mobile	User's primary cell phone number.
job_title	User's job title.
physical_delivery_office_name	Office location in the user place of business.
postal_code	Postal code of the user's address.
preferred_language	Language in which the user prefers to communicate. This value must follow the ISO 639-1 Code. For example, you might enter **en-US**. The default value is set to **en-US**.
state	State or province for the user's address.
street_address	Street address of the user's place of business.
telephone_number	Primary telephone number of the user's place of business.
usage_location	Two letter country code that is required for users who are assigned Office 365 licenses. The default value is **US**.

Output variables

Create User output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
status_code	Contains the status code returned from the Web service.
user_exists	Output variable mapped to the JSON message that contains the `User already exists` error.
user_info	The *`user_info`* array contains attributes that can be leveraged by other activities as inputs. For example, the user *`objectid`* output (GUID) can be passed to the Add User to Group activity as the *`user_id`* input.

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Create User output variables (continued)

Variable	Description
	• *objectid*: User's Azure AD identifier. • *accountEnabled*: Boolean variable indicating whether the user's account is active or inactive. • *displayName*: Users display name, such as **jacinto.gawron**. • *userPrincipalName*: User's name in email format, such as **jacinto.gawron@wammo.com**. • *mailNickname*: User's email alias.

Conditions

Create User conditions

Conditions	Description
Created user	Activity successfully created the user.
User already exists	User already exists in the tenant domain.
Failure	Activity failed to connect to Azure AD, or an input value was invalid.

Delete User Azure AD activity

The Delete User activity deletes the named user's account from the Azure Active Directory tenant.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important: The REST message used for this activity must be configured to use OAuth 2.0.

Input variables

Delete User input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.

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Output variables

Delete User output variables

Variables	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Delete User conditions

Condition	Description
Deleted user	Activity deleted the specified user.
User does not exist	Specified user does not have an account in the tenant domain.
Failure	Activity failed to connect to Azure AD.

Get User Info Azure AD activity

The Get User Info activity returns the named user's information from the Azure Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important: The REST message used for this activity must be configured to use OAuth 2.0 .

Input variables

Check If User Exists input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com** **Note:** Version 2 of this activity enforces input validation. If empty, the following message appears: "Mandatory input 'user_id' is empty" .

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Output variables

Check If User Exists output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.
user_info	The *user_info* array contains attributes that can be leveraged by other activities as inputs. For example, the user *objectid* output (GUID) can be passed to the Add User to Group activity as the *user_id* input. • *objectid*: User's Azure AD identifier. • *accountEnabled*: Boolean variable indicating whether the user's account is active or inactive. • *displayName*: Users display name, such as **jacinto.gawron**. • *userPrincipalName*: User's name in email format, such as **jacinto.gawron@wammo.com**. • *mailNickname*: User's email alias.

Conditions

Check If User Exists conditions

Condition	Description
User exists	Activity found the named user.
User does not exist	Activity was unable to find the named user in the customer tenant domain.
Failure	Activity failed to connect to Azure AD.

Remove User from Group Azure AD activity

The Remove User from Group activity removes an existing user from a security group in Azure Active Directory.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important: The REST message used for this activity must be configured to use OAuth 2.0.

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Input variables

Remove User from Group input variables

Variable	Description
user_id	Object ID (GUID) of the user to be removed.
group_id	Object ID (GUID) of the target group.

Output variables

Remove User from Group output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Remove User from Group conditions

Variable	Description
Success	Activity removed the object ID from the security group.
Failure	Activity failed to update the group's membership, or the activity failed to connect to Azure AD.

Remove User License Azure AD activity

The Remove User License activity revokes the specified Office 365 software license for the named user.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important: The REST message used for this activity must be configured to use OAuth 2.0.

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Input variables

Remove User License input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.
sku_id	Subscription SKU ID associated with the tenant's enterprise agreement.

Output variables

Remove User License output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Remove User License conditions

Condition	Description
Success	Activity removed an Office 365 license from the named user.
Failure	Activity failed to remove an Office 365 from a user, or the activity failed to connect to Azure AD.

Reset User Password Azure AD activity

The Reset User Password activity changes the named user's Azure Active Directory password.

The Azure password policy imposes constraints on the complexity, length, and re-use of a password.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Azure AD**. This activity was built with the REST web service activity template.

Important: The REST message used for this activity must be configured to use OAuth 2.0.

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Input variables

Reset User Password input variables

Variable	Description
user_id	The object ID (GUID) or the user principal name of the target user. An example of a user principal name is **someuser@a830edad9050849NDA1.onmicrosoft.com**.
password	User's Azure AD password. This password must be passed as a workflow input with a type of **Password (2 Way Encrypted)** and must meet the password policy set in Azure AD.
change_password	Control that requires the user to change their password at the next login, if set to true.

Output variables

Reset User Password output variables

Variable	Description
error	Returns the error string from the REST message. If there are no errors, this variable returns a null value.
body	Contains a string value representing the output from the REST message.
status_code	Contains the status code returned from the Web service.

Conditions

Reset User Password conditions

Condition	Description
Success	Activity reset the named user's password.
Failure	Activity failed to reset the named user's password, or the activity failed to connect to Azure AD.

Exchange activity pack

The Exchange activity pack allows workflows to manage Microsoft Exchange mail systems.

The use of Orchestration Exchange activities requires the following:

- Microsoft Exchange 2010, 2013, or 2016.
- A MID Server configured to run Powershell 2.0

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- A target Exchange server in the same Active Directory domain as the instance.
- Powershell Remoting enabled on the target Exchange server.

Note: These activities cannot be used to interact with Microsoft Exchange Online.

Orchestration provides custom Exchange activities that were created with the Orchestration activity designer template. These activities perform the same functions as Exchange activities by the same name from previous releases and replace those activities for all new workflows. The custom Exchange activities were built with a Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Note: Existing workflows from earlier versions that were created with legacy Exchange activities continue to function normally after an upgrade to Geneva. However, all new workflows must use these custom Exchange activities.

To use the Microsoft Exchange custom activities, you must request activation of the Orchestration - Exchange plugin. The custom Exchange activities are available in the Workflow Editor on the **Custom** tab. Expand the **Custom Activities** tree and select the **Exchange** category for the activity you want to use.

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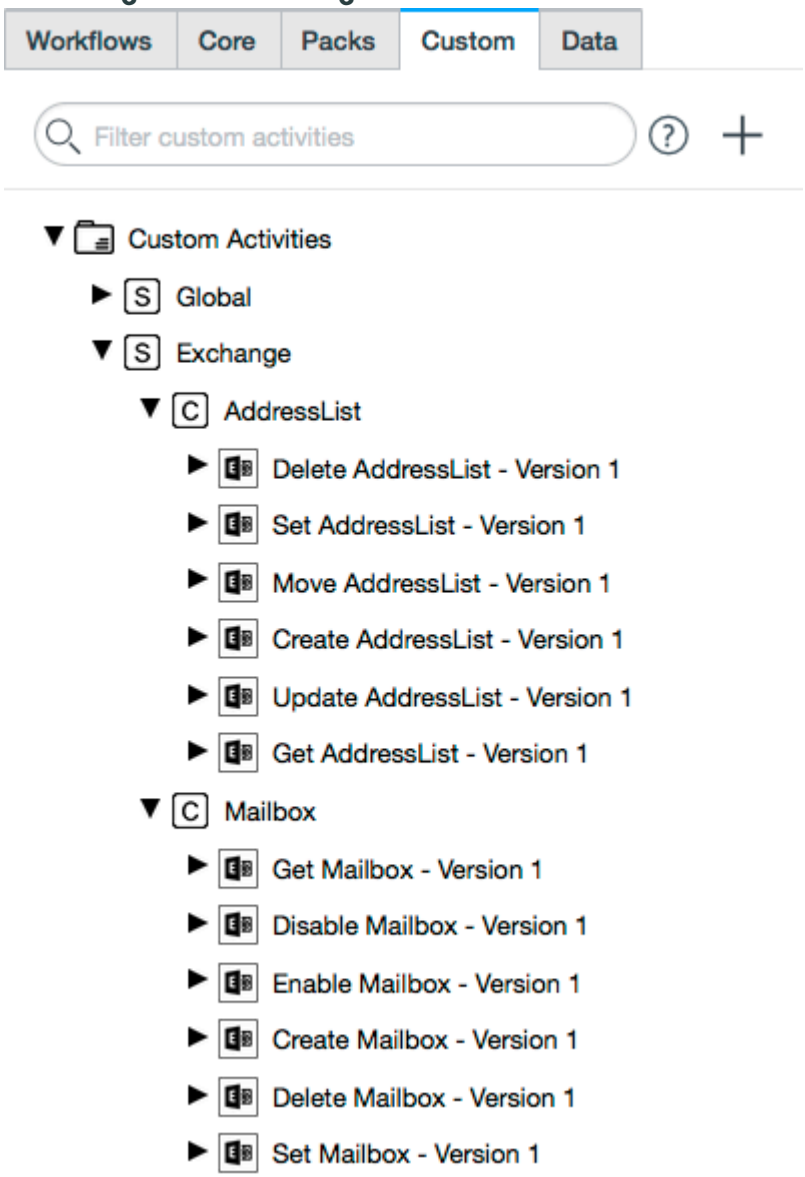
Accessing custom Exchange activities



Configure MID Server for Exchange

Configure a MID Server with defined IP ranges to use Exchange.

Before you begin

Role required: admin

About this task

If the MID Server manages resources within defined IP ranges, instead of all computers on your network, you must perform additional configuration steps to run Exchange activities. You do not need to perform these steps if your MID Server uses the default configuration.

Procedure

1. In the navigation filter, enter `cmdb_ci_dns_name.list`.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of your Exchange server in the **Name** field.
4. Right-click the form header and select **Save**.

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5. In the **IP Address** related list, click **New**.
6. In the **IP Address** field, enter the IP address of your Exchange server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.
8. Leave the **Netmask** field blank.
9. Click **Submit**.

Pass multivalued properties with an Exchange activity

To set a multivalued property using an Exchange activity, you must use a specific parameter format.

About this task

The Optional parameters shared input variable allows you to set multivalued properties.

Procedure

- To set a multivalued property, replacing any existing values, use this format: "`PropertyName`":"(`value1`, `value2`, `value3`)"
- To add values, use this format: "PropertyName":"+(`value1`, `value2`, `value3`);"
- To remove values, use this format: "PropertyName":"-(`value1`, `value2`, `value3`);"
- To both add and remove values, use this format: "PropertyName":"-(`value1`, `value2`, `value3`);+(`value1`, `value2`, `value3`);"

Create Address List activity

The Create Address List activity creates a new address list that acts as an alias for emailing all users in the group.

This alias cannot be used to manage user permissions. This activity implements the Microsoft Exchange New-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Create Address List input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
name	Name of the new address list to create.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an

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Create Address List input variables (continued)

Variable	Description
	object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Create Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Create Address List conditions

Condition	Description
Success	The activity succeeded in creating a new address list.
Failure	The activity failed to create a new address list.

Delete Address List activity

The Delete Address List activity removes an existing address list from an Exchange server.

This activity implements the Microsoft Exchange Remove-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

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Input variables

Delete Address List input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to remove.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
recursive	Check box that indicates if the activity should delete Active Directory elements that are children of the specified address list.
whatif	Check box that indicates if the activity should stage the changes without applying them. Use this variable to test your activity settings before using the activity in a live workflow. When this variable is selected, the Exchange server does not make any changes but indicates if the command would succeed or fail. You can review any messages from the Exchange server using the ECC queue.

Output variables

Delete Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Delete Address List conditions

Condition	Description
Success	The activity succeeded in removing the address list from the Exchange server.
Failure	The activity failed to remove the address list from the Exchange server.

Get Address List activity

The Get AddressList activity retrieves all attributes from the specified Exchange address list.

This activity implements the Microsoft Exchange Get-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

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Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Get Address List input variables

Variables	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
identity	Name of the address list to get attributes from. If you enter a value in this variable, leave the **container** and **searchText** variables blank.
organization	Organization to which the specified address list belongs.
searchText	Filter text that causes the activity to return only results that contain this text. This variable can only be used with Exchange 2013 servers. If you enter a value in this variable, leave the **container** and **identity** variables blank.
container	Parent address list of the address list from which you want to retrieve attributes. If you enter a value in this variable, leave the **identity** and **searchText** variables blank

Output variables

Get Address List output variables

Variables	Descriptions
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Get Address List conditions

Condition	Description
Success	The activity succeeded in retrieving the attributes from the address list.
Failure	The activity failed to retrieve the attributes from the address list.

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Move Address List activity

The Move Address List activity moves a Microsoft Exchange address list to another location in the address hierarchy.

This activity implements the Microsoft Exchange Move-AddressList command.

The Exchange server caches the changes from this activity but does not immediately apply them. Use the Update Address List activity after this activity to apply the changes or wait for the Exchange server to automatically apply cached changes.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Move Address List input variables

Variables	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to move.
target	Path to the address list's new location.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
whatif	Check box that indicates if the activity should stage the changes without applying them. Use this variable to test your activity settings before using the activity in a live workflow. When this variable is selected, the Exchange server does not make any changes but indicates if the command would succeed or fail. You can review any messages from the Exchange server using the ECC queue.

Output variables

Move Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

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Conditions

Move Address List conditions

Condition	Description
Success	The activity succeeded in moving the address list to another location.
Failure	The activity failed to move the address list to another location.

Set Address List activity

The Set Address List activity modifies a Microsoft Exchange address list.

Use the Optional parameters variable to pass specific values to the Microsoft Exchange server. This activity implements the Microsoft Exchange Set-AddressList command.

The Exchange server caches the changes from this activity but does not immediately apply them. Use the Update Address List after this activity to apply the changes or wait for the Exchange server to automatically apply cached changes.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Set Address List input variables

Variables	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to modify.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

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Output variables

Set Address List output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Set Address List conditions

Variable	Description
Success	The activity succeeded in modifying the specified address list.
Failure	The activity failed to modify the specified address list.

Update Address List activity

The Update Address List activity adds or removes users from the specified address list and immediately applies any cached address list changes to the server.

Use the optional parameters variable to specify which users to add or remove. This activity implements the Microsoft Exchange Update-AddressList command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Address List**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Update Address List input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
identity	Name of the address list to update.
domainController	Fully-qualified domain name (FQDN) of the domain controller that writes to Active Directory.
whatif	A check box that indicates if the activity should stage the changes without applying them. Use this variable to test your activity settings before using the activity in a live workflow. When this variable is selected, the Exchange server does not make any changes but indicates if the command would

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Update Address List input variables (continued)

Variable	Description
	succeed or fail. You can review any messages from the Exchange server using the ECC queue.

Output variables

Update Address List output variables

Variable	Description
result	Either **Success** or **Failure**.
error	Error message if the operation fails.

Conditions

Update Address List conditions

Condition	Description
Success	The activity succeeded in adding or removing users from the specified address list.
Failure	The activity failed to add or remove users from the specified address list.

Create Mailbox activity

The Create Mailbox activity creates a new Active Directory user, if that user does not already exist, and a Microsoft Exchange mailbox for that user.

This activity implements the Microsoft Exchange New-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Create Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain. **Important:** The MID Server must be in the same domain as the Exchange server.

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Create Mailbox input variables (continued)

Variable	Description
first_name	First name of the user.
middle_initial	Middle initial of the user.
last_name	Last name of the user.
alias	The display name for the mailbox address, the part of the email address to the left of the @ symbol. If no alias is specified, the activity uses First name.Last name as the alias. The alias is also used as the user's principal name (UPN) if none is specified in the optional parameters.
password	Password to use for the new mailbox. The password is encrypted when it is sent to the target host.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Create Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Create Mailbox conditions

Condition	Description
Success	The activity succeeded in creating a new mailbox for the specified user. If no Active Diectory account existed for that user, this activity succeeded in creating a new account.
Failure	The activity failed to create a new mailbox or an Active Directory account for the specified user.

Delete Mailbox activity

The Delete Mailbox activity deletes the Microsoft Exchange mailbox of an Active Directory user.

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Optional parameters determine how the Exchange server handles the mailbox after deleting the user. This activity implements the Microsoft Exchange Remove-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Delete Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user to delete. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

Output variables

Delete Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Delete Mailbox conditions

Condition	Description
Success	The activity succeeded in deleting the specified user's mailbox.
Failure	The activity failed to delete the specified user's mailbox.

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Disable Mailbox activity

The Disable Mailbox activity disables the mailbox associated with a specified Active Directory account.

This activity implements the Microsoft Exchange Disable-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Disable Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user who's mailbox should be disabled. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *`"parameter":"true"`*.

Output variables

Disable Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

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Conditions

Disable Mailbox conditions

Condition	Description
Success	The activity succeeded in disabling the specified mailbox.
Failure	The activity failed to disable the specified mailbox.

Enable Mailbox activity

The Enable Mailbox activity creates a new mailbox for an existing Active Directory user.

This activity implements the Microsoft Exchange Enable-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Enable Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user who's mailbox should be enabled. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

Output variables

Enable Mailbox output variables

Variable	Description
result	Either **success** or **failure**.

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Enable Mailbox output variables (continued)

Variable	Description
error	Error message if the operation fails.

Conditions

Enable Mailbox conditions

Condition	Description
Success	The activity succeeded in creating a new mailbox for the specified user.
Failure	The activity failed to create a new mailbox for the specified user.

Get Mailbox activity

The Get Mailbox activity gets the mailbox for the specified user or all mailboxes on a Microsoft Exchange server.

This activity implements the Microsoft Exchange Get-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Get Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	User whose mailbox this activity should retrieve. If no user is specified, the activity gets all mailboxes on the Exchange server. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type. Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format `"parameter":"true"`.

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Output variables

Get Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.
output	Raw XML payload from the Exchange server. This data includes all Exchange attributes.

Conditions

Get Mailbox conditions

Condition	Description
Success	The activity succeeded in retrieving the attributes of the specified mailbox.
Failure	The activity failed to retrieve the attributes of the specified mailbox.

Set Mailbox activity

The Set Mailbox activity modifies the settings of an existing Microsoft Exchange mailbox.

Use the optional parameters variable to pass specific values to the Exchange server. This activity implements the Microsoft Exchange Set-Mailbox command.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Exchange** > **Mailbox**.

Note: This activity replaces an Exchange activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Set Mailbox input variables

Variable	Description
hostname	The hostname of the Exchange server with which the activity interacts. Do not enter an IP address in this variable.
domain	The name of the Exchange server's assigned domain.
user	Active Directory user whose mailbox you want to modify. The activity passes this value to Exchange as the Identity Exchange variable.
parameters	Optional parameters to pass to the Exchange server written in JavaScript Object Notation (JSON). Exchange activities cannot pass parameters that reference an object, such as a PSCredential object. Plain text is automatically converted to SecureString objects for parameters that require that data type.

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Set Mailbox input variables (continued)

Variable	Description
	Attempting to save an activity that specifies duplicate parameters, including parameters from activity variables, or incorrectly formatted JSON causes a warning message to appear. **Note:** When passing a switch parameter, such as ForceUpgrade, you must use the format *"parameter":"true"*.

Output variables

Set Mailbox output variables

Variable	Description
result	Either **success** or **failure**.
error	Error message if the operation fails.

Conditions

Set Mailbox conditions

Conditions	Description
Success	The activity succeeded in modifying the settings of the specified mailbox.
Failure	The activity failed to modify the settings of the specified mailbox.

F5 Network Management activity pack

Orchestration provides custom activities for configuring elements of an F5 load balancer, including pools, pool members, and the virtual servers contained in the pool.

All F5 custom activities are in the F5 Network Management Application Application scope and are activated by the Orchestration - F5 network management plugin, which must be activated by request.

ServiceNow provides custom F5 activities, built from the REST web service activity template, that you can use to perform the following tasks:

- Add, delete, or verify pools.
- Add, delete, or identify pool members.
- Add or delete virtual servers.
- Add a profile to a virtual server.
- Configure the virtual server for vlans, irules, pool, and persistence.

Add F5 Pool Member activity

The Add F5 Pool Member activity adds a member to an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: post

Input variables

Add F5 Pool Member input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.
F5IPAddress	IP address of the F5 console.
MemberName	Pool member IP address and port, such as 192.168.2.19:80.

Output variables

Add F5 Pool Member output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.
output	The REST output.

Conditions

Add F5 Pool Member conditions

Condition	Description
Success	Activity successfully added an F5 load balancer pool member.
Failure	Activity failed to add an F5 load balancer pool member.

Get F5 Pool Member activity

The Get F5 Pool Member activity returns the pool members and verifies the pool's status.

Use this activity to verify that a pool member was created properly.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

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REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: get

Input variables

Get F5 Pool Member input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.
F5IPAddress	IP address of the F5 console.

Output variables

Get F5 Pool Member output variables

Variable	Description
MembersArray	Array for the returned pool member IP address and port, such as 192.168.2.19:80.
status_code	The HTTP status code.
error	The REST error.
result	Success or failure.
output	The REST output.

Conditions

Get F5 Pool Member conditions

Condition	Description
Success	Activity successfully returned the F5 load balancer pool members.
Failure	Activity failed to return the F5 load balancer pool members

Delete F5 Virtual Server activity

The Delete F5 Virtual Server activity deletes a virtual server from an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 VIP Management
- **REST function**: delete

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Input variables

Delete F5 Virtual Server input variables

Variable	Description
F5IPAddress	IP address of the F5 console.
name	The virtual server's name, such as `testVIP`.

Output variables

Delete F5 Virtual Server output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.

Conditions

Delete F5 Virtual Server conditions

Condition	Description
Success	Activity successfully deleted the virtual server from the F5 load balancer pool.
Failure	Activity failed to delete the virtual server from the F5 load balancer pool.

Check F5 Pool activity

The Check F5 Pool activity checks the status of a pool to determine if it is available to accept traffic.

Use this activity to determine if a pool you just created is up and running with the proper configuration.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Management
- **REST function**: get

Input variables

Check F5 Pool input variables

Variable	Description
F5IPAddress	IP address of the F5 console.

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Check F5 Pool input variables (continued)

Variable	Description
PoolName	Name of this pool, such as `testPool`.

Output variables

Check F5 Pool output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.

Conditions

Check F5 Pool conditions

Condition	Description
Success	Activity successfully returned the status of the F5 load balancer pool.
Failure	Activity failed to return the status of the F5 load balancer pool.

Add F5 Profile to Virtual Server activity

The Add F5 Profile to Virtual Server activity adds a profile to a virtual server assigned to an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 VIP Profile Management
- **REST function**: post

Input variables

Add F5 Profile to Virtual Server input variables

Variable	Description
name	The virtual server's name, such as `testVIP`
F5IPAddress	IP address of the F5 console.
VirtualServerName	Name of the virtual server, such as `testVIP`.

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Output variables

Add F5 Profile to Virtual Server output variables

Variable	Description
result	Success or failure.
output	The REST output.
status_code	The HTTP status code.

Condtions

Add F5 Profile to Virtual Server conditions

Condition	Description
Success	Activity successfully added the F5 load balancer profile to the virtual server.
Failure	Activity failed to add the F5 load balancer profile to the virtual server.

Modify F5 Virtual Server activity

The Modify F5 Virtual Server activity configures a virtual server assigned to an F5 load balancer pool with irules and a vlan.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 VIP Management
- **REST function**: put

Input variables

Modify F5 Virtual Server input variables

Variable	Description
name	The virtual server's name, such as `testVIP`.
F5IPAddress	IP address of the F5 console.
irules	The irules for the virtual server, such as `_sys_https_redirect`. • **pool**: Name of the pool for the virtual server, such as `testPool`. • **persistent**: Persistent profile for the virtual server, such as `cookie`.

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Modify F5 Virtual Server input variables (continued)

Variable	Description
vlans	Vlans for the virtual server, such as `internal`.

Output variables

Modify F5 Virtual Server output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
output	The REST output.

Conditions

Modify F5 Virtual Server conditions

Condition	Description
Success	Activity successfully configured a virtual server assigned to an F5 load balancer pool.
Failure	Activity failed to configure a virtual server assigned to an F5 load balancer pool.

Add F5 Virtual Server activity

The Add F5 Virtual Server activity adds a virtual server.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: post

Input variables

Add F5 Virtual Server input variables

Variable	Description
name	The virtual server's name, such as `testVIP`.
description	Description of this virtual server.
ipProtocol	Protocol used for this virtual server, such as `tcp`.

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Add F5 Virtual Server input variables (continued)

Variable	Description
destination	Virtual server IP address and port number, such as 192.168.4.20:80.
mask	Subnet mask for this virtual server, such as 255.255.255.255.
F5IPAddress	IP address of the F5 console.
sourceAddressTranslation	Source address translation mode.

Output variables

Add F5 Virtual Server output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.
output	The REST output.

Conditions

Add F5 Virtual Server conditions

Condition	Decription
Success	Acitivty successfully added a virtual server.
Failure	Activity failed to add a virtual server.

Delete F5 Pool Member activity

The Delete F5 Pool Member activity deletes an F5 load balancer pool member.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Membership Management
- **REST function**: delete

Input variables

Delete F5 Pool Member input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.

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Delete F5 Pool Member input variables (continued)

Variable	Description
F5IPAddress	IP address of the F5 console.
MemberName	Pool member IP address and port, such as 192.168.2.19:80.

Output variables

Delete F5 Pool Member output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.

Conditions

Delete F5 Pool Member output variables

Condition	Description
Success	Acivity succeeded in deleting an F5 load balancer pool member.
Failure	Acivity failed to delete an F5 load balancer pool member.

Delete F5 Pool activity

The Delete F5 Pool activity deletes an F5 load balancer pool.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Management
- **REST function**: delete

Input variables

Delete F5 Pool input variables

Variable	Description
F5IPAddress	IP address of the F5 console.
PoolName	Name of this pool, such as `testPool`.

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Output variables

Delete F5 Pool output variables

Variable	Description
result	Success or failure.
error	The REST error.
status_code	The HTTP status code.

Conditions

Delete F5 Pool conditions

Condition	Description
Success	Activity successfully deleted the F5 load balancer pool.
Failure	Activity failed to delete the F5 load balancer pool.

Add F5 Pool activity

The Add F5 Pool activity creates the F5 load balancer pool.

Use this activity to verify that a pool member was created properly.

This activity was built using the REST web service activity template. To access the activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Active Directory**.

REST settings

- **REST message**: F5 POOL Management
- **REST function**: post

Input variables

Add F5 Pool input variables

Variable	Description
PoolName	Name of this pool, such as `testPool`.
F5IPAddress	IP address of the F5 console.
MemberName	Pool member IP address and port, such as 192.168.2.19:80.

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Output variables

Add F5 Pool output variables

Variable	Description
result	Success or failure.
status_code	The HTTP status code.
error	The REST error.
output	The REST output.

Conditions

Add F5 Pool conditions

Condition	Description
Success	Activity succeeded in creating the F5 load balancer pool.
Failure	Activity failed to create the F5 load balancer pool.

Infoblox DDI activity pack

This activity pack supports Infoblox DDI management through ServiceNow Orchestration.

The Infoblox DDI activity pack manages the IP addresses used in a network by integrating DNS and DHCP. Custom Orchestration activities use Infoblox Web API (WAPI) REST web services to access the Infoblox GRID server.

Important: Managing IP addresses through the Infoblox server requires a fully functional MID Server.

Starting with the Jakarta release, the Infoblox activity pack updates to version 2. This update supports Infoblox network views, which can restrict the visibility of network data. The view parameter can be passed as a query parameter or payload content, to do operations in a specific view. Version 2 also supports specifying the version of WAPI to use in integration endpoints.

Supported for Infoblox:

- WAPI version 2.0 for REST messages
- NIOS appliance version 7.0

Note: To use the Infoblox DDI activities and workflow, you must request activation of the Orchestration - Infoblox DDI Activty Pack plugin.

Create a REST credential for Infoblox activities

All Infoblox activities require a REST credential to manage IP addresses from the Infoblox DDI server.

Before you begin
Before starting this procedure, make sure you have the following:

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- A properly configured and running Infoblox DDI Grid Server.
- REST credentials defined on the Infoblox DDI server.

Role required: admin

About this task

You must create a REST credential record on the ServiceNow instance that each Infoblox activity can use to access management features on the Infoblox server.

Procedure

1. Navigate to **All** > **Orchestration** > **Credentials** and click **New**.
2. In the list of credential types, select **Basic Auth Credentials**.
3. Create the credential record with a logical name, such as **InfobloxCred**.
4. Right-click in the header bar of your new credential record and select **Copy sys_id** from the context menu.
   Follow browser instructions to copy the sys_id if browser security measures restrict this function.
5. Paste the sys_id into the **restCredentials** input field of each activity you use.

Infoblox workflows

The Infobox DDI activity pack includes two default workflows, one that reserves and registers IP addresses and another that releases IP addresses.

To access these workflows, navigate to **Workflow** > **Workflow Editor** and select the **Workflows** tab. Click on a workflow to open it, and then click the information icon in the workflow header to display the properties dialog box.

Infoblox Reserve/Register IP in IPAM

Use this workflow to register IPv4 addresses or request the next available IP address on IPAM. Optionally, you can use it to register IP addresses on DNS. The custom Infoblox activities used in this workflow are:

- IPAM Register IP Address
- IPAM Reserve IP Address
- Register DNS A-Record
- Get Network Details

Infoblox Reserve/Register IP input variables

Field	Description
Infoblox Server	IP address of the Infoblox DDI server.
Network	Network containing the target IP address.
Zone	The DNS zone for the IP address being registered.
Rest Credentials	The sys_id of the REST credentials from the ServiceNow instance.
DNS Host Name	Name of the DNS server machine on which the IP address is being registered.

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Infoblox Reserve/Register IP input variables (continued)

Field	Description
IPv4 Address	IP address being reserved or registered.

Infoblox Release IPAM Reservations

Use this workflow to release (delete) all the IPAM reservations associated with an IPv4 address. The custom Infoblox activities used in this workflow are:

- IPAM List IP Reservations
- List DNS Record
- DNS Delete
- IPAM Delete

Infoblox Release IPAM Reservations input variables

Field	Description
Rest Credentials	The sys_id of the REST credentials from the ServiceNowinstance.
IP to Delete	IP address to release.
Infoblox Server	IP address of the Infoblox DDI server.

Infoblox roles and permissions

Define the roles and permissions that the Infoblox activities need to access the various resources on the Infoblox server.

Admin groups

There are three types of admin groups on an Infoblox server:

- Superuser
- Default
- Limited Access

To perform specific operations on the Infoblox server, the Limited Access user must have a minimum set of privileges for the desired resources, using either the user interface or an API. These privileges are based on read and read/write access. For more information, refer to the "About Admin Groups" section in the Infoblox NIOS Administrator Guide.

Permission hierarchy

1. **User**: A user can be part of multiple groups.
2. **Group**: A group can have many roles.
3. **Role**: Each role consistes of specific resource permissions.

Required permissions

The ServiceNow Infoblox activity pack requires appropriate read and read/write privileges for these resources:

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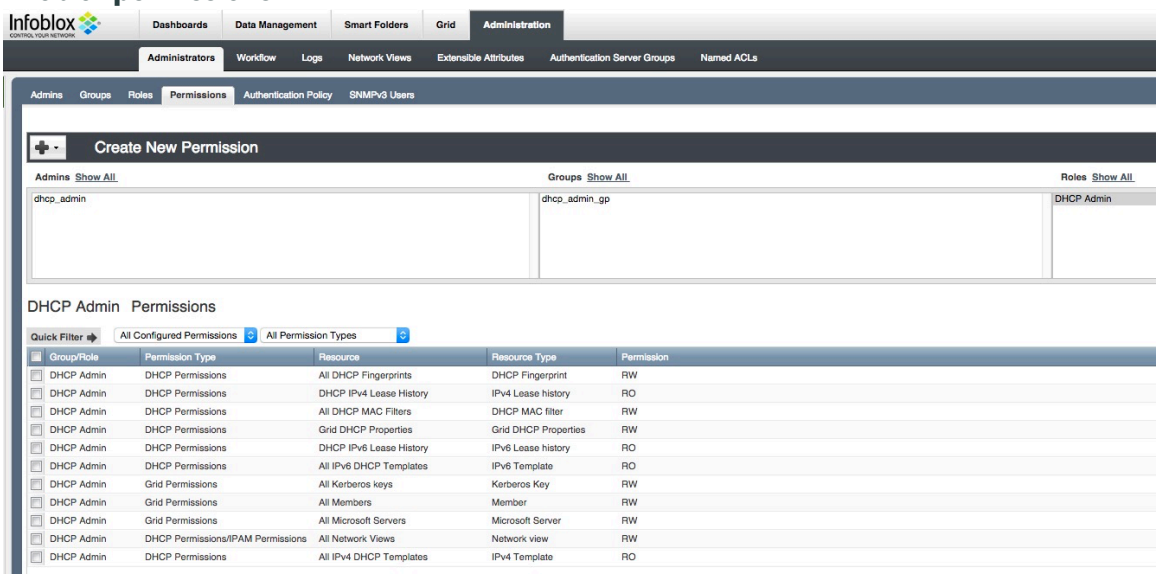
- Network
- DHCP
- DNS
- IPAM

This example shows a default DHCP admin role, its resources, and the related permissions for each.

Infoblox permissions



Infoblox DHCP activities

The Infoblox DHCP activities manage the IP addresses reserved for DHCP in your network.

Use these activities to reserve, list, or delete IP addresses that are used for DHCP assignment in your network.

DHCP Reserve IP v4 Address Range activity

The DHCP Reserve IP v4 Address Range activity reserves an IP address range for DHCP use.

The DHCP activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DHCP**.

Input variables

DHCP Reserve IP v4 Address Range input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
startIpAddress	Beginning IPv4 address of the range to reserve.
endIpAddress	Ending IPv4 address of the range to reserve.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.

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DHCP Reserve IP v4 Address Range input variables (continued)

Variable	Description
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

DHCP Reserve IP v4 Address Range output variables

Variable	Description
DHCPIpAddressRange	Range of reserved IPv4 addresses.
error	Displays the message for any REST error encountered.

Conditions

DHCP Reserve IP v4 Address Range conditions

Variable	Description
Success	Activity successfully reserved the specified IPv4 address range.
Failure	Activity failed to reserve the specified IPv4 address range.

DHCP Delete IP Reservation activity

The DHCP Delete IP Reservation activity deletes IP reservations in DHCP using either an IPv4 or IPv6 address range.

An automation can obtain an Infoblox DHCP object to delete from either of these activities:

- DHCP List IP Reservations
- DHCP Reserve IPv4 Address Range

The DHCP activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DHCP**.

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Input variables

DHCP Delete IP Reservation input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
ipToDelete	IP address range to delete, in the form: `range/<encrypted code>:<start range>/<end range>/default`
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

Output variables

DHCP Delete IP Reservation output variables

Variable	Description
DHCPDeletedIpRange	Range of deleted IP addresses.
error	Displays the message for any REST error encountered.

Conditions

DHCP Delete IP Reservation conditions

Variable	Description
Success	Activity successfully deleted the specified IP address range.
Failure	Activity failed to delete the specified IP address range.

DHCP List IP Reservations activity

The DHCP List IP Reservations activity generates a list of all the DHCP range reservations on a specific InfoBlox server.

The DHCP activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DHCP**.

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Input variables

DHCP List IP Reservations input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

DHCP List IP Reservations output variables

Variable	Description
reference	Reference value for an array of DHCP address ranges in this format: `range/<encrypted code>:<start range>/<end range>/default`
network	Address of the network containing the IP address range.
network_view	Routing doman associated with the network returned.

Conditions

DHCP List IP Reservations conditions

Variables	Description
Success	Activity successfully returned an array of DHCP IP address ranges.
Failure	Activity failed to return an array of DHCP IP address ranges.

Infoblox DNS activities

The Infoblox DNS activities manage DNS records in your network using an Infoblox DDI Grid Server.

Use these activities to register, list, or delete DNS records managed on an Infoblox server.

List DNS C-records activity

The List DNS C-records activity retrieves all canonical (CNAME) records from a specified Infoblox server.

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The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

List DNS C-records input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

List DNS C-records output variables

Variable	Description
error	Displays the message for any REST error encountered.
reference	Reference value for a DNS CNAME record, such as: `record:cname/ZG5zLmJpbmRfY25hbWUkL19kZWZhdWx0LmNvbS50ZXN0LmNuYW1l:cname.test default`
cannonicalName	CNAME record.
name	Name of the network option returned, such as *`domain-name-server`*.
view	The assigned view of the DNS data. A given zone can have multiple views, which are accesse depending on the IP address of the source of the query. The **default** view of DNS data for this activity is the network view.

Conditions

List DNS C-records conditions

Variable	Description
Success	Activity successfully listed the DNS C records.
Failure	Activity failed to list the DNS C records.

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Register DNS A-record activity

The Register DNS A-record activity creates a DNS A record on a specified Infoblox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

Register DNS A-record input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
network	Address of the network containing the IP address to register in the record.
hostName	Name of the actual server machine associate with the IP address in this record.
zone	The DNS zone associated with the record being created.
ipAddress	Specific IP address registered in this record.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

Register DNS A-record output variables

Variable	Description
error	Displays the message for any REST error encountered.
DNSARecord	Name of the record registered, expressed in the format: *record:host/<encrypted code>:<network name>/default*.

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Conditions

Register DNS A-record conditions

Variable	Description
Success	Activity successfully created the DNS A record.
Failure	Activity failed to create the DNS A record.

Register DNS C-Record activity

The Register DNS C-Record activity creates a DNS canonical (CNAME) record on a specified Infoblox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

Register DNS C-Record input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
cname	The DNS cannonical record to create, as expressed by the *c_name* value.
recordName	Name of the record to create.
zone	The DNS zone containing the cannonical record to create.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

Register DNS C-Record output variables

Variable	Desctiption
error	Displays the message for any REST error encountered.
DNSCRecord	Name of the CNAME record registered, expressed in the format: *record:cname/<encrypted code>:<network name>/default*.

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Conditions

Register DNS C-Record conditions

Variable	Description
Success	Activity successfully created the cannonical DNS record.
Failure	Activity failed to create the cannonical DNS record.

List DNS Record activity

The List DNS Record activity generates a list of all the DNS entries on a specific InfoBlox server.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Input variables

List DNS Record input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

List DNS Record output variables

Variable	Description
reference	Reference value for a DNS record, such as: `record:cname/ZG5zLmJpbmRfY25hbWUkL19kZWZhdWx0LmNvbS50ZXN0LmNuYW1l:cname.tes default`
configure_for_dhcp	Returns the status of a DHCP fixed address object.
host	Host machine with which the DNS record is associated.
ipv4addr	The reserved IPv4 address associated with a DNS record.

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List DNS Record output variables (continued)

Variable	Description
name	Name of the network option returned. For example, the name of the DNS record object from **reference** example is *cname.test.com*.
view	The assigned view of the DNS data. A given zone can have multiple views, which are acces depending on the IP address of the source of the query. The **default** view of DNS data for th activity is the network view.
error	Displays the message for any REST error encountered.

Conditions

List DNS Record conditions

Variable	Description
Success	Activity successfully listed all the available DNS record.
Failure	Activity failed to list the available DNS record.

DNS Delete activity

The DNS Delete activity deletes DNS records of any type from in Infoblox server, such as C and A records.

The DNS activities use the REST web service activity template to manage DNS records using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **DNS**.

Note: It is faster to create a new record than recover one that has been deleted.

Input variables

DNS Delete input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
RecordToDelete	Name of the DNS record to delete. The record is expressed in this format: *record:cname/ ZG5zLmJpbmRfY25hbWUkL19kZWZhdWx0LmNvbS50ZXN0LmNuYW11:cname.test. default*
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

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Output variables

DNS Delete output variables

Variable	Description
DeletedRecord	Name of the deleted DNS record.
error	Displays the message for any REST error encountered.

Conditions

DNS Delete conditions

Variable	Description
Success	Activity successfully deleted the specified DNS record.
Failure	Activity failed to delete the specified DNS record.

Infoblox IPAM activities

The Infoblox IPAM activities manage IP addresses in your network using an Infoblox DDI Grid Server.

Use these activities to register, reserve, list, or delete IP addresses.

IPAM Register IP Address activity

The IPAM Register IP Address activity registers an IP address in a network using Infoblox IPAM.

The output of this activity produces an InfoBlox IP address record that can be used for other IPAM functions in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM Register IP Address input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
macAddress	Mac address of the computer for which this IP address is registered.
ipAddress	Specific IP address to register.
network	Address of the network containing the registered IP address.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**.

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IPAM Register IP Address input variables (continued)

Variable	Description
	Note: This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

IPAM Register IP Address output variables

Variable	Description
error	Displays the message for any REST error encountered.
IPAddressRecord	IPAM record of the registered IP address.

Conditions

IPAM Register IP Address conditions

Variable	Description
Success	Activity successfully registered the specified IP address.
Failure	Activity failed to register the specified IP address.

IPAM Reserve IP Address activity

The IPAM Reserve IP Address activity reserves an IP address in a network using Infoblox IPAM.

The output of this activity produces an InfoBlox IP address record that can be used for other IPAM functions in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM Reserve IP Address input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
macAddress	Mac address of the computer for which this IP address is reserved.

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IPAM Reserve IP Address input variables (continued)

Variable	Description
network	Address of the network containing the reserved IP address. The Infoblox server reserves the next available IP address from this network.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

IPAM Reserve IP Address output variables

Variable	Description
error	Displays the message for any REST error encountered.
IPAddressRecord	IPAM record of the reserved IP address.
IPAddress	Selected IP address to reserve.

Conditions

IPAM Reserve IP Address conditions

Variable	Description
Success	Activity successfully reserved the specified IP address.
Failure	Activity failed to reserve the specified IP address.

IPAM List IP Reservations activity

The IPAM List IP Reservations activity returns an array of all IP Address within the named InfoBlox Server.

The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

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Input variables

IPAM List IP Reservations input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

The output of this activity produces an array of reserved IP addresses in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.

IPAM List IP Reservations output variables

Variable	Description
reference	Reference value of a reserved IP address contained in an array of addresses, such as `fixedaddress/ZG5zLmZpeGVkX2FkZHJlc3MkMTAuMC4xMDMuMTEuMC4u:0.0.0.11/default" ipv4addr: "0.0.0.11"`
ipv4addr	The reserved IPv4 address.
network_view	Routing domain associated with the network returned.
error	Displays the message for any REST error encountered.

Conditions

IPAM List IP Reservations conditions

Variable	Description
Success	Activity successfully retrieved the list of reserved IP addresses from the Infoblox server.
Failure	Activity failed to retrieve the list of reserved IP addresses from the Infoblox server.

IPAM Delete activity

The IPAM Delete activity deletes an IP Address within a named InfoBlox server.

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The IPAM activities use the REST web service activity template to manage IP addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **IPAM**.

Input variables

IPAM Delete input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
itemToDelete	The IP address to delete, in the format `fixedaddress/<encrypted key>:<reserved ip address>/<view>`.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

Output variables

IPAM Delete output variables

Variable	Description
DeletedRecord	IPAM record of the deleted IP address.
error	Displays the message for any REST error encountered.

Conditions

IPAM Delete conditions

Variable	Description
Success	Activity successfully deleted the specified IP address.
Failure	Activity failed to delete the specified IP address.

Infoblox network activities

The Infoblox network activities manage networks using an Infoblox DDI Grid Server.

Use these activities to create, list, or delete networks on an Infoblox server.

Create Network activity

The Create Network activity creates new networks on a specified Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

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To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Create Network input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
network	Address of the network to create.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

Create Network output variables

Variable	Description
NetworkCreated	Address of the network created.
error	Displays the message for any REST error encountered.

Conditions

Create Network conditions

Variable	Description
Success	Activity successfully created the network.
Failure	Activity failed to create the network.

Get Network Details activity

The Get Network Details activity retrieves the information about a specific network on an Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

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Input variables

Get Network Details input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
network	Address of the network whose details you want to see.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening in the default view.

Output variables

The output variables from this activity are objects on the Infoblox server used to identify network details. For more information, refer to the Infoblox documentation.

Get Network Details output variables

Variable	Description
error	Displays the message for any REST error encountered.
NetworkOptions	The *NetworkOptions* array contains these attributes: • *reference*: Reference value for the network requested. This value is in the form of `network/ZG5zLm5ldHdvcmskMTAuMS4wLjAvMTYvMA:10.1.0.0%2F1` • *options*: The *options* array contains these attributes: ◦ *name*: Name of the network option returned, such as *domain-name-server*. ◦ *num*: Index number of the option. For example, the index for *domain-name-server* is *6*. ◦ *use_option*: Indicates whether a DHCP option is used at that level in the network heirarchy. Set this value to **True** to override the Grid Level DHCP option with this option at the network level. ◦ *value*: Value to use for this option. For example, the value for the *domain-name-server* option is the IP address of the server machine. ◦ *vendor_class*: The class of the network object. The options are **DHCP**, **DNS**, or **IPAM**.

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Conditions

Get Network Details conditions

Variable	Description
Success	Activity successfully retrieved network details from the Infoblox server.
Failure	Activity failed to retrieve network details from the Infoblox server.

Delete Network activity

The Delete Network activity deletes a network from an Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Delete Network input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
networkToDelete	Reference number of the network to delete from the Infoblox server. You can obtain this value either by using the List Registered Networks activity or when creating a network with the Create Network activity. An example of the network reference value is: *`network/ZG5zLm51dHdvcmskMTUuMC40NS4wLzI0LzA:15.0.45.0/24/default`*.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If the field is empty, the orchestration activity will fail.

Output variables

Delete Network output variables

Variable	Description
DeletedNetwork	Reference number of the deleted network from the Infoblox server.
error	Displays the message for any REST error encountered.

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Conditions

Delete Network conditions

Variable	Description
Success	Activity successfully deleted the network.
Failure	Activity failed to delete the network.

List Registered Networks activity

The List Registered Networks activity retrieves all the networks associated with an Infoblox server.

The network activities use the REST web service activity template to manage network addresses using an Infoblox DDI Grid Server. These activities are configured to use a MID Server with REST capabilities.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Infoblox DDI** > **Network**.

Input variables

Activity input variables

Variable	Description
InfobloxServer	Name of the Infoblox DDI Grid Server.
restCredentials	The sys_id of the REST credentials from the ServiceNow instance.
api_version	Defines the version of WAPI to use for the integration endpoints. The default value is **2.0**. **Note:** This field is mandatory. If field is empty, the orchestration activity will fail.
view	Name of the Infoblox network view. The default value is **default**. **Note:** If the field is empty, the operation is treated as happening with no view and returns the values with data from all views.

Output variables

Activity output variables

Variable	Description
reference	Reference value of a registered network.
network	Network address.
network_view	Routing doman associated with the network returned.
error	Displays the message for any REST error encountered.

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Conditions

Activity conditions

Variable	Description
Success	Activity successfully retrieved the list of registered networks available on the Infoblox server.
Failure	Activity failed to retrieve the list of registered networks available on the Infoblox server.

PowerShell activity pack

PowerShell is built on the Windows .NET Framework and is designed to control and automate the administration of Windows machines and applications.

Orchestration provides custom PowerShell activities that were created with the PowerShell activity designer template. These activities perform the same functions as PowerShell activities by the same name from previous releases and replace those activities for all new workflows. These custom activities give workflow administrators the ability to store input and output variables in the databus.

Note: Existing workflows from earlier versions that were created with legacy PowerShell activities continue to function normally after an upgrade to Geneva. However, all new workflows must use these custom PowerShell activities.

Starting with the Brazil release, there are the following updates to the PowerShell activity pack:

- A new PowerShell probe (V2), which takes advantage of Integration Hub functionality
- The ability to insert debug statements in the PowerShell scripts and produce the resulting messages at runtime

To use the PowerShell custom activities, you must request activation of the Orchestration - PowerShell plugin. These activities are available in the Workflow Editor on the **Custom** tab. Expand the **Custom Activities** tree and select the PowerShell category for the activity you want to use.

ServiceNow supports PowerShell 3.0 to 5.1.

PowerShell activity designer

PowerShell activities are configured to return data to a workflow from a host using Microsoft PowerShell.

You must purchase Classic Orchestration to use this template. For specific information about using the tools in the activity designer, refer to these resources:

- Orchestration activity designer
- Create input variables
- Create a parsing rule

ServiceNow supports PowerShell 3.0 to 5.1.

PowerShell protocols and troubleshooting

PowerShell uses the Windows Management Instrumentation (WMI) and Windows Remote Management (WinRM) protocols to enable Orchestration activities to run commands on remote Windows hosts.

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Windows Management Instrumentation (WMI)

WMI provides a uniform interface for any local or remote applications or scripts that obtain management data from a computer system, a network, or an enterprise. WMI contains these components:

- **Managed objects and WMI providers**: A WMI provider is a COM object that monitors one or more managed objects for WMI. A managed object is a logical or physical enterprise component, such as a hard disk drive, network adapter, database system, operating system, process, or service.
- **WMI infrastructure**: The WMI infrastructure is a Microsoft Windows operating system component know as the WMI service (winmgmt). The WMI infrastructure is composed of the WMI Core and the WMI repository. The WMI repository is organized by WMI namespaces. The WMI service creates namespaces, such as `root\default`, `root\cimv2`, and `root\subscription`, at system startup and preinstalls a default set of class definitions, including the Win32 Classes, the WMI System Classes, and others. The remaining namespaces found on your system are created by providers for other parts of the operating system or products.
- **WMI consumers**: A WMI consumer is a management application or script that interacts with the WMI infrastructure. A management application can query, enumerate data, run provider methods, or subscribe to events by calling either the COM API or the Scripting API for WMI.

WMI installation and configuration

For the MID Server to successfully make a remote connection to the target host, TCP port 135 must be open. The Windows firewall automatically creates an inbound rule for WMI connectivity called Windows Management Instrumentation (DCOM-In).

Windows Remote Management (WinRM)

WinRM is the Microsoft implementation of WS-Management Protocol, a standard Simple Object Access Protocol (SOAP) protocol that allows hardware and operating systems from different vendors to interoperate.

WinRM contains these components:

- **WinRM Scripting API**: This scripting API enables Orchestration to obtain data from remote computers, using scripts that perform WS-Management protocol operations.
- **WMI Service**: The WMI service continues to run side-by-side with WinRM and provides requested data or control through the WMI plug-in. You can continue to obtain data from standard WMI classes, such as as Win32_Process.

WinRM configuration

WinRM is automatically installed on Windows 2008 R2 and above operating systems, but must be configured before use.

1. In a command prompt, enter **winrm quickconfig**. This command is not case sensitive.
2. When the console displays **Make these changes [y/n]?**, enter **y**.

   The `winrm quickconfig` command performs the following operations:

   - Starts the WinRM service, and sets the service startup type to **auto start**.
   - Configures a listener for the ports that send and receive WS-Management protocol, using either HTTP or HTTPS on any IP address.
   - Creates a firewall exception for the current user profile.

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MID Server PowerShell files

PowerShell functions are stored in script files (*.ps1) that use a PowerShell Script module (*.psm1) file name extension.

The PowerShell functions are used by the PowerShell MID Server script files included in these activity packs:

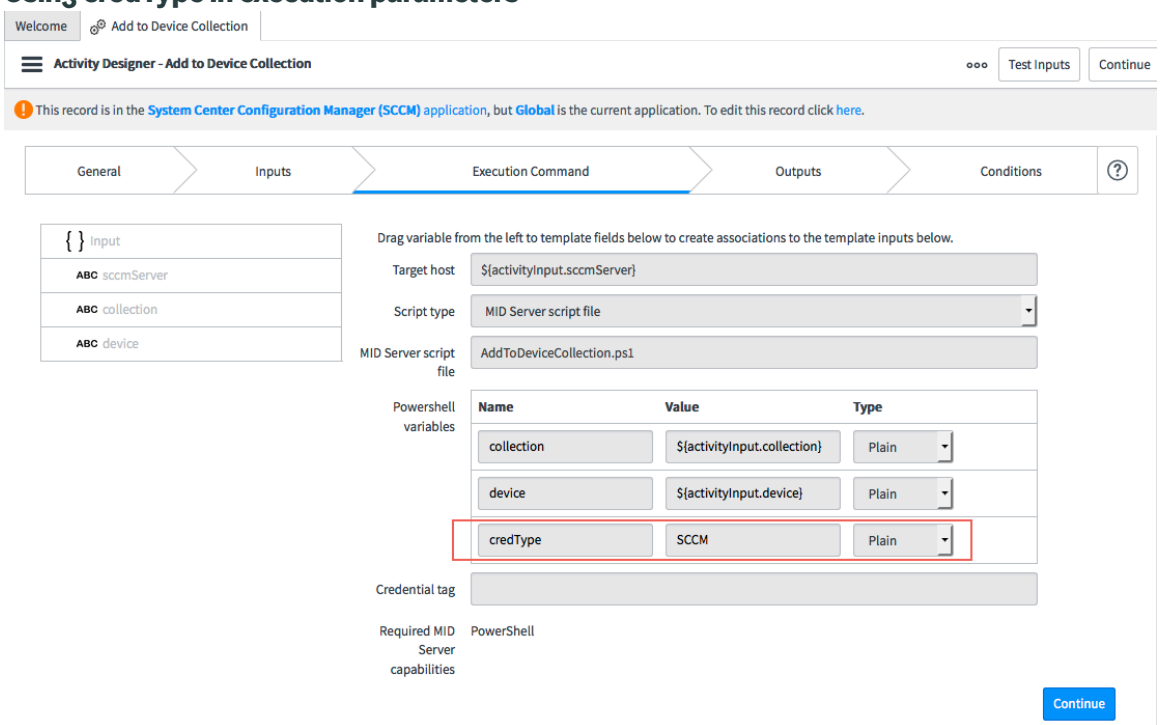
- Active Directory
- Exchange
- SCCM
- PowerShell

PSScript.ps1

This script performs a few tasks, such as credential testing, password encryption, and the execution of scripts configured in the Orchestration Activity Designer or in MID Script Files. However, this document focuses on how PSScript.ps1 uses the `credential.psm1` module for testing access to remote hosts.

The PowerShell variables are generally used directly in the PowerShell execution command or as arguments in the MID Server script file you specify. There are special variables that are passed to PSScript.ps1, such as *`credType`*.

Using credType in execution parameters



PowerShell credTypes

The PowerShell credential types:

Type	Description
WMI	testCredentialWMI
Exchange	testCredentilExchange

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Type	Description
AD	testCredentialAD
SCCM	testCredentialSCCM

If no credential type is passed to the PSScrip.ps1 script, the MID Server defaults to the WMI test function to test access to the target host. If there is a credential type used, the MID Server runs the corresponding test function for that credential type.

Exit codes

These exit codes are returned from the PSScript.ps1 script and logged in the MID Server log file.

PSScript.ps1 exit codes

Type	Test function
0	PowerShell command/script ran successfully.
1	Test finished successfully, but the command/script failed to execute.
2	Incorrect syntax passed to script.
3	All credentials including MID Server service account failed to execute the command/script.
4	Passed test and executed the activity, but an error was returned. Example user cannot be found.

DiagnosticsUtil.psm1

The MID Server uses this module file to perform PowerShell logging that assists debugging any Orchestration activity using PowerShell scripting. You can also add debugging statements directly to custom scripts.

PowerShell diagnostic utilities

Utility	Description
SNCLog-DebugInfo	Log a debug message for a PowerShell script or PowerShell Orchestration activity. Examples: • `SNCLog-DebugInfo -message "My debug message..."` • `SNCLog-DebugInfo "My debug message"`
SNCLog-ParameterInfo	Log a function parameter value. For `"function getHostName{ param( [String] $target )"`, the first value to the PowerShell hashtable is a string to indicate which function executes, and the values for each of the function parameters. Examples:

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PowerShell diagnostic utilities (continued)

Utility	Description
	• Function with single parameter: `SNCLog-ParameterInfo @("Running getHostName", $target)` **Note:** The debug message shows, `'Running getHostName $target:[actual value of $target]'`. • Function with multiple parameters: `SNCLog-ParameterInfo @("Running functionName", $param1, $param2, $param3)`
SNCObfuscate-Value	Use this utility to encrypt values for security purposes. The function displays `"$variableName":***`, where *** is the obfuscated value. Example: `SNCObfuscate-Value $password` **Note:** The debug message reads: `"$password : ***"`.

Credentials.psm1

The MID Server uses this module file to test access to a target host. The MID Server loops through all Windows credentials stored in its credentials table using the following access type functions, unless the PowerShell activity has a credential type (**credType**) defined. All ServiceNow® authored PowerShell activities are hard-coded to use a specific credential type. As a result, the MID Server only tests credential access against the designated function.

PowerShell test functions

Function	Description
testCredentialWMI	Tests the given user and password on the target host using the *`Get-WMI`* object.
testCredentilAD	Tests the given user and password on the target host using the built-in *`DirectoryEntry`* object.
testCredentialExchange	Tests the given user and password to create a session on an Exchange host. This test uses the built-in PowerShell remoting feature on a remote host. WinRM is configured on Exchange servers by default.
testCredentialSCCM	Tests the given user and password to create a session on an SCCM server. This test uses the built-in PowerShell remoting feature on a

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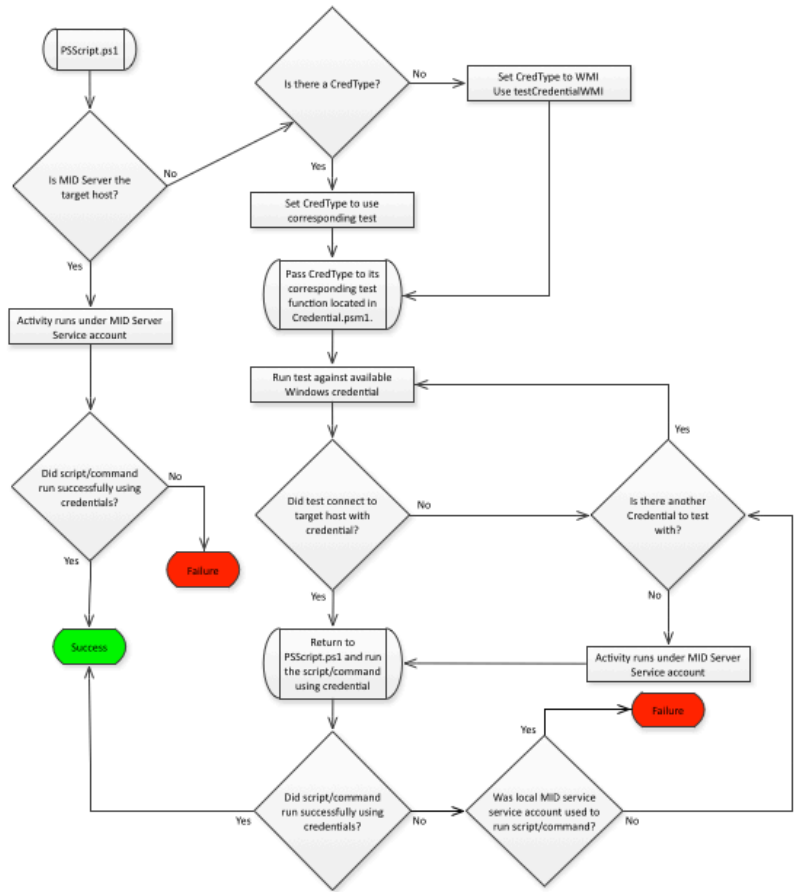
PowerShell test functions (continued)

Function	Description
	remote host. This test requires WinRM to be configured.
testNoCredentialAccessWMI	Tests the given user and password on the target host, using the *Get-WMI* object. This test is used when no **credType** is used.

Note: If the test passes using one of these functions, that credential is used to run the PowerShell script/command. If the tests fail to access the target host using these functions, the MID Server runs the PowerShell script/command under the account of the MID Server service.

This diagram illustrates the dependency of the credential selection behavior on the host being targeted by the PowerShell activity. If the target host is the IP address or host name of the MID Server, the MID Server bypasses all credentials in the Credentials table and uses the account of the MID Server service. If the target host is not the MID Server, then all Windows credentials are used first. If all credentials in the Credentials table are unsuccessful in running the PowerShell activity, then the MID Server uses the MID Server service account.

PowerShell credential selection criteria



ActiveDirectory.psm1

This module file stores the functions used by the PowerShell scripts shipped with the Active Directory activity pack.

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Exchange.psm1

This module file stores the functions used by the PowerShell scripts shipped with the Exchange activity pack.

SCCM.psm1

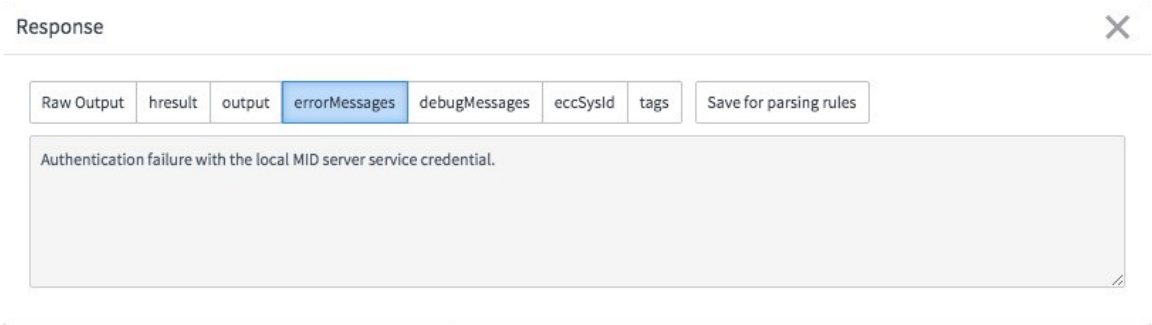
This module file stores the functions used by the PowerShell scripts shipped with the SCCM activity pack.

PowerShell troubleshooting

Authentication and access denied errors can prevent PowerShell activities from running a command on a target host.

Use these procedures for troubleshooting authentication failures with Orchestration PowerShell activities and when the Remote Procedure Call (RPC) server is unavailable or when access is denied. The authentication failure error displays when all credentials, including those of the local MID Server service account, do not have the correct permissions to run the Powershell script/command. The same error displays when the target host is unreachable.

Authentication error message



Authentication failure in an Active Directory activity

This example uses the Create AD Object activity to illustrate troubleshooting authentication failure in PowerShell.

Before you begin

Role required: Permissions to access and create accounts on Active Directory

About this task

Validate that the account you are using has the proper permissions to run the activity.

Procedure

1. Log on to the target machine using the account under which you want to run the activity. Active Directory tools must be installed on this machine.
2. Launch the Active Directory Users and Computers application.
3. Navigate to the OU under which you want to create the Active Directory object.
4. Attempt to create the object.

   If this procedure is successful under the specified user, the following might be the cause of the authentication failure:

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- User name is invalid.
- Password entered incorrectly.
- Domain controller is unreachable.

Note: The majority of the return codes listed in the MID Server log for this error are **1**s and **3**s. This is because the Active Directory activities use the ADSI provider and not WMI or WinRM. An error code of **1** means the account was able to connect with the test account, but running the script failed.

```
Attempting to use credential with username 'service-now\joel.zamallo
Running command:-> C:\Windows\System32\WindowsPowerShell\v1.0\powers
rShell\PSScript.ps1' -computer '10.11.144.230'   -script 'C:\Users\j
useCred $true -isDiscovery $false -debug $true; exit $LASTEXITCODE}"
Thread name is Powershell is executing...
The exit value from waitFor() is 1
The status code returned from running the command is 1
```

An error code of **3** means that the MID Server attempted to run the PowerShell activity under the MID Server service account but failed.

```
Worker-Standard:PowershellProbe DEBUG: Thread name is Powershell is executing...
Gobbling stdout: Powershell is executing... Gobbled: <powershell>
Gobbling stdout: Powershell is executing... Gobbled: <output>
Gobbling stdout: Powershell is executing... Gobbled: </output>
Gobbling stdout: Powershell is executing... Gobbled: </powershell>
Worker-Standard:PowershellProbe DEBUG: The exit value from waitFor() is 3
Worker-Standard:PowershellProbe DEBUG: The status code returned from running the command is 3
Worker-Standard:PowershellProbe DEBUG: Queuing Powershell Windows - Powershell (nodes: 3)
Worker-Standard:PowershellProbe Sending to queue: Powershell,Windows - Powershell (nodes: 3),1
Worker-Standard:PowershellProbe Document: <?xml version="1.0" encoding="UTF-8"?><results probe
<error>Authentication failure with the local MID server service credential.</error>
```

Authentication failure in an Exchange activity

This example uses the Create Mailbox activity to illustrate troubleshooting authentication failure in PowerShell.

Before you begin

Role required: Permissions to access and create mailboxes on the Exchange server

Procedure

1. Validate that the account you are using has the proper permissions to run the PowerShell activity.
2. Log on to a machine that has the Exchange Management Shell (EMS) installed.
3. Create a user using the `New-mailbox` Exchange commandlet.

Creating a new user in Exchange

```
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>
[PS] C:\Windows\system32>New-Mailbox -Name 'Test P. Smith' -Alias 'test.smith' -OrganizationalUnit 'discolab2.service-no
w.com/Managed Objects/Users/San Diego' -UserPrincipalName 'test.smith@discolab2.service-now.com' -SamAccountName 'test.s
mith' -FirstName 'Test' -Initials 'P' -LastName 'Smith' -Password 'System.Security.SecureString' -ResetPasswordOnNextLog
on $false_
```

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If this procedure is successful under the specified credential, the following is the likely cause of the failure:

- User name is invalid.
- Password entered incorrectly.
- Exchange server is unreachable.

4. If the Exchange server is unreachable, examine the MID Server logs.
   Because the Exchange activities use WinRM to access the Exchange server, the logs can provide more troubleshooting information.

Note: Ensure that the error is NOT **WinRM cannot process the request**.

Remote Procedure Call (RPC) server unavailable or access denied

Typically, this error is logged when running a PowerShell script/command that uses WinRM or WMI.

Possible causes of error

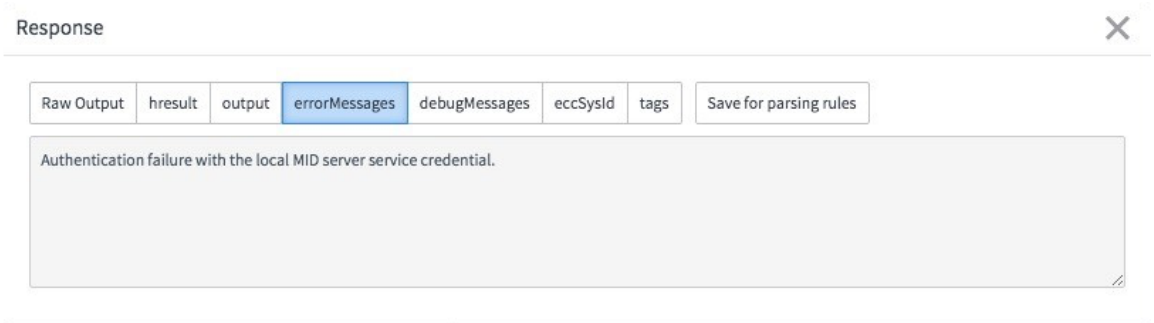
The target host might have one of these issues:

- WinRM isn't configured.
- Firewall is blocking access to the host over TCP port 135 (WMI) or HTTP/HTTPs and TCP port 5985 (WinRM).
- Kerberos issue, caused by hopping to multiple hosts using WMI.

Example WinRM error

The Create Mailbox activity from the Exchange activity pack has generated an error in the ECC queue involving authentication using the MID Server service credential. This occurred because the MID Server credential is the last to be used if the targeted host is not the MID Server.

Authentication failure error message



The MID Server log shows that the MID Server tried to run the activity under specific credentials, but wasn't successful and received an exit code of 1.

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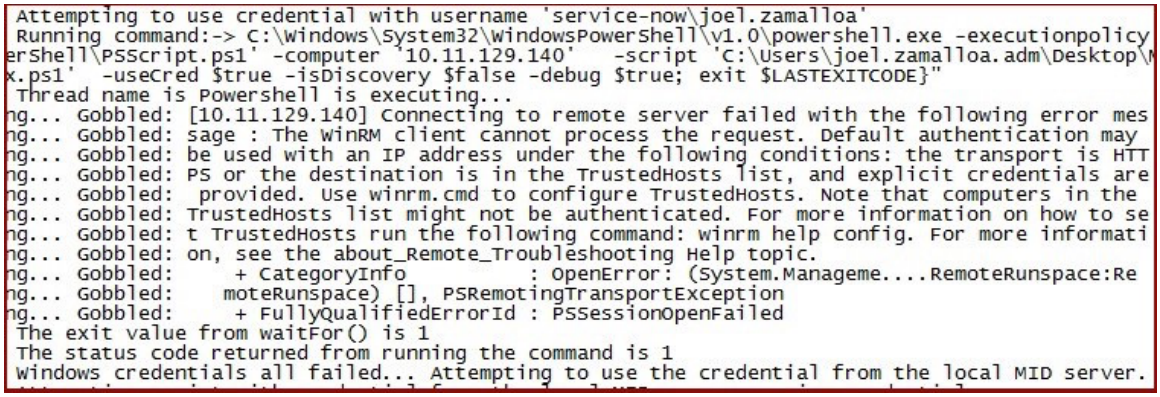
MID Server error code



```
Attempting to use credential with username 'service-now\joel.zamalloa'
Running command:-> C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -executionpolicy
erShell\PSScript.ps1' -computer '10.11.129.140'   -script 'C:\Users\joel.zamalloa.adm\Desktop\M
x.ps1'  -useCred $true -isDiscovery $false -debug $true; exit $LASTEXITCODE}"
Thread name is Powershell is executing...
ng... Gobbled: [10.11.129.140] Connecting to remote server failed with the following error mes
ng... Gobbled: sage : The WinRM client cannot process the request. Default authentication may
ng... Gobbled: be used with an IP address under the following conditions: the transport is HTT
ng... Gobbled: PS or the destination is in the TrustedHosts list, and explicit credentials are
ng... Gobbled:  provided. Use winrm.cmd to configure TrustedHosts. Note that computers in the
ng... Gobbled: TrustedHosts list might not be authenticated. For more information on how to se
ng... Gobbled: t TrustedHosts run the following command: winrm help config. For more informati
ng... Gobbled: on, see the about_Remote_Troubleshooting Help topic.
ng... Gobbled:     + CategoryInfo          : OpenError: (System.Manageme....RemoteRunspace:Re
ng... Gobbled:    moteRunspace) [], PSRemotingTransportException
ng... Gobbled:     + FullyQualifiedErrorId : PSSessionOpenFailed
The exit value from waitFor() is 1
The status code returned from running the command is 1
Windows credentials all failed... Attempting to use the credential from the local MID server.
```

Join Domain activity

The Join Domain activity joins a Windows computer to a domain.

If the computer is already a member of a domain, this activity completes without modifying the computer. Joining a domain requires a username and password. This user must have domain administration privileges or privileges to join a computer to the domain.

Note: This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Join Domain input variables

Variables	Description
Hostname	Hostname or IP address of the Windows server that is joining the domain.
Domain	Name of the domain to join.
Domain_user	The name of a user who has domain administration privileges or privileges to join a computer to the domain.
Domain_user_password	The password for the user who has domain administration privileges or privileges to join a computer to the domain.

Output variables

Join Domain output variables

Variables	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

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Conditions

Join Domain conditions

Condition	Description
Success	The activity succeeded in joining the computer to the domain.
Failure	The activity failed to join the computer to the domain.

Install Windows App activity

The Install Windows App activity installs an application from an MSI package on a Windows target machine.

Note: This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the PowerShell activity designer, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Install Windows App input variables

Variable	Description
hostname	Hostname or IP address of the target Windows machine on which the service is installed. Use the Resolve DNS MID Server capabilities to resolve hostnames into IP addresses.
installerpath	Path to the installer. The installer can be on any machine that is visible to both the MID Server and the target machine (local drive, UNC path, mapped drive, etc.).
installer	Name of the installer file, such as `winzip150.msi`. The installer must be an MSI package.
arguments	The parameter that contains the command line arguments to the MSI package. These are name=value pairs, separated by a space. For example, the argument might appear as: `INSTALLDIR=c:\myinstallfolder ADDDESKTOPICON=0`. These arguments are dependent on the what the actual MSI being installed defines. If there are no arguments, leave the field empty.

Output variables

Install Windows App output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

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Conditions

The activity state tells the workflow engine what to do with the activity.

Install Windows App conditions

Name	Description
Success	The Windows application was successfully installed on the target machine.
Failure	The Windows application failed to install on the target machine

Enable WMI Windows Installer provider

To install software on Windows machines using the Install Windows App activity, enable WMI Windows Installer provider on all target machines.

Before you begin

- It is recommended that the MID Server, the target machine, and the installer source machine be on the same Active Directory domain. However, if these computers are on separate domains, those domains must have a trust relationship established between them.
- If the installer path is a UNC file sharing machine, the Active Directory account of the target computer must be trusted for delegation. For instructions on this configuration, see the posting on the community for installing and uninstalling Windows applications.

About this task

Note: See WMI Providers for a list of Windows operating systems that provide this tool by default.

Procedure

1. Open the Control Panel.
2. Go to **Add or Remove Programs**.
3. Select **Add/Remove Windows Components**.
4. Double-click **Management and Monitoring Tools**.

   This action opens a secondary window displaying additional selections.
5. Select **WMI Windows Installer Provider** check box.
6. Click **OK** to return to the Windows Components Wizard window.
7. Click **Next**.
   You might be asked for the Windows installation CD to complete this process.

Change Service State activity

The Change Service State activity starts or stops a Windows service on a remote system.

This activity replaces a Powershell activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

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Input Variables

Change Service State input variables

Variable	Description
hostname	Hostname or IP address of the target Windows machine on which the service is installed. Use the Resolve DNS activity to resolve hostnames into IP addresses.
service	Name of the Windows service to start or stop. The *service* parameter is the service name, not the display name of the service affected.
state	There are two actions to select for a service state change: **StartService** or **StopService**.

Output variables

Change Service State output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If there is no error, this value is null.

Conditions

Change Service State conditions

Condition	Description
Success	The target service was successfully started or stopped.
Failure	The update to the target service was unsuccessful, or the service was not found on the target system.

Restart Windows Server activity

The Restart Windows Server activity stops and then restarts a Windows server using Powershell.

Note: This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Restart Windows Server input variables

Variable	Description
Hostname	Hostname or IP address of the Windows server to restart.

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Output variables

Restart Windows Server output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

Conditions

Restart Windows Server conditions

Condition	Description
Success	The activity succeeded in restarting the Windows server.
Failure	The activity failed to restart the Windows server.

Uninstall Windows App activity

The Uninstall Windows App activity uninstalls an application from a Windows target machine.

The only applications that can be uninstalled using this activity are those that were installed by a Windows Installer.

Note: This activity replaces a Powershell activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the Powershell activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Uninstall Windows App input variables

Variable	Description
hostname	Hostname or IP address of the Windows target machine on which to uninstall an application.
product	The name of the application to uninstall exactly as it appears in the Windows Add/Remove Programs list.

Output variables

Uninstall Windows App output variables

Variable	Description
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

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Conditions

Uninstall Windows App conditions

Condition	Description
Success	The activity succeeded in unistalling the application from the Windows server.
Failure	The activity failed to uninstall the application from the Windows server.

Probe activity pack

Orchestration provides an activity pack customized using the ServiceNow activity designer that runs probes on target hosts to return specific information.

These custom activities were built with the Create a probe activity, which gives workflow administrators the ability to store input and output variables in the databus.

To use the custom probe activities, you must request activation of the Orchestration - Probe plugin.

Resolve DNS Name activity

The Resolve DNS Name activity takes an IP address or a fully qualified domain name (FQDN), which it resolves into one or more IP addresses.

The domain name is sent through the MID Server to the domain name system (DNS) to resolve the name. If a single IP address is returned, it is stored in two variables: *`resolved_ip`* and *`resolved_ips`*. If multiple IP addresses are returned, the first IP address is stored in the *`resolved_ip`* variable, and all the addresses are stored in the *`resolved_ips`* variable. If an IP address is provided instead of an FQDN, this address is output directly to both variables. Your ServiceNow instance must have access to a MID Server configured to use Resolve DNS to run this activity.

This activity replaces an activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Probe activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Resolve DNS Name input variables

Variable	Description
FQDN	The fully qualified domain name to resolve or an IP address.

Output variables

Resolve DNS Name output variables

Variable	Desctiption
ip	The first IP address of the resolved DNS name.
ips	Comma separated list of resolved IP addresses.

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Resolve DNS Name output variables (continued)

Variable	Desctiption
result	One of the following: • **resolved**: Able to resolve the sprcified DNS name. • **unresolved**: Unable to resolve the specified DNS name.

Conditions

Resolve DNS Name conditions

Condition	Description
Success	Activity successfully resolved the DNS name.
Failure	Activity failed to resolve the DNS name.

SNMP Query activity

The SNMP Query activity queries an SNMP device.

Your ServiceNow instance must have access to a MID Server configured to use SNMP to run this activity.

This activity replaces an activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Probe activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

SNMP Query input variables

Variable	Description
hostname	Hostname or IP address of the SNMP device being queried.
oids	A list of unique object identifiers used to identify SNMP devices.

Output variables

SNMP Query output variables

Variable	Description
description	Description of the SNMP object.
timeout	Boolean value indicating whether or not the query timed out.
error	Indicates any error that occurred. If no error occurred, this value is null.

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SNMP Query output variables (continued)

Variable	Description
oid_data	An array of data objects for all unique object identifiers.

Conditions

SNMP Query conditions

Condition	Description
Success	Activity successfully ran the query on the target device.
Failure	Activity failed to run the query on the target device. Failure could be caused by invalid credentials or a device that is not accessible.

SCCM activity pack

The Microsoft System Center Configuration Management (SCCM) activity pack provides Orchestration activities you can use to manage software deployments and collections on an SCCM server.

You can use SCCM Orchestration activities to deploy and revoke software from an SCCM server or manage user and device collections. The system manages software on an SCCM server using Orchestration activities and workflows.

Client software distribution requires:

- SCCM 2012 R2 and later.
- Powershell 3.x.
- Powershell Remoting enabled.
- The Windows PowerShell x86 execution policy must be set to unrestricted mode.
- Latest version of the SCCM *cmdlet* library installed on the SCCM server.
- Use the credentials to log onto the SCCM Server and connect via Windows PowerShell from the System Center Configuration Manager console at least once to set the path variable for that credential.

Request SCCM activities

The Orchestration - System Center Configuration Manager plugin installs the SCCM activity pack that deploys software from an SCCM host and manages user and device collections.

Before you begin

Role required: admin

About this task

The SCCM plugin is activated automatically when the Orchestration - Client Software Distribution [com.snc.orchestration.sccm_mgnt] plugin is activated, but can be activated separately.

Note: The activities in the SCCM plugin run in the System Center Configuration Manager scope.

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Procedure

1. Navigate to **All** > **System Applications** > **All Available Applications** > **All**.
2. Select **Request plugin** to open the **Activate Plugin** form on Now Support.
3. On the **Activate Plugin** form, provide the following information.

Activate Plugin form

Field	Description
What is your target instance	Select the instance that you want to activate the plugin on.
Which plugin would you like to activate	Select the name of the plugin to activate. **Note:** If the system doesn't list the plugin you want or if you're activating the plugin on an OEM or on-premise instance, select the **Plugin I'm looking for is not listed** check box and then enter the name of the plugin.
Select Maintenance Date and Time	Select the date and time to activate the plugin.

Example

For example, see the following form to activate the Event Management plugin on an instance named SNC Instance.

4. Select **Submit**.
   After the maintenance window, the system installs the plugin on your instance. To confirm the installation, go to the Installed tab in the Application Manager.

Configure the MID Server for SCCM activities

To use a MID Server with Microsoft System Center Configuration Management (SCCM) activities, configure it to communicate with the SCCM server.

Before you begin

Role required: admin

Procedure

1. In the navigation filter, enter **cmdb_ci_dns_name.list**.
2. Click **New**.
3. Enter the fully-qualified domain name (FQDN) of the SCCM server in the **Name** field.
4. Right-click in the form header and select **Save**.
5. In the **IP Address** related list, click **New**.
6. In the **IP Address** field, enter the IP address of the SCCM server.
7. In the **Nic** field, select **eth0** or your preferred network interface controller.

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8. Leave the **Netmask** field blank.
9. Click **Submit**.

Add to Device Collection activity

The Add to Device Collection activity adds the specified device into a Microsoft System Center Configuration Manager (SCCM) device collection.

The Add to Device Collection activity uses the Powershell activity template to add a specified device to an SCCM device collection. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called `AddToDeviceCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note: The Add to Device Collection activity does not use pre-processing or post-processing scripts.

Input variables

Add to Device Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the device collection.
device	Name of the device to add to the collection.

Output variables

Add to Device Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow.
error	Variable that contains the activity output error message.

Conditions

Add to Device Collection conditions

Condition	Description
Success	Activity successfully added the device to the SCCM device collection.
Failure	Activity failed to add the device to the SCCM device collection.

Add to User Collection activity

The Add to User Collection activity adds a user to a Microsoft System Center Configuration Manager (SCCM) user collection.

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The Add to User Collection activity uses the Powershell activity template to access the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called `AddToUserCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note: The Add to User Collection activity does not use pre-processing or post processing scripts.

Input variables

Add to User Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the user collection.
user	Name of the user to add to the collection.

Output variable

Add to User Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow.
error	Variable that contains the activity output error message.

Conditions

Add to User Collection conditions

Success	Activity successfully added a user to the SCCM user collection.
Failure	Activity failed to add a user to the SCCM user collection.

Get Applications activity

The Get Applications activity returns a list of all the applications available on a Microsoft System Center Configuration Manager (SCCM) server.

The Get Applications activity uses the Powershell activity template to access the applications on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called `GetApplications.ps1`. This script filters the results of the GET, so that only specific attributes are returned for the applications on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable application data. The list of available applications is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note: The Get Applications activity does not use a pre-processing script.

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Input variables

Get Applications input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

Output variables

The output variables for the Get Applications activity contain an array of objects called *applications* and an error message. Each object in the array contains the attributes in this table.

Get Applications output variables

Variables	Description
applications	The *applications* array contains these attributes: • *id*: Primary key of the SCCM application. • *ciUniqueId*: Unique ID of the SCCM application. • *name*: Name of the application. • *manufacturer*: Manufacturer of the application. • *version*: Version of the application. • *isDeployable*: True/false value indicating if this application is deployable. • *isDeployed*: True/false value indicating if this application is already deployed. • *numberOfUsersWithApp*: Count of users with this application installed. • *numberOfDevicesWithApp*: Count of devices on which this application is installed. • *application*: Object containing the data set listed above for this application. Use the script to parse additional data from this set that you might need.
error	Variable that contains the activity output error message.

Conditions

Get Applications conditions

Variables	Description
Success	Activity successfully retrieved the list of applications available on the SCCM host.
Failure	Activity failed to retrieve the list of applications available on the SCCM host.

Get Deployments activity

The Get Deployments activity returns the list of deployments performed by Orchestration using a Microsoft System Center Configuration Manager (SCCM) server.

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The Get Deployments activity uses the Powershell activity template to access the deployments on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called *GetDeployments.ps1* that returns the deployments on the host. This script filters the results of the GET, so that only specific attributes are returned for the deployments on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable deployment data. The list of available deployments is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note: The Get Deployments activity does not use pre-processing scripts.

Input variables

Get Deployments input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

Output variables

Get Deployments output variables

Variable	Description
deployments	The *deployments* array contains these attributes: • *id*: Primary key of the SCCM application. • *applicationId*: Primary key of the SCCM application. • *softwareName*: Name of the software that will be deployed. • *collectionId*: Primary key of the SCCM collection. • *collectionName*: Name of the SCCM collection. • *desiredConfigType*: Possible values are: *Install* (1) and *Uninstall* (2). • *deploymentIntent*: Intended purpose of the deployment. Possible values are: **Available** (1) and **Required** (2) . • *numberSuccess*: Number of clients that successfully installed the deployment. • *numberErrors*: Number of clients with an error when installing the deployment. • *deployment*: Object containing the data set of attributes listed here for this deployment. Use the post-processing script to parse additional data from this set that you might need..
error	Variable that contains the activity output error message.

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Conditions

Get Deployments conditions

Condition	Description
Success	Activity successfully retrieved the list of deployments performed by Orchestration using an SCCM host.
Failure	Activity failed to retrieve the list of deployments performed by Orchestration using an SCCM host.

Get Device Collections activity

The Get Device Collections activity returns the list of available device collections on a Microsoft System Center Configuration Manager (SCCM) host.

The Get Device Collections activity uses the Powershell activity template to access the collections on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called `GetDeviceCollections.ps1` that returns the device collections on the server. This script filters the results of the GET, so that only specific attributes are returned for the device collections on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable device collection data. The list of available collections is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note: The Get Device Collections activity does not use pre-processing scripts.

Input variables

Get Device Collections input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server..

Output variables

Get Device Collections output variables

Variable	Description
deviceCollections	The `deviceCollections` array contains these attributes: • `id`: Primary key of the SCCM device collection. • `name`: Name of the SCCM device collection. • `collectionType`: Type of SCCM collection. In this case, the value is **device**. • `localMemberCount`: Count of device collection members visible at the local SCCM site.

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Get Device Collections output variables (continued)

Variable	Description
	• *memberCount*: Count of all device collection members. • *deviceCollection*: Object containing the data set of attributes listed here for this device collection. Use the post-processing script to parse additional data from this set to use.
error	Variable that contains the activity output error message.

Conditions

Get Device Collections conditions

Condition	Description
Success	Activity successfully retrieved a list of device collections available on the SCCM host.
Failure	Activity failed to retrieve a list of device collections available on the SCCM host.

Get User Collections activity

The Get User Collections activity returns the list of available user collections on a Microsoft System Center Configuration Manager (SCCM) server.

The Get User Collections activity uses the Powershell activity template to access the user collections on the SCCM server. The activity is configured to use a MID Server with Powershell capabilities and to run a MID Server script called *GetUserCollections.ps1* that returns the user collections on the host. This script filters the results of the GET, so that only specific attributes are returned for the user collections on the SCCM server. Filtering the results in this manner controls the size of the payload, while providing the most desirable user collection data. The list of available collections is returned as an array in a JSON object.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Note: The Get User Collections activity does not use pre-processing scripts.

Input variables

Get User Collections input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.

Output variables

Get User Collections output variables

Variable	Description
userCollections	The *userCollections* array contains these attributes:

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Get User Collections output variables (continued)

Variable	Description
	• *id*: Primary key of the SCCM user collection. • *name*: Name of the SCCM user collection. • *collectionType*: Type of SCCM collection. In this case, the value is **user**. • *localMemberCount*: Count of user collection members visible at the local SCCM site. • *memberCount*: Count of all user collection members. • *userCollection*: Object containing the data set of attributes listed here for this user collection. Use the post-processing script to parse additional data from this set to use.
error	Variable that contains the activity output error message.

Conditions

Get User Collections conditions

Condition	Description
Success	Activity successfully retrieved the list of available user collections on an SCCM host.
Failure	Activity failed to retrieve the list of available user collections on an SCCM host.

Is Device in Collection activity

This activity verifies if a device exists in an SCCM device collection.

The Is Device in Collection activity uses the PowerShell activity template to verify if a specific device exists in an SCCM device collection. The activity is configured to use a MID Server with PowerShell capabilities and to run a MID Server script called *IsDeviceInCollection.ps1* to perform the test.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Is Device in Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the device collection.
device	Name of the device to verify is in the collection.

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Output variables

Is Device in Collection output variables

Variable	Description
output	Variable that contains the test result: True/False
errorMessage	Variable that contains the activity output error message.

Conditions

Is Device in Collection conditions

Condition	Description
Exist	The device exists in the collection.
Not exist	The device does not exist in the collection.
Failure	Activity failed.

Is User in Collection activity

This activity verifies if a user exists in an SCCM user collection.

The Is User in Collection activity uses the PowerShell activity template to verify if a specific user exists in an SCCM user collection. The activity is configured to use a MID Server with PowerShell capabilities and to run a MID Server script called `IsUserInCollection.ps1` to perform the test.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Is User in Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the user collection.
user	Name of the user to verify is in the collection.

Output variables

Is User in Collection output variables

Variable	Description
output	Variable that contains the test result: True/False
errorMessage	Variable that contains the activity output error message.

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Conditions

Is User in Collection conditions

Condition	Description
Exist	The user exists in the collection.
Not exist	The user does not exist in the collection.
Failure	Activity failed.

Remove from Device Collection activity

The Remove from Device Collection activity removes a device from a Microsoft System Center Configuration Manager (SCCM) device collection.

The Remove from Device Collection activity uses the Powershell activity template to remove a device from a device collection on a Microsoft SCCM server. The activity is configured to use a MID Server with Powershell capabilites and to run a MID Server script called *`RemoveFromUserCollection.ps1`* to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Remove from Device Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the device collection.
device	Name of the device to add to the collection.

Output variables

Remove from Device Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow
error	Variable that contains the activity output error message.

Conditions

Remove from Device Collection conditions

Condition	Description
Success	Activity successfully removed the device from the SCCM device collection.
Failure	Activity failed to remove the device from the SCCM device collection.

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Remove from User Collection activity

The Remove from User Collection activity removes a user from a Microsoft System Center Configuration Manager (SCCM) user collection.

The Remove from User Collection activity uses the Powershell activity designer template to access a user collection on a Microsoft SCCM target host. The activity is configured to use a MID Server with Powershell capabilites and to run a MID Server script called `RemoveFromUserCollection.ps1` to edit the collection.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **System Center Configuration Manager (SCCM)**.

Input variables

Remove from User Collection input variables

Variable	Description
sccmServer	The fully qualified domain name (FQDN) of the SCCM server.
collection	Name of the user collection.
user	Name of the user to add to the collection.

Output variables

Remove from User Collection output variables

Variable	Description
output	Variable that contains a value that is passed to other activities in the workflow.
error	Variable that contains the activity output error message.

Conditions

Remove from User Collection conditions

Condition	Description
Success	Activity successfully removed the user from the SCCM user collection.
Failure	Activity failed to remove the user from the SCCM user collection.

SFTP File Transfer activity pack

Use the SFTP File Transfer activities to manage files and directories on an SFTP server and to move files from one SFTP server to another.

The SFTP activity pack includes scoped activities for common file transfer tasks and a ready-to-use workflow that includes these activities. Use the SFTP workflow to control which files are going to be moved, what conditions the files need to meet, the order in which the files are moved, and which overwrite options are executed.

Note: To use the SFTP File Transfer activities and workflow, you must request activation of the Orchestration - SFTP plugin.

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SFTP File Transfer workflow

The SFTP File Transfer activity pack includes a scoped workflow that uses multiple activities to manage files on SFTP servers.

The maximum activity count for the SFTP File Transfer workflow is set to 10,000. This allows the workflow to move up to 1000 files from one server to another.

Accessing the workflow

- Navigate to **Workflow** > **Workflow Editor** and select the **Workflows** tab.
- Click on the SFTP File Transfer workflow to open it.
- Click the information icon in the workflow header to display the properties dialog box.

Input variables

SFTP File Transfer workflow input variables

Variable	Description	Default value
Source host	Name or IP address of the server containing the files you want to move.	
Source port	Port number to use to communicate with the source server.	22
Source directory	Full path to the directory where the source files are located.	
Source files	Names of specific source files to move. Separate the file names in this list with semi-colons. This field supports the use of wild cards. For information about how the values in this field are affected by options in other fields, see the section below the table.	
Excluded files	Names of specific source files to exclude from the move. The system moves all other files found in the source directory or subfolders. Separate the file names in this list with semi-colons. This field supports the use of wild cards. For information about how the values in this field are affected by options in other fields, see the section below the table.	
Target host	Name or IP address of the server to which the files are being moved.	
Target port	Port number to use to communicate with the target host.	22
Datetime format	Timestamp format to apply when the `$[DateTime]` variable is used in the **Target directory** or **Target files** field. The system uses the current time from the instance to create timestamp values.	yyyy-MM-dd
Target directory	Path to the directory in the target host where the files are being moved. You can specify a target directory whose name includes the timestamp by adding the `$[DateTime]` variable to the directory name. For example, you might enter this path to a target directory: `/user/jacinto.gawron/documents/projects_$[DateTime]`. This produces the `projects_20150505` directory. When the timestamp variable is used, the system uses the format specified in the **Datetime format** field.	

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SFTP File Transfer workflow input variables (continued)

Variable	Description	Default value
Target file	Format to use for target file names when a timestamp is added. You can configure the system to add the timestamp as a prefix to the file name or insert the timestamp into the name, using these variables: • `$[DateTime]`: Current timestamp, using the format defined in the **Datetime format** field. • `$[SourceFile]`: Complete file name. • `$[SourceFile:Base]`: Base file name without the extension. • `$[SourceFile:Ext]`: File extension only. A target file name with the timestamp added as a prefix is expressed as: `$[DateTime]_$[SourceFile]`. This produces a file name that looks like this: `20150505_file1.txt` A target file name with the timestamp inserted into the name is expressed as: `$[SourceFile:Base]_$[DateTime]$[SourceFile:Ext]`. This produces a file name that looks like this: `file1_20150505.txt`	
Apply move conditions	Check box to apply conditions to the file transfer. If this check box is selected, additional fields appear for setting conditions.	false
Minimum file size, in bytes	Condition that defines a target file's minimum size requirement. This setting can help determine if the file is valid. This field appears when the **Apply move conditions** check box is selected.	0
Maximum file size, in bytes	Condition that defines a target file's maximum size requirement. This field appears when the **Apply move conditions** check box is selected.	-1
File is not older than	Condition that sets the earliest acceptable date for this file's age range. The range starts at 00:00 (midnight) on the date specified. This field appears when the **Apply move conditions** check box is selected.	
File is not newer than	Condition that sets the latest acceptable date for this file's age range. The range ends at 23:59 on the date specified. This field appears when the **Apply move conditions** check box is selected.	
Include subfolders	Check box to move the files from subfolders in the source directory. For information about how your selection affects other fields in the form, see the section below the table.	
Move order	Order in which the files are moved from the source to the target. The possible options are: • **None** (same order as files in the source directory) • **By timestamp** • **By file name** • **By file size**	

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SFTP File Transfer workflow input variables (continued)

Variable	Description	Default value
Sort order	Order in which the files are sorted in the target directory, using the option selected in the **Move order** field. Sorting options are **Ascending** and **Descending**.	desc
Maximum number of retries	Number of attempts the activity can make to connect to the target host or to move a file before timing out. When the retry limit to move a file or to connect to the host is exceeded, the system logs a failure. If the maximum number of failures is not exceeded, the system attempts to connect again or to move the next file named.	2
Time between retries, in seconds	Time, in seconds, between repeat attempts to connect to the target or to begin moving a file.	10
Maximum number of failures	Acceptable number of times the system can fail to connect to the target host or to move a file before it quits trying. A failure occurs when the number of configured retries is exceeded. Using the default settings, failure occurs when the system cannot connect to the target or move a file after two retries.	0
Duplicate file action	Action to take if a file being moved already exists in the target directory. The choices are: • **Overwrite if file exists** (default) • **Rename with index** • **Do not move**	overwrite
Preserve file attributes	Check box to use the time stamp and mode information from the source files for the copied files. If this check box is cleared, the copied files have a current time stamp and mode. **Note:** This timestamp is a file attribute and is not appended to the file name.	false
Upon success, remove files from source	Check box to delete original files from the source directory when they are copied to the new location. Clear this check box to keep the source files in their current location in the source host.	false
Upon failure, keep moved files on target	Check box to keep any files on the target that were moved successfully, even if the entire file transfer operation ended in failure. If this check box is cleared, the system removes all successfully transfered files from the target when general failure occurs.	true
Credential tag for source	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the source host.	

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SFTP File Transfer workflow input variables (continued)

Variable	Description	Default value
Credential tag for target	Specific credential tag this activity must use to run SSH commands on the target host.	

File selection logic

When selecting the files to move from the source host, the system uses this logic:

- If the **Source files** and **Excluded files** fields are empty, the system moves all the files in the source directory.
- When the **Include subfolders** check box is selected, the following dependencies exist:
  - If no files are specified in the **Source files** and **Exclude files** fields, the system moves all files in the source directory and all files in all subfolders of the source directory.
  - If the **Source files** field contains file names, the system moves those files from their location on either the source directory or any of its subfolders.
  - If the **Exclude files** field contains file names, the system moves all the files from the source directory and its subfolders except those excluded files.
- When the **Include subfolders** check box is cleared, the system looks only in the source directory for files to move or exclude.

Copy File activity

The Copy File activity copies a file from an SFTP server (source host) to another SFTP server (target host).

Input variables

Copy File input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to transfer.
sourcePort	Port number to use to communicate with the source server. The default port number is **22**.
sourceFilePath	Full path to the file to copy from the source host.
targetHost	Name or IP address of the server to which you want to move the files.
targetPort	Port number to use to communicate with the target server. The default port number is **22**.
targetFilePath	Full path to the copied file on the target host.
tempFileSuffix	Temporary suffix to use when moving a file. If this field contains a value, the activity deletes the duplicate target file, if it exists, and then copies the source file to a temporary file using *`targetFilePath + tempFileSuffix`* as the name. Upon completion, the activity renames the file to the actual target file name. If this field is blank, the

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Copy File input variables (continued)

Variable	Description
	activity copies the source file directly to the target file and overwrites it, if it already exists.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the source host.
targetCredentialTag	Specific credential tag this activity must use to run SSH commands on the target host.

Output variables

Copy File output variables

Variable	Description
errorMessages	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Text message advising that the command was executed successfully.

Conditions

Copy File conditions

Condition	Description
Success	The activity succeeded in copying the file.
Failure	The activity failed to copy the file.

Create Directory activity

The Create Directory activity creates a new directory on an SFTP server.

Input variables

Create Directory input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to move.
sourcePort	Port number to use to communicate with the source server. The default port number is **22**.
sourceDirectory	Path to the target directory to create.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

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Output variables

Create Directory output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Text message advising that the command was executed successfully.

Conditions

Create Directory conditions

Variable	Description
Success	The activity succeeded in creating the directory.
Failure	The activity failed to create the directory.

Get File List activity

The Get File List activity returns a list of files from a given directory and its subdirectories on an SFTP server (source host).

Input variables

Get File List input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to list.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceDirectory	Path to the target directory containing the files to list.
sourceFiles	List of target files to return. This is a comma separated list that accepts wildcards, such as ***.txt**.
excludedFiles	List of target files to exclude. This is a comma separated list that accepts wildcards, such as ***.txt**.
includeSubfolders	True/false variable that determines if files from subfolders are included in the list. The default value for this variable is **false**.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Get File List output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed. An activity can examine the error message to customize a condition. For example, if the

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Get File List output variables (continued)

Variable	Description
	error message contains *NO_SUCH_FILE*, the activity can be considered successful, depending on circumstances.
result	List of requested files, returned as a JSON string.

Conditions

Get File List conditions

Condition	Description
Success	The activity succeeded in listing the requested files.
Failure	The activity failed to list the requested files.

Remove File or Directory activity

The Remove File or Directory activity removes a file or a directory on an SFTP server, including subdirectories, when configured.

Input variables

Remove File or Directory input variables

Variable	Description
sourceHost	Name or IP address of the server containing the files you want to remove.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceFilePath	Full path to the file or directory to remove. To remove multiple files or directories using a single activity, enter a semicolon-separated list of paths in this field.
isDirectory	True/false variable that determines if the specified file path is a directory. The default value for this variable is **false**.
includeSubfolders	True/false variable that determines if the given directory and all of its subfolders should be removed. The default value for this variable is **false**. If the value for this field is **false**, then the activity can only remove an empty directory. This field appears when the **isDirectory** checkbox is selected.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Remove File or Directory output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

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Remove File or Directory output variables (continued)

Variable	Description
result	Either **success** or **failure**.
deletionResults	The *deletionResults* array contains these attributes: • *fullPath*: Full path to the file or directory targeted. • *status*: Either **succeeded** or **failed**. • *reason*: Text message describing the cause of a failure.

Conditions

Remove File or Directory conditions

Condition	Description
Success	The activity succeeded in removing the file or directory specified.
Failure	The activity failed to remove the file or directory specified.

Rename File or Directory activity

The Rename File or Directory activity renames a file or directory to a new name on an SFTP server.

Input variables

Rename File or Directory input variables

Variable	Description
sourceHost	Name or IP address of the server containing the file or directory you want to rename.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceFilePath	Full path to the file or directory to rename.
targetFilePath	Full path to the renamed file or directory.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Rename File or Directory output variables

Variable	Description
errorMessages	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.

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Rename File or Directory output variables (continued)

Variable	Description
result	A message saying that the operation has been successful. For example, you might see: `Rename /tmp/sftp_test/subdir1 to /tmp/sftp_test/subdir2 complete`.

Conditions

Rename File or Directory conditions

Condition	Description
Success	The activity succeeded in renaming the file or directory.
Failure	The activity failed to rename the file or directory.

Set File Attributes activity

The Set File Attributes activity sets common file attributes, such as timestamps, size, permissions, and UID/GID, for a file or directory on an SFTP server.

A good practice is to use the Get File List activity to return a list of files and their attributes first. Then, when you moved a file from a source host to a target host, use the Set File Attributes activity to set the source file attributes on the target file. This is demonstrated in the SFTP File Transferworkflow.

Input variables

Set File Attributes input variables

Variable	Description
sourceHost	Name or IP address of the server containing the file or directory whose attributes you want to change.
sourcePort	Port number to use to communicate with the target server. The default port number is **22**.
sourceFilePath	Full path to the file or directory whose attributes you want to change.
userID	User ID attribute to apply to the file or directory. The UID and GUID variables must be set together as a pair.
groupID	Group ID attribute to apply to the file or directory. The UID and GUID variables must be set together as a pair.
permissions	File or directory permissions to set for the user and group specified. This value must be expressed as an integer, such as **16877**, which defines these permissions: *rwxr-xr-x*. **Note:** The permissions number is an internal value returned by the Get File List activity.
accessTimestamp	Override the timestamp when the file or directory was last accessed. The access and modification timestamps must be set together as a pair.

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Set File Attributes input variables (continued)

Variable	Description
modificationTimestamp	Override the timestamp when the file or directory was last modified. The access and modification timestamps must be set together as a pair.
sizeInBytes	Size of the file or directory, expressed in bytes.
sourceCredentialTag	Specific Credential aliases for Orchestration activities this activity must use to run SSH commands on the host.

Output variables

Set File Attributes output variables

Variable	Description
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources. If this variable is not null, the operation has failed.
result	Text message advising that the command was executed successfully.

Conditions

Set File Attributes conditions

Condition	Description
Success	The activity succeeded in changing the attributes of the specified file or directory.
Failure	The activity failed to change the attributes of the specified file or directory.

SSH activity pack

Orchestration provides an activity pack of SSH activities that were customized using the ServiceNow activity designer.

These activities perform the same functions as SSH activities by the same name from previous releases and replace those activities for all new workflows. The custom SSH activities were built with the Create an SSH activity, which gives workflow administrators the ability to store input and output variables in the databus.

Note: Existing workflows from earlier versions that were created with legacy SSH activities continue to function normally after an upgrade to Geneva. However, all new workflows must use these custom SSH activities.

To use the SSH custom activities, you must request activation of the Orchestration - SSH plugin.

Secure Copy activity

The Secure Copy activity copies a file from one host to another, without storing the copied file on the MID Server.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer

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template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Secure Copy input variables

Input variable	Description
from_host	Host name or IP address of the source machine.
from_scp_file	Name of the file to copy, including the absolute path.
to_host	Host name or IP address of the target machine.
to_scp_file	Path to the target file. This path can be absolute or relative to the logged in user's home directory.
debug_mid	Check box that enables debug logging when selected.
debug_ssh	Check box that enables J2SSH debug logging when selected.

Output variables

Secure Copy output variables

Output variable	Description
payload	The *executionResult.payload* from the Activity designer parsing sources.
output	The *executionResult.output* from the parsing sources.

Conditions

Secure Copy conditions

Condition	Description
Success	Activity successfully copied the file from one host to another.
Failure	Activity failed to copy the file from one host to another.

Files Compare activity

The Files Compare activity compares two files on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Global** > **Orchestration - SSH**.

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Input variables

Files Compare input variables

Input variable	Description
Hostname	Hostname or IP address of the destination server for SSH activity.
Directory	Name of the working directory.
OldFile	Name of the first file to compare.
NewFile	Name of the second file to compare.

Output variables

Files Compare output variables

Output variable	Description
contents	File comparison result. This is the difference of the two compared files.
result	Either **success** or **failure**.
return-code	Either **0**, if the two files are the same, or **1**, if the two files are different.
errorMessage	The *`executionResult.errorMessages`* from the Activity designer parsing sources.

Conditions

Files Compare conditions

Condition	Description
Success	Activity successfully compared the specified files.
Failure	Activity could not complare the specified files.

File Read activity

The File Read activity reads a file on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Global** > **Orchestration - SSH**.

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Input variables

File read input variables

Input variable	Description
Hostname	Hostname or IP address of the destination server for SSH activity.
Directory	Name of the working directory.
File	The name of the file to read.

Output variables

File read output variables

Output variable	Description
contents	Content of the file to read.
result	Either **success** or **failure**.
errorMessage	The *executionResult.errorMessages* from the Activity designer parsing sources.

Conditions

File Read conditions

Condition	Description
Success	Activity successfully read the contents of the specified file.
Failure	Activity could not read the contents of the specified file.

File Write activity

The File Write activity writes a file on a Linux or UNIX computer.

The source file can be an absolute or relative path from the Directory. If an absolute path is used, then no value is required in the *Directory* field.

This activity replaces an SSH activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

File Write input variables

Field	Description
hostname	Hostname or IP address of destination server for SSH activity.
directory	Name of the working (target) directory.

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File Write input variables (continued)

Field	Description
file	Name of the file to be written.
behavior	Select one of the following: • **overwrite**: Creates the file if it does not exist and overwrites the file if it does exist. • **append**: Creates the file if it does not exist and appends the new content to an existing file. • **create only**: Creates the file if it does not exist and fails if the file does exist.
contents	What to write or append (depending on the behavior) to the file

Output variables

File Write output variables

Variable	Description
return_code	Indicates whether or not the file write operation was successful.
error_message	Message that indicates if an error has occurred. Any value other than **0** indicates a failure.

Conditions

File Write conditions

Condition	Description
Success	The activity wrote a file in the target directory.
Failure	The activity failed to write a file in the target directory.

File Copy activity

The custom File Copy activity copies a file on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Geneva. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Geneva. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity designer template, which gives workflow administrators the ability to store input and output variables in the databus.

To access this activity in the Workflow Editor, select the **Custom** tab, and then navigate to **Custom Activities** > **Global** > **Orchestration - SSH**.

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Input variables

File Copy input variables

Input variable	Description
hostname	Hostname or IP address of destination server for SSH activity.
directory	Name of the working directory.
src_file	Name of the source file.
dst_file	The name of the destination file.

Output variables

File Copy output variables

Output variable	Description
result	Either **success** or **failure**.

Conditions

File Copy conditions

Condition	Description
Success	Activity successfully copied the file on the specified host.
Failure	Activity failed to copy the file on the specified host.

File Replace String activity

The File Replace String activity finds and replaces a string in a file on a Linux or UNIX computer.

This activity replaces an SSH activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

File Replace String input variables

Variable	Description
hostname	Hostname or IP address of destination server for SSH activity.
directory	Name of the working (target) directory.
file	Name of the file in which the string is to be replaced.
find_pattern	A regular expression of the text to replace.
replace_string	The replacement string for the text found by the expression in the *find_pattern* variable.
options	Replacement options:

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File Replace String input variables (continued)

Variable	Description
	• **first**: Replaces the first occurence of the pattern. • **all**: Replaces all occurrences of the pattern.

Output variables

File Replace String output variables

Variable	Description
return_code	Indicates whether or not the string was replaced successfully in the target file.
error_message	Message that indicates if an error has occurred. Any value other than **0** indicates a failure.

Conditions

File Replace String conditions

Condition	Description
Success	The activity has successfully replaced the string in the file.
Failure	The activity has failed to replaced the string in the file.

Reset Linux User Password activity

The *Reset Linux User Password* activity resets the password for a given user on a Linux computer.

This activity requires that the user executing the command be able to run the **chpasswd** command and, if expiring the password immediately, to run **chage** with MID Server privileged commands.

This activity replaces an SSH activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the SSH activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Reset Linux User Password input variables

Variable	Description
hostname	IP address of the target Linux machine.
user	Name of the user whose password is being reset.

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Reset Linux User Password input variables (continued)

Variable	Description
password	New password set for this user. The password is a workflow variable that is encrypted either as a **password2** field or by calling the encryption method of a *`Packages.com.glide.util.Encrypter`* object.
force_change	Indicates if this password is temporary and to force the named user to change the password at login.

Output variables

Reset Linux User Password output variables

Variable	Description
return_code	Indicates whether or not the user password reset action was successful.
error_message	Describes any error that occurred during password reset. If no error occurred, this value is null.

Conditions

Reset Linux User Password conditions

Variable	Description
Success	Activity successfully changed specified user's password
Failure	Activity failed to change specified user's password.

Global activities

Global activities are Orchestration activities created in the global scope.

Any activities you create in the global scope are listed in the Global category in the **Packs** and **Custom** tabs of the Workflow Editor.

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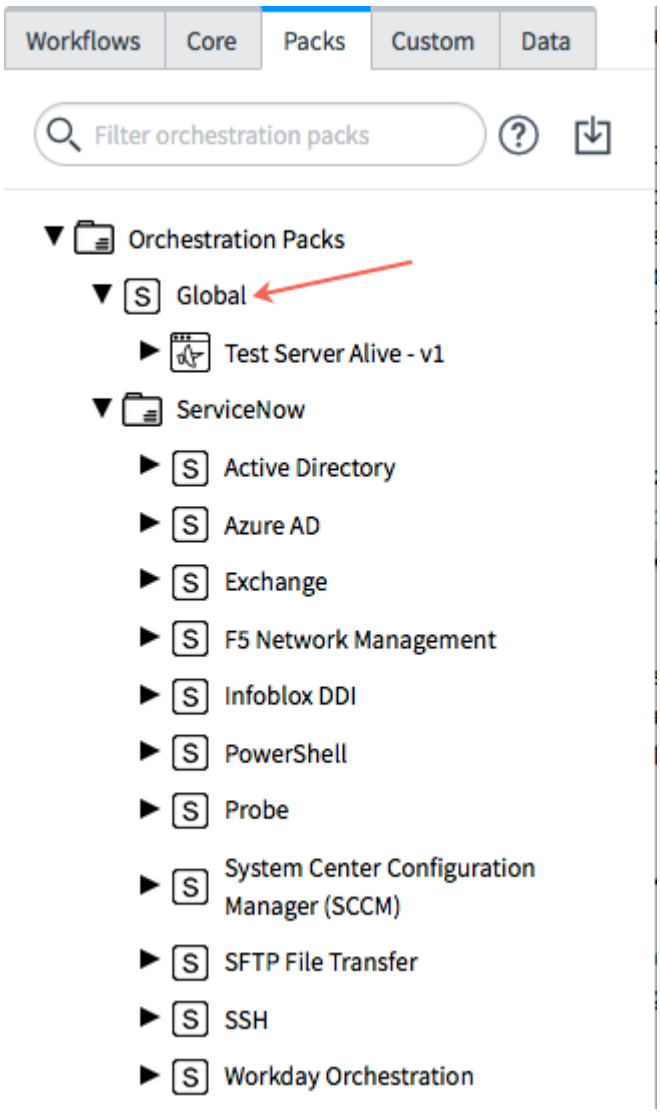
Global activities



Test Server Alive activity

The Test Server Alive activity determines if a target system is alive by its response to a particular protocol.

This activity replaces an activity by the same name available in releases prior to Istanbul. If you have a workflow created in a previous version that uses the deprecated activity, your workflow will continue to work normally after upgrading to Istanbul. However, all new workflows must use the custom version of this activity. This activity was built with the Probe activity template, which gives workflow administrators the ability to store input and output variables in the databus.

Input variables

Test Server Alive input variables

Variable	Description
port_probes	A comma separated list of protocols to use to check for signs of activity on the target machine (example: *wmi,wins,https,ssh,http,https,snmp,dns*)
hostname	Hostname or IP address of the target system to check.

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Output variables

Test Server Alive output variables

Variable	Description
alive	Code that indicates whether or not the server is alive. If any value but **'1'** is returned, the server is not alive.

Conditions

Test Server Alive conditions

Condition	Description
Success	Activity determined that the device is running.
Failure	Activity failed to determine if the target device is running. Failure could be caused by a missing protocol or a device that is not accessible.

Orchestration activity designer

The Orchestration activity designer enables a user with either the workflow_admin or activity_creator and workflow_creator roles to construct reusable activities that suit an organization's business needs.

Activities created by the activity designer offer the following advantages over core activities offered in previous releases:

- Reuse custom activities in multiple workflows.
- Upload and download custom activities from the ServiceNow Store.
- Parse data from standard input formats.
- Test input variables against a target host or endpoint and inspect the payload.
- Automatically map values from a test payload to an activity's output variables.
- Share data between activities.
- View previous versions of an activity.

Access to the activity designer requires activation of ServiceNow Orchestration. For instructions about managing transitions and conditions for all activities, see Workflow activities.

Orchestration provides numerous pre-defined activities, which are reusable components that can be used in numerous workflows without having to understand the complexities of the underlying system. These activities are grouped into activity packs, which address specific business needs, such as: Active Directory, Azure AD, Exchange, Infoblox DDI, and PowerShell. There are other ServiceNow applications which provide and maintain their own separate activity packs, such as Security Incident Response, Cloud Management, or Release Automation.

Customers can also build their own activities and activity packs. You can construct custom activities with a specified template through the Orchestration Activity Designer. Custom-built activities built with the Activity Designer are referred to as activity elements. Activity elements provide optimal operations, enable code reuse, and minimize the need to write code. They also

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enable you to follow the flow of data within a given workflow across orchestration activities. Incorporating activity elements limits the dependency on the scratchpad which reduces problems in complex workflows. Limit the use of core activities, like 'Run Script', unless you need direct access the scratchpad, for example, for a counter. Activity elements do not have direct access to the scratchpad. You can, however, pass scratchpad variables as inputs into your activities.

Orchestration activities created by the activity designer:

- Can be uploaded and shared in the ServiceNow App Store
- Use the databus, which allows the activity to have well-defined inputs and outputs
- Share data across activities within a workflow
- Use versioning
- Provide a consistent approach for activity development regardless protocol

Note: Prior to the Fujirelease, activities were built with Activity Definitions. In Fuji, a new architecture was introduced using the Activity Designer. Orchestration Core activities, built originally as Activity Definitions, have been converted to use the new template format (Activity Elements) and the databus offered with the activity designer. Workflows in upgraded instances that use legacy activities continue to work normally.

For instructions on using activities to construct a workflow, see Add an activity to a workflow.

Introduction to credentials, connections, and aliases for Orchestration

All application integrations in Orchestration require connection information, credentials, and connection and credential aliases to their respective applications to access resources.

Before you can execute an application integration in Orchestration, you must create and configure the corresponding connection information and credentials. The Connections pertains to an integration with a system, such as an IP address or endpoint with protocols. It contains specific details, such as database particulars, when integrating with a database. The associated Credentials are the authentication data required to make the connection.

Connection information and credentials can vary between QA/Development/Production environments for the same integration. The tight coupling between this data and application metadata, such as workflow or job scheduling, make application metadata obsolete when you change environments. To alleviate this problem, the concept of an alias is introduced, for connections and credentials, to decouple this data from application metadata. These aliases allow customers to design their application metadata to couple to an alias, which during runtime resolves to connection and credential data.

There are two types of aliases, a connection and credential alias and a credential alias. There are business rules that enforce certain constraints on these aliases. Names should contain alphabets, numbers, and underscores but cannot have special characters. The alias must be unique in a scope. If you choose to have multiple active connections, you can have more than one active connection in the same domain. If you do not choose this option, you can have only one active connection in per domain.

Note: If you enable multiple active connections, when the connection records resolve, your application picks one connection based on an established order. The order of the connections depends on the API you use to retrieve connection data.

You can add additional connection attributes to an alias, which are available in connection data during run time. Variables overridden by connection administration during run time should not affect the alias.

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The credential alias resolves only credential data. Along with alias data model, you can use a scriptable API which can get connection and credential data during runtime.

Using Connection and Credential Alias with Orchestration

Define an alias to label a credential or connection record.

The Credential and Connection Alias defines an alias that labels a credential or connection record. It is extended from the sys_metadata table. It requires the admin role. The credential_admin and connection_admin have read access to sys_alias. A connection alias contains:

Name

Name of the alias.

ID

This field is based on the format "scope name.alias name" Unique index on ID to ensure unique record based on scope name + name. If the scope is global, the ID is the alias name.

Type

You can select either 'Credential' or 'Connection and Credential'. The default is Connection and Credential.

Connection type

This field is applicable when the alias type is set to Connection and Credential. There are three connection types: HTTP, JDBC, JMS. The default is HTTP.

If you create a workday alias in global scope, the ID is set to workday

If you create a workday alias in hr app scope, the ID is set to x_hr_app.workday

- Name can only contain alphabets, numbers and underscore.
- During the upgrade, the tag in credential record will be migrated to connection alias. If the tag in previous release's credential record contains special characters other than alphabets, numbers and underscore, the tag data will be preserved during the upgrade. The user still can use these connection alias, but the user cannot update these alias, unless he removes these special characters when do the update.

Using credentials with Orchestration

Orchestration requires credentials to access resources.

Credential table

The credential table (discovery_credential) defines credentials that can be used for integration. In the previous release, the Credential table contains a string-type tag field, which labels a credential and the tag is used in Orchestration activities. In the Madrid release, the credential alias is renamed from tag, and the type is changed from string to GlideList, which is a reference to the connection alias table.

Credential types

The following credential types are provided:

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Credential type	Description	Supports Test Credential option
Applicative credentials	The credentials to explore the applications on a device or computer. Discovery patterns used by ITOM Visibility often need applicative credentials.	No
Amazon Web Service credentials	The Amazon Web Services (AWS) main account, access key ID, and secret access key. **Note:** You cannot test AWS credentials through the Test	No
Azure Service Principal and Enterprise Agreement credentials	The Azure service principals required for an Azure subscription.	No
Basic authentication credentials	A user name and password.	No
CIM credentials	The user name and password required to access a CIMOM - Common Information Model Object Manager (CIM) server, which obtains information about VMware ESX servers.	No
Cloud credentials	Credentials that Orchestration uses to access cloud resources.	No
JDBC credentials	A user name and password to access a Java Database Connectivity (JDBC) connection.	Yes
JMS credentials	A user name and password to access to a Java Message Service (JMS).	Yes
OAuth 2.0 credentials	OAuth 2.0 credentials enable ServiceNow® to obtain access to user accounts on an HTTP service.	
SNMP community credentials	The community string to access devices via SNMP.	Yes
SNMPv3 credentials	The user name and keys required to access devices on your SNMP v3 network.	Yes
SSH credentials	The user name and password to access Linux and UNIX devices.	Yes
SSH credentials	The private key credentials to access Linux and UNIX devices. **Note:** For better security, SSH private key credentials are suggested over SSH password credentials.	Yes
VMware credentials	Credentials to access vCenter resources. These credentials are required for any work that is performed on vCenter, such as cloning a virtual machine.	Yes

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Credential type	Description	Supports Test Credential option
Windows credentials	The user name and password required to access Windows computers. Several Windows credentials must be met to use Windows credentials.	Yes

How MID Servers use credentials

By default, Windows MID Servers use the login credentials of the MID Server service on the host machine to discover Windows devices in the network. You should Configure Windows MID Server service credentials so that they have domain or local administrator privileges. For Linux and UNIX machines and network devices, the MID Server uses the SSH and SNMP credentials configured in the instance in **Discovery** > **Credentials**.

MID Servers that Orchestration uses must have access to the necessary credentials to execute commands on computers in the network as specified by the Workflow activities. Orchestration can use the same SSH and SNMP credentials as Discovery, but has two additional credentials designed for specific workflow activities: Windows (for PowerShell) and VMware.

Encryption and decryption

The platform stores credentials in an encrypted field on the Credentials [discovery_credentials] table. Once they are entered, they cannot be viewed.

When credentials are requested by the MID Server, the platform decrypts the credentials using the following process:

1. The credentials are decrypted on the instance with the password2 fixed key.
2. The credentials are re-encrypted on the instance with the MID Server's public key.
3. The credentials are encrypted on the load balancer with SSL.
4. The credentials are decrypted on the MID Server with SSL.
5. The credentials are decrypted on the MID Server with the MID Server's private key.

Note: The platform does not have separate encryption keys for multi-tenant instances.

Credential order

Credentials can be assigned an order value in the Credentials form, which forces the application to try all the credentials at their disposal in a certain sequence. If you do not specify an order value, the application tries the credentials in the Credentials [discovery_credential] table randomly, until it finds one that works, such as when Orchestration attempts to run a command on an SSH server (such as a Linux or UNIX machine), or when Discovery attempts to query an SNMP device (such as a printer, router, or UPS).

After identifying the credentials for a device, Discovery and Orchestration create an affinity between the credentials and the device using the Credential Affinity `[dscy_credentials_affinity]` table. All subsequent discoveries or Orchestration activities attempt to match the credentials in this table with a device for which an affinity exists. If credentials for a device change, Discovery and Orchestration try all available credentials again until they create a new affinity.

Note: If Orchestration and Discovery are installed, and credential alias is enabled, multiple affinities can exist. In this case, the platform looks up credentials for each affinity and inserts the credential for the affinity with the lowest order into the probe.

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Ordering credentials is useful in the following situations:

- The credentials table contains many credentials, with some used more frequently than others. For example, if the table contains 150 SSH credentials, and 5 of those are used to log in to 90% of the devices, it is good practice to configure those five with low-order numbers, which places them at the top of the execution list. Discovery and Orchestration will work faster if they try these common credentials first. After the first successful connection, the system knows which credentials to use the next time for each device.
- The system has aggressive login security. For example, if the Solaris database servers in the network only allow three failed login attempts before they lock out the MID Server, configure the database credentials with a low-order value.

Credential alias

Credential alias enables flow and workflow creators to:

- Assign individual credentials to any activity in an Orchestration workflow.
- Assign individual credentials to any action in Workflow Studio.
- Assign different credentials to each occurrence of the same activity type in an Orchestration workflow.
- Assign different credentials to each occurrence of the same action in designer flow.

Credential alias also works with credential affinities.

External credential stores

If you do not want credentials stored in your instance, you can use external credential repositories. External credential stores save the credentials in an external site that your instance can access. Only CyberArk is supported.

Connections with Orchestration

Use the connections table to setup a JMS, JDBC, or HTTP(s) connection to a target host.

Connection Table

The Connection table (sys_connection) is the base table for all connection tables. You can setup connections for the following protocols:

- JDBC
- JMS
- HTTP(s)

The connection table references the connection alias table, which couples the connection alias to connection information. Every connection records the following information:

Base connection properties

Field	Description
Name	Name of the connection. This field must be unique on the table.
Credential	Specify the credential to use with this connection. This is optional.

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Base connection properties (continued)

Field	Description
Connection alias	The connection alias resolves your connection and credentials at run time. Only one connection is active per Connection alias at any one time.
Active	Check to make the current connection active.
Domain	Domain to which the connection belongs.

Credential is unique across active connections, if not empty.

Upgrading connection information

The JDBC connection (jdbc_connection) and JMS connection (orch_jms_ds) tables are existing Orchestration connection tables. In madrid, we re-parent them to extend from Connection (sys_connection) table. They move from Orchestration run time plugins to Credentials & Connections plugins. They are originally extended from sys_metadata. The sys_metadata related data will be removed. JDBC field name changes:

- JDBC server is renamed to host
- Database port is renamed to port

Create custom activities using custom activity designer templates

You can create and update different types of custom activities in the Workflow Editor using a custom template.

Before you begin

Roles required: workflow_admin or activity_creator

About this task

The Activity Designer contains common steps which are applicable to all the activities that you create. This procedure guides you through the common steps and the order they should be set up. You specify an activity template before you create a custom activity.

Procedure

1. Navigate to **All** > **Orchestration** > **Workflow Editor**.
   The **Welcome** tab of the Workflow Editor opens.
2. On the **Custom** tab in the palette, click **+** to create a new activity select the appropriate template from the list.

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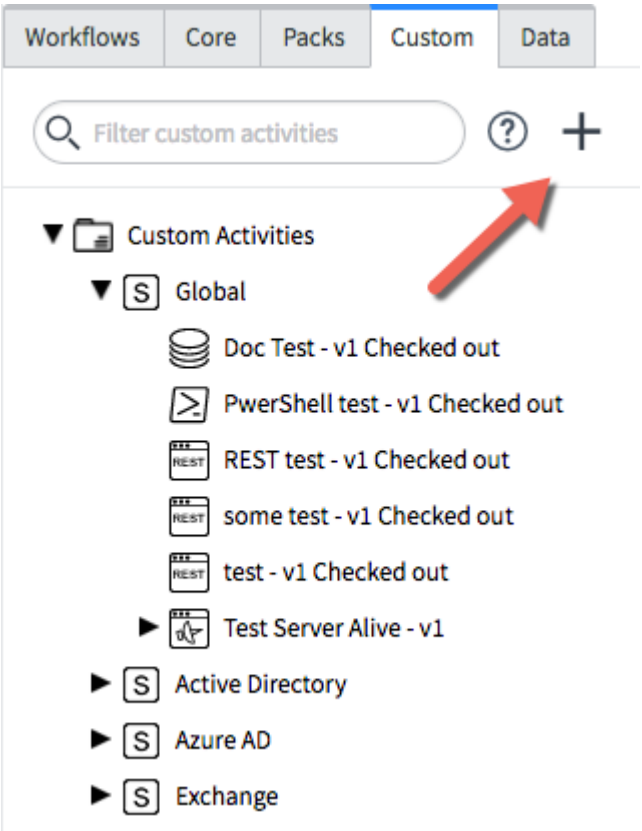
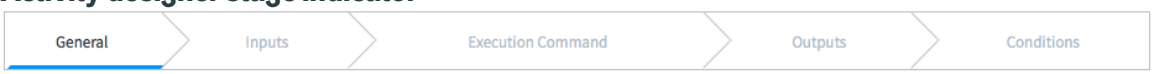


The Activity Designer form appears, with a stage indicator at the top. All new activities start at the **General** stage. The current stage shows with a blue underscore.

Activity designer stage indicator



3. Add the general properties.
   This information is standard for each custom activity, include a name, description, and other related information.
4. Create the template Create input variables for the template.
   Create the variables to pass into the activity in the Inputs form of the activity designer.
5. **Optional:** Add a pre-processing script.
   For input validation or transforming input data, you might need a pre-processing script.

   Note: This step is not included in the Run Script activity.

6. Click **Continue** to open the Execution Command form, then fill out the **Execution Command** step based on the corresponding execution templates:
   - Create a SOAP web service activity
   - Create a JDBC activity
   - Create a JavaScript Probe activity
   - Create a PowerShell activity
   - Create a REST web service activity
   - Create a Probe activity
   - Create an SFTP activity

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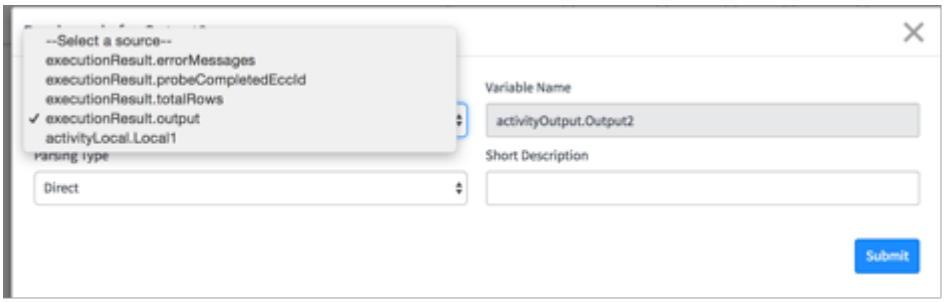
- Create a Run Script activity
- Create an SSH activity
- Create a JMS activity

7. **Optional:** Test your inputs.
8. **Optional:** In the Outputs form, define local and/or output variables.
   Local variables can be used for temporary storage when cascading parsing rules. For example, you might extract an XML payload from within a JSON payload. A local variable can access the XML document and use that as a source for another parsing rule. The graphic shows a *Local1* variable source to parse data for *Output2*.

Define local variable



9. Use one of the options to assign values to Outputs.

Option	Description
Parsing rule	You can create a parsing rule and map them to the output fields by dragging and dropping the variables into the parsing rules structure. The REST, SOAP, and JDBC templates pro vide auto-mapping to create the parsing rules automatically. If available from the test inputs form, auto-mapping should be used when possible.
Post-processing	Post-processing scripts allow you to code your own output data validation, output pars ing code, and related tasks. Post-process ing executes after the execution command results have been returned and before the parsing rules and conditions are run. Click **Go to Post-Processing (Advanced)** to create a post-processing script. **Note:** If you create a script, this step re flects as a stage in the indicator.

10. Click **Continue** to open the Conditions form to create exit condition rules for your activity and then click **Save**.

General properties for activity designer templates

The following General Property fields are common to all activity designer templates.

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General Property fields common to all activity designer templates

Fields	Description
Name	Descriptive name of the activity. Select a unique name that makes the activity easily identifiable in the palette. If you do not name the activity, it is identified in the **Data** tab of the Workflow Editor with an index number when it is added to a workflow. This index reflects the order in which the custom activity was added to the workflow. Only custom activities and their output variables appear in the **Data** tab.
Short description	Brief description of what the activity does.
Image	Icon that identifies an activity of this type in the workflow palette.
Execution template	Predefined template selected for this activity.
Application	Current Application scope set on the instance. To view the scope, click the gear icon on the right side of the title bar in any record or list and look at the value in the **Application** field. The activity runs in this scope within a workflow. You cannot view or change the scope for the instance in the Workflow Editor.
Accessible from	Accessibility setting for this activity, by scope. The following options are available: • **All application scopes**: This activity is available to all application scopes. • **This application scope only**: Use of this activity is restricted to the scope named in the **Application** field.
Category	Category for this activity in the **Custom** and **Packs** tabs. All categories are listed under their scope in the collapsible hierarchy.
Description	Detailed description of the activity.

Create input variables

Create the variables to pass into the activity in the **Inputs** form of the activity designer.

Before you begin

You must name your activity in the **General** form before you can advance to the **Inputs** stage.

Roles required: workflow_admin or activity_creator

Note: Variable strings in the **Inputs** form have a 255 character limit.

Procedure

1. Click the **+** icon to create a new input variable.

   The designer creates a default variable called **Input1**.

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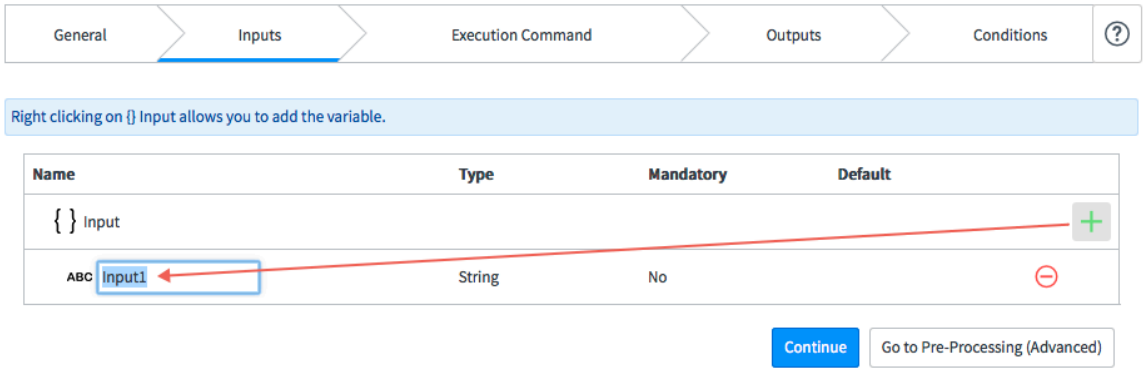

2. Type your new variable name in the field.
3. To change the name of a variable or any of its attributes, double-click the value and then select or enter a new value in the field that appears.
4. Configure your variable using these fields:

Variable configuration

Field	Description
Type	Data type for this variable. Double-click on the field to display the choice list. In addition to the usual data types, you can create input arrays and encrypt individual variables that contain sensitive data. Encrypted variables are passed to the ECC Queue and then decrypted by the MID Server when they run on the target host. Sensitive data returned from running these variables on the host can then be passed to another activity through encrypted output variables.
Mandatory	Marks an input variable as mandatory. Variables marked as mandatory are required fields in the properties form for the activity in the workflow. The input testing feature allows you to filter on mandatory variables.
Default	Default value for this input variable. Default values are prepopulated for variables in the properties form for the activity in the workflow. You can override this value when you test the variables.

5. To reorder the variable list, select a row and then drag the row to its new location.

   When you select a row to move it, the pointer icon changes to an up/down arrow icon ( ).
6. To delete a variable, click the delete icon ( ) in the row.
7. Click **Continue** to advance to the **Execution Command** stage or click **Go to Pre-Processing (Advanced)** to create a script that runs before the activity executes.

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Map an input variable

After you create the input variables, map them to the fields in the Execution Command form.

Before you begin

Role required: activity_admin, activity_creator

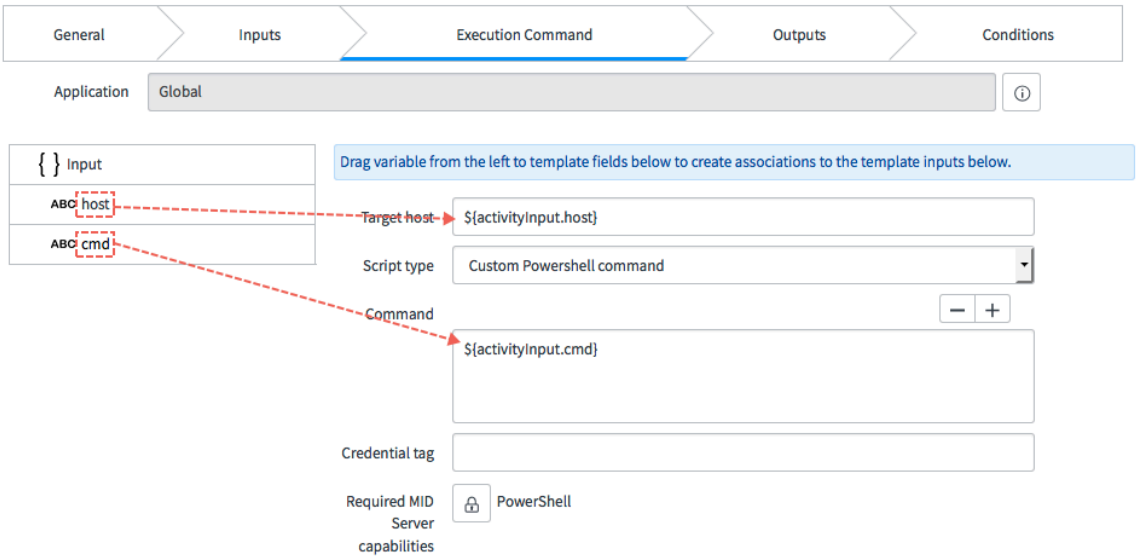
About this task

These fields contain values required by the target host or endpoint to authenticate and query for data. Included in this example are fields for a command to run on the target and the MID Server to use, if one is required.

Procedure

To map a variable, drag it into the appropriate field.

The designer automatically expresses the variable in the syntax the system requires.



Configure the PowerShell execution command

Use the input variables you created to configure the command that Orchestration executes on the Windows target machine.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note: You can test the PowerShell connection between the MID Server and the target computer without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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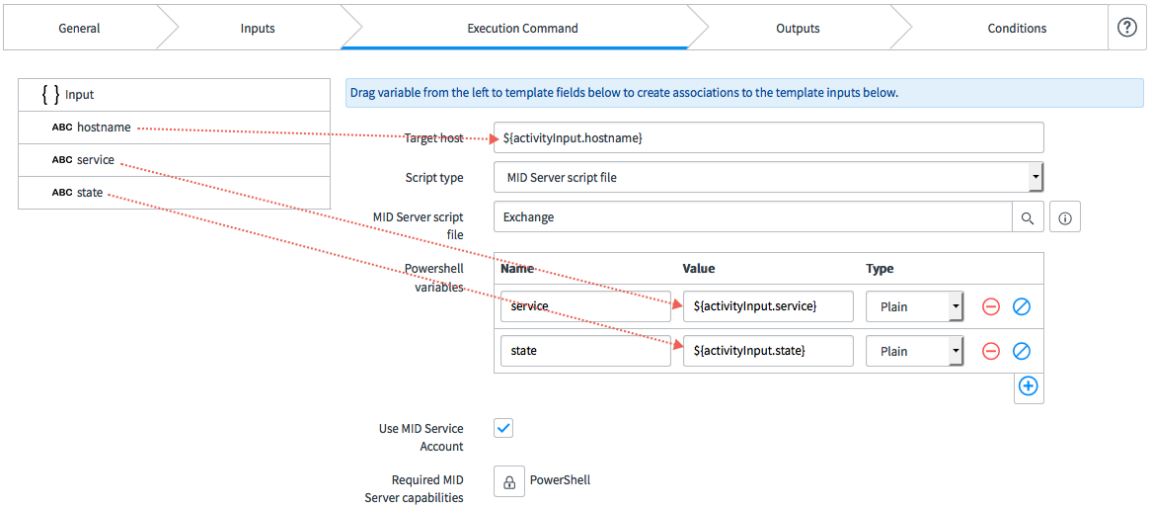
PowerShell execution command



2. Complete the fields shown in the table.

Powershell command fields

Field	Description
Input	Input variable builder. Create variables to map to available fields.
Target host	Host name or IP address of the target server for this PowerShell activity.
Script type	Type of script to run on the PowerShell host. Available options are: ○ Custom Powershell command ○ MID Server script file
MID Server script file	MID Server script file to run. This field is available when the **Script type** selected is *MID Server script file*.
Command	Command that this activity runs on the target host. This field is available when the **Script type** selected is *Custom Powershell command*. You can drag and drop input variables from the variable builder into this field to create your command.
Powershell variables	Name-value pairs to pass to the host with Powershell. You can create these variables manually, or drag input variables into the **Value** field. Encrypted input variables retain their encryption, regardless of the data type settings in this field. If you type in a value and select the **Encrypted** data type, your value appears in plain text in this field and is only encrypted when it passes to the ECC Queue.
Use MID service account	Forces this activity to authenticate on the target host using the credentials of the MID Server service account only, without trying any other credentials. When this check box is selected, the **Credential tag** field is not available.
Credential tag	Specific Credential aliases for Orchestration activities this activity must use to run Powershell commands on the host. If this field is left blank, the MID Server tries all the available credentials until it finds a valid one, ending with the MID Server service account. If a credential alias is defined, the MID Server tries the credentials for that alias only and does not try the MID Server service account. This field is not available when the **Use MID service account** check box is selected.

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Field	Description
Required MID Server capabilities	MID Server to use for querying Powershell, by capabilities. By default, the system selects a Powershell MID Server.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Test activity template inputs

You can test the input parameters of a custom activity during its development without having to run the activity in a workflow context.

Before you begin

Create input variables and map them to fields in the **Execution Command** form or provide actual values for these fields.

Role required: web_service_admin, activity_admin, activity_creator

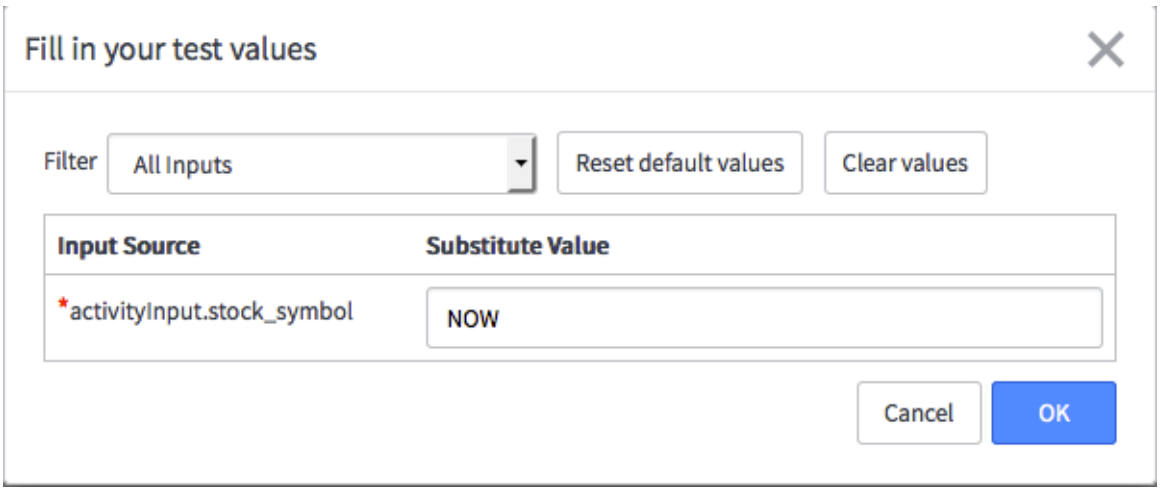
About this task

An input test executes only the input parameters against an endpoint and not the pre-processing or post-processing scripts. You need to use a workflow to test a pre-processing or post-processing scritp. You do not need to check out the activity to test it, and you can test input variables from any stage in the activity designer, if your activity is properly configured. Typically, the **Execution Command** stage is the point at which your inputs are ready for testing.

Note: If you intend to use auto-mapping, you must test your input variables.

Procedure

1. Click **Test Inputs**.
   The list of input source variables appears. If you added default values for these variables, those values appear in the **Substitute Value** column. Mandatory variables are marked with a red star. In this example, a SOAP endpoint returns a value for a stock quote variable.



2. Filter the variable list with these controls:
   - **All Inputs**: Displays all input variables. This is the default view.
   - **Mandatory Inputs**: Displays only mandatory input variables.
   - **Inputs Without Defaults**: Shows input variables that do not have assigned default values.

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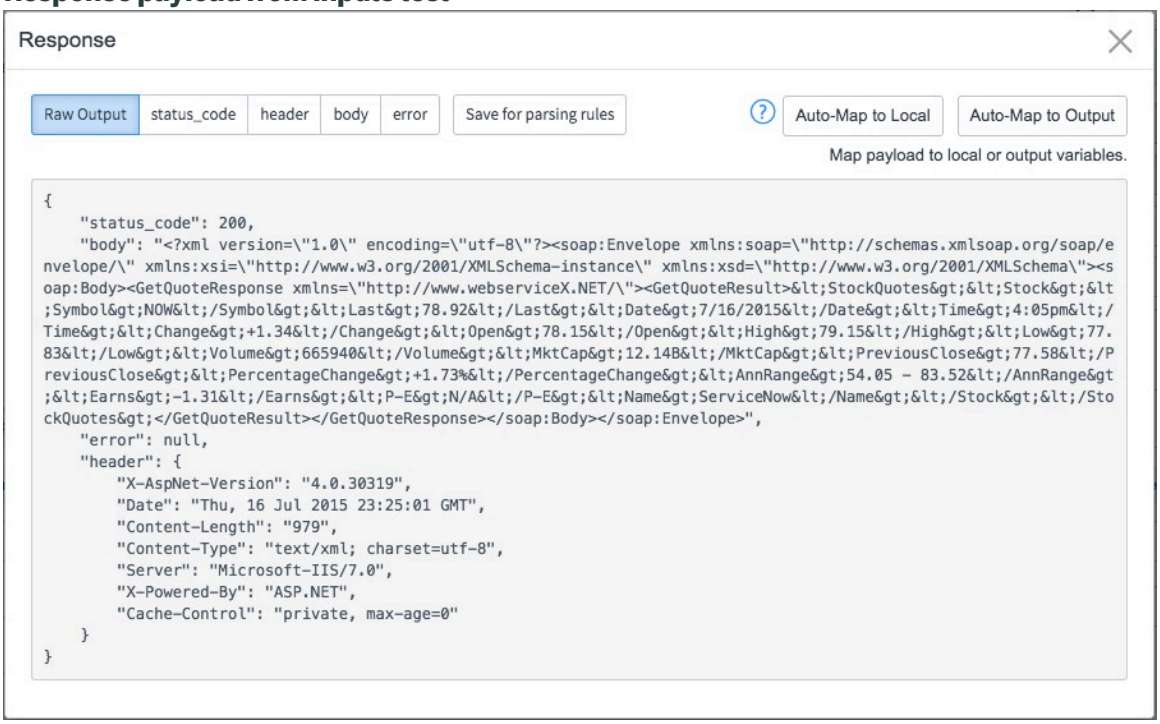
3. Reset values as needed.
   - **Reset default values**: Replaces any test values set in this form with the default values, if they are present.
   - **Clear values**: Clears all values in the input variable list, even if default values exist.
4. When your test values are configured correctly, click **OK**.
   The system runs the values for all the inputs configured against the specified target and returns the resulting payload. The buttons in the Response form display different views of the payload. The entire payload appears in the **Raw Output** window.

Response payload from inputs test



5. To map appropriate parameter values in the payload to variables in the **Outputs** stage automatically, select an auto-mapping option.
6. Alternately, you can click **Save for parsing rules** to copy the entire payload to the parsing rules. This allows you to manually select values for the output variables directly from the payload. This action completely overwrites any previous payload that existed in the parsing rules.
7. Click the **X** in the upper right corner of the window to close it.

Data encryption for activity variables

You can protect sensitive data passed from Orchestration activities by encrypting input and output variables.

The system never stores encrypted variables as clear text. If the MID Server is used to fulfill the activity, the corresponding ECC Queue's input payload is encrypted if an encrypted output variable is defined in the template. Output variables passed to a downstream activity as input variables maintain their encryption throughout processing.

Inputs that require data encryption come from one of these sources:

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- Workflows: These inputs are provided through the Workflow Editor and must be in the password2 format for two-way encryption.
- Service catalog requests: These input values are provided to an activity as encrypted variables from a service catalog item.
- GlideRecord: These are variables attached to any ServiceNow table. The source column in the table must be a password2 type variable.
- Activity outputs: These are variables passed as outputs from one activity to a downstream activity as inputs, through the data bus.
- Empty string: The system allows you to define encrypted input variables but never pass a value into the variable.

Activity designer template pre-processing fields

Use the **Pre Processing** form of the activity designer to define a script to run before the activity executes.

Pre-processing fields

Field	Description
Input process script	Script to run before the activity executes.
Variables	Input variables that are available to use as building blocks in the input process script. Click the arrow above the field to open the variables list. Click an item in the tree to add it to your script in the appropriate syntax. The list displays execution parameters and input variables you passed into the activity on the **Inputs** form. All activity variables added in the **Inputs** form are read-only and are expressed in the pre-processing script with this syntax: `activityInput.variable`. Before the activity executes and makes a call to the service or host, you can override the effective execution value of this variable by assigning values to the `executionParam.variable_name` execution parameter. Refer to the specific execution parameters for your template.

Logging

Activity designers can add logging to the pre-processing using the *`ActivityLogger`* API, which works for scoped or global applications. Logged data from the script appears in the **Workflow Log** related list in the context records for any workflow that uses the activity. The **Source** for these messages in the workflow log is **ACTIVITY**.

Important: To display the debug messages in the workflow log, set the *`glide.workflow.log.debug`* property to **true**.

The supported messages are:

- `ActivityLogger.debug("Pre Processing Log Message");`
- `ActivityLogger.info ("Pre Processing Log Message");`
- `ActivityLogger.warn ("Pre Processing Log Message");`
- `ActivityLogger.error("Pre Processing Log Message");`

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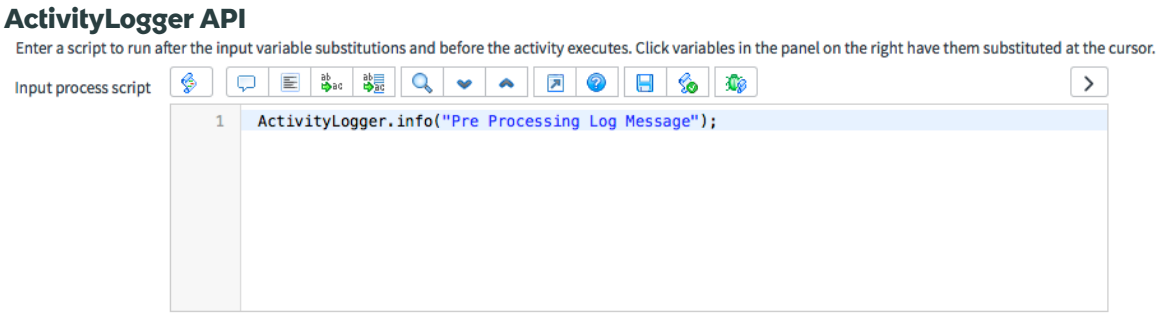

Template post-processing fields

From the **Post Processing** form in the activity designer you can define a script to run after the activity executes.

Post-processing fields

To use the results returned by the activity, append the `executionResult.` prefix to these parameters.

Field	Description
Output process script	Script to run after the activity executes.
Variables	Input variables that are available to use as building blocks in the output process script. Click the arrow above the field to open the variables list. Click an item in the tree to add it to your script in the appropriate syntax. The list displays execution results and the variables you passed into the activity on the **Inputs** form. All activity variables added in the **Inputs** form are read-only and are expressed in the post-processing script with this syntax: `activityInput.variable`. For parameter descriptions, refer to the table in the post-processing parameters topic for this activity.

Logging

Activity designers can add logging to the post-processing script using the *`ActivityLogger`* API, which works for scoped or global applications. Logged data from the script appears in the **Workflow Log** related list in the context records for any workflow that uses the activity. The **Source** for these messages in the workflow log is **ACTIVITY**.

Important: To display the debug messages in the workflow log, set the *`glide.workflow.log.debug`* property to **true**.

The supported messages are:

- `ActivityLogger.debug("Post Processing Log Message");`
- `ActivityLogger.info ("Post Processing Log Message");`
- `ActivityLogger.warn ("Post Processing Log Message");`
- `ActivityLogger.error("Post Processing Log Message");`

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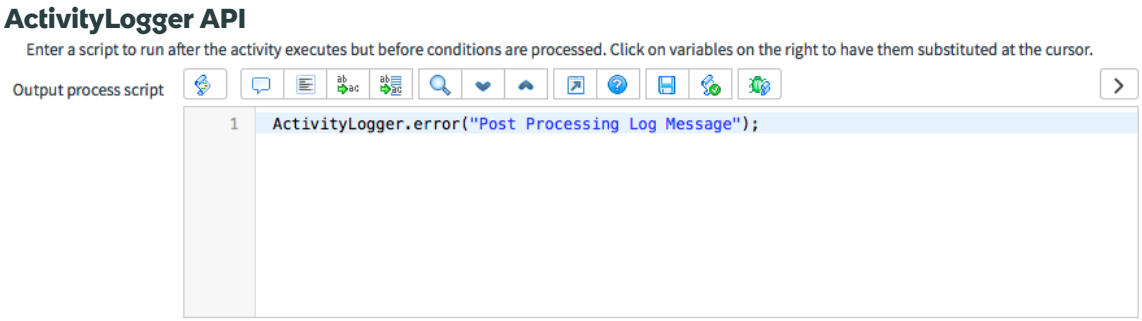


Auto-map activity output variables

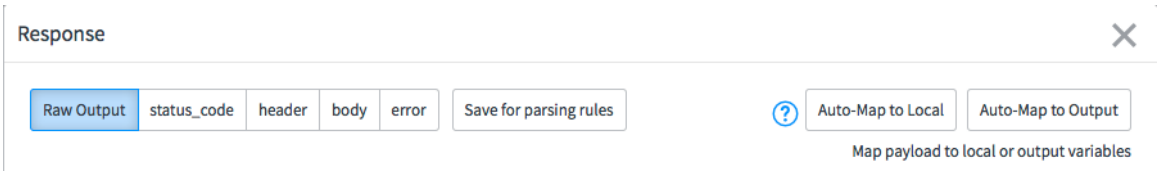
You can map parameter values in a test payload to variables in the **Outputs** tab automatically.

Before you begin

Role required: admin

Procedure

1. From the Execution Command in the template, select the **Inputs** tab.
2. Click **Test Inputs** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
3. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



4. Select an auto-mapping option.

Option	Description
Auto-Map to Local	Translates the entire payload into a JSON object and places it in the data bus. This al lows for post-processing manipulation in JavaScript. This selection causes the entire data field on the right to disappear and the inputs structure to be auto-populated with these default variables: ○ output ○ totalRows ○ errorMessage ○ eccSysId
Auto-Map to Output	Automatically populates the output variables in the activity with the same default variables used as inputs for the local variable.

Note: No parsing rules are available with auto-mapping selections.

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Create an output variable

The **Outputs** form in the designer contains a variable builder for creating data structures of objects and arrays.

Before you begin

Roles required: activity_admin, activity_creator

About this task

Elements in this structure are mapped with Create a parsing rule to specific data contained in payloads returned from an endpoint or host. These variables and their values are then made available locally or for reuse in other activities.

Procedure

1. Click the **+** icon in the **Outputs** column to create a local or output variable.

   Local variables are only available within an activity and are not visible in the data structures displayed in the **Custom** tab. Output variables are available for reuse in other activities, either individually or as an entire data structure. When you create a new variable of either type, the designer provides a default name of **Local1** or **Output1**.

2. Type your new variable name in the field and select a data type.

   Variable names must be unique within an array or an object. You can assign a data type of **Encrypted** to output variables that contain sensitive data. Data protected by encryption is passed to other activities or processes encrypted and is never displayed in plain text.

3. To change the name of a variable or any of its attributes, double-click the value, type a new value in the editing field, and then press **Enter**.

   The icon to the left of the name reflects the data type of the variable.

4. To reorder the variable list, select a row and then drag the row to its new location.

   When you select a row to move it, the pointer icon changes to an up/down arrow icon ().

5. Drag the row into another location.
6. Choose from the following options.
   - To reuse a variable from another activity, drag it from the **Custom** tab in the palette to the **Local** or **Output** heading at the top of the variable list.
   - To copy an entire data structure, drag the parent object or array into the variable list header.

   The designer duplicates the copied data structure in the outputs variable builder.

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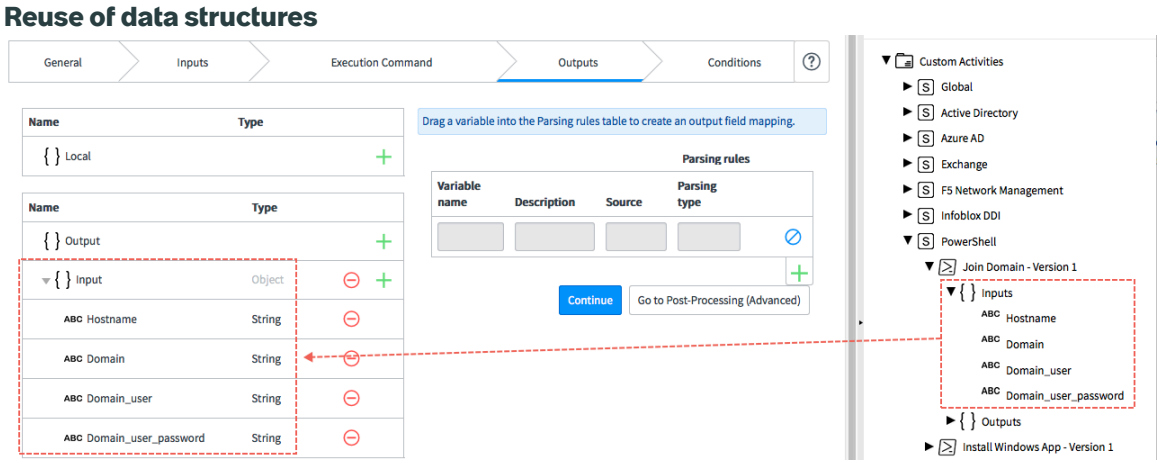

7. To delete a variable, click the delete icon ( ) in the row.

Activity designer template outputs

Output variables contain messages returned from a destination that are available to other activities in a workflow or internally to the activity.

Activity designer output fields

Field	Description
Variable name	Name of a variable, either **Local** or **Output**, that this activity passes.
Local	Variable that contains a value used within an activity. For example, use a local variable to identify metadata that is processed within an activity before the final value is exported to an output variable.
Output	Variable that contains a value that is passed to other activities in the workflow.

Map an output field

Mapping is configured with parsing rules that allow you to build expressions in the appropriate data format for the selected payload.

Before you begin

Role required: activity_admin, activity_creator

About this task

When you are finished creating the output data structure, map each variable to the specific data you want to extract from the target host.

Procedure

To map a variable, drag it from the **Outputs** variable builder and drop it into an empty **Variable name** field in the Parsing rules section.

See create a parsing rule for instructions on configuring parsing for output variables.

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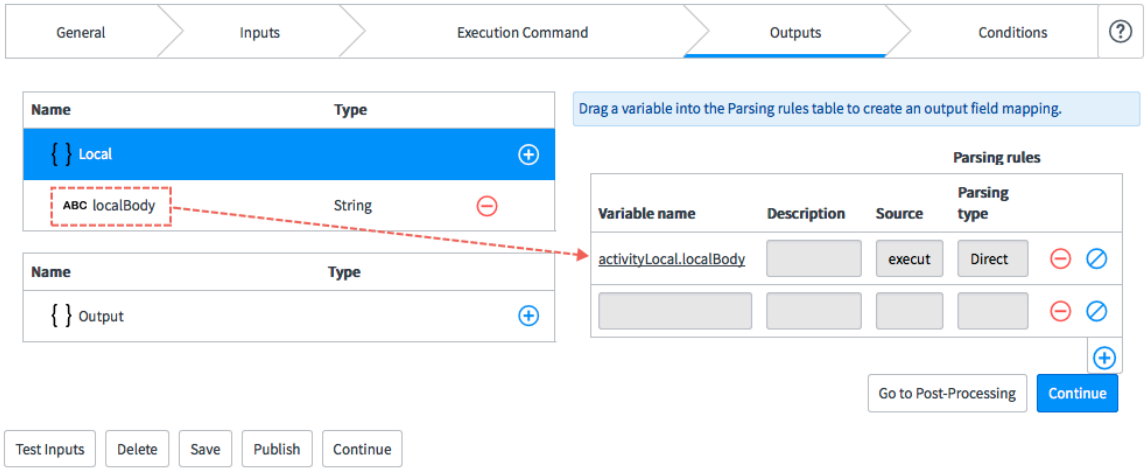


Create a parsing rule

Populate output variables defined in a custom activity with payload data returned from an inputs test on an external host or endpoint.

Before you begin

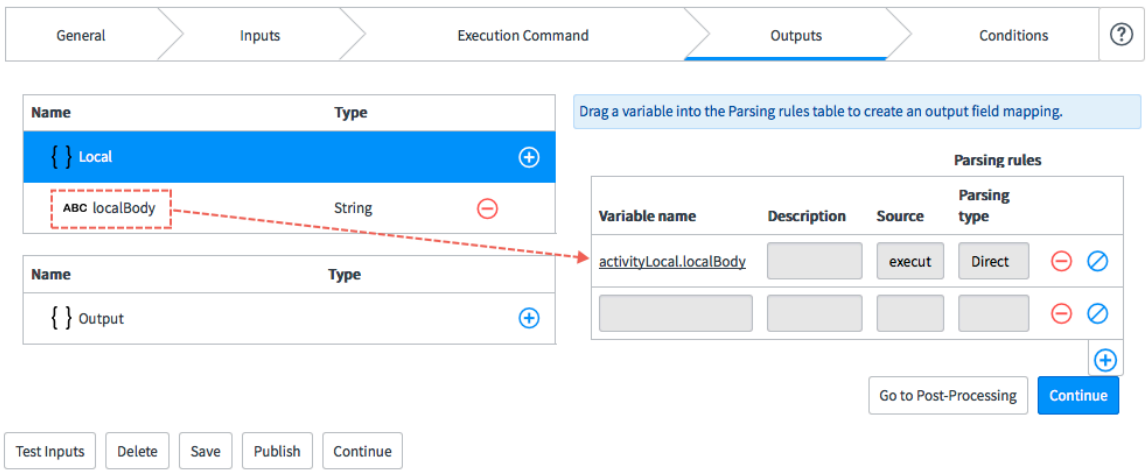
Roles required: activity_admin, activity_creator

About this task

Procedure

1. Navigate to **All** > **Workflow** > **Workflow Editor**.
2. From the **Custom** tab in the palette, open a custom activity.
3. In the Activity Designer form, advance to the **Output** stage.
4. Drag an output variable from the data structure builder into the **Variable name** field in the **Parsing rules** builder.

Mapping variables to parsing rules



   The parsing rules form appears for the selected variable. By default, the parsing type is set to **Direct**, which populates the variable with all the data from the selected payload, without parsing the contents. Each template has a specific default parsing source.

5. Complete the form using the fields in the table.
   In this example, the parsing type selected is **XML**, which allows you to select specific parameters from the payload to parse.

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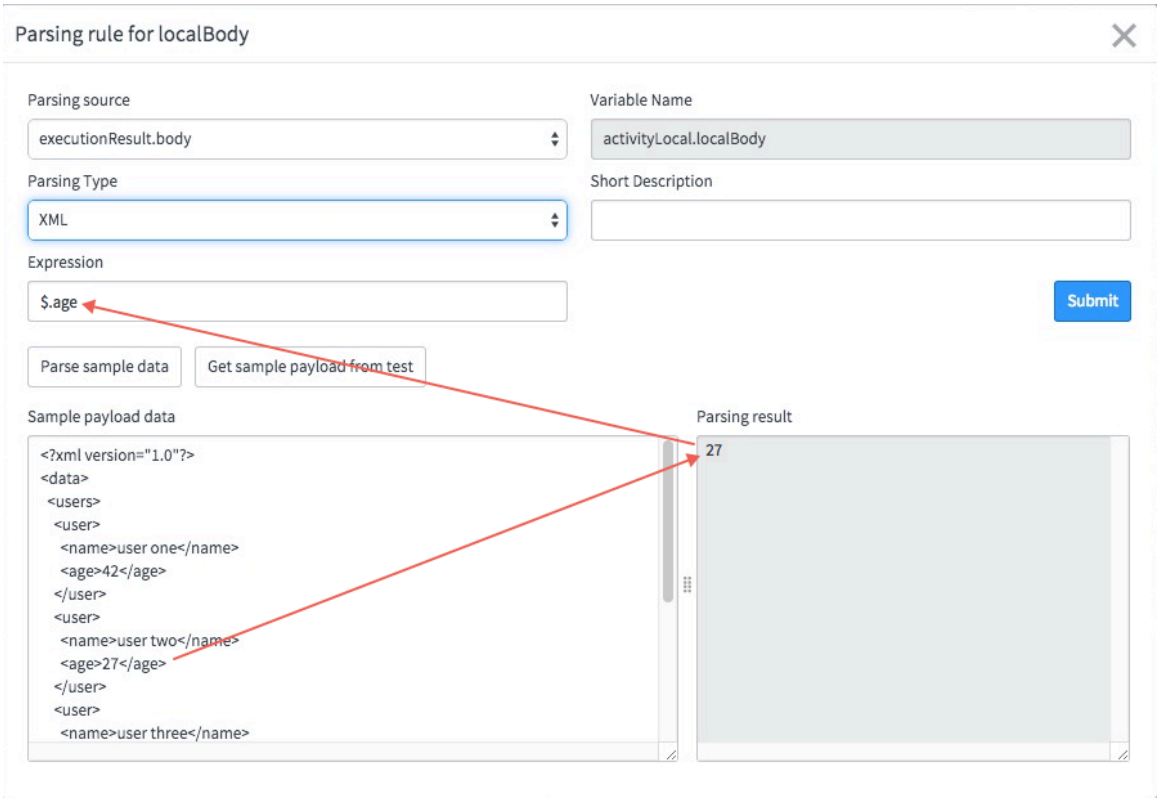

Parsing rules fields

Field	Description
Parsing source	Source of the data returned from the target host or endpoint. Each template opens to a specific, default payload. Available choices depend on the execution template selected for the activity. You can also use local variables as a parsing source if a parsing rule has previously been defined for them. For a list of the available payloads for each template, see Activity designer parsing sources.
Expression	Expression used to extract specific data from the selected parsing source. This expression is created from clickable data in the sample payload and appears in the format selected in the **Parsing type** field. When testing, the expression can return multiple results. Discern which choice gives reliable or predictable results before choosing your expression. **Note:** The system cannot generate clickable **RegEx** expressions from sample data. You must write all regular expressions manually.
Variable name	Revised variable name as it is used in the final output expression. The system adds the **activityOutput** or **activityLocal** prefix to the variable you specify.
Parsing type	The language to use for querying the target host's payload. The selections are: ○ **Direct**: Maps to the entire content of the payload selected in the **Parsing source** field, without any parsing. This is the default parsing type. ○ **XML**: XPath query used for selecting nodes from an XML payload. ○ **JSON**: JSONPath query for selecting parts of a JSON payload. ○ **RegEx**: Parsing method that uses a regular expression to extract data from a payload. The RegEx parsing type does not support multi-line parsing and is not case sensitive.

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Field	Description
Short description	Brief description of this parsing rule.
Sample payload data	Sample data from the source containing the data requested. This field is not available for **Direct** parsing types. After you click **Parse sample data**, the data in this field cannot be edited, but becomes clickable for the purpose of creating expressions. Click **Edit sample data** to make the field editable again.
Parsing results	Displays the data returned from the source by the selected expression. This field is not available for **Direct** parsing types.

6. To retest the inputs, click **Get sample payload from test**.
   This action reopens the test form, allowing you to substitute different test values and create a different payload.
7. Click **Save** to have the parsing rules overwrite the previous payload with the one you just created.
8. To create an expression for the parsing rule, click the specific parameter you want to see in the sample payload.
   The value for that parameter appears in the **Parsing result** field, and the system creates the appropriate expression in the **Expression** field.
9. Click **Submit** to save the parsing rule for that variable.

Activity designer parsing sources

This table lists the parsing sources available with each execution template.

Parsing sources

Template	Source
SOAP Web Service	• executionResult.body (Default) • executionResult.status_code • executionResult.header • executionResult.error
JDBC	• executionResult.output (Default) • executionResult.errorMessages • executionResult.probeCompletedEccId • executionResult.totalRows
JavaScript Probe	• executionResult.payload (Default) • executionResult.output • executionResult.eccSysId • executionResult.errorMessages

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Parsing sources (continued)

Template	Source
Powershell	• executionResult.output (Default) • executionResult.tags • executionResult.hresult • executionResult.eccSysId • executionResult.errorMessages
REST Web Service	• executionResult.body (Default) • executionResult.status_code • executionResult.header • executionResult.error
SFTP	• executionResult.output (Default) • executionResult.eccSysId • executionResult.errorMessages • executionResult.tags
Probe	• executionResult.output (Default) • executionResult.payload • executionResult.eccSysId
SSH	• executionResult.output (Default) • executionResult.eccSysId • executionResult.errorMessages • executionResult.tags
JMS	• executionResult.status • executionResult.standardHeaders • executionResult.customHeaders • executionResult.messagePayload • executionResult.eccSysId • executionResult.errorMessages

Activity designer parsing rule example

In this example, the parsing rule is configured to populate the *activityOutput.ipv4* variable with the value for the IP address from a domain server, using PowerShell.

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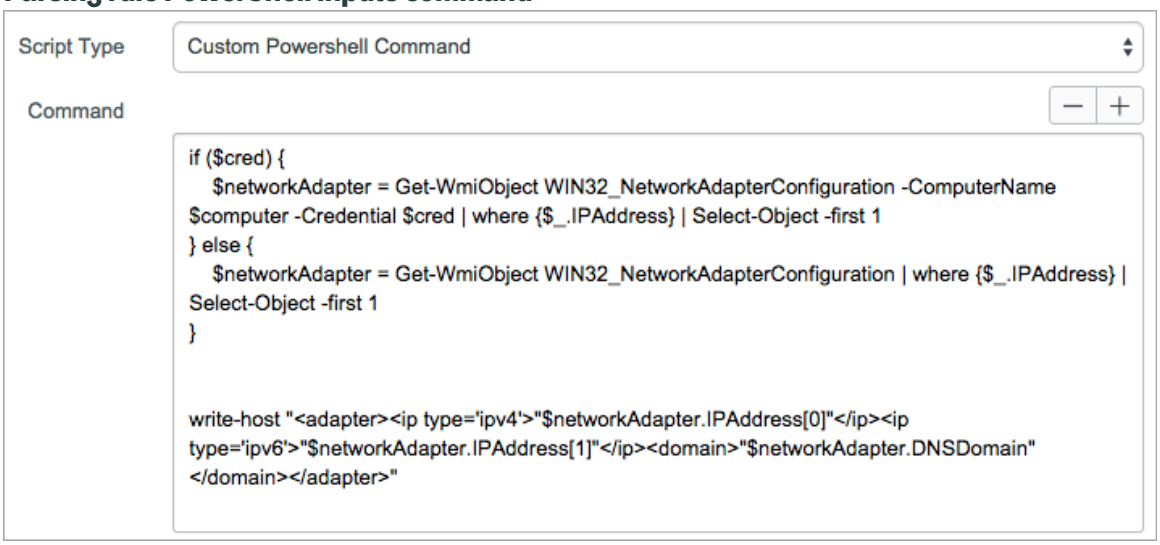
Before you begin
Role required: activity_creator, activity_admin

About this task
To generate the sample data, the administrator must actually run the command on the host and then paste the data returned into the **Sample payload data** field when creating the parsing rule. The administrator can then create an expression that returns IP addresses from that sample in two formats: `ipv4` and `ipv6`. In this example, the system produces two expressions to use for the parsing rule.

Procedure
1. Navigate to **All** > **Workflow** > **Workflow Editor** and open the activity that runs on the host.
2. Click the **Inputs** tab, and note the **Command**.

Parsing rule PowerShell inputs command



3. In a PowerShell console, run the **Command** on the host to extract the XML sample that contains the values you need.
4. Copy the data that is returned to the clipboard.
5. In the activity designer, click the **Outputs** tab and paste the returned data into the **Sample payload data** field.

   In this example, the data includes IP addresses in two different formats and the domain name.
6. Select the parsing type for the source.

   Example
   In the following example, you would select **XML**.

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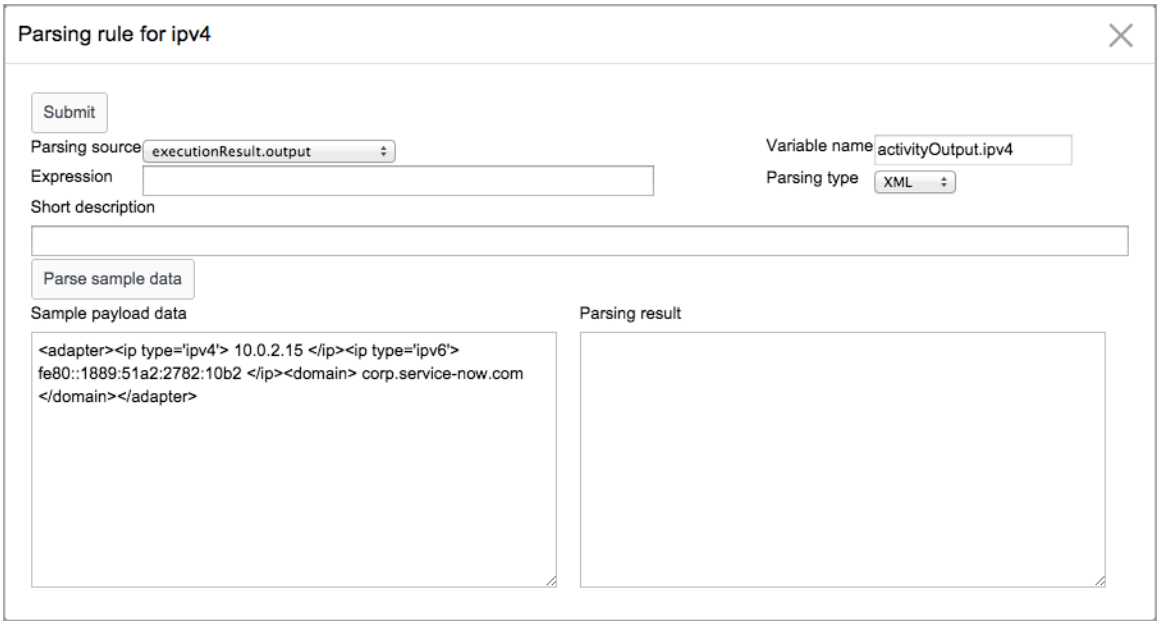
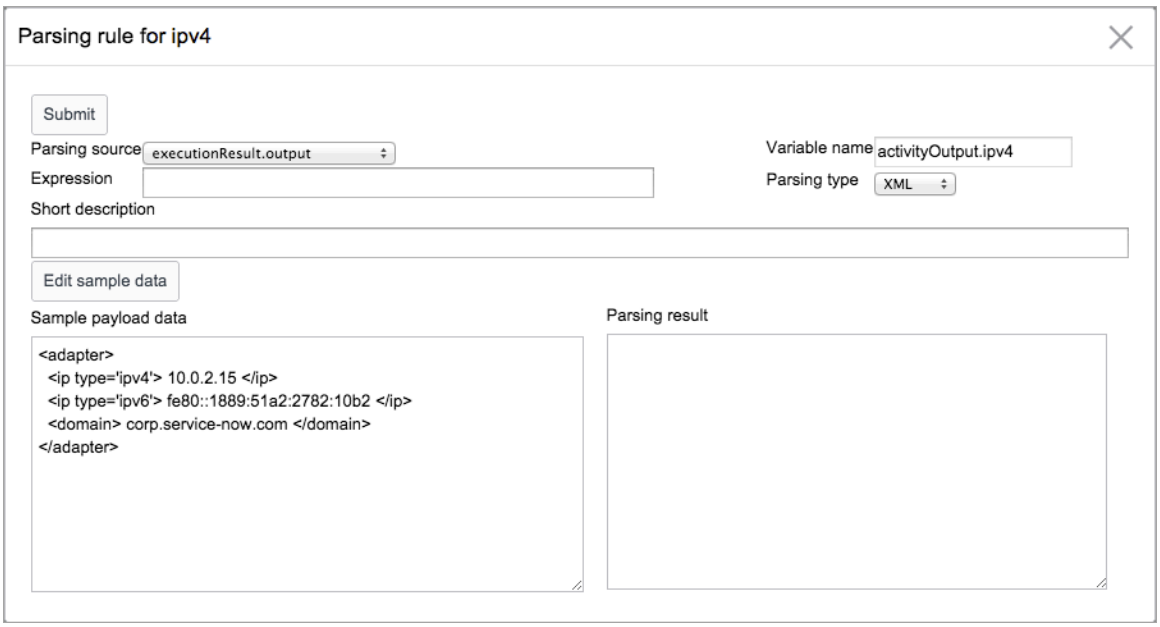


7. Click **Parse sample data**.

   The system displays the XML in the proper format, and it becomes clickable. In this view, the system can translate clicked data from the sample into an expression.



8. To create the expression, click the elements in the data sample you want to map to the variable.

   Based on the sample data you clicked, the system creates two expressions.

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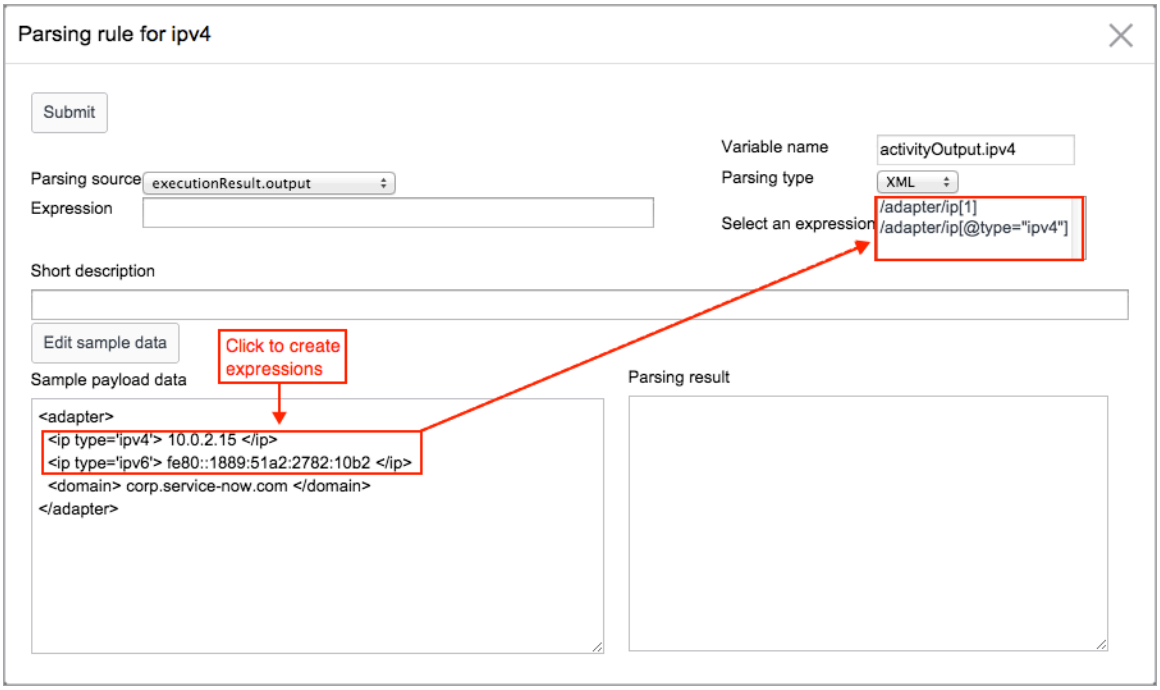

9. Select an expression from the list.

The desired result is the IP address that has a **type** attribute of **ipv4**. The system populates the **Expression** field with this choice.



10. Click **Test expression**.

The system parses the payload using the selected expression and returns the requested data in the **Parsing result** field.

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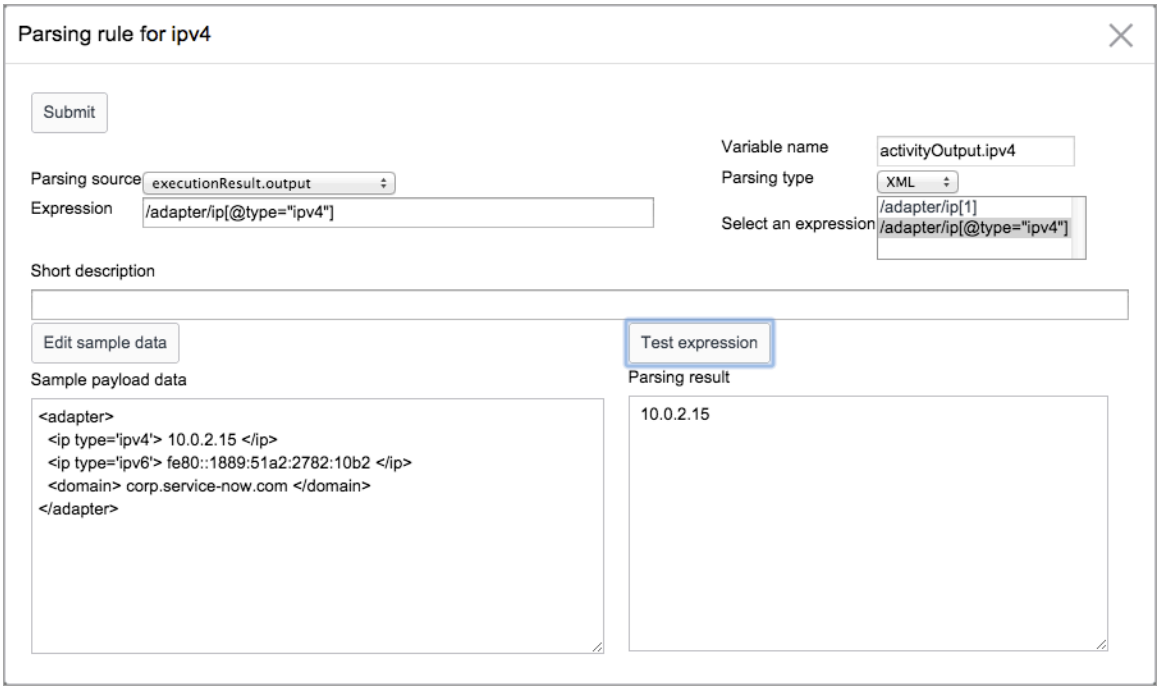

11. Click **Submit**.

    The view returns to the **Outputs** tab of the activity designer. The new parsing rule is listed, and a blank row is available for another rule.



Activity conditions

Create the exit conditions for your activity in the **Condition** column and set the order for each..

The system evaluates the condition with the lowest order number first and stops when it finds the first true condition. The system delays evaluation of conditions with an **Else** value set to **true** until all conditions with an **Else** value set to **false** are evaluated. If the system does not find a true condition, it looks for a default condition in which the value for **Else** is **true** and takes this exit. You must have at least one default exit condition, or the activity hangs when the workflow runs.

The following are possible conditions you might create for an activity:

Sample activity conditions

Condition	Evaluation
Success	Tests for a success condition. **Else** is set to **false** and the **Order** is set to **100**. If this condition is true, the activity takes the **Success** exit. If this condition is false, the system evaluates the next condition in order.

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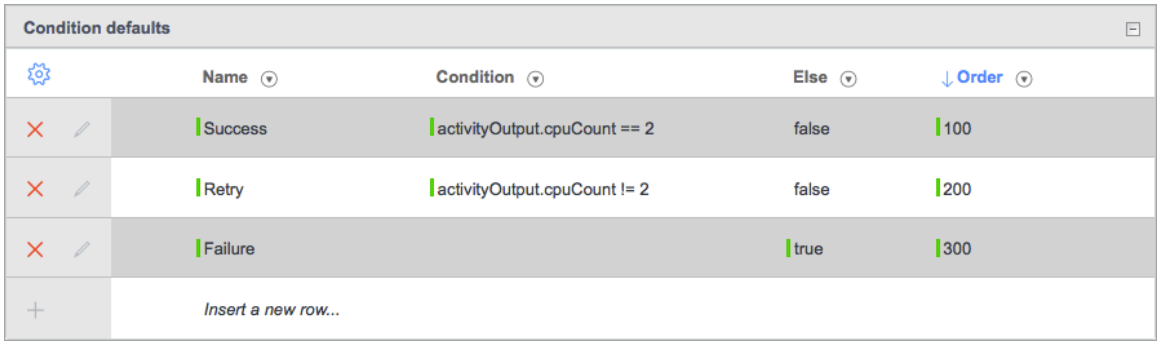
Sample activity conditions (continued)

Condition	Evaluation
Retry	Tests for a condition that runs the activity again. **Else** is set to **false**. If this condition is true, the activity runs again. If this condition is false, the system takes the default **Failure** exit.
Failure	Default condition that allows the workflow to continue if the other conditions in the activity are false. **Else** is set to **true**.



Orchestration custom activity templates

Orchestration provides customizable activity templates to create and manage custom activities in the Workflow Editor.

You create and update different types of Orchestration activities with the Activity Designer using activity templates for SSH, PowerShell, REST, SOAP, JMS, SFTP, JDBC, JavaScript Probes, and Probes.

Hundreds of workflows can share these activities simultaneously. Before you change an activity, you should check the workflows that they are part of by clicking the form menu icon (☰) and selecting **Used In**. Any central change to a versioned activity automatically updates across workflows unless you have pinned that activity.

All the Orchestration Core activities are built using the Activity Designer in scoped applications. Custom activities can be developed in the global scope or their own application scope even if that scope is different from the scope of the workflow. Use Activity scoping when build your own activity packs.

Create a JDBC activity

Create a custom JDBC activity to automate SQL commands and stored procedure calls to relational databases from workflow.

Before you begin

Role required: activity_admin, activity_creator

About this task

The JDBC activity template allows you to execute ANSI SQL statements or stored procedures on a target database. Support for stored procedures with IN, OUT, and INOUT parameters are available in Brazil. To learn how to set up these parameters, see JDBC stored procedure parameters.

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Note: If you are transferring bulk data into a ServiceNow instance from an external data source, use Import sets key concepts. The JDBC activities allow you to transfer data between external data sources and ServiceNow within a workflow. It is not intended to replace the bulk import features of data sources.

Procedure

1. Create or verify your JDBC credential.
   Your JDBC credentials must have permission for the target database and proper configuration for the corresponding JDBC connection. Credentials must be set up before you can create a JDBC activity.
2. Create or verify your JDBC connection.
   Your JDBC connection must be configured with valid JDBC credentials set up before you can create a JDBC activity.
3. Create a custom activity.
   This action creates a custom activity using a template.
4. After setting up general properties and creating input variables, configure the JDBC Execution Command.

Option	Description
JDBC Connection	Configure or reference the appropriate JDBC Connection for the database. The connection selected provides the activity with the following information: ○ Target database information (server and database names) ○ Connection URL ○ Target database port (if different from standard port number) ○ Database instance name
Credential	JDBC credential to use for your JDBC connection.
SQL statement	Input the ANSI SQL to execute on the JDBC target database. **Note:** This field is hidden when the Stored Procedure check box is selected. You can map the input variables you created to configure the SQL statements. By default, you can run the following SQL statements. ○ select ○ insert ○ update ○ delete ○ show ○ create ○ describe

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Option	Description
	For added security measure, a MID Server property controls the operations that this JDBCOrchestrationProbe executes, which restricts the SQL commands used. This property protects against potentially destructive commands, such as drop database. The mid.property.jdbc_operations contains the MID Server property controls. **Note:** You cannot run multiple statements of different types. For example, you cannot run a select statement and an update statement together, but you can run two insert statements. However, you cannot run multiple select statements in this activity.
Maximum rows	Maximum number of records to retrieve from database. The default is 1000.
Maximum payload size (KB)	You can set a limit on the maximum payload size of data retrieved from the database. The default is 64 kilobytes.
Connection timeout	How long the activity waits to make the connection. This field is populated automatically from the data source, but can be changed for this activity.
Query timeout	Elapsed time to wait after running the query until the data is returned. This field is populated automatically from the data source, but can be changed for this activity.
Required MID Server capabilities	MID Server to use for querying JDBC, by capabilities. By default, the system selects a MID Server that has JDBC capability.
Use stored procedure	If checked, you can run a stored procedure on MySQL, Oracle, or SQL Server databases by entering the procedure name and parameters. See JDBC stored procedure parameters.

Note: You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

- Test JDBC activity inputs
- Use auto-mapping to generate outputs and parsing rules (recommended for JDBC)
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Related topics

Create custom activities using custom activity designer templates

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Create a JDBC connection for an Orchestration activity

The JDBC Connection [jdbc_connection] table provides the information custom JDBC Orchestration activities use to connect to various target databases.

Before you begin

You must have an appropriate JAR file, whether it is supplied with the instance or a custom JAR file.

Note: The ServiceNow instance supplies `mysql-connector-java-5.1.21.jar`, `sql-server-jdbc-4.0.jar`, and `ojdbc6.jar` files as part of the current release, which supports MySQL, SQLServer, and Oracle databases. Other databases, such as Sybase or DB2 Universal, must use a custom JAR file that must be uploaded to the instance before setting the JDBC connection.

Role required: activity_admin, activity_creator

About this task

JDBC credentials JDBC credentials are retrieved separately by the activity designer template and support external credential storage, such as CyberArk.

Procedure

1. Navigate to **All** > **Orchestration** > **Credentials & Connections** > **JDBC Connections** and click **New**.
2. Complete the form using the fields in the table.
   The database selection in the **Format** field determines which fields are available.

JDBC connection fields

Field	Database Format	Description
Name	All	Unique name of this JDBC connection. For example, you might enter **JDBC MySQLProd**.
Query timeout	All	Maximum elapsed time the JDBC query is allowed to run without a response.
Connection timeout	All	Maximum elapsed time for the JDBC activity to wait while attempting to connect to the target database.
Application	All	Scope for this table. By default, the JDBC Connection [jdbc_connection] table runs in the **Global** scope.
Domain	All	Domain for this table. By default, the JDBC Connection [jdbc_connection] table runs in the **global** domain.
Format	All	Database type for this connection. The default choices are: ○ **MySQL** ○ **Oracle** ○ **SQLServer** ○ **None** You can add **Sybase** or **DB2 Universal** to the choice list by uploading the appropriate JDBC driver JAR file to the instance. Orchestration automatically recognizes these drivers when they are loaded into the system and adds them to this list.

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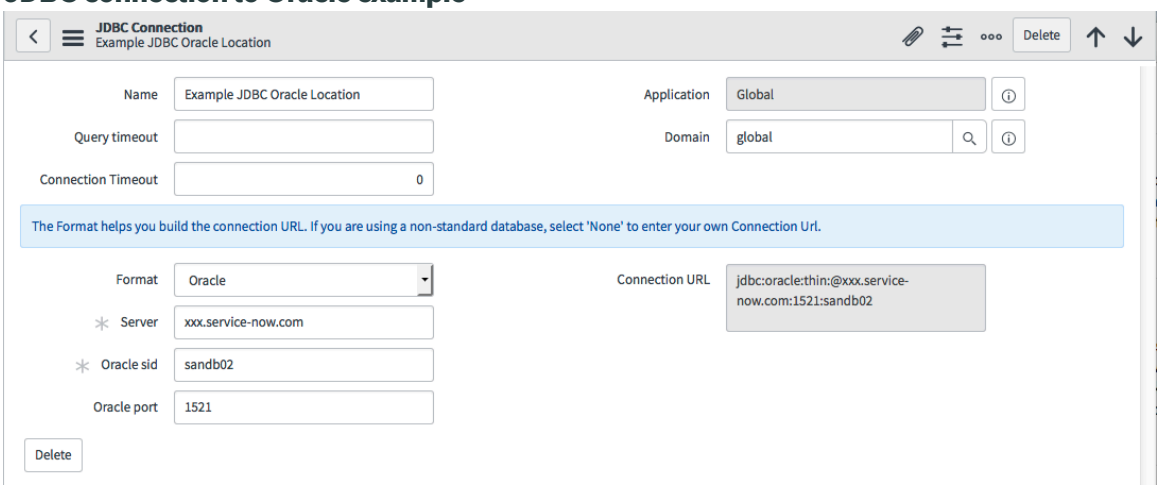
Field	Database Format	Description
Server	Oracle, MySQL, SQLServer	Host name or IP address of the database server.
Oracle sid	Oracle	The Oracle database site identifier. The default value is **orcl**.
Oracle port	Oracle	Port that the Oracle database is using. The default value is **1521**.
Database name	MySQL, SQLServer	Name of the database.
Database port	My SQL, SQLServer	Port that the selected database is using.
Instance name	SQLServer	Instance name for the selected SQLServer
Connection URL	All	URL that the MID Server uses to connect to the specified database. The URL is created automatically when you save the form, and is read-only for the default databases. **Note:** If the format selected is not one of the default databases, you must create the connection URL manually so that the MID Server knows how to create the connection.
JDBC driver	None, DB2 Universal, Sybase	The JDBC driver to use for this connection when it is not a default database. **Note:** If you add a Sybase or DB2 Universal database, you must enter the driver name in this field and upload the driver JAR file to the instance.

JDBC connection to Oracle example



3. Click **Submit**.

Related topics

JDBC credentials

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Auto-map JDBC activity output variables

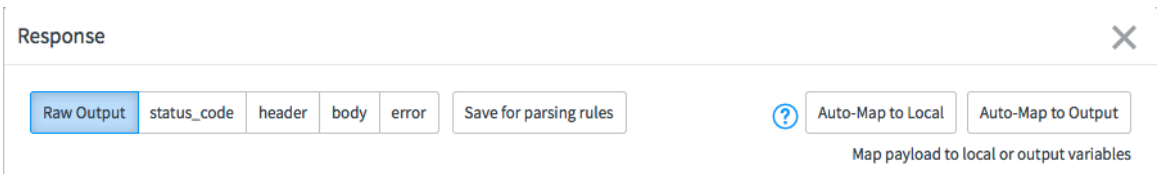
The ServiceNow activity designer allows you to map parameter values in a JDBC test payload to variables in the **Outputs** tab automatically.

Before you begin

Role required: admin

Procedure

1. In the JDBC provider template form, select the **Inputs** tab.
2. Click **Test Activity** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
3. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



4. Select one of these auto-mapping options.
   - **Auto-Map to Local**: Directly maps values to a local variable for use within the activity.
   - **Auto-Map to Output**: Directly maps values to the output variable to pass to other activities in the workflow. Auto-mapping to an output variable creates an array of objects, each of which contains the column names from the query result.

JDBC stored procedure parameters

You can use Orchestration to run a stored procedure on MySQL, Oracle DB, and MS-SQL databases.

There is support of multiple data types, with the following limitations:

- Only one result-set is returned.
- The order of input and output data types in the stored procedure parameters must match the activity definition.
- Binary, Blob, Varbinary, and LongBinary should be base64 encoded.
- Date, Time, and Timestamp have a specific format:

  Date format: yyyy-mm-dd

  yyyy-mm-dd is the supported format.

  Time format: hh:mm:ss[.sss]

  hh:mm:ss[.sss] is the supported format. Precision is in milliseconds only, microseconds or nanoseconds cannot be handled.

  Note: `10:30:59` and `10:30:59.999000` are correct, but `10:30:59.` is incorrect.

  Timestamp format: yyyy-mm-dd hh:mm:ss[.ffffff]

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yyyy-mm-dd hh:mm:ss[.ffffff] is the supported format. Precision is to microseconds.

- ResultSet is the first result set coming back from database server.
- MS-SQL does not support INOUT parameters. If you use INOUT parameters, the Activity Template transparently maps them to OUT parameters.

Note: If you do not want to do a validation of data types in stored procedure parameters, like the legacy behavior, you set the glide.stored_proc.data_type.validation as false. See MID Server properties for more information.

Stored procedure parameters

Field	Description
Mode	Type of stored procedure parameter. Supported parameters: • IN • OUT • INOUT
Sql Type	A SQL data type. Supported data types: • ARRAY • BIGINT • BINARY • BIT • BLOB • CHAR • CLOB • DATE • DECIMAL • DISTINCT • DOUBLE • FLOAT • INT • INTEGER • JAVA_OBJECT • LONGVARBINARY • LONGVARCHAR • NULL • NUMERIC • OTHER • REAL • REF

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Stored procedure parameters (continued)

Field	Description
	• REF_CURSOR • SMALLINT • STRUCT • TIME • TIMESTAMP • TINYINT • VARBINARY • VARCHAR
Name/Value	Name-value pairs to pass to the host. You can create these parameters manually, or drag and drop input variables into the parameter fields and assign a value.

Note: Not all database providers support the entire realm of JDBC data types. Reference your database reference manual to understand the supported datatypes for your installation.

Test JDBC activity template inputs

You can test the input parameters of a custom JDBC activity during its development without having to run the activity in a workflow context.

Before you begin

Create input variables and map them to fields in the Execution Command form or provide actual values for these fields. Role required: web_service_admin, activity_admin, activity_creator

About this task

This test executes only the input parameters against an endpoint and not the pre-processing or post-processing scripts. It is not necessary to check out the activity to test it.

Note: If you provide enough information for Orchestration to contact the endpoint or host and return data, you can test the input variables. You can test from any stage in the activity designer. Typically, the Execution Command stage is the point at which your inputs are ready for testing.

Procedure

1. From the JDBC Execution Command, click **Test Inputs**.
   The list of input source variables appears. If you added default values for these variables, those values appear in the **Substitute Value** column. Mandatory variables are marked with a red star.

   Note: The test fails if the MID Server cannot be found or if it cannot connect to the target.

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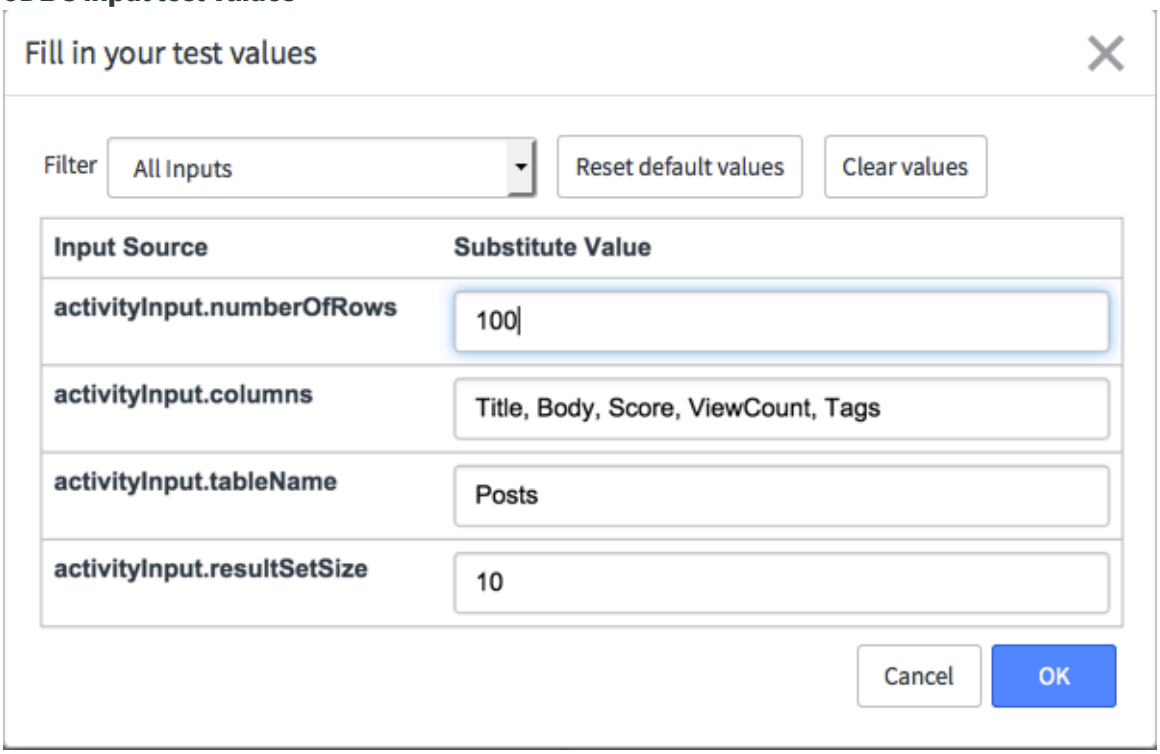
JDBC input test values



2. Filter the variable list with these controls:
   - **All Inputs**: Displays all input variables. This control is the default view.
   - **Mandatory Inputs**: Displays only mandatory variables.
   - **Inputs Without Defaults**: Shows input variables that do not have assigned default values.
3. Reset values as needed.
   - **Reset default values**: If values are present, this control replaces any test values set in this form with the default values.
   - **Clear values**: Clears all values in the input variable list, even if default values exist.
4. When your test values are configured correctly, click **OK**.
   The system runs the values for all the inputs configured against the specified target and returns the resulting payload. The buttons in the Response form display different views of the payload. The entire payload appears in the **Raw Output** window.

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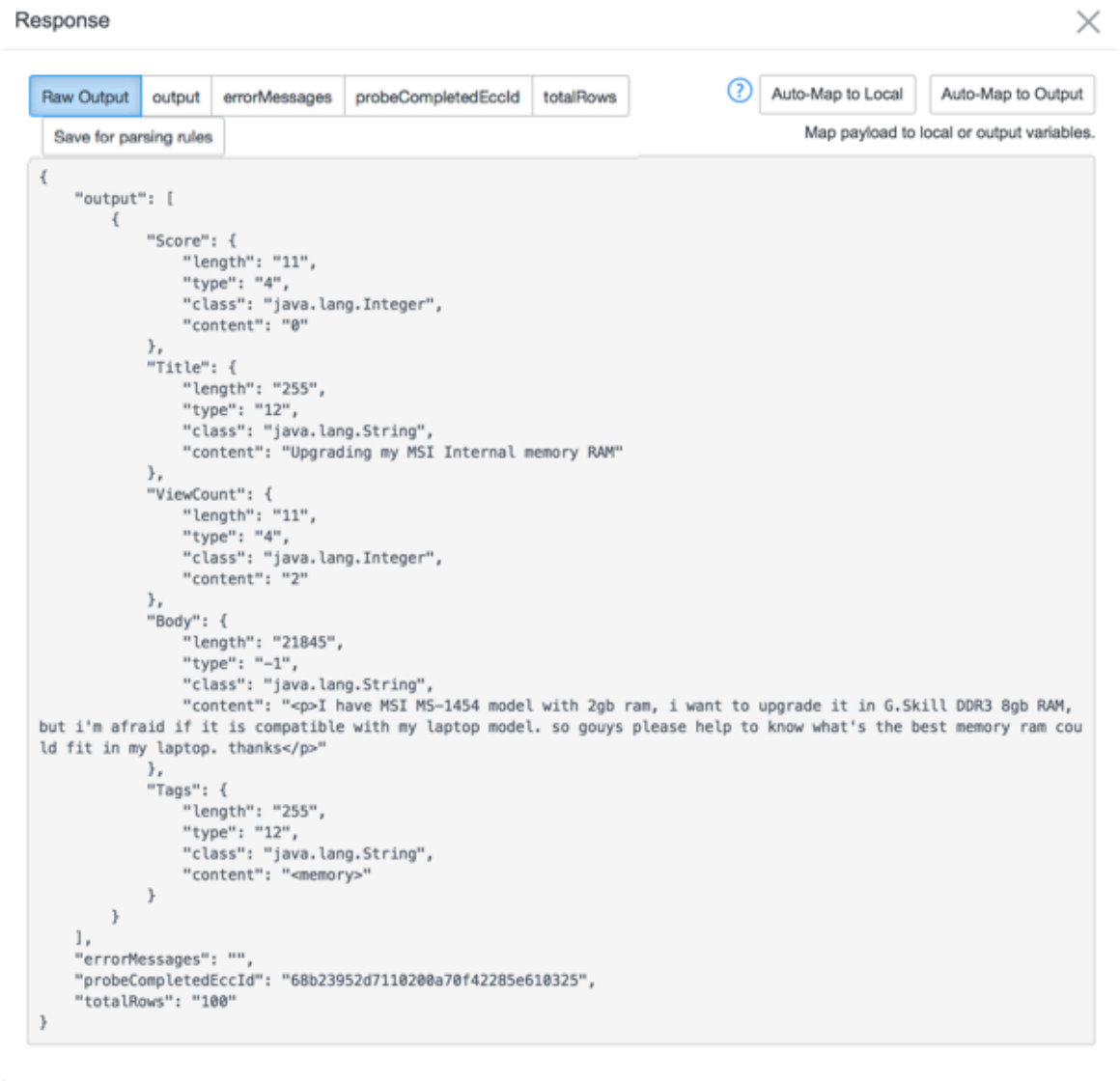
Response payload from inputs test



5. To map appropriate parameter values in the payload to variables in the **Outputs** stage automatically, select an auto-mapping option.
6. Click the **X** in the upper right corner of the window to close it.

Create a SOAP web service activity

Use this template to create a custom SOAP activity.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

For instructions on using the activity template process flow, see create custom activities.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.

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2. After setting up general properties and creating input variables, configure the SOAP web service Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes on the SOAP web service.
Web service message	Specify the SOAP web service message to use for this activity. If you need information on SOAP web services messages, see SOAP
Web service message function	Specify the SOAP message function available in conjunction with the SOAP web service.
Endpoint	If you enter an endpoint in this field, it over rides the endpoint URL configured in the SOAP message web service. Click the lock icon to open the input field and add the end point.
SOAP message parameters	Name-value pairs to pass to the SOAP end point. You can create these parameters man ually, or drag input variables into the parame ter fields and then assign a value. Parameters defined in the SOAP message that use ${} can be assigned data from this activity tem plate. Use the **Additional attribute** column to configure the system to not escape the text. By default, text sent to the SOAP message is escaped. The **Name** column is auto-populat ed if the users have provided variables using Variable substitution in outbound REST mes in the SOAP message.
Use MID Server	Check box that determines if a MID Server must be used to invoke the SOAP web ser vice. If the SOAP web service message func tion defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server for connecting to the SOAP end point. By default, the system selects a MID Server with SOAP capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the SOAP web service re quest before it times out, in seconds. The de fault is **10**.
Authentication	Determines what type of authentication is re quired for the endpoint. The options are:

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Option	Description
	○ **Use existing credentials in SOAP mes sage**: Uses credential definitions from the SOAP message definition. ○ **Override with Basic Authentication cre dentials:** Uses |Enable basic authentica credentials. Over rides the credentials in the SOAP message definition. Basic authentication credentials must be provisioned before they are avail able for selection. ○ **Override with Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with certifi cate authentication credentials. ○ **Override with Both Basic and Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with both basic authentication or certificate authentication credentials. ○ **Override with WS-Security Username profile**: Overrides the credentials in the SOAP message definition with credentials defined in WS-Security.
Credentials	Required REST endpoint basic authentica tion credentials. This field is available when **Override with Basic Authentication creden tials** is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes creden tials stored on the instance and credential IDs from an external storage system. If you are us ing credentials stored in a CyberArk safe, you can override the default safe defined in the MID Server configuration file by adding the name of a different safe as a prefix to the cre dential ID, separated by a colon. For example, *`newsafe:orch-test-f5`*. See Configure for details.
Protocol Profile	Outbound web services mutual authentica to use for authentication. This field is available when the authentication type is ei ther **Override with Certificate Authentica tion credentials** or **Override with Both Basic and Certificate Authentication credentials**.

Note: You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

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What to do next

- Use auto-mapping to generate outputs and parsing rules (recommended for JDBC)
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Auto-map SOAP activity output variables

The ServiceNow activity designer allows you to map parameter values in a SOAP test payload to variables in the **Outputs** stage automatically.

Before you begin

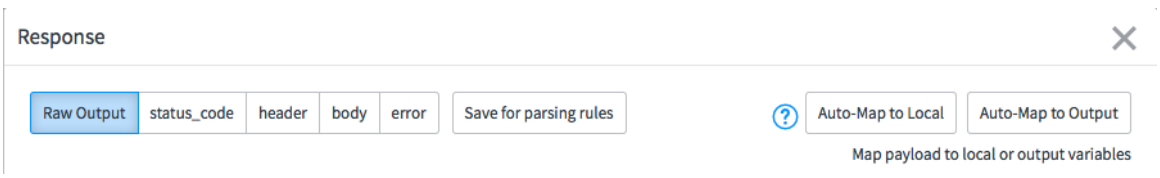
Role required: web_service_admin, activity_admin, activity_creator

About this task

Note: You can test input variables from any stage in the activity designer if you have provided enough information for Orchestration to contact the endpoint and return data. Typically, the **Execution Command** stage is the point at which your inputs are ready for testing.

Procedure

1. In the activity designer, proceed to the **Execution Command** stage.
2. Define an appropriate MID Server, if requested.
   The test fails if the MID Server cannot be found or if it cannot connect to the target.
3. Click **Test Activity** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
4. Provide test values, if requested, and click **OK** to display the payload.
   The entire payload appears in the **Raw Output** tab of the Response form.



5. Select one of these auto-mapping options.
   - **Auto-Map to Local**: Directly maps values to a local variable for use within the activity.
   - **Auto-Map to Output**: Directly maps values to the output variable to pass to other activities in the workflow. Auto-mapping to an output variable creates an array of objects, each of which contains the column names from the query result.

Provide credentials to access a SOAP message WSDL

If the SOAP WSDL you are requesting in a test payload requires authentication, you must provide basic auth credentials in either the SOAP message or the SOAP activity.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

The ServiceNow instance only supports basic auth credentials for accessing a WSDL. If the SOAP function or the SOAP message does not provide these credentials, you must configure them in the SOAP activity template. Orchestration uses these priorities for deciding which basic authentication credentials to use:

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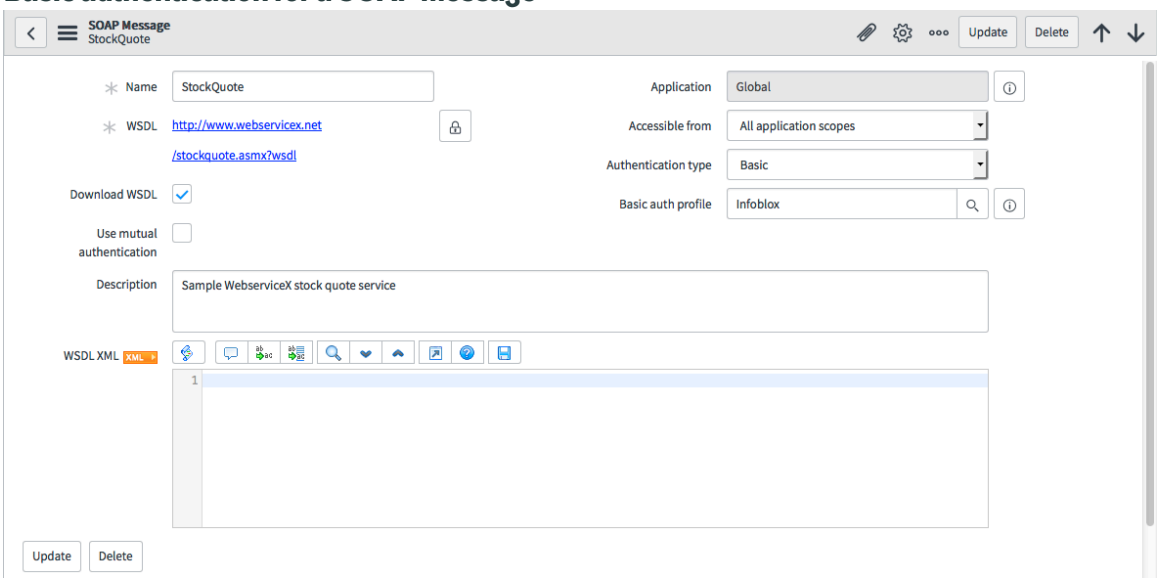
- SOAP message: Credentials for a SOAP message are used if no other credentials are defined.
- SOAP function: Credentials for a SOAP function override the credentials configured for the SOAP message.
- SOAP activity template: Credentials for a SOAP activity template override both the SOAP function and SOAP message credentials.

Procedure

1. Navigate to **All** > **System Web Services** > **Outbound** > **SOAP Message**.
2. Select the SOAP message you want the activity to use.
3. In the SOAP Message record, select the **Download WSDL** check box.
4. In the **Authentication type** field, select **Basic**.
   The **Basic auth profile** field appears.
5. Select the basic auth profile to use with this SOAP message.

Basic authentication for a SOAP message



6. Alternately, you can configure basic authentication credentials in Configure the SOAP execution command.

   a. In the **Authentication** field, select **Override with Basic Authentication credentials**.
      The **Credentials** field appears.

   b. Select the basic auth credentials to use to access the WSDL.

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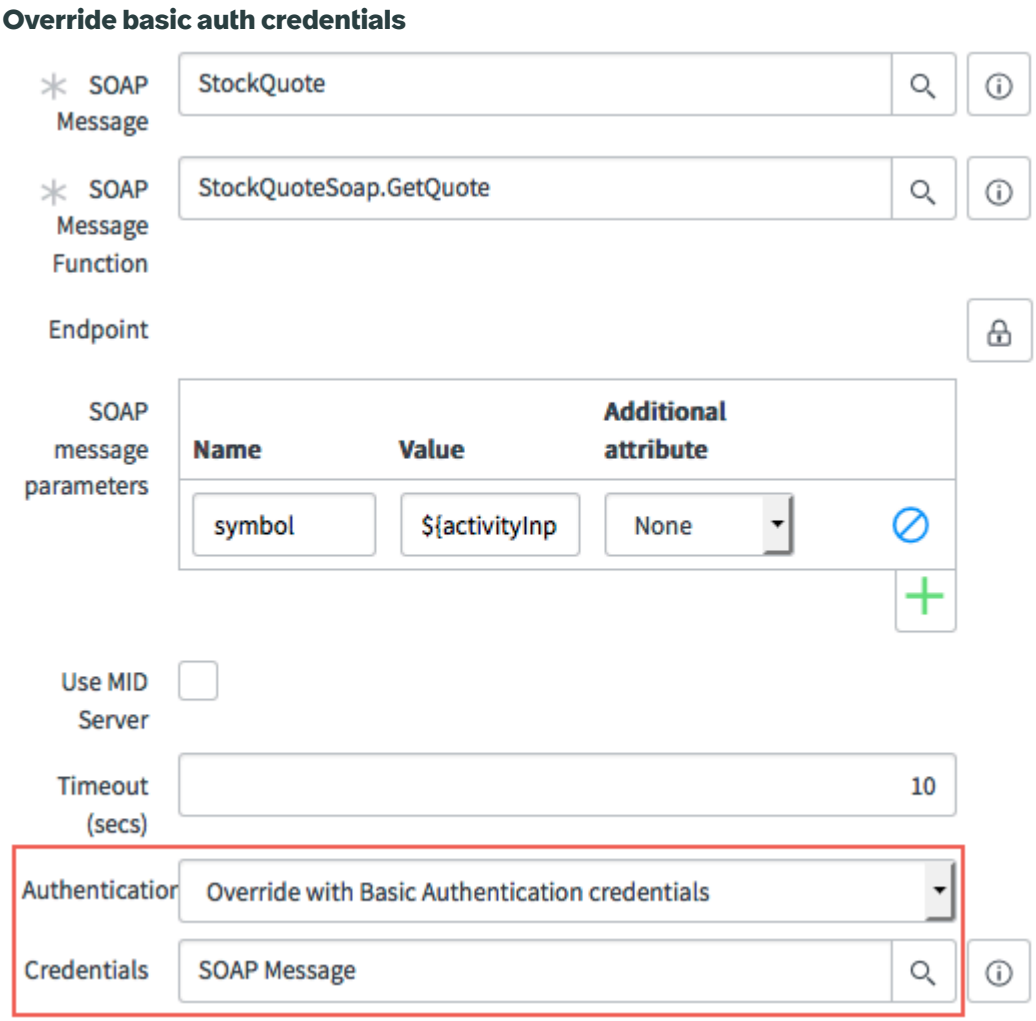
This setting overrides any credentials configured in the SOAP message.



Configure the SOAP execution command

Use the input variables you created to configure the command that Orchestration executes on the SOAP endpoint.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: web_service_admin, activity_admin, activity_creator

Note: You can test the SOAP connection between the MID Server and the endpoint without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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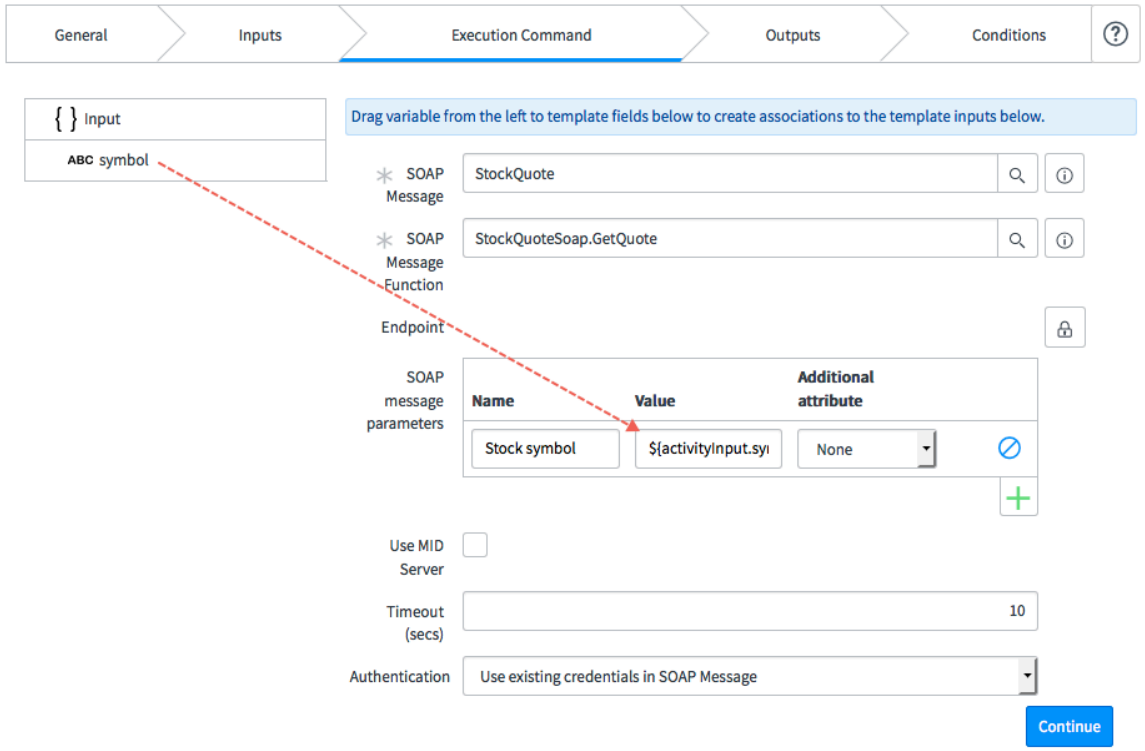
SOAP execution command



2. Complete the fields shown in the table.

SOAP template execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Web service message	SOAP message to use for this activity. Users must have the web_service_admin role to configure this field.
Web service message function	SOAP message SOAP message functions to use for this activity. Users must have the web_service_admin role to configure this field.
Endpoint	Endpoint URL for the SOAP web service this activity uses. Enter an endpoint in this field to override the endpoint configured in the SOAP message. Click the lock icon to open the input field.
SOAP message parameters	Name-value pairs to pass to the SOAP endpoint. You can create these parameters manually, or drag input variables into the parameter fields and then assign a value. Parameters defined in the SOAP message that use ${} can be assigned data from this activity template. Use the **Additional attribute** column to configure the system to not escape the text. By default, text sent to the SOAP message is escaped. The **Name** column is auto-populated if the users have provided variables using Variable substitution in outbound REST messages in the SOAP message.
Use MID Server	Check box that determines if a MID Server must be used to invoke the SOAP web service. **Note:**

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Field	Description
	If the SOAP web service message function defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the SOAP endpoint. By default, the system selects a MID Server with SOAP capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the SOAP web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in SOAP message**: Uses credential definitions from the SOAP message definition. ○ **Override with Basic Authentication credentials:** Uses |Enable basic authentication for outbound SOAP credentials. Overrides the credentials in the SOAP message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with certificate authentication credentials. ○ **Override with Both Basic and Certificate Authentication credentials**: Overrides the credentials in the SOAP message definition with both basic authentication or certificate authentication credentials. ○ **Override with WS-Security Username profile**: Overrides the credentials in the SOAP message definition with credentials defined in WS-Security.
Credentials	Required REST endpoint basic authentication credentials. This field is available when **Override with Basic Authentication credentials** is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the Configure the MID Server for CyberArk defined in the MID Server configuration file by adding the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *`newsafe:orch-test-f5`*.
Protocol Profile	Outbound web services mutual authentication to use for authentication. This field is available when the authentication type is either **Override with Certificate Authentication credentials** or **Override with Both Basic and Certificate Authentication credentials**.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

SOAP template execution parameters

You use execution parameters to create the input process script in the **Pre processing** form of the activity designer.

For descriptions of the SOAP web service command fields, see the table in Configure the SOAP execution command.

Note: You must use the `executionParam.` prefix with all variables in this table.

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SOAP execution parameters

Name	Variable	Type	Usage
Web service message	web_service_message	Reference	The sys_id of the corresponding SOAP message.
Web service message function	web-service_message_function	Reference	The sys_id of the SOAP message function.
Web service endpoint	web_service_endpoint	String	URL of the SOAP endpoint.
Parameters	parameters	Array of JavaScript objects	Array of JavaScript objects, expressed with the `executionParam.` prefix. For instructions on creating arrays using this parameter, see Create a JavaScript array in a SOAP template.
Use mid server	use_mid_server	Boolean	When true, indicates that a MID Server is used.
MidCapabilities	midCapabilities	String (comma separated)	List of references to required MID Server capabilities.
Time out	time_out	String	Allowed duration of the SOAP web service request before it times out, in seconds. The default is **10**.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. Use this example to customize the MID Server selection if there are additional capabilities that are assigned by value: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`
Auth Type	auth_type	Boolean	Type of credentials to use. The choices are: • basic_auth_pick_credentials • use_existing_credentials
Credentials	credentials	Reference	Credentials to use for this SOAP message when the `auth_type` is `basic_auth_pick_credentials`.

Create a JavaScript array in a SOAP template

These are instructions for creating JavaScript arrays using SOAP execution parameters.

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Before you begin
Role required: web_service_admin, activity_admin, activity_creator

About this task
To add more name-value pairs to the parameter's array, append the values to the existing array.

Procedure
1. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_a
ttribute":"none"};
executionParam.parameters.push(newParameter);
```

   By adding the new parameter JavaScript object to the array, you ensure that any elements already available in the array are not impacted.

2. Make sure to set the value in the **Additional attribute** column in the **SOAP message parameters** input field to **Do not escape text**.

   In this case, the system does not escape the value specified for the **value** attribute. An example of this is:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_a
ttribute":"do_not_escape_text"};
executionParam.parameters.push(newParameter);
```

   Note: If the value for the **additional_attribute** field is **None**, then the system escapes the value specified by the **value** attribute. In the first example, `parameterValue` is escaped.

SOAP template post-processing parameters
Use these parameters to create a post-processing script.

Activity designer post-processing parameters

Name	Variable	Type	Usage
Status code	status_code	Integer	Contains the status code returned from the web service.
Header	header	Hashmap of JavaScript object	Contains the key value paired hashmap associated with the header values passed into the web service. You can access each value with `executionResult.header[keyName]`.
Body	body	String	Contains a string value representing the output from the SOAP message
Error	error	String	Returns the error string from the SOAP web service, unless there are no errors, in which case it returns**null**.

Create a JavaScript Probe activity
Create a JavaScript Probe activity to instruct a MID server to execute server-side javascript.

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Before you begin
Role required: activity_creator or workflow_admin

About this task
The JavascriptProbe activity has the same functionality as making 'Packages' calls into standard Java libraries. It allows you to have more control over the Java libraries on the MID Server. You can load your own JAR files on the MID Server and have the JavascriptProbe make Package calls into those java files.

Procedure
1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the JavaScript probe activity Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes on the MID server.
Script type	Select the type of script to include. Available options are: ○ Custom JavaScript ○ MID Server script include
Script	Custom JavaScript to run with this probe. **Note:** This field is available when the **Script type** selected is **Custom JavaScript**.
MID Server script include	Script for the MID Server to run with this probe. **Note:** This field is available when the **Script type** selected is **MID Server script include**.
Select MID Server by host	MID Server on which the probe runs.
Required MID Server capabilities	MID Server to use, by capabilities.
Parameters	Name-value pairs to pass to the host with this probe. You can create these parameters manually, or drag input variables into the **Parameters** fields and assign a value.

Note: You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next
Finish creating your JavaScript probe activity by creating output variables, creating a parsing rule, or Conditions. Refer to the create custom activities topic to know your template options.

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JavaScript probe template execution parameters

You use execution parameters to create the input process script in the **Preprocessing** form of the activity designer.

For descriptions of the JavaScript Probe command fields, see the table in Configure the JavaScript Probe execution command.

Note: You must use the `executionParam.` prefix with all variables in this table.

JavaScript template execution parameters

Name	Variable	Type	Usage
Script Type	script_type	Enumerated	Type of script to run. The possible types are: • custom_javascript_typ • mid_script_include_type
Script	script	String	Script that runs custom JavaScript when the **script_type** is **custom_javascript_type**.
Mid script include	mid_script_include	Reference	The sys_id reference associated with the MID Server script include to call, when the **script_type** is **mid_script_include_type**.
Source	source	String	Target host on which to run the script.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.
Parameters	parameters	Array of JavaScript object	Array of JavaScript objects, expressed with the `executionParam.` prefix. To add more name-value pairs to the **parameters** array, append them to the existing array. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array. This assigns additional parameters to the message: `var newParameter = {"name":"parameterName","value":"parameterValue"}; executionParam.parameters.push(newParameter);`
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection:

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JavaScript template execution parameters (continued)

Name	Variable	Type	Usage
			`var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

JavaScript probe template post-processing parameters

Use these parameters to create a post-processing script.

JavaScript probe post-processing parameters

Name	Variable	Type	Usage
Payload	payload	String	Contains raw payload returned from the JavaScript Probe.
Output	output	String	Contains output data returned from the JavaScript Probe.
EccSysId	eccSysId	String	Contains the reference ID associated with the ECC Queue input message.
Error Messages	errorMessages	String	Contains the error messages returned from the JavaScript probe. If no error messages are returned, this value is null.

Configure the JavaScript Probe execution command

Use the input variables you created to configure the command that Orchestration executes on the JavaScript Probe target host.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note: You can test the JavaScript Probe connection between the MID Server and the target without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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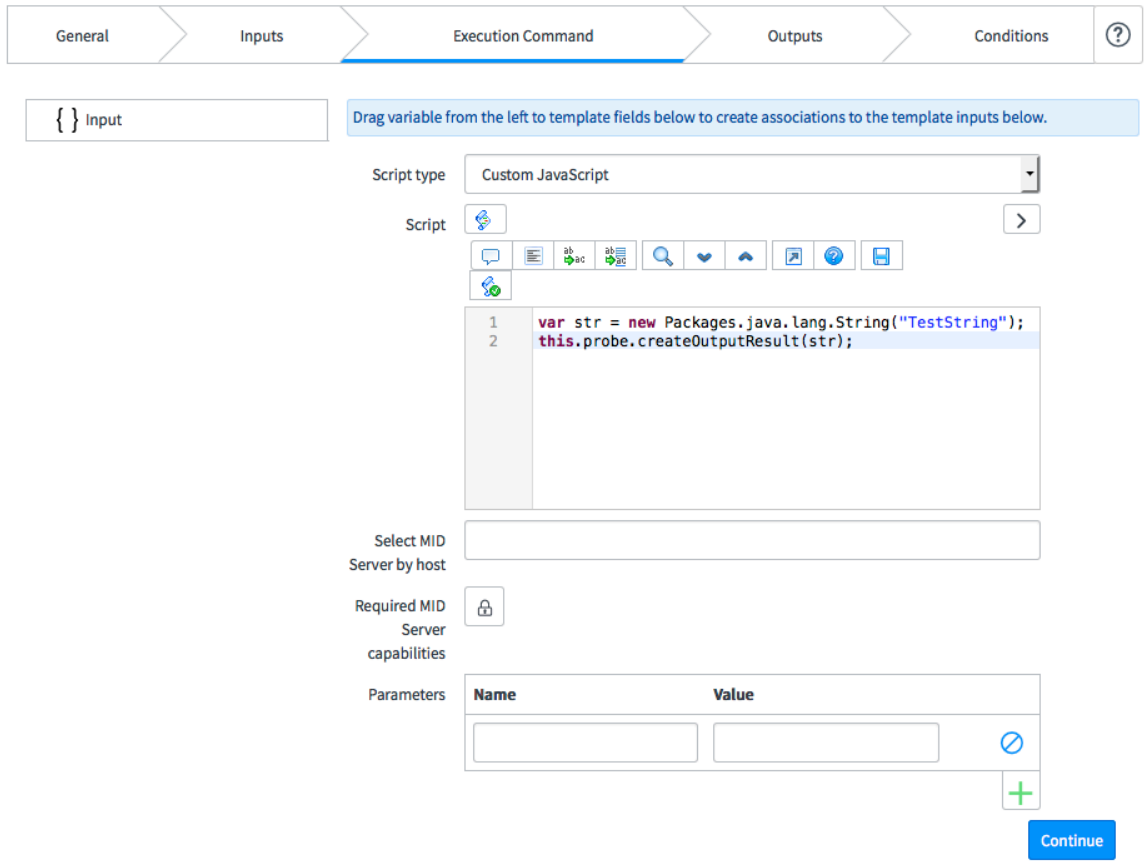
JavaScript Probe execution command



2. Complete the fields shown in the table.

JavaScript Probe execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Script type	Select the type of script to include. Available options are: ○ Custom JavaScript ○ MID Server script include
Script	Custom JavaScript to run with this probe. This field is available when the **Script type** selected is **Custom JavaScript**.
MID Server script include	Script for the MID Server to run with this probe. This field is available when the **Script type** selected is **MID Server script include**.
Select MID Server by host	MID Server on which the probe runs.
Required MID Server capabilities	MID Server to use, by capabilities.
Parameters	Name-value pairs to pass to the host with this probe. You can create these parameters manually, or drag input variables into the **Parameters** fields and assign a value.

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3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create a PowerShell activity

Create a custom PowerShell activity return data to a workflow from a host using Microsoft PowerShell.

Before you begin

Role required: activity_creator or workflow_admin

About this task

ServiceNow supports PowerShell 3.0 to 5.1.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the PowerShell Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes on the MID Server.
Target host	Host name or IP address of the target server for this PowerShell activity.
Script type	Type of PowerShell script to run on the Power Shell host. Available options are: ○ Custom PowerShell command ○ MID Server script file
MID Server script file	The MID Server script file contains the Power Shell scripts. This field is available when the **Script type** selected is MID Server script file.
Command	PowerShell command the activity executes. This field is available when the **Script type** se lected is *Custom PowerShell command*. You can create your commands by dragging and dropping input variables from the variable builder into this field.
PowerShell variables	Name-value pairs to pass to the host with Pow erShell. You can create these variables man ually, or drag input variables into the **Value** field. Encrypted input variables retain their en cryption, regardless of the data type settings in this field. If you type in a value and select the **Encrypted** data type, your value appears in plain text. It is only encrypted when it pass es to the ECC Queue.
Use MID Service Account	If checked, this activity authenticates on the target host using the credentials of the MID

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Option	Description
	Server service account only, without trying any other credentials. **Note:** The **Credential tag** field is not available.
Credential tag	Credential tag this activity must use to run PowerShell commands on the host. If this field is left blank, the MID Server tries all the available credentials until it finds a valid one, ending with the MID Server service account. If a credential tag is defined, the MID Server tries the credentials with that tag specified on ly and does not try the MID Server service ac count. **Note:** This field is not available when the **Use MID service account** check box is selected.
Required MID Server capabilities	MID Server to use for querying PowerShell, by capabilities. By default, the system selects a PowerShell MID Server.

Note: You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

Finish creating your PowerShell activity by creating output variables, creating a parsing rule, or Conditions. Refer to the create custom activities topic to know your template options.

PowerShell template execution parameters

You use execution parameters to create the input process script in the **Pre Processing** form of the activity designer.

For descriptions of the Powershell command fields, see the table in Configure the PowerShell execution command.

Note: You must use the `executionParam.` prefix with all variables in this table.

Powershell execution parameters

Name	Variable	Type	Usage
Source	source	String	Target host on which to execute the command.
Script type	script_type	Enumeration	Type of script to run. The possible types are:

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Powershell execution parameters (continued)

Name	Variable	Type	Usage
			• **command:** Custom PowerShell command. • **file:** Identifies the MID Server script file to run.
Command	command	String	Command sent to the MID Server for it to run on the target host.
MidScriptFile	midScriptFile	Reference	Reference sys_id of the MID Server script file to execute, when the **script_type** is **file**.
PowershellVariables	powershellVariables	Array of hashmap	Hashmap of JavaScript objects with **name**, **value**, and **type** for each object. The **type** of each object can be one of **plain**, **encrypted**, **boolean**, or **null**, corresponding to the PowerShell variable **type** selected in the inputs tab. For example, you might enter: `var newParameter = {"name":"parameterName","value":"parameterValue", "type": "plain" }; executionParam.powershellVariables.push(newParameter);`
Credential tag	credential_tag	String	Specific credential tag this activity must use to run PowerShell commands on the host.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY': 'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

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Powershell post-processing parameters and payload parsing

Use these parameters to create a post-processing script, payload parsing, and tagging.

Powershell post-processing parameters

Name	Variable	Type	Usage

Tags	tags	Hashmap of tag values to return from the PowerShell command.	Contains the tags used to extract output using the PowerShell commands. The tag output is delimited by double percentage signs, as in **%%tagname%% ... %%**. Set up the command using the format in this example:
			`Write-Host %%tagname1%%`
			`output1 line 1`
			`output1 line 2`
			`…`
			`Write-Host%%`
			
			`Write-Host %%tagname2%%`
			`output2 line 1`
			`output2 line 2`
			`…`
			`Write-Host%%`
			
			The tags returned are JavaScript hashmap objects in which each key is prefixed with **tag** appended with the **tagname**.
			`{"__text__": "",`
			`"tagtagname1":"output1`
			`line1\noutput1 line2\n",`
			`"tagtagname2":"output2`
			`line1\noutput2 line2\n"}`

Hresult	hresult	String	Contains any **hresult** returned from the PowerShell command. If no **hresult** is returned, this parameter is **null**.
Output	output	String	Contains the raw output from the PowerShell command.
EccSysID	eccSysID	String	Contains the reference ID associated with the ECC Queue input message returned by the activity.
ErrorMessages	errorMessages	String	Contains any error messages retrieved from the PowerShell command. This value is **null** if there are no error messages.

Create a REST web service activity

Use this procedure to create a custom REST web service Orchestration activity.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

To create and use a REST web service workflow activity:

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- Create a Create a REST message if an appropriate one is not already configured.
- Assign the web_service_admin role to any user who must create or edit a custom REST activity.
- Determine an application, or Application scope, for this activity.
- Determine the Create a REST message to use for the activity. Use this value to override the endpoint configured in the REST message.
- Optionally, create basic authentication credentials. Use this value to override the credentials configured in the SOAP message.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the REST web service Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes.
REST message	Name of an existing REST message to use in this activity.
REST message function	REST message function to use for this activity.
Endpoint	Endpoint URL for the REST web service this activity uses. Enter an endpoint in this field to override the endpoint configured in the REST message. Click the lock to open the in put field.
Variable substitutions	Name-value pairs to pass to the REST end point. You can create these parameters manu ally, or drag input variables into the parameter fields, and then assign a value. Parameters defined in the REST message that use **${}** can be assigned data from this activity template. Use the **Additional attribute** column to config ure the system to not escape the text. By de fault the text sent to the REST message is es caped. If the users have provided variables using Variable substitution in outbound REST in the REST message, then the **Name** column is automatically populated.
Additional Headers	Additional HTTP header parameters for the REST message selected. You can also use these values to override parameters inherited from the REST message.
Additional Query Parameters	Additional query parameters for the REST message selected. You can also use these val ues to override parameters inherited from the REST message.

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Option	Description
Use MID Server	Check box that determines if a MID Server should be used to invoke the REST web service. **Note:** If the REST web service message function defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the REST endpoint. By default, the system selects a MID Server with REST capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the REST web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in REST message**: Uses credential definitions from the REST message definition. ○ **Override with Basic Authentication credentials**: Uses Enable basic authentication credentials to override the credentials in the REST message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Uses a certificate, such as a private key, to override the credentials in the REST message definition. ○ **Override with Both Basic and Certificate Authentication credentials**: Uses both basic authentication and certificate authentication to override the credentials in the REST message definition. ○ **Override with OAuth Authentication credentials**: Uses OAuth 2.0 credentials to override the credentials in the REST message definition. The REST message selected for this activity must have its OAuth set to **OAuth 2.0** and its OAuth profiles and configured appropriately.
Credentials	Required REST endpoint basic authentication credentials. This field is available when **Override with Basic Authentication creden**

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Option	Description
	tials is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes creden tials stored on the instance and credential IDs from an external storage system. If you are us ing credentials stored in a CyberArk safe, you can override the default safe defined in the MID Server configuration file. See Configure for details. Add the name of a different safe as a prefix to the credential ID, separated by a colon. For exam ple, *newsafe:orch-test-f5*.
Protocol Profile	Certificate authentication to use. This field is available when the selections in the **Authen tication** are either **Override with Certificate Authentication credentials** or **Override with Both Basic and Certificate Authentication credentials**.
OAuth profile	Profile for the OAuth provider for this REST message. See for more information.

Note: You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

Finish creating your Rest web service activity by creating output variables, creating a parsing rule, or Conditions. Refer to the create custom activities topic to know your template options.

Auto-map REST activity output variables

The ServiceNow activity designer allows you to map parameter values in a REST test payload to variables in the **Outputs** stage automatically.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

Note: You can test input variables from any stage in the activity designer if you have provided enough information for Orchestration to contact the endpoint and return data. Typically, the **Execution Command** stage is the point at which your inputs are ready for testing.

Procedure

1. In the activity designer, proceed to the **Execution Command** stage.
2. Define an appropriate MID Server, if requested.
   The test fails if the MID Server cannot be found or if it cannot connect to the target.
3. Click **Test Activity** to test the input parameters.
   If you added actual values for the parameters and fields, the system runs those values against the specified target and returns the resulting payload. If you mapped input variables to fields and parameters, the system displays a dialog box for assigning test values to those variables.
4. Provide test values, if requested, and click **OK** to display the payload.

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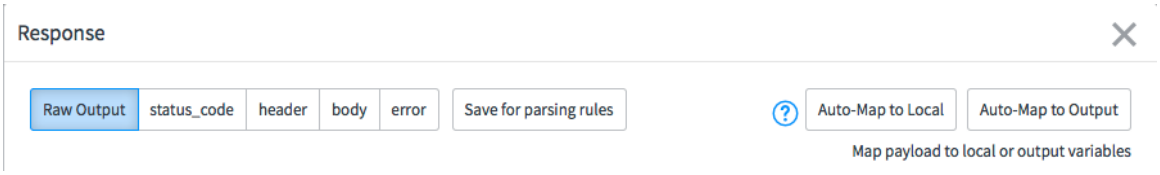
The entire payload appears in the **Raw Output** tab of the Response form.



5. Select one of these auto-mapping options.
   - **Auto-Map to Local**: Directly maps values to a local variable for use within the activity.
   - **Auto-Map to Output**: Directly maps values to the output variable to pass to other activities in the workflow. Auto-mapping to an output variable creates an array of objects, each of which contains the column names from the query result.

REST template execution parameters

You use execution parameters to create the input process script in the **Pre Processing** form of the activity designer.

For descriptions of the REST web service command fields, see Configure the REST execution command.

Note: You must use the `executionParam.` prefix with all variables in this table.

REST template execution parameters

Name	Variable	Type	Usage
Web service message	web_service_message	Reference	The sys_id of the corresponding web service message.
Web service message function	web_service_message_function	Reference	The sys_id of the REST message function.
Web service endpoint	web_service_endpoint	String	URL of the REST endpoint.
Parameters	parameters	Array of JavaScript objects	Array of JavaScript objects, expressed with the `executionParam.` prefix. For instructions on creating arrays using this parameter see Create a JavaScript array in a REST template.
Use mid server	use_mid_server	Boolean	Selects whether or not to use the MID Server. A value of **true** uses the MID Server, and a value of **false** does not use the MID Server.
MidCapabilities	midCapabilities	String (comma separated)	List of references to required MID Server capabilities.
Time out	time-out	String	Allowable time out duration, expressed in seconds.

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REST template execution parameters (continued)

Name	Variable	Type	Usage
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. Use this example to customize the MID Server selection if there are additional capabilities that are assigned by value: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`
Auth Type	auth-type	Boolean	Type of credentials to use. The choices are: • basic_auth_pick_credentials • use_existing_credentials
Credentials	credentials	Reference	Contains the credentials to use for this REST message when the **auth_type** selected is **basic_auth_pick_credentials**.

Create a JavaScript array in a REST template

These are instructions for creating JavaScript arrays using REST execution parameters.

Before you begin

Role required: web_service_admin, activity_admin, activity_creator

About this task

To add more name-value pairs to the parameter's array, append the values to the existing array.

Procedure

1. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_attribute":"none"};
executionParam.parameters.push(newParameter);
```

By adding the new parameter JavaScript object to the array, you ensure that any elements already available in the array are not impacted.

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2. Make sure to set the value in the **Additional attribute** column in the **REST message parameters** input field to **Do not escape text**.

   In this case, the system does not escape the value specified for the **value** attribute. An example of this is:

```
var newParameter =
 {"name":"parameterName","value":"parameterValue","additional_a
ttribute":"do_not_escape_text"};
executionParam.parameters.push(newParameter);
```

Note: If the value for the **additional_attribute** field is **None**, then the system escapes the value specified by the **value** attribute. In the first example, `parameterValue` is escaped.

REST template post-processing parameters

Use these parameters to create a post-processing script.

Activity designer post-processing parameters

Name	Variable	Type	Usage
Status code	status_code	Integer	Contains the status code returned from the REST web service.
Header	header	Hashmap of JavaScript object	Hashmap of key value pairs associated with the header values passed into the web service. You can access each value with `executionResult.header[keyName]`.
Body	body	String	Contains a string value representing the output from the REST message
Error	error	String	Returns the error string from the REST web service, unless there are no errors, in which case it returns**null**.

Configure the REST execution command

Use the input variables you created to configure the command that Orchestration executes on the REST endpoint.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: web_service_admin, activity_admin, activity_creator

Note: You can test the REST connection between the MID Server and the endpoint without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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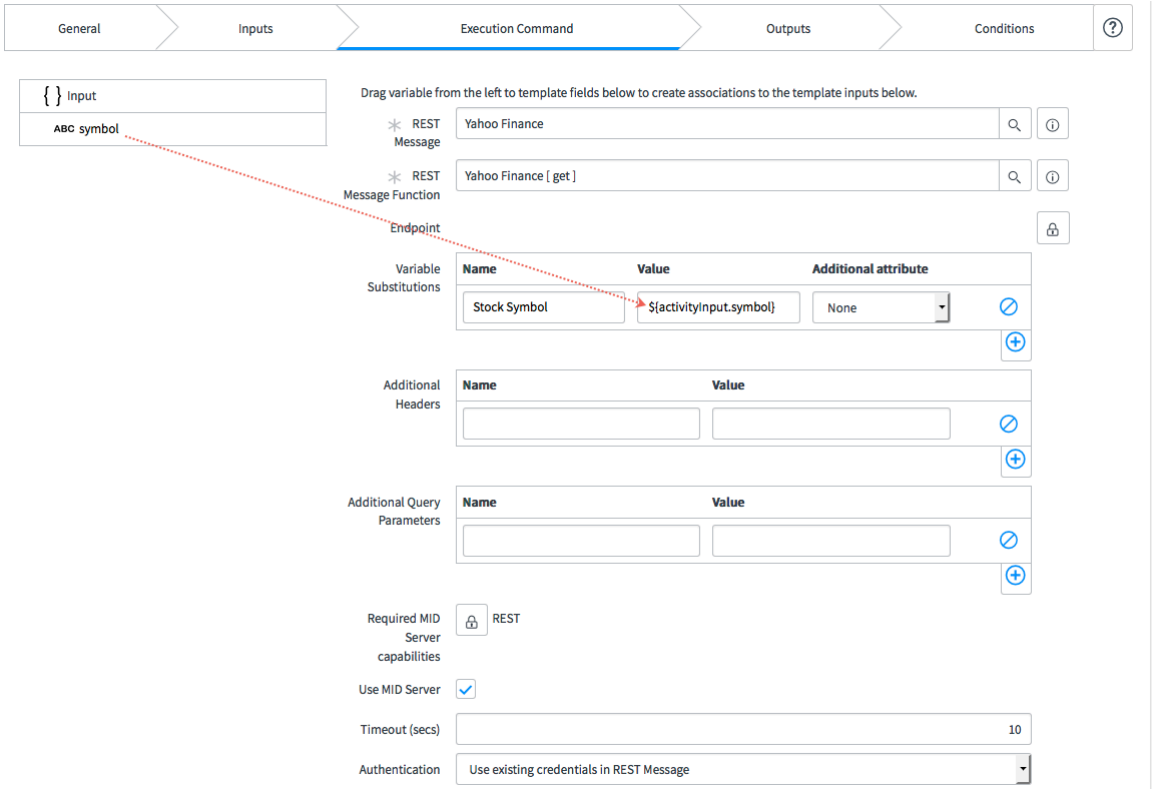
REST execution command



2. Complete the fields shown in the table.

REST execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
REST message	Name of an existing REST message to use in this activity. Users must have the web_service_admin role to configure this field.
REST message function	REST message function to use for this activity. Users must have the web_service_admin role to configure this field.
Endpoint	Endpoint URL for the REST web service this activity uses. Enter an endpoint in this field to override the endpoint configured in the REST message. Click the lock to open the input field.
Variable substitutions	Name-value pairs to pass to the REST endpoint. You can create these parameters manually, or drag and drop input variables into the parameter fields, and then assign a value. Parameters defined in the REST message that use **${}** can be assigned data from this activity template. Use the **Additional attribute** column to configure the system to not escape the text. By default the text sent to the REST message is escaped. The **Name** column is automatically populated if the users have provided variables using Variable substitution in outbound REST messages in the REST message.
Additional Headers	Additional HTTP header parameters for the REST message selected. You can also use these values to override parameters inherited from the REST message.

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Field	Description
Additional Query Parameters	Additional query parameters for the REST message selected. You can also use these values to override parameters inherited from the REST message.
Use MID Server	Check box that determines if a MID Server should be used to invoke the REST web service. **Note:** If the REST web service message function defines a MID Server, that MID Server is used instead of the one selected here.
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the REST endpoint. By default, the system selects a MID Server with REST capabilities. This field is available when the **Use MID Server** check box is selected.
Timeout	Allowed duration of the REST web service request before it times out, in seconds. The default is **10**.
Authentication	Determines what type of authentication is required for the endpoint. The options are: ○ **Use existing credentials in REST message**: Uses credential definitions from the REST message definition. ○ **Override with Basic Authentication credentials**: Uses Enable basic authentication for outbound SOAP credentials to override the credentials in the REST message definition. Basic authentication credentials must be provisioned before they are available for selection. ○ **Override with Certificate Authentication credentials**: Uses a certificate, such as a private key, to override the credentials in the REST message definition. ○ **Override with Both Basic and Certificate Authentication credentials**: Uses both basic authentication and certificate authentication to override the credentials in the REST message definition. ○ **Override with OAuth Authentication credentials**: Uses OAuth 2.0 credentials to override the credentials in the REST message definition. The REST message selected for this activity must have its OAuth 2.0 tutorial - create a REST message set to **OAuth 2.0** and its OAuth profiles and scopes configured appropriately.
Credentials	Required REST endpoint basic authentication credentials. This field is available when **Override with Basic Authentication credentials** is selected in the **Authentication** field. Only basic authentication credentials appear in the selection list, which includes credentials stored on the instance and credential IDs from an external storage system. If you are using credentials stored in a CyberArk safe, you can override the Configure the MID Server for CyberArk defined in the MID Server configuration file by adding the name of a different safe as a prefix to the credential ID, separated by a colon. For example, *`newsafe:orch-test-f5`*.
Protocol Profile	Certificate authentication to use. This field is available when the selections in the **Authentication** field is either **Override with Certificate Authentication credentials** or **Override with Both Basic and Certificate Authentication credentials**.

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Field	Description
OAuth profile	Profile for the OAuth provider for this REST message. See Specify an OAuth profile for more information.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create an SFTP activity

Create an activity that executes basic SFTP commands on a remote server.

Before you begin

Roles required: activity_creator or workflow_admin

About this task

You can create a custom activity that manages files and directories on a target host or copies a file from one SFTP server to another. The file content is streamed through a MID Server, which avoids having to store the data on the hard drive of the MID Server host machine.

Note: This activity requires the credentials of a user who can execute SFTP commands on the source host. The Copy File activity, provided in the activity pack, requires separate credentials to access the target host.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the SFTP Execution Command.

Option	Description
Command	Type of activity to create. The choices are: ○ Copy file ○ Create directory ○ Get file list ○ Remove file or directory ○ Rename file or directory ○ Set file attributes **Note:** The fields that display on the form depend on the command you se lect.
Source host	Name or IP address of the server containing the files targeted by the activity.
Source port	Port number to use to communicate with the source server. The default port number is **22**.
Source file path	Full path to a file (`/temp/test_data_file.txt`) or directory (`/temp/test_dir`) on a source host depending on the se lected command. Field available on following commands:

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Option	Description
	○ Copy file ○ Remove file or directory ○ Set file attributes
Source directory	Path to the directory where the source files are located. Field available on following com mands: ○ Create directory ○ Get file list
Source files	Names of specific source files to include in the file transfer. Separate the file names with semi-colons. This field supports a semi-colon separated list of wild-card patterns. For ex ample: `*.txt; a?cd.pdf`. If this field is blank, all files are included. Field available on following command: Get file list **Note:** For information about how the values in this field affect options in other fields, see the logic explanation which follows.
Is a directory	If checked, specifies the file path is a directo ry. Field available on following command: Re move file or directory
Credential tag for source	Specific credential tag this activity must use to run SFTP commands on the source host.
Credential tag for target	Specific credential tag this activity must use to run SFTP commands on the target host. Field available on following command: Copy file
Excluded files	Names of specific source files to exclude from the file transfer. The activity acts on all other files found in the source directory or subfold ers. Separate the file names with commas. This field supports comma-separated list of wild-card patterns. For example: `*.txt, a?cd.pdf`. Field available on following com mand: Get file list **Note:** For information about how the values in this field affect options in other fields, see the logic explanation which follows.
Include subfolders	If checked, includes the files from subfolders in the source directory. Field available on fol lowing command: Get file list

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Option	Description
	Note: For information about how your selection affects other fields in the form, see the logic explanation which follows.
Target host	Name or IP address of the server to which the files are being transferred. Field available on following command: Copy file
Target port	Port number to use to communicate with the target host. The default port number is **22**. Field available on following command: Copy file
Target file path	Full path to a file on a target host. Field avail able on following commands: ○ Copy file ○ Rename file or directory
Suffix for temporary file	If a file exists on a target host, this command enables a temporary suffix to use for a file name. If this field contains a value, the activity first copies the source file to a temporary file on the target host using *`targetFilePath + tempFileSuffix`* as the name. Up on completion, the activity renames the file to the actual target file name. If this field is blank, the activity copies the source file direct ly to the target file and overwrites it, if it exists. Field available on following command: Copy file
UID	User ID attribute to apply to a file or directory. The UID and GID values must be set together as a pair or they are ignored. The UID and GID numbers are internal values returned by the Get File List activity. Typically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a target host and set the source file attributes on the target file. This flow is demonstrated in the SFTP File Trans fer workflow. Field available on following com mand: Set file attributes
GID	Group ID attribute to apply to a file or direc tory. The UID and GID values must be set to gether as a pair or they are ignored. The UID and GID numbers are internal values returned by the Get File List activity. Typically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a target host and set the source file attributes on the target file. This flow is demonstrated in the SFTP File

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Option	Description
	Transfer workflow. Field available on following command: Set file attributes
Permissions	File or directory permissions to set for the user and group specified. This value must be expressed as an integer, such as **16877**, which defines these permissions: *rwxr-xr-x*. The permissions numbers are internal val ues returned by the Get File List activity. Typ ically, you first use the Get File List activity to return a list of files and their attributes. Then you can move a file from a source host to a tar get host and set the source file attributes on the target file. This flow is demonstrated in the SFTP File Transfer workflow. Field available on following command: Set file attributes
Access timestamp	Override the timestamp when the file or direc tory was last accessed. The access and mod ification timestamps must be set together as a pair. Field available on following command: Set file attributes
Modification timestamp	Override the timestamp when the file or direc tory was last modified. The access and modi fication timestamps must be set together as a pair. Field available on following command: Set file attributes
Size in bytes	Size of a file, expressed in bytes. Field avail able on following command: Set file attributes
Required MID Server capabilities	MID Server with the appropriate MID Server for connecting to the source and target servers.

The system uses this logic to determine which files to move from the source host:

- If the Source files field is empty, the system selects all the files in the source directory. Otherwise, it only selects those files whose names match one of the file name patterns given in the field.
- If the Excluded files field is empty, the system excludes nothing. Otherwise, it excludes those files whose names match one of the file name patterns given in the field.
- The exclude rule has a higher preference than the include rule. If a file name matches one of the file name patterns in the Excluded files field, it does not get into the selection regardless of the include rule.
- When the Include subfolders check box is cleared, the system looks only in the source directory for files to include or exclude. Otherwise, it looks in the source directory and any of its subfolders for files to include or exclude.

Note: You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

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What to do next

- Use auto-mapping to generate outputs and parsing rules (recommended for JDBC)
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

SFTP template execution parameters

You use execution parameters to create the input process script in the **Preprocessing** form.

For descriptions of the command fields, see Configure the SFTP execution command.

Note: You must use the `executionParam.` prefix with all variables in this table.

SFTP execution parameters

Name	Variable	Type	Usage
Command	command	String	Identifies the function of this activity. The possible commands are: • Copy file • Create directory • Get file list • Remove file or directory • Rename file or directory • Set file attributes
Source	source	String	Identifies the source host.
Source port	source_port	Integer	Identifies the port used to communicate with the source host.
Source directory	source_directory	String	Path to the source directory of the files to be moved.
Source files	source_files	String	Names of the files on the source to be moved.
Excluded files	excluded_files	String	Lists the files excluded from the operation.
Source file path	source_file_path	String	Path to the source files to be moved.
Target host	target_host	String	Identifies the target host.
Target port	target_port	Integer	Identifies the port used to communicate with the target host.
Target directory	target_directory	String	Full path to the target directory on the target host.
Target file path	target_file_path	String	Full path to a file or directory on the source host or on the target host. For example, this value is used in the Rename File or Directory activity in the activity pack.

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SFTP execution parameters (continued)

Name	Variable	Type	Usage
Temp file postfix	temp_file_postfix	String	Temporary file name extension used by the Copy File activity when moving a file. If this field contains an extension, the source file is copied to a temporary file using *target file name + temp_file_postfix*, before being renamed to the actual target file. If this field is blank, the source file is copied directly to the target file.
Is directory	is_directory	Boolean	Indicates whether the given file path is a directory.
Include subfolders	include_subfolders	Boolean	Indicates whether the system looks into subfolders of the source directory for files to include and exclude.
File attribute uid	file_attribute_uid	Integer	User ID associated with a file or directory.
File attribute gid	file_attribute_gid	Integer	Group ID associated with a file or directory.
File attribute permissions	file_attribute_permissions	Integer	File or directory permissions for the user and group specified.
File attribute atime	file_attribute_atime	Integer	Access time stamp from the file attributes.
File attribute mtime	file_attribute_mtime	Integer	Modification time stamp from the file attributes.
File attribute size	file_attribute_size	Integer	Size of the file, in bytes.
Source credential tag	source_credential_tag	String	Credential aliases for Orchestration activities used to run the command on the source host.
Target credential tag	target_credential_tag	String	Credential tag used to run the command on the target host.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.

SFTP post-processing parameters and payload parsing

Use these parameters to create a post-processing script, payload parsing, and tagging.

SFTP post-processing parameters

Name	Variable	Type	Usage
Output	output	String	Contains output data returned by the query.

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SFTP post-processing parameters (continued)

Name	Variable	Type	Usage
EccSysId	eccSysId	String	Contains the Reference ID associated with the ECC Queue input message.
ErrorMessages	errorMessages	String	Contains the error messages returned from the query. If no error messages are returned, this value is null.

Tags	tags	Hashmap of tag values returned from the SSH command	Contains the tags used to extract output using the SSH commands. The tag output is delimited by double percentage signs, as in `%%tagname%% ... %%`. Set up the command using the following format:
			`%%tagname1%%`
			`output1 line 1`
			`output1 line 2`
			`...`
			`%%`
			
			`%%tagname2%%`
			`output2 line 1`
			`output2 line 2`
			`...`
			`%%`
			
			The tags returned are JavaScript hashmap objects in which each key is prefixed with `tag` appended with the tagname.
			`{"__text__": "",`
			`"tagtagname1":"output1`
			`line1\noutput1 line2\n",`
			`"tagtagname2":"output2`
			`line1\noutput2 line2\n"}`

Configure the SFTP execution command

Use the input variables you created to configure the command that Orchestration executes on the SFTP target.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note: You can test the JDBC connection between the MID Server and the target without having to run the activity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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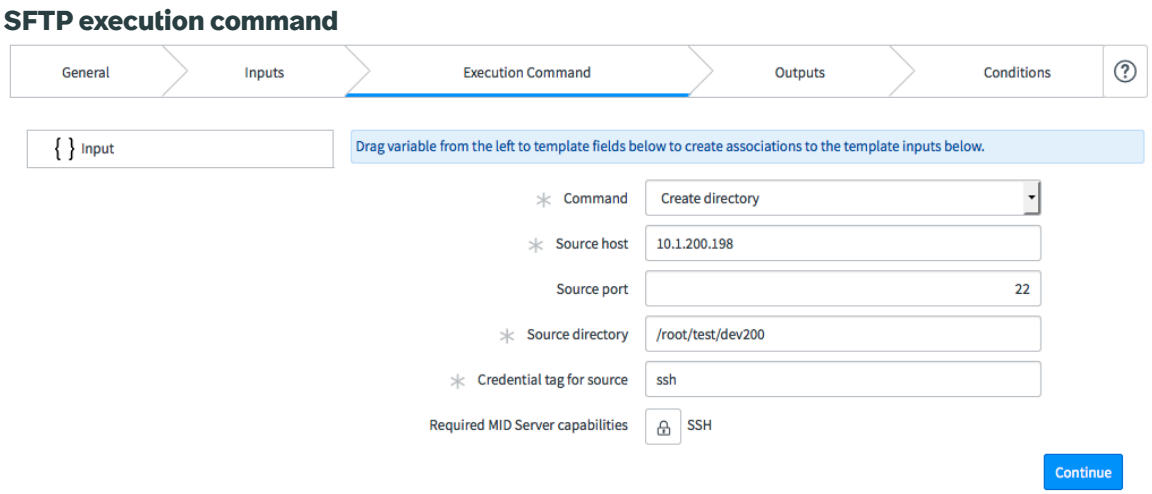

2. Complete the fields shown in the table.

SFTP command fields

Field	Description	Command
Command	Type of activity to create. The choices are: ○ Copy file ○ Create directory ○ Get file list ○ Remove file or directory ○ Rename file or directory ○ Set file attributes **Note:** The fields displayed on the form depend on the command selected.	All
Source host	Name or IP address of the server containing the files targeted by the activity.	All
Source port	Port number to use to communicate with the source server. The default port number is **22**.	All
Source file path	Full path to a file on a source host.	○ Copy file ○ Remove file or directory ○ Set file attributes
Source directory	Path to the directory where the source files are located.	○ Create directory ○ Get file list
Source files	Names of specific source files to include in the management action. Separate the file names in this list with semi-colons. This	Get file list

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Field	Description	Command
	field supports the use of wild cards. If this field is blank, all files are included. For information about how the values in this field are affected by options in other fields, see the section below the table.	
Is a directory	Check box that determines if the specified file path is a directory.	Remove file or directory
Credential tag for source	Specific Credential aliases for Orchestration activities this activity must use to run SFTP commands on the source host.	All
Credential tag for target	Specific credential tag this activity must use to run SFTP commands on the target host.	Copy file
Excluded files	Names of specific source files to exclude from the management action. The activity acts on all other files found in the source directory or subfolders. Separate the file names in this list with semi-colons. This field supports the use of wild cards. For information about how the values in this field are affected by options in other fields, see the section below the table.	Get file list
Include subfolders	Check box to manage the files from subfolders in the source directory. For information about how your selection affects other fields in the form, see the section below the table.	Get file list
Target host	Name or IP address of the server to which the files are being transferred.	Copy file
Target port	Port number to use to communicate with the target host. The default port number is **22**.	Copy file
Target file path	Full path to a file on a target host.	○ Copy file ○ Rename file or directory
Suffix for temporary file	Temporary suffix to use for a file name if the file already exists on a target host. If this field contains a value, the activity deletes the duplicate target file if it exists, and then copies the source file to a temporary file using *`targetFilePath + tempFileSuffix`* as the name. Upon completion, the activity renames the file to the actual target file name. If this field is blank, the activity copies the source file directly to the target file and overwrites it, if it already exists.	Copy file
UID	User ID attribute to apply to a file or directory. The UID and GID values must be set together as a pair or they are ignored.	Set file attributes
GID	Group ID attribute to apply to a file or directory. The UID and GID values must be set together as a pair or they are ignored.	Set file attributes
Permissions	File or directory permissions to set for the user and group specified. This value must be expressed as an integer, such as **16877**, which defines these permissions: *`rwxr-xr-x`*. The permissions number is an internal value returned by the Get File List activity. Typically, you first use the Get File List activity to return a list of files and their attributes. Then you can move	Set file attributes

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Field	Description	Command
	a file from a source host to a target host and set the source file attributes on the target file. This is demonstrated in the SFTP File Transfer workflow.	
Access timestamp	Override the timestamp when the file or directory was last accessed. The access and modification timestamps must be set together as a pair.	Set file attributes
Modification timestamp	Override the timestamp when the file or directory was last modified. The access and modification timestamps must be set together as a pair.	Set file attributes
Size in bytes	Size of a file, expressed in bytes.	Set file attributes
Required MID Server capabilities	MID Server with the appropriate MID Server capabilities for connecting to the source and target servers. By default, the system selects an SSH MID Server.	All

The system uses this logic to determine which files to move from the source host:

- If the **Source files** field is empty, the system select all the files in the source directory. Otherwise, it only selects those files whose names match one of the file name patterns given in the field.
- If the **Excluded files** field is empty, the system excludes nothing. Otherwise, it excludes those files whose names match one of the file name patterns given in the field.
- The exclude rule has a higher preference than the include rule. A file whose name matches one of the file name patterns in the **Excluded files** field does not get into the selection, even though it would be selected by the include rule.
- When the **Include subfolders** check box is cleared, the system looks only in the source directory for files to include or exclude. Otherwise, it looks in the source directory and any of its subfolders for files to include or exclude.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create a probe activity

Create an activity that runs a probe on the target host that is configured to return specific information..

Before you begin

Role required: activity_creator or workflow_admin

About this task

For instructions on using the activity template process flow, see create custom activities.

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the Probe Execution Command.

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Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes.
Probe	Probe to run with this activity, from the list of probes in the system
Target host	Host name or IP address of the target server for this activity.
Parameters	MID Server to use, by capabilities.
Required MID Server capabilities	Name-value pairs to pass to the host with this probe. You can create these parameters man ually, or drag and drop input variables into the parameter fields and assign a value.

Note: You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Probe template execution parameters

You use execution parameters to create the input process script in the **Pre Processing** form.

For descriptions of the command fields, see Configure the Probe execution command.

Note: You must use the `executionParam.` prefix with all variables in this table.

Probe activity execution parameters

Name	Variable	Type	Usage
Probe	probe	Reference	The sys_id of the MID Server probe.
Source	source	String	Intended target host
Parameters	parameters	Array of JS object	Array of JavaScript objects, expressed with the `executionParam.` prefix. To add more name-value pairs to the **parameters** array, append them to the existing array. Create a JavaScript object with the following syntax, and add it to the `executionParam.parameter` array. This assigns additional parameters to the message: `var newParameter = {"name":"parameterName","value":"parameterValue"}; executionParam.parameters.push(newParameter);`

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Probe activity execution parameters (continued)

Name	Variable	Type	Usage
MidCapabilities	midCapabilities	String (comma separated)	List of required MID server capabilities.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

Probe template post-processing parameters

Use these parameters to create a post-processing script.

Probe post-processing parameters

Name	Variable	Type	Usage
Payload	payload	String	Contains raw payload returned from the probe.
Output	output	String	Contains output data returned from the probe.
EccSysId	eccSysId	String	Contains the reference ID associated with the ECC Queue input message.

Configure the Probe execution command

Use the input variables you created to configure the command that Orchestration executes on the target.

Before you begin

Create the input variables you need in the **Inputs** form before you can advance to the **Execution Command** stage.

Role required: activity_creator, admin

Note: You can test the activity connection between the MID Server and the target without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

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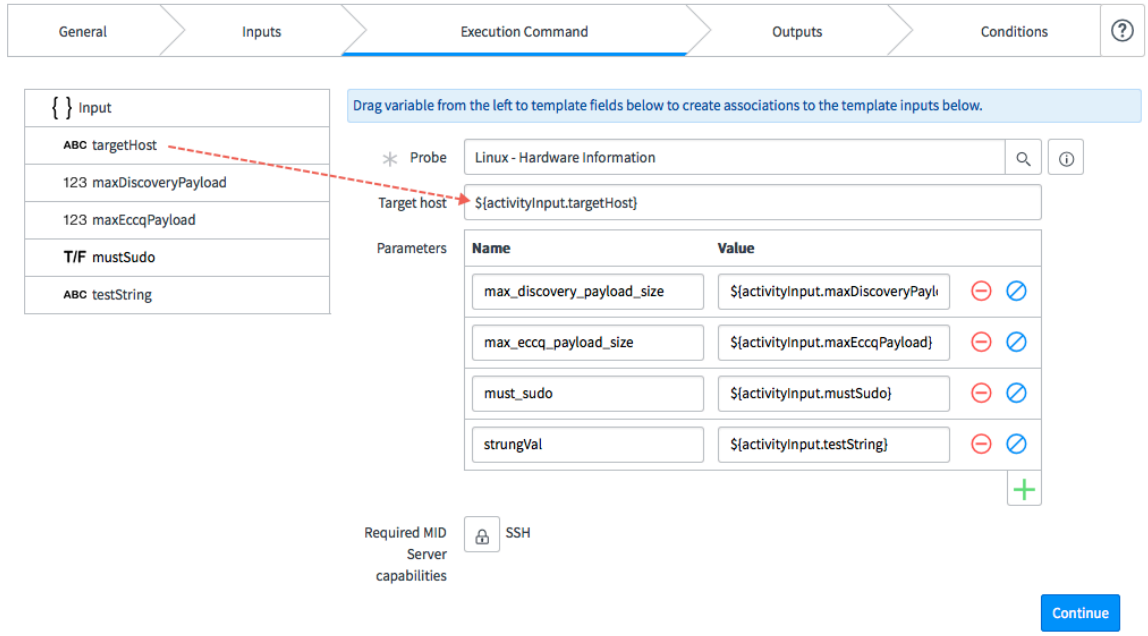
Probe execution command



2. Complete the fields shown in the table.

Probe execution command fields

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Probe	Probe to run with this activity, from the list of probes in the system.
Target host	Host name or IP address of the target server for this activity.
Required MID Server capabilities	MID Server to use, by capabilities.
Parameters	Name-value pairs to pass to the host with this probe. You can create these parameters manually, or drag and drop input variables into the parameter fields and assign a value.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create an SSH activity

Create an activity that extracts data from a target host that uses the SSH network protocol.

Before you begin

Role required: activity_creator or workflow_admin

About this task

For instructions on using the activity template process flow, see create custom activities.

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Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the SSH Execution Command.

Option	Description
Map the input variables	Use the variables you created to configure the command that Orchestration executes.
Target host	Host name or IP address of the target server for this activity.
Command	Command this activity runs on the target host. You can invoke a MID Server script from this field using any script type that the SSH command line supports. For more informa tion, see **Advanced SSH script options** be low the table.
Directory	Directory on the target host where the com mand is run.
Credential tag	The Orchestration credential tag to use when running the command.
Required MID Server capabilities	MID Server with the appropriate capabilities for connecting to the host. By default, the sys tem selects a MID Server with SSH capabili ties.
Long running	If checked, disables the SSH connection time out for commands that might take longer to run than the default 60 seconds. Orchestra tion periodically checks the running process to determine its status until it is finished.
Must Sudo	If checked, enables the use of [redacted] to run commands.

Note: You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

Example: Advanced SSH script options

To run a MID Server script on the target host, specify the script type and pass the name of the script into the `${syncFile()}` parameter. The system uses this parameter to locate the named script in the MID Server Script File [ecc_agent_script_file] table and run it on the target host. For example, a bash script can be expressed as:

```
bash ${syncFile("<MID script name>")} argument1 argument2
 argument3
```

A base script (`main_script.bash`) can reference another script (`my_include.bash`) as well as a separate file (`.my_profile`) located on the target host. Both scripts and the file referenced must be synced to the MID Server, using the `${syncFile()}` parameter, to execute properly.

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```
source ${syncFile(".my_profile")}
cp ${syncFile("my_include.bash")} /usr/ssmith/my_include.bash
bash ${syncFile("main_script.bash")} one two three four five six
rm /usr/ssmith/my_include.bash
```

A Python example with inline comments might look like this:

```
set $LIB_DIR=/usr/bin;.
# Sync a file that is referenced inside myF5CreateLBPool.py
cp ${syncFile("specialFunctions.py")} ~/specialFunctions.py
# set up environment variables
source ${syncFile(".python_profile")}
# call script that sets up dependencies on the box from remote
 package repos
python ${syncFile("setupPythonDependencies.py")} pycontrol
# call a script that requires functions from the package as well
 as a function from myIncludedFile
python ${syncFile("myF5CreateLBPool.py")} snow_pool
 myActualValue
# user is responsible for their own cleanup
rm ~/specialFunctions.py
```

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

SSH template execution parameters

Use execution parameters to create the input process script in the **Pre Processing** form of the activity designer.

For descriptions of the command fields, see Configure the SSH execution command.

Note: You must use the `executionParam.` prefix with all variables in this table.

SSH execution parameters

Name	Variable	Type	Usage
Source	source	String	Intended target or host.
Command	command	String	Comment to run on the host.
Directory	directory	String	Directory on the host in which to run the command.
Credential tag	credential_tag	String	Orchestration credential tag to use when running the command.
MidCapabilities	midCapabilities	String (comma separated)	List of required MID Server capabilities.
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use

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SSH execution parameters (continued)

Name	Variable	Type	Usage
			this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`
Long running	long_running	Boolean	Indicates whether or not the command is long running. A value of true indicates that the command is long running.
Must sudo	must_sudo	Boolean	Indicates whether or not this activity must use sudo to run root commands. A value of true indicates that sudo SSH credentials must be used.

SSH post-processing parameters and payload parsing

Use these parameters to create a post-processing script, payload parsing, and tagging.

SSH post-processing parameters

Name	Variable	Type	Usage
Output	output	String	Contains the output returned from the SSH command.
EccSysID	eccSysID	String	Contains the reference ID associated with the ECC Queue input message returned by the activity.
ErrorMessages	errorMessages	String	Contains the error messages retrieved from the SSH command. This value is **null** if there are no error messages.

Tags	tags	Hashmap of tag values returned from the SSH command	Contains the tags used to extract output using the SSH commands. The tag output is delimited by double percentage signs, as in `%%tagname%% ... %%`. Set up the command using the following format:
			`%%tagname1%%`
			`output1 line 1`
			`output1 line 2`
			`...`
			`%%`
			
			`%%tagname2%%`
			`output2 line 1`
			`output2 line 2`
			`...`
			`%%`

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SSH post-processing parameters (continued)

Name	Variable	Type	Usage
			The tags returned are JavaScript hashmap objects in which each key is prefixed with `tag` appended with the tagname. `{"__text__": "", "tagtagname1":"output1 line1\noutput1 line2\n", "tagtagname2":"output2 line1\noutput2 line2\n"}`

Configure the SSH execution command

Use the input variables you created to configure the command that Orchestration executes on the host target.

Before you begin

Create the input variables you need in the **Inputs** form before you advance to the **Execution Command** stage.

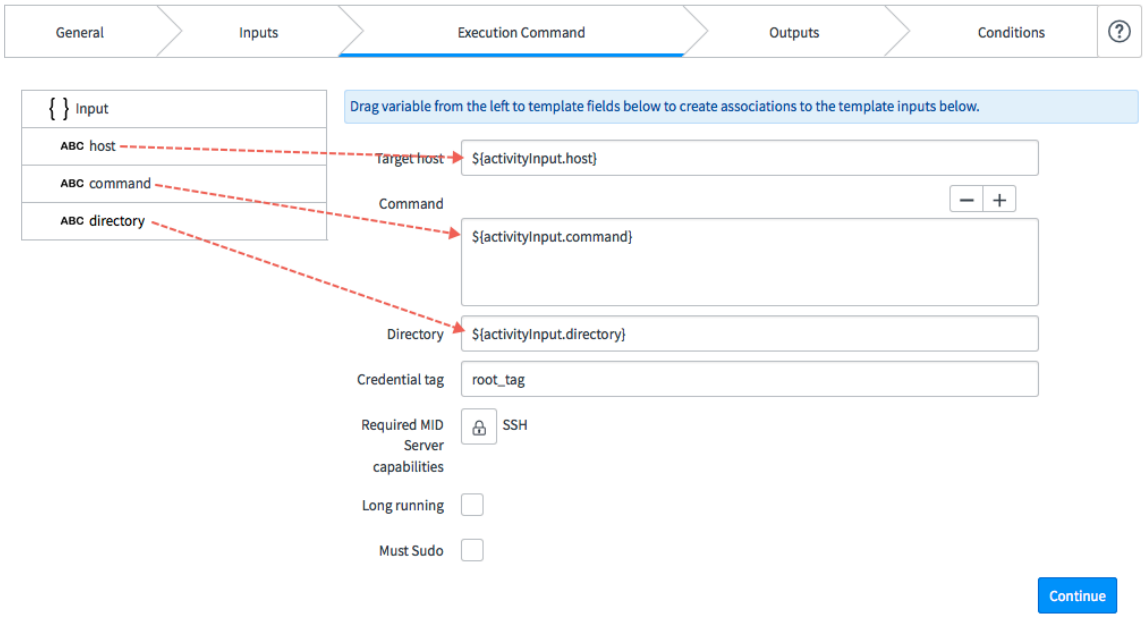
Role required: activity_creator, admin

Note: You can test the SSH connection between the MID Server and the target without having to run the acvitity in a workflow context. For details, see test template outputs.

Procedure

1. Drag variables from the list of inputs and drop them into command fields.
   The system formats the variable in the proper syntax for the command.

SSH execution command



2. Complete the fields shown in the table.

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SSH activity inputs

Field	Description
Input	Input variable builder. Create input variables to map to available fields.
Target host	Host name or IP address of the target server for this activity.
Command	Command this activity runs on the target host. You can invoke a MID Server script from this field using any script type that is supported by the SSH command line. For more information, see **Advanced SSH script options** below the table.
Directory	Directory on the target host where the command is run.
Credential tag	The Credential aliases for Orchestration activities to use when running the command.
Select MID Server by capabilities	MID Server with the appropriate capabilities for connecting to the host. By default, the system selects a MID Server with SSH capabilities
Long running	Check box to disable the SSH connection timeout for commands that might take longer to run than the default 60 seconds. Orchestration periodically checks the running process to determine its status until it is finished.
Must Sudo	Check box to allow the use of SSH credentials to run commands.

3. Click **Save**.
4. Click **Continue** to advance to the **Outputs** stage.

Create a run script activity

Create an activity that runs any script.

Before you begin

Role required: activity_creator or workflow_admin

Procedure

1. Create a custom activity.
   This action creates a custom activity using a template.
2. After setting up general properties and creating input variables, configure the Run Script Execution Command:
   Create a script for this activity to execute.

   Note: You can map parameter values in a test payload to variables in the **Outputs** tab automatically. See automap output variables.

What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

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Run Script template processing script

Use the Run Script custom template Script form to enter a script to call and use with other activities.

Run Script processing script

Field	Description
Processing script	Script that the activity runs.
Variables	Input variables that are available to use as building blocks in the input process script. Click the arrow above the field to open the variables list. Click an item in the tree to add it to your script in the appropriate syntax. The list displays input variables you passed into the activity on the **Inputs** form. All activity variables added in the **Inputs** form are read-only and are expressed in the processing script with this syntax: `activityInput.variable`.

Create a JMS activity

Create a custom JMS activity to retrieve or send messages to external systems using the Java Messaging Service.

Before you begin

Role required: activity_creator or workflow_admin

About this task

The JMS activity supports third party JMS providers whose JMS client application is written with a typical Java EE pattern and can support these operations:

- Using JNDI to find a ConnectionFactory object.
- Using JNDI to find one or more destination objects.
- Using the ConnectionFactory to create a JMS connection object.
- Using the JMS connection to create one or more JMS session objects.
- Using a JMS session and the destinations to create the MessageProducer and MessageConsumer objects.
- Starting the JMS connection to enable delivery or consumption of messages.

Note: The JMS activity designer has been tested with the JMS providers ActiveMQ and Tibco EMS. When connecting to a JMS provider, refer to your third party user documentation.

Procedure

1. Create or verify your JMS credential .
   Your JMS credentials must have permission for the target database and proper configuration for the corresponding JMS connection. Credentials must be set up before you can create a JMS activity.
2. Create or verify your JMS connection .
   Your JMS connection must be configured with valid JMS credentials set up before you can create a JMS activity.
3. Create a custom activity.
   This action creates a custom activity using a template.

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4. After setting up general properties and creating input variables, configure the JMS Execution Command.

Option	Description
Configure your credential	Fill in the fields necessary for your database connection.
Connection Factory	Name of the JMS Connection Factory. You should create or verify your JMS connection. This configuration links the name of the Ini tial Context Factory with the URL of the JMS provider.
Destination Type	Type of destination used for this message: ○ **Queue**: Message is queued for point-to-point communications. **Note:** The **GET** operation is only sup ported for the Queue destination type. ○ **Topic**: Message is used for publish and sub scribe communication.
Destination Name	Name of the queue or topic destination that is configured on the JMS provider.
Message Type	The JMS message type value. Only the **Text Message** type is supported. The queue or top ic destination must be configured to receive or send only Text Message. Other message types are dropped, since the JMS Activity can not process them.
Operation	The programmatic operation to perform on the destination. The choices are **PUT** or **GET**.
Timeout (Secs)	Allowed time to wait for a message in the mes sage queue before it times out, in seconds. The default is **30**.
Custom message headers	The custom header values in a name/value pair format, that is available on the JMS desti nation. **Note:** This is only supported for a **PUT** operation.
Message payload	Actual message content or payload that is sent to the JMS destination. **Note:** This is only supported for a **PUT** operation.
Credential tag	A tag for an individual credential for a JMS ac tivity in an Orchestration workflow.
Required MID Server capabilities	MID Server to use, by capabilities.

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What to do next

- Use auto-mapping to generate outputs and parsing rules
- If you do not use auto-mapping, you can manually create output variables and create parsing rules

Create a JMS connection for an Orchestration activity

Configure your system to use Java Messaging Service (JMS) with a custom Orchestration JMS activity.

Before you begin

Role required: admin

About this task

The MID Server must have the correct JMS connection factories for your organization. Configure those values in the *mid.property.jms.command.allowed_factory_names* property, found in **MID Server** > **Properties**. The default values for this property can be changed to any value or comma-separated list of values that the third-party JMS provider advertises.

Procedure

1. Navigate to **MID Server** > **JAR Files**.
2. Click **New** and add.

Option	Description
Name	A unique and descriptive name for identifying the file in the instance.
Version	A version number for the file, if one is avail able.
Source	Location of the JAR file for reference purpos es. Source information is not used by the sys tem.
Description	Short description of the JAR file and its pur pose in the instance.

3. Click the paper clip icon in the banner and attach the JMS driver jar file.
   The JMS driver jar file should be available as part of JMS provider installation. Few JMS vendors make them available as a separate product. Refer to the JMS provider documentation to determine which JMS client driver jar files require the client applications to connect to the JMS provider. For example, if you are trying to connect to ActiveMQ V5.10 (JMS provider), you need the `activemq-all-5.10.1.jar` file.
4. Navigate to **Orchestration** > **Credentials & Connections** > **JMS Connection Factory**.
5. Click **New**, add the following, and click **Submit**.

Option	Description
Name	Unique name of this connection factory.
Initial Context Factory	Name of the JNDI class that is used to create the InitialContext.

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Option	Description
	Note: For example, to connect to ActiveMQ V5.10 (JMS Provider), the value is `org.apache.activemq.jndi.ActiveMQInitialContextFactory`.
Provider URL	Location of the running JMS provider installation. **Note:** For example, to connect to ActiveMQ V5.1: `tcp://ipAddressOrHostName:61616`.

6. Navigate to **Orchestration** > **Credentials**.
7. Click **New**, select **JMS Credentials**, and provide the user name and password the MID should use to communicate with the JMS provider.
   For more information, see JMS credentials JMS credentials.
8. Click **Submit**.
   You are ready to create a custom JMS activity.

JMS template execution parameters

You use execution parameters to create the input process script in the **Preprocessing** form.

You must use the `executionParam.` prefix with all variables in this table.

JDBC execution parameters

Name	Variable	Type	Usage
Jms ds	jms_ds	Reference	Selected JMS data source.
Destination type	destination_type	Enumerated	
Destination name	destination_name	String	
Message type	message_type	Enumerated	
Operation	operation	Enumerated	
Time out	time_out	Integer	Length of time to wait for the query to return results.
Custom headers	custom_headers	Array of JavaScript objects	
Message payload	message_payload	String	
Credential tag	credential_tag	String	List of required MID Server capabilities.
MidCapabilities	midCapabilities	String (comma separated)	

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JDBC execution parameters (continued)

Name	Variable	Type	Usage
ValueCapabilities	valueCapabilities	Array of hashmap	Capability values used to select the MID Server. For more information, see MID Server capabilities. If there are additional capabilities that are assigned by value, use this example to customize the MID Server selection: `var valueCapability = {'NEW_MID_CAPABIILTY':'NEW_MID_CAPABILITY_VALUE'}; executionParam.valueCapabilities.push(valueCapability);`

JMS template post-processing parameters

Use these parameters to create a post-processing script.

JMS post-processing parameters

Name	Variable	Type	Usage
Status	status	String	Status of the operation (Put or Get) on the JMS destination.
StandardHeaders	standardHeaders	String	All the standard headers, as specified by JMS, that are obtained as part of the JMS message during a Get operation. This field is applicable only for Get operations.
CustomHeaders	customHeaders	String	All custom headers added by a producer or publisher application that are obtained as part of the JMS message during a Get operation. This field is applicable only for Get operations.
MessagePayload	messagePayload	String	Message payload that is obtained as part of the JMS message during a Get operation. This field is applicable only for Get operations.
EccSysID	eccSysID	String	Contains the reference ID associated with the ECC Queue input message returned by the activity.
ErrorMessages	errorMessages	String	Contains any error messages retrieved from the JMS command. This value is **null** if there are no error messages.

Activity scoping

Custom activities run in their own scope, even if it is different from that of the workflow.

Any script that runs inside a custom activity with a scope can only access outside artifacts that are within the scope of that activity or artifacts that are configured to run in any scope. Conversely, an outside artifact can only access the script inside that private activity if the outside

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artifact is running in the same scope. Activities with public scopes can interact with outside artifacts in any application scope.

You can use private activities as part of a workflow that has a public application scope. These activities are protected from reaching outside of the workflow or from being reached from outside the workflow. For details about setting application scoping for custom activities, see the field description table for the appropriate activity template.

Note: Custom activities uploaded to the ServiceNow Store must be configured as accessible to all application scopes.

Publish a custom activity

When a user creates a custom activity and saves or submits it, that activity appears in the **Custom** and **Packs** tabs of the designer palette, but is visible only to the user who created it.

Before you begin

Roles required: admin, activity_admin, activity_creator

Procedure

1. When you finish configuring the activity, click **Publish**.

   This makes the activity accessible to other users on the instance with the workflow_admin or activity_creator role. Published activities are available for upload to the ServiceNow Store, can be added to workflows, and can be edited by any user with the proper roles.

2. To edit a published activity, click **Checkout**.

   When an activity is checked out by a user, only that user can modify it. The fields of a checked out activity are read-only for all other users.

3. When you are finished editing the checked out activity, publish it again.

   The system adds a new version of this activity to the **Custom** tab in the Workflow Editor palette.

   Note: Activities you create and publish are visible in the **Packs** tab only if they were created in the current application scope.

Return a locked activity to a published state

Problems can arise if an activity version is checked out by a user and not checked back in. An activity in this state cannot be checked out for update.

Before you begin

Role required: admin, activity_admin, activity_creator

About this task

An administrator can return a locked activity to a published state.

Procedure

1. Open the Workflow Editor.
2. From the **Custom** tab, open the activity that is locked.
3. Click the menu icon in the title bar and select **Versions** from the context menu.

   A list of all the versions of that activity appears. The locked version displays the user who checked it out.

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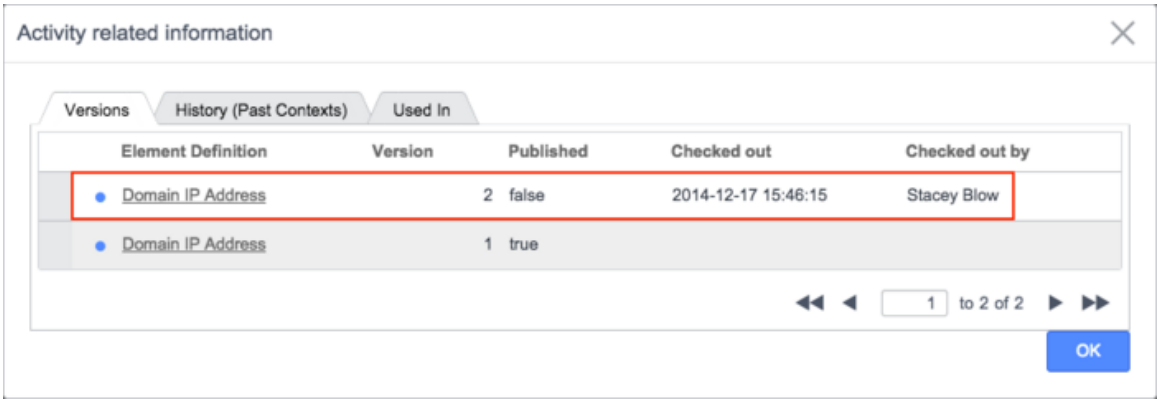


4. Select the checked out version.

   The system opens the record in the activity designer.

5. Click the menu icon again and select **Force Checkout** from the context menu.

   The activity fields become editable.

6. Click **Publish**.

   The activity becomes available to users with the appropriate roles.

Copy a custom activity

You can copy activities for reuse from the **Custom** tab in the global scope.

Before you begin

Role required: admin, activity_admin, activity_creator

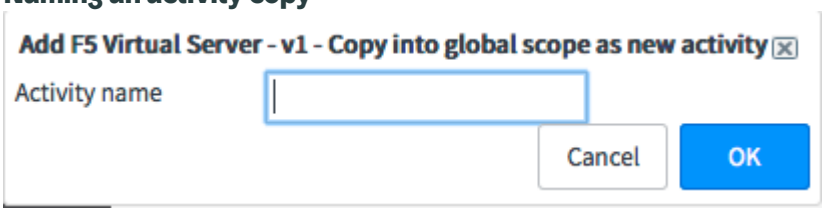
About this task

Note: You cannot copy an activity in a private scope.

Procedure

1. To reuse an activity in the global scope, expand the parent category to display the activities.
2. Right-click the activity you want to copy and select one of these options:
   - *Copy into global scope as new activity*: Copies the activity with the new name you provide, uses the same version number as the original activity, and moves it to the global scope in the **Custom** tab.

     Naming an activity copy

   - *Copy into global scope as new version*: Copies the activity using the same name, increments the version number, and moves it to the global scope in the **Custom** tab. The

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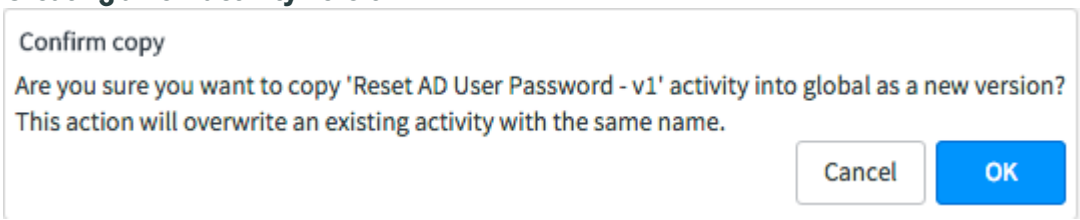
system automatically adds the parent category to the **Custom** tab if it does not already exist. This action will overwrite another activity with the same name and version number.

Creating a new activity version



Note: If the activity is in any other scope but global, the system displays this message: `Cannot copy privately scoped activity.`

Orchestration databus

The databus allows workflow designers to track the flow of data through an Orchestration workflow and provides access to output data that can be consumed by other custom activities.

Data is made available in a workflow when you use activities created with the Orchestration activity designer. The activity designer provides the ability to specify well defined inputs and outputs for your activities. When you use those activities on the workflow canvas, the outputs appear in the **Data** tab and are available for use as inputs in subsequent activities.

Note: Orchestration does not filter the data you are given for reuse in the **Data** tab. You must make sure an activity in the workflow canvas has executed before you consume its output data.

When you drop a custom activity onto the workflow canvas, the system assigns it an index. If you delete an activity from the canvas and add a new one, the indexes are not reused. This ensures that you don't accidentally start subscribing to data you did not intend to use. If you update an activity in the activity designer, the system automatically updates the activity on the canvas to ensure the data you are subscribing to downstream is not affected.

Reuse data in the activity designer

The **Data** tab in the Workflow Editor lists all custom activities used in the current workflow that produce data and displays that data for reuse in other custom activities.

Before you begin

Roles required: workflow_creator

About this task

Activities are categorized by application in this tab and are available for use as data sources for other activities. The **Data** tab is a graphical representation of the workflow Databus, which manages all the temporary data used by the current workflow.

Procedure

1. Drag output variables from an activity in this tab into the inputs of another activity on the workflow canvas to link the activities together.

   You can use any of the outputs in the structure, regardless of the application to which they belong. An index number in parenthesis after the activity name provides a unique identifier for the parameters that you use as input data in other activities. If you do not name a custom activity, the only identifier for that activity in the **Data** tab is the index number. Index numbers indicate the sequence in which custom activities were added to the workflow and are not

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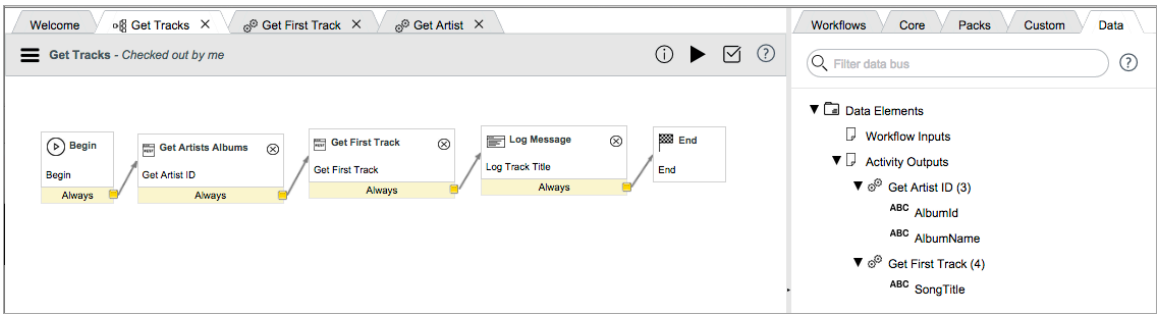
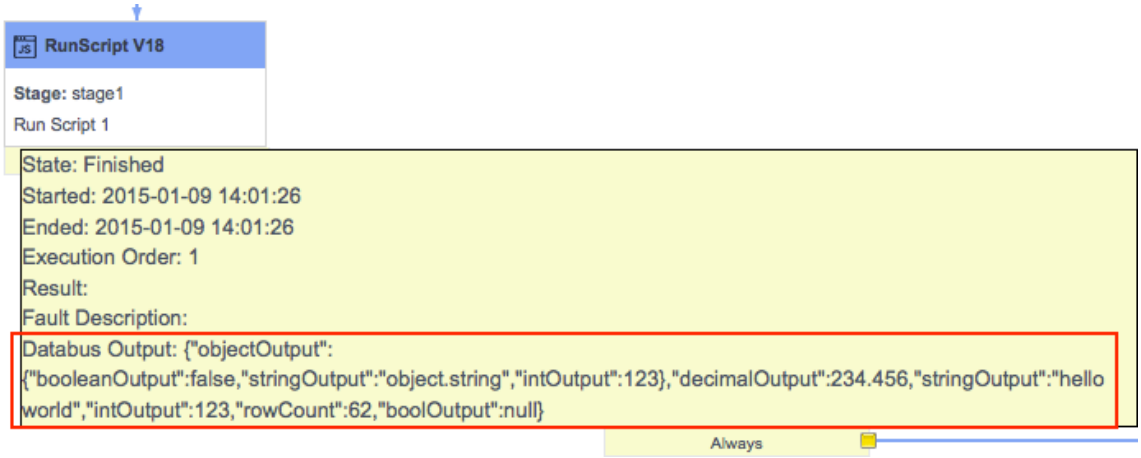
reused. When you drag a custom activity onto the workflow canvas, the system adds that activity and its output data to the structure. Conversely, if you remove a custom activity from the canvas, that activity and its outputs disappear from the data list.



2. Point to an activity to display information about it in a pop-up window.

   Any output data reused by the activity is listed in the **Databus Output** field of the pop-up window.



MID Servers for Orchestration

Orchestration automatically selects an appropriate MID Server based on the capabilities that you configure in activities, the IP addresses of target devices, and the application that the MID Server is allowed to use.

To allow a MID Server to work with Orchestration, it must have the **Orchestration** application or the **ALL** application assigned to it. See Configure a default MID Server for each application for instructions.

You can have MID Servers focus on different capabilities and separate sections of your network. See:

- MID Server capabilities
- Map an IP address to a DNS name

You can also specify a default MID Server to use if no MID Servers meet the capability and IP range criteria for an activity. See Select the default MID Server for Orchestration.

Related topics

MID Server capabilities

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MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range.

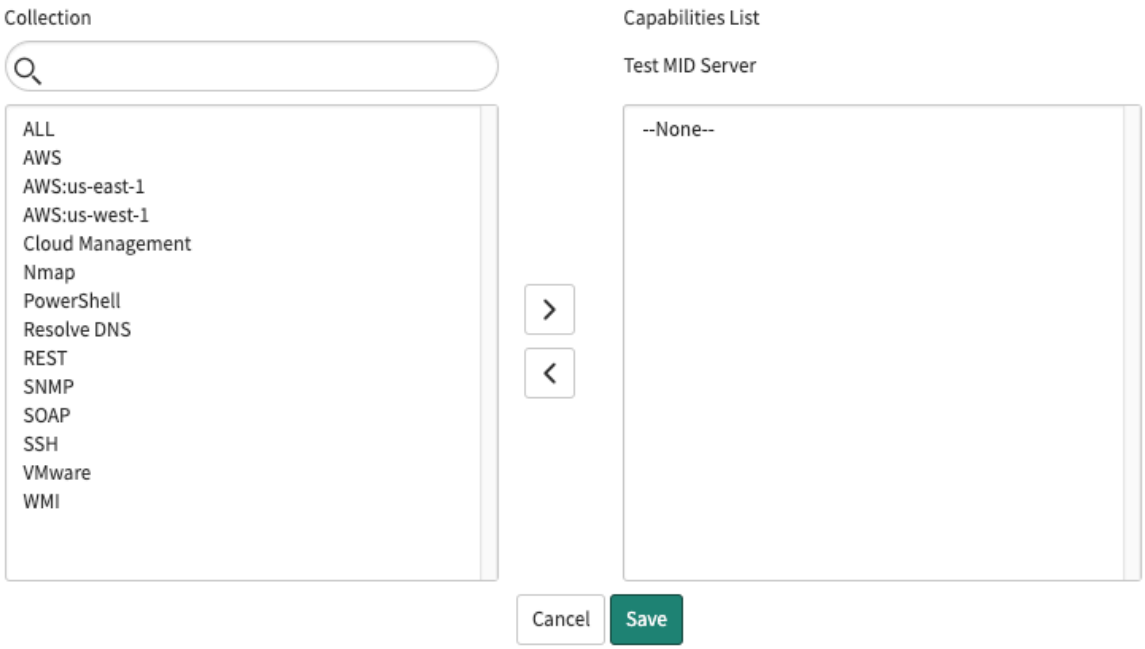
Nmap capability

The **Nmap** capability is only assigned to MID Servers for which the Network Mapper (Nmap) scanner has been installed for credential-less Discovery. This capability cannot be added to or removed from any MID Server manually. For instructions on installing or uninstalling Nmap, see Install and uninstall Nmap on a MID Server

MID Server capability values

Capabilities provided in the base system do not have a defined value string. The capability value can be blank, a single value, or a * (wildcard). A MID Server configured to use a capability that has no value can locate any device using that capability's protocol. If a capability has a defined value, the MID Server using that capability finds only those devices using that protocol that match the value string exactly. The exception to this is the Resolve DNS capability, which is configured to resolve any DNS name into an IP address using a partial string match. The * (wildcard) will match a request capability specifying any non-blank value.

Starting with the Madrid release, the **[capability name]:[value]** combination appears in the slushbucket when you add a capability to a MID Server. This combination allows you to see all the capabilities that have different values, even if the capability name is the same. For example, if you are using the Cloud Management capability, and you use the value field to specify the us-west logical datacenter on one of the capability records, you can see the combination in the **Collection** list.



MID Server selection

The MID Server is selected using an algorithm based on the capabilities available. The selector produces a list of suitable MIDs using filters in the following order: **server status** > **applications** > **IP range** > **capabilities**. The algorithm searches the capabilities in the following sequence and, if a step finds at least one MID server, the remaining steps are skipped:

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1. **Exact value match:** Find each MID Server containing capabilities with name/value pairs with an exact match to all requested capability name/value pairs. Blank is a valid value. * (wildcard) values are ignored.
2. **Wildcard value match:** The same as an exact value match, but also allows a non-blank request value to match MID server capability records containing value *.
3. **Special capability name ALL:** Find each MID Server containing the special capability name ALL, ignoring capability's value field.

Note: If the requested capability name does not exist in the ecc_agent_capability table, **BadArgumentException** is thrown rather than falling back to the ALL capability.

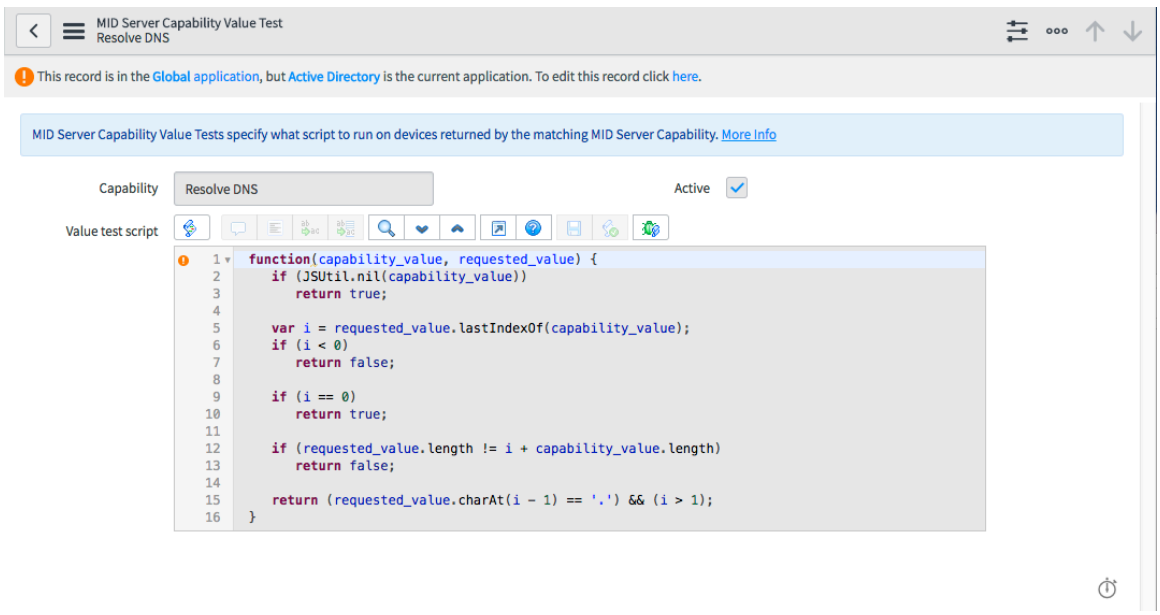
Scripted MID Server capability value matching

You can use value tests to create capabilities that find devices using values without requiring exact string matching. Action on these values is controlled by a user-defined script.

The Resolve DNS capability is provided in the base system and is configured to resolve DNS names into IP addresses for devices whose names end with a specified domain name. The capability **Value** entered is automatically prefaced with a dot during processing to match domain syntax. This value can contain one or more sub-domains, but must include the end of the domain string. Matching devices must end with the identical syntax. The script for the Resolve DNS capability determines if a device name matches the criteria defined by **Value**. If a match exists, the platform performs the address resolution automatically. For example, if the value for the Resolve DNS capability is `service-now.com`, the MID Server with this capability finds `lnxlab01.sandiego.service-now.com` and `dbsrv101.sanjose.service-now.com`. If the value is changed to `sandiego.service-now.com`, then the MID Server finds only `lnxlab01`.

Note: If **Value** in the Resolve DNS capability is blank, then all domains match.

To view the script for evaluating this capability, navigate to **MID Server** > **Capability Value Tests** and select **Resolve DNS** from the list.



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Configure MID Server capabilities

MID Server capabilities define the specific functions of a MID Server within an IP address range, allowing an application to select the most appropriate MID Server. Configure capabilities on MID Servers for applications like Orchestration, , and .

Before you begin

Role required: admin or sm_admin

About this task

Several applications use capabilities, IP ranges, and to narrow the pool of MID Servers the applications need.

Note: At least one capability is required for each MID Server used by Orchestration. See for more information.

The following capabilities are available by default with Discovery:

All	IBM	Resolve DNS
Ansible	JDBC	REST
AWS	NetApp	SNMP
Azure	Nmap	SOAP
Chef	OpenStack	SSH
Cloud Management	PowerShell	VMware
Google	RCA	WMI

Procedure

1. Navigate to **All** > **MID Server** > **Capabilities**.
2. Select an existing capability or select **ALL** to include all capabilities.

   Note: Ensure that each IP address range has MID Servers with the necessary capabilities to complete the Orchestration activities on that network segment.

3. Create a new capability:

   a. Select **New**.

   b. Configure the value for a custom capability.

   Example
   An example is a capability for **DOMAIN**, with a value of **service-now**.

   c. Select **Submit**.

4. Select **Edit** in the MID Servers related list to add MID Servers to the capability.
5. Select one or more MID Servers for this capability from the **Available** list.

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6. Select **Save**.

   The capability defined here also appears in the primary record for this MID Server.

Select the default MID Server for Orchestration

Orchestration uses the default MID Server if it cannot find a MID Server with the correct IP range and capability.

Specify the default MID Server in either of these locations:

- The **Default MID Server** field on the Orchestration application record. See Configure a default MID Server for each application for instructions.
- The **Default MID Server to use for Orchestration Activities** property. Navigate to **Orchestration** > **MID Server Properties** to set this value.

These two values are automatically kept in synch. You can change the default MID Server in either location.

PowerShell probe version 2 system property

View detailed PowerShell credential information and view extended logging information.

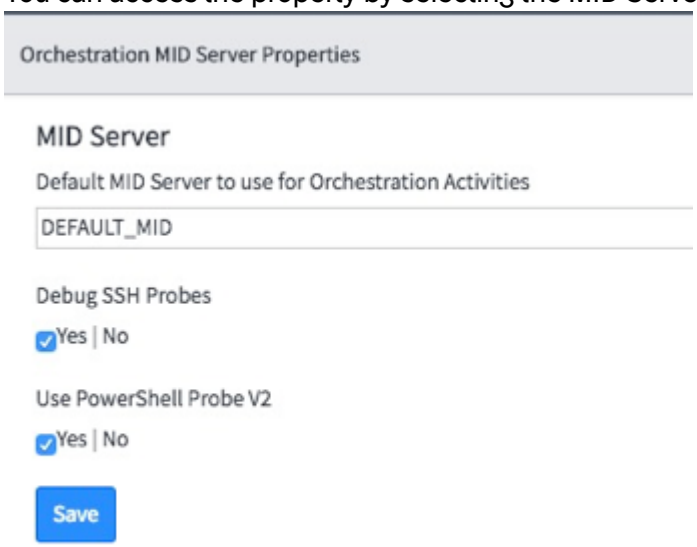
Starting with the madrid release, there is a new system property for the PowerShell probe which enables the version 2 of the probe. This new version enables you to view detailed credential information on why PowerShell credentials fail or succeed. You can also view logging information for an ECC Queue payload and Workflow Context log.

mid.server.rba_powershell_v2

Enables the PowerShell probe version 2 for use with all PowerShell activities. The default value is true. If you choose false, the legacy PowerShell probe is used. Unless there are issues, use version 2, as the legacy version is going to be deprecated.

Note: This property only applies to Orchestration activities. Discovery probes are not affected.

You can access the property by selecting the MID Server Properties link in the navigation pane:



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PowerShell log property

Enable debug messages to display from PowerShell.

This property enables control of when and where to display debug messages generated by debug statements embedded in the PowerShell scripts.

mid.property.powershell.log_info

The new MID Server PowerShell log property:

- Displays logging information.

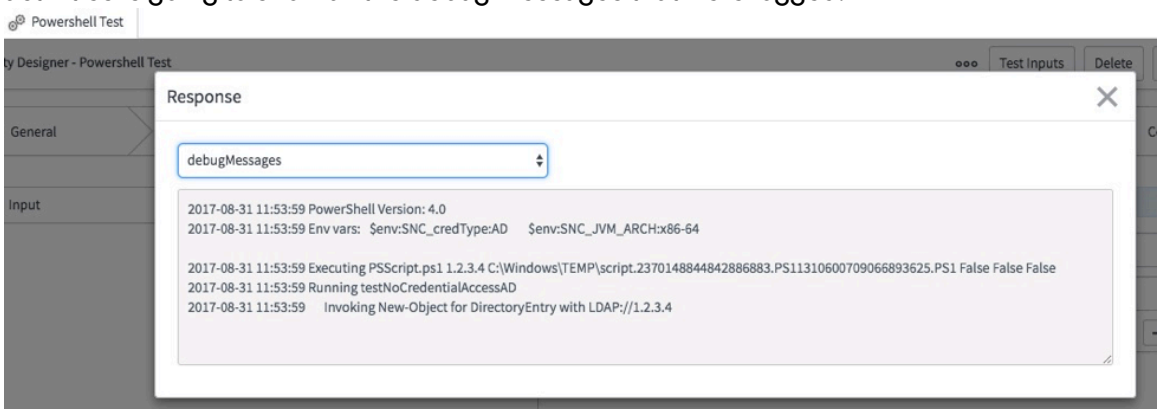
  Note: Once logging is enabled, OOB PowerShell scripts log information.

- Adds logging information to your developed PowerShell scripts and PowerShell activities.

  Note: Logging information is only available when property is enabled.

- Logging is not enabled by default.

If the property is set to true, debug messages display from the workflow context or from the Response popup after you test inputs. The ecc_queue entry payload for each of the PowerShell activities is going to show all the debug messages that were logged.



Enable the PowerShell log property for each MID Server. If the MID Server field is empty, the property applies to all MID Servers. There are separate credential debug messages that always come back regardless of this setting. The credential debug messages show which credentials have been used and other related information.

Note: All the debug messages that come back to the instance are also saved to the MID Server log file. The log file might have additional debug messages generated from Java code, which might help the debug process.

Use the Orchestration Usage dashboard

This dashboard shows an overview of Orchestration usage metrics to show customers how their organization uses Orchestration and to support license compliance.

Before you begin
Role required: orchestration_manager

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Procedure

1. To view the dashboard, navigate to **Orchestration** > **Operations & Troubleshooting** > **Orchestration Usage Dashboard**.
   The Orchestration Usage dashboard is displayed. The tabs on the dashboard include Licensable Usage and Orchestration Usage. Reports on these tabs include:

Orchestration Usage Metrics

Metric	Description
Transaction Summary Last 12 months	A running transaction count of all Orchestration transactions over the last 12 months. Includes: ○ The count of orchestration transactions associated with the HR Application ○ The count of Orchestration transactions associated with the Security Operations Application
Transaction Summary YTD	Cumulative count of all transactions since the time the Orchestration plugin was activated or the customer upgraded to Geneva.
365 day Running Average of Server	The running average over the last 365 days for cmdb_ci_computer - cmdb_ci_server. This includes all physical and virtual client nodes and excludes server nodes from the count.
365 day Running Average of Client	The running average over the last 365 days for cmdb_ci_server. This includes all physical and virtual server nodes.
Orchestration Transactions by Month for Last 12 Months	
Average Client Nodes Orchestrated Last 365 Days	
Average Server Nodes Orchestrated Last 365 Days	
Number of Orchestration Activities Developed Last 365 Days	The aggregate number of activity definitions you have developed and OOB activity definitions you have modified. This number includes activity elements (Activities build with the Activity Designer) you have developed and OOB activity definitions you have modified. **Note:** his number excludes activity elements that are shipped with ServiceNow Applications that use the Orchestration Runtime e.g. ServiceNow Security Operations and Human Resources Apps.
Cumulative Client Nodes Orchestrated by Month	

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Metric	Description
Cumulative Server Nodes Orchestrated by Month	
Usage by Provider Last 12 Months	Breaks down emphasis by provider, such as PowerShell, JDBC, SSH, etc.
Top 10 Orchestration Activities	

2. **Optional:** You can add more widgets to the dashboard by clicking the **Add Content** icon (+) in the upper right corner of the dashboard.

Note: You should not modify the first tab in this Dashboard. If you want a different dashboard experience, add a tab and customize that with your usage reports.

Imports

Import data from external systems and transform it into ServiceNow AI Platform record data.

Get started

Explore



Learn about import sets concepts and features.

Configure



Configure a data source for an import set.

Use



Learn how to import data using import sets.

Reference



Get details about easy import template validation.

Products

Import sets

Import sets enable administrators to import data from various data sources, and then map that data into ServiceNow tables.

Integration Hub - Import

Automate data import tasks through a consolidated interface that provides a guided, step-by-step experience. Define external data sources, specify target tables, map how source data becomes target data, and schedule regular imports.

Import Set API

The `Import Set` API provides endpoints that enable you to interact with import set tables. The API transforms incoming data based on associated transform maps.

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The *Import Set* API supports synchronous transforms and mirrors the existing SOAP interface.

Easy import

Easy import is a simplified import process that enables you to import only the columns you want.

Inbound email actions

Define an inbound email action to script how the system responds to an inbound email.

Import sets

Import sets enable administrators to import data from various data sources, and then map that data into ServiceNow tables.

Explore

- Upgrade to Washington DC
- Import sets key concepts

Set up

- Create a data source
- Create a transform map

Administer

- Import sets properties
- Troubleshoot import set performance

Use

- Run an import
- Importing Data into ServiceNow
- Schedule a data import
- Use the Import Set API
- Easy import
- Monitor scheduled data import executions

Develop

- Developer training
- Developer documentation
- Field map script variables
- Scheduled data import scripting options

Integrate

- Web service import sets
- Importing from another ServiceNow instance
- Apply CI Identification and Reconciliation to Import Sets
- Importing from a Kafka environment with Stream Connect for Apache Kafk

Troubleshoot and get help

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- Blog: Troubleshooting missing data in date fields
- Search the Known Error Portal for known error articles
- Contact Customer Service and Support

Import sets key concepts

Learn about import sets before importing data to your instance.

The import sets table acts as a staging area for records imported from a data source.

Note: Do not import data in extremely large chunks. Creating an extremely large import set can cause delays and system outages.

A transform map determines the relationships between fields displaying in an import set table and fields in an existing ServiceNow table, such as the Incidents or Users table.

Importing sets skip records when the data in the instance matches the data being imported.

Note: Import sets run as user System and therefore cannot add data to encrypted fields.

Import sets terminology

Key terms

Term	Definition
Import Set table	A table that acts as a staging location for records imported from a data source before transforming those records. Fields on these tables are generated automatically based on imported data and should not be modified manually. **Note:** Columns in an import set table are generated automatically and shouldn't be added manually. Manually adding columns can negatively impact the table's scheduled cleanup and may lead to an incomplete cleanup and orphaned records. If you need to add columns to an import set table, first add the column to the input data, then select **Test Load 20 Records** or **Load All Records** to auto generate the columns in the import set table. Columns in an import set table might not have the same type as the input data. For example, a currency column may be represented as a string column in an import set table until it's assigned to a target table column that is of type currency.
Data source	A record that defines where to get the data to import. A data source may point to a file, a JDBC-compatible database, or an LDAP organizational unit.
Transformation	The conversion of data from an import set table to another table according to the rules defined in a transform map.
Transform map	A set of field maps that define the relationships between fields in an import set and fields on a table, such as Incident.

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Key terms (continued)

Term	Definition
	During transformation, data is copied from the Import Set table to the destination table based on the transform map. A single import set field may be mapped to multiple fields on other tables.
Robust import set transformer	Extract, transform, and load data to one or more target tables. Separate the transform and processing functions, providing a more flexible alternative to transform maps.
Foreign record insert	A foreign record insert occurs when an import makes a change to a table that is not the target table for that import. This change happens when updating a reference field on a table. For example, when updating a value for the caller on an incident, the import is actually updating the sys_user table.
Coalesce	Lets you update existing target table records when transforming import data. You can specify whether a **Target field** should be used to coalesce on when import set records are transformed. If the field map **Coalesce** option is selected, when the import set row is transformed, the instance checks for an existing record in the target table that has the same value in the **Target field** as the import set row **Source field**. If an existing record with a matching value in the target table is found, that record is updated. If no matching record is found, then a new record is created in the target table.

Supported import formats

You can import data from several different file formats or external data sources.

File formats

Format	Limitations
CSV	CSV files must comply with the proposed CSV standard in RFC4180. In particular, this means that double quotes may not appear inside fields. The first row of data in an imported CSV file becomes the header row and defines the columns for that import set.
Excel	Excel files must have the XLS or XLSX extension.
XML	XML files must have a consistent XPath for each data row.
JSON	• For JSON arrays, the path for each row must specify the array root element twice, such as `/incidents/incidents`. • JSON files should follow RFC-4627. For example, a single comma should separate a value from the following name. Names within an object should be unique. • Predicates such as `@element`, `[index]`, or `text()`, as well as Axis such as children, siblings, or ancestors are not supported.

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File formats (continued)

Format	Limitations
Custom (Parse by Script)	You can write custom JavaScript to parse input lines into the list of maps.

The ServiceNow® platform can import data from the following external data sources.

External data sources

Data Source	Limitations
JDBC	JDBC imports require a valid transform map. Some network configurations may require a ServiceNow® MID Server.
LDAP	LDAP imports require a valid transform map.
OIDC	OIDC imports require a valid transform map.
ServiceNow® REST (Integration Hub)	REST imports require a valid transform map.
Custom (Load by Script)	Custom imports require a valid transform map.

For more details about the different data sources, see Data sources.

Transform maps versus robust import set transformers

Both transform maps and robust import set transformers convert data. Transform maps convert data from the staging table to the destination file. Robust import set transformers convert data from a source table to a message listener. If a data source has both a transform map and a robust import set transformer, the system uses the robust import set transformer instead of the transform map.

Import set scheduled cleanup

The *`Import Set Deleter`* scheduled job cleans up old import set data every day at midnight.

By default, the job deletes all import sets that are older than 7 days, as well as the associated import set table records. If this scheduled job is not active on your instance, activate it to mitigate the growing import set tables you may have, especially when using recurring imports.

Note: If scheduled cleanup is not currently active on your system, you must ensure that your import set tables are not too large (> 5 million records total across all tables) before enabling this cleanup. If the tables are too large, manually delete the records first before proceeding. Contact Customer Service and Support to coordinate the deletion of this data.

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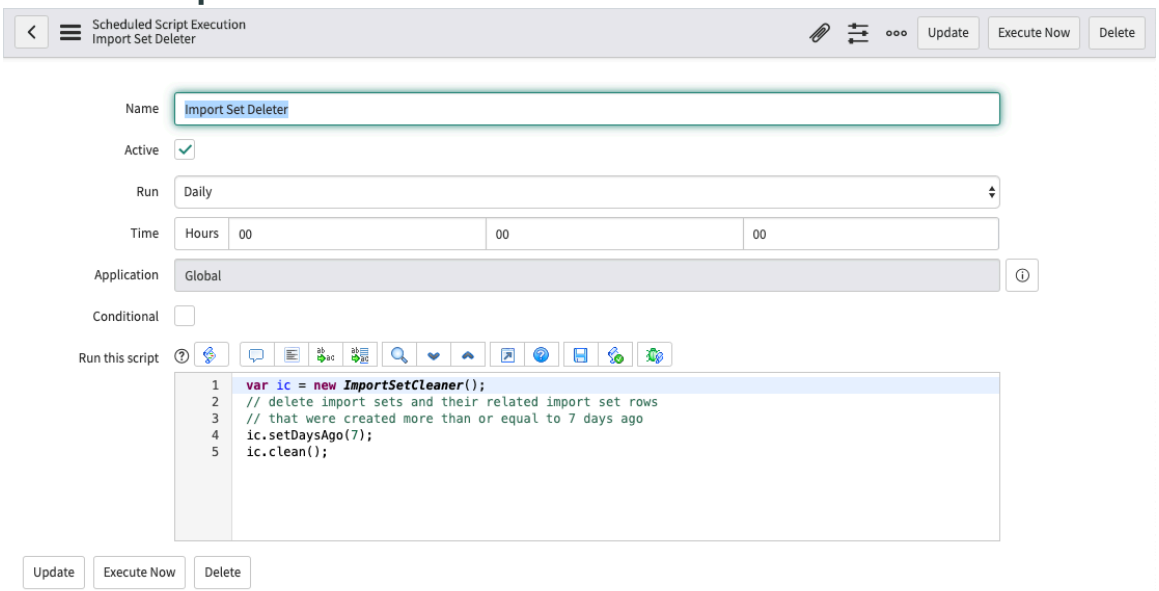
Scheduled Script Execution



For procedures, see Delete import sets.

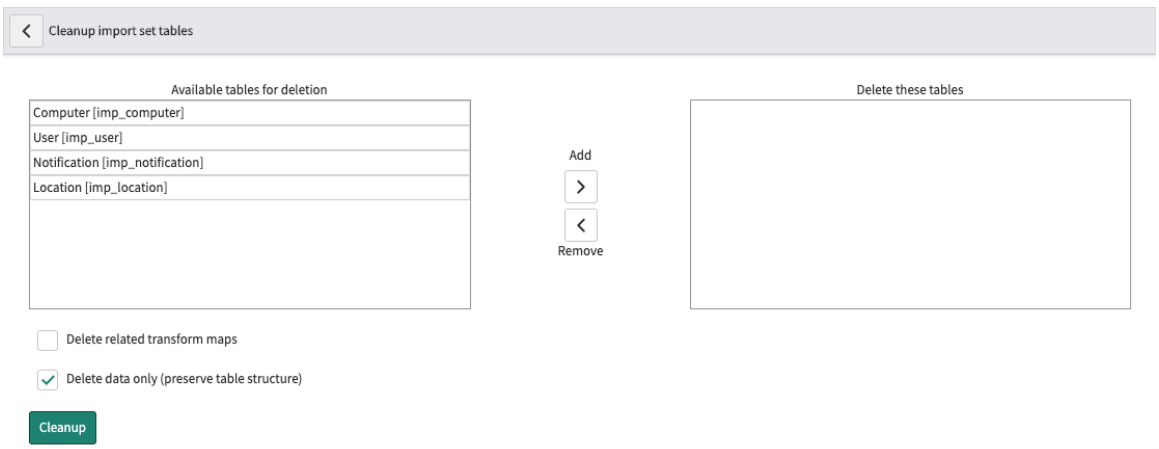
Import set table deleter

You can manually delete any or all of the following import set tables:

- Computer
- User
- Notification
- Location

You can also delete the related transform maps, or you can delete data only and preserve the table structure.

Tables available for deletion



For procedures, see Delete import set tables.

Concurrent imports

Split incoming data into multiple import sets and transform the import sets concurrently to reduce processing time.

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Running a concurrent import can be helpful when order does not matter and imports take a long time due to large data sets with time-consuming scripts. If order matters, you can split the import into multiple partitions to ensure that each partition is processed in order.

Note: Concurrent imports add processing and monitoring overhead. Use them only with large data sets.

Enable concurrent imports only after fine-tuning all other parameters, such as database indexes and transformations.

Scheduling concurrent imports

You enable concurrent imports by selecting **Concurrent Import** on the Scheduled Data Import form. For instructions, see Schedule a data import.

When the schedule runs a concurrent import, the system pulls the data from databases, Excel spreadsheets, CSV files, or other sources to a temporary staging table, and then transforms the data from the staging table to the target table.

When you run a concurrent import, the system creates multiple import sets, up to the value of the *glide.scheduled_import.max.concurrent.import_sets* system property (default = 10). For example, a two-node cluster produces four import sets, and a ten-node cluster produces ten import sets.

Import Set Transformer job

Each active node runs two Import Set Transformer jobs every minute, and those jobs poll the Concurrent Import Sets Jobs queue, pick import sets from the queue, and transform those import sets. All jobs run concurrently, depending on the availability of worker threads.

Concurrent Import Set record

Each concurrent import creates a Concurrent Import Set record. The form view shows all related import sets, concurrent import set jobs, and transform histories.

You can resume or reprocess any import set. For more information, see Monitor concurrent import sets.

Concurrent Import Sets Jobs queue

After loading data, the system adds the import sets to the Concurrent Import Sets Jobs table. The Concurrent Import Sets Jobs table indicates the job type and status of each concurrent import set job.

For more information, see Monitor concurrent import set jobs.

Partitioning concurrent imports

You can partition import sets to maintain the processing order within each partition.

By default, the system allocates records to import sets in a round robin fashion. However, you can write a custom script to define a custom partition key that identifies the target import set. Every row with the same partition key adds to the same import set, and the data in that import set is processed in sequential order.

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Hierarchical imports

You can create a scheduled import set hierarchy by scheduling an import to run after another import set completes. One parent scheduled import can have many child scheduled imports, and each child scheduled import executes in the order specified. For concurrent scheduled imports, child scheduled imports can be started only after all Import Set Transformer jobs complete.

The last Import Set Transformer job starts the next import in the hierarchy.

The system generates an execution plan at the beginning of parent import process. Each import process uses the execution plan to fetch the next process to invoke. For concurrent imports, the last Import Set Transformer job fetches the next import and executes it.

Synchronized inserts

Coalesce fields help define uniqueness among records. The transformation process checks for an existing record with the coalesce values and updates the existing record, if it exists, or inserts a new record if none exists. For more information, see Updating records using coalesce.

By default, concurrent imports allow each running import set to insert new records. When an import set inserts a record, it establishes a write lock on the target table to prevent other import sets from inserting the same record.

Tables for concurrent imports

Table	Description
Concurrent Import Set (sys_concurrent_import_set)	Stores details of each concurrent import set in import set records.
Concurrent Import Set Jobs (sys_concurrent_import_set_job)	Lists the import sets to be processed.
Execution Context for Scheduled import (sys_execution_context)	Specifies the execution context for each scheduled import. The execution context specifies the next scheduled import to use when processing a hierarchical scheduled import.
Hierarchical scheduled import execution plan (sys_execution_plan).	Stores the execution plan for hierarchical imports. The execution plan is a tree structure that identifies which scheduled import runs after the preceding scheduled input.

Domain Separation with concurrent imports

You can add the sys_domain field to a scheduled import table to enable domain separation for the import set. Both import set loading and transform jobs run in the domain specified in the scheduled import set job.

Data sources

Data sources are used to create an import set so that data can be processed, if necessary, prior to being mapped onto a production table.

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Data Source Types

Type	Description
File	Data is in a recognized file format, accessible locally or remotely through several file retrieval methods.
JDBC	Data is in a database, accessible using JDBC. Customer Service and Support supports Oracle, MySQL, Sybase, DB2 Universal, and MS SQL Server drivers.
LDAP	Data is in an LDAP server, accessible through the LDAP or LDAPS ports, 389 and 636 respectively.
OIDC	Data is accessible via OpenID Connect.
REST (Integration Hub)	Data is in a REST API, accessible through Integration Hub.
Data Stream Integration Hub	Data is loaded from a Data Stream Action, accessible through Integration Hub.
Custom (Load by Script)	Data is obtained using a custom script.

File type data sources

Import a file from a local source, a remote network server, or another instance by providing a path and authentication information.

For file type import sets, you can select from a list of file retrieval methods: SFTP, FTP, FTPS, HTTP, HTTPS, and SCP.

Note: FTPS is not recommended because it is no longer supported by some firewall vendors. Consider using SFTP as an alternative.

File retrieval methods

The following file retrieval methods are available to copy the file from where it resides to ServiceNow to be loaded into an import set.

After defining the files that are compatible for importing, define how the files can be imported.

Note: For the import to succeed, your FTP server and client must be set up for the same authentication mechanism that you select here.

Method	Description
Attachment	Add and manage attachments a file to the record and import that file in an import set.
SFTP	Retrieve a file using SFTP. Fields are provided for the server name and login credentials.
FTP	Retrieve a file from an FTP server in your network. Fields are provided for the server name and login credentials.

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Method	Description
	Note: FTP transfers are sent as clear text and cannot be encrypted. Use SCP or SFTP instead whenever possible.
FTPS (Auth SSL) [not recommended]	Not recommended because FTPS is no longer supported by some firewall vendors. Consider using SFTP as an alternative. An FTP Secure authentication command issued through the Secure Socket Layer (SSL) protocol. This method is also known as explicit FTP over SSL.
FTPS (Auth TLS) [not recommended]	Not recommended because FTPS is no longer supported by some firewall vendors. Consider using SFTP as an alternative. An FTP Secure authentication command issued through the Transport Layer Security (TLS) protocol. This method is also known as explicit FTP over TLS.
FTPS (Implicit SSL) [not recommended]	Not recommended because FTPS is no longer supported by some firewall vendors. Consider using SFTP as an alternative. In implicit security, the FTPS server defines a specific port for the client (990) to use for secure connections. Implicit security automatically begins with an SSL connection the moment an FTPS client connects to an FTPS server.
FTPS (Implicit TLS) [not recommended]	Not recommended because FTPS is no longer supported by some firewall vendors. Consider using SFTP as an alternative. In implicit security, the FTPS server defines a specific port for the client (990) to use for secure connections. Implicit security automatically begins with a TLS connection the moment an FTP client connects to an FTP server.
HTTP	Retrieve a file using HTTP. Fields are provided for the server name and login credentials. **Important:** For HTTP and HTTPS protocols, the file path is automatically URL encoded. Do not specify a URL-encoded file path when using either of these protocols.
HTTPS	Retrieve a file using HTTPS. Fields are provided for the server name and login credentials. Use this method to transfer data between ServiceNow instances.
SCP	The Secure Copy protocol (SCP) securely transfers files between a local and a remote host or between two remote hosts, using the Secure Shell (SSH) protocol.

File data source examples

These examples describe how to import various file types as data sources.

Excel data source file

You can import using both the XLSX format and the legacy XLS format. XLS is the default format for spreadsheets created in Excel for versions 2003 and older. XLSX is the default format for Excel 2007 or later. Use XLSX instead of legacy XLS whenever possible for optimal performance.

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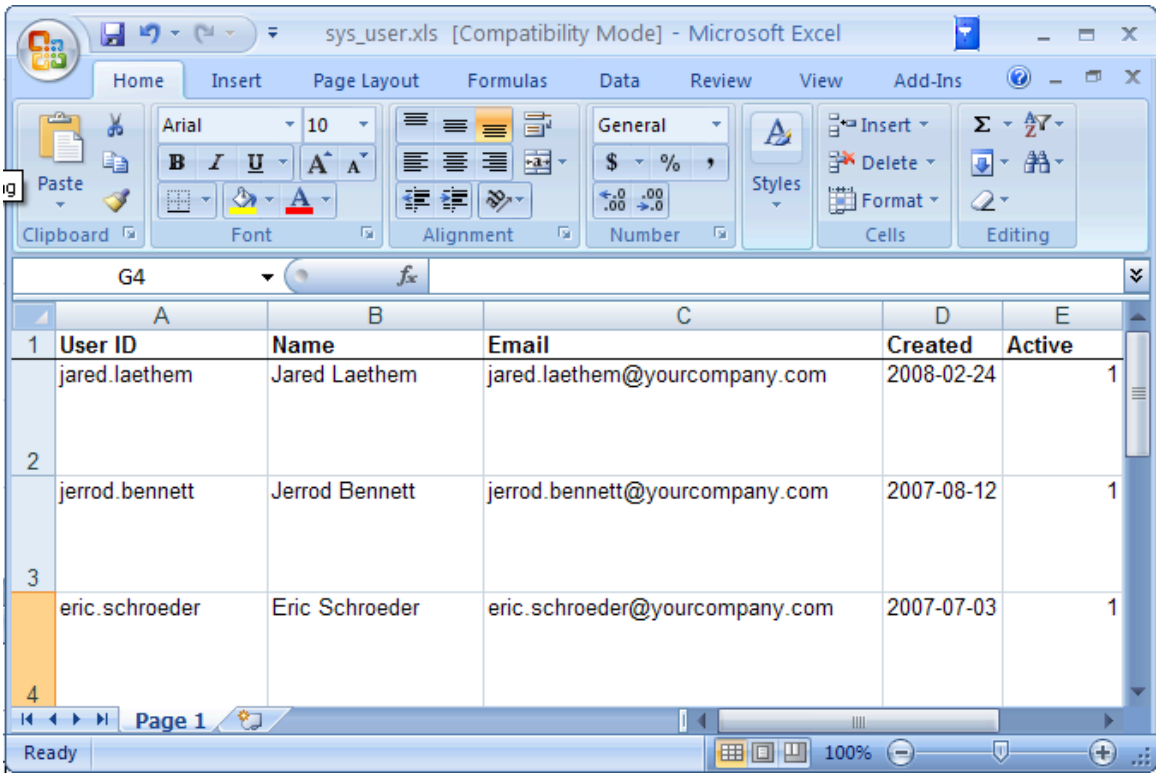
Note:

- All .xls files must use the 1900 date system as opposed to the 1904 date system. The 1904 date system causes your dates to be imported with a year that is four years earlier than what appears in your spreadsheet. Refer to MS Support for additional information about date systems.
- When importing a file from Excel that has upper case boolean values of (TRUE/FALSE), both values always transform to false. To prevent this behavior, set the *glide.transform.boolean.casesensitive* property to false.

Microsoft Excel Demo Data



XML data source file

XPath for each row

XML data source definitions have an extra field to specify the **XPath for each row**. This field is an XPath expression to select the elements whose children are converted to rows in the import set table. Each selected element causes a row to be created in the import set table. The children of the selected element are converted into columns in the row. For example, to import the asset information from the sample XML file below, the XPath expression should be specified as `/export/asset`. This expression matches the three `<asset>` elements in the file, so three rows are created. Although you could also specify `//asset`, this expression is much less efficient for large files. Use the absolute location path form for XPath expressions when using the XML loader. In other words, avoid expressions containing `//` unless strictly necessary.

Be careful not to specify an insufficiently restrictive XPath expression with a large XML file. For example, the expression `/export` would be wrong for the following sample file, since it matches the document (root) element. In general, you should never specify an XPath expression which matches the root element unless you want everything in the document to be made into a single row. Specifying an insufficiently restrictive XPath expression when attempting to load large XML files could result

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in lengthy processing times and incorrect output. For this reason, it is best to test and debug XML data source specifications with small XML files containing only a few rows worth of data. Once the specification has been tested, you can run it again with the full file.

<userInfo> elements

Note that the `<userInfo>` elements contained within `<asset>` contain child elements. This type of nesting creates a column called **userInfo** that contains XML for the `<userInfo>` element. If **Expand child nodes** is checked, individual columns are also created for **userInfo/lastName** and **userInfo/firstName**. If **Expand child nodes** is not checked, only the **userInfo** XML column is created.

Loading data from an XML file

When loading data from an XML file, ServiceNow samples the first 10 records to determine what fields are required to hold the data. If none of the first 10 records specify a value for a field, ServiceNow does not add that field to the table that holds the imported data. Ensure that at least one of the first 10 records specifies a value for any fields being imported.

If the XML file used for an XML data source does not contain a field in the first 10 nodes, the field is ignored. To import the field and ensure it is not ignored, you can add the *glide.db.impex.XMLLoader.max.scan_nodes* system property with a value greater than or equal to the position of the node where the field is first encountered. This property applies to all XML data sources. *glide.db.impex.XMLLoader.max.scan_nodes* defaults to **10**, but you can enter a value from **1** to **2147483647** to specify how many nodes should be scanned to determine the values to be used for the import. You can specify **-1** to scan all nodes in the XML files.

Important: If you specify **-1** or increase the value of *glide.db.impex.XMLLoader.max.scan_nodes* beyond the default of **10**, all XML import processing may incur a significant increase in overall load time.

```
<?xml version= "1.0" encoding=
 "utf-8" ?
><export><asset><assetTag>AT-01939</assetTag><type>Desktop</type
><os>Windows 7 Professional</os><lastlogondate>12-07-2010
 12:31:24</lastlogondate><userInfo><lastName>Loo</lastName><firs
tName>David</firstName></userInfo><isenabled>true</isenabled></a
sset><asset><assetTag>AT-53480</assetTag><type>Desktop</type><os
>Windows 7 Professional</os><lastlogondate>09-07-2010
 13:25:53</lastlogondate><userInfo><lastName>Merritt</lastName><
firstName>Norris</firstName></userInfo><isenabled>true</isenable
d></asset><asset><assetTag>AT-55782</assetTag><type>Desktop</typ
e><os>Unknown</os><lastlogondate>01-01-1900
 00:00:00</lastlogondate><userInfo><lastName>Currie</lastName><f
irstName>Mike</firstName></userInfo><isenabled>true</isenabled
></asset></export>
```

CSV data source file

CSV files are used as a cross-compatible file format for transferring files across platforms. A CSV file is a text file that defines a grid, where commas define columns and line breaks define rows. To define precise spacing for importing strings, you can optionally wrap text in quotes.

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```
"user_name","name","email","sys_created_on","active"
"jared.laethem","Jared
 Laethem","jared.laethem@yourcompany.com","2008-02-24
 22:21:32","true"
"jerrod.bennett","Jerrod
 Bennett","jerrod.bennett@yourcompany.com","2007-08-12
 12:12:18","true"
"eric.schroeder","Eric
 Schroeder","eric.schroeder@yourcompany.com","2007-07-03
 11:50:20","true"
"rob.woodbyrne","Rob
 Woodbyrne","rob.woodbyrne@yourcompany.com","2007-07-03
 11:49:57","true"
"admin","System
 Administrator","admin@yourcompany.com","2007-07-03
 11:48:47","true"
"christen.mitchell","Christen
 Mitchell","christen.mitchell@yourcompany.com","2007-05-16
 15:26:42","true"
"rob.phillips","Rob
 Phillips","rob.phillips@yourcompany.com","2007-01-22
 11:25:34","true"
"davin.czukowski","Davin
 Czukowski","davin.czukowski@yourcompany.com","2006-07-11
 14:01:26","true"
"luke.wilson","Luke
 Wilson","luke.wilson@yourcompany.com","2006-02-07
 15:29:48","true"
"bow.ruggeri","Bow
 Ruggeri","bow.ruggeri@yourcompany.com","2005-07-07
 11:39:58","true"
"don.goodliffe","Don
 Goodliffe","don.goodliffe@yourcompany.com","2005-05-02
 12:28:40","true"
"david.loo","David Loo","david.loo@yourcompany.com","2005-02-22
 16:00:00","true"
"guest","Guest","guest@yourcompany.com","2004-05-01
 17:00:00","true"
"fred.luddy","Fred
 Luddy","fred.luddy@yourcompany.com","2004-05-01
 17:00:00","true"
```

When using CSV files, you can specify the encoding charset using the **Properties** field on the Data Source form. You may need to Configuring the form layout the Data Source form to see this field. For example, to use utf-8 encoding, enter **charset=utf-8**.

Data in single column

For the JSON and XML formats, this feature lets you store a full record in a single column.

The column name used to store the full record is `data`.

If you create a JSON format data source to save data in a single column, selecting the **Data in single column** check box updates the following options:

- **Discard Array** becomes unselected and is removed from the form.
- **Expand node children** becomes selected and is removed from the form.

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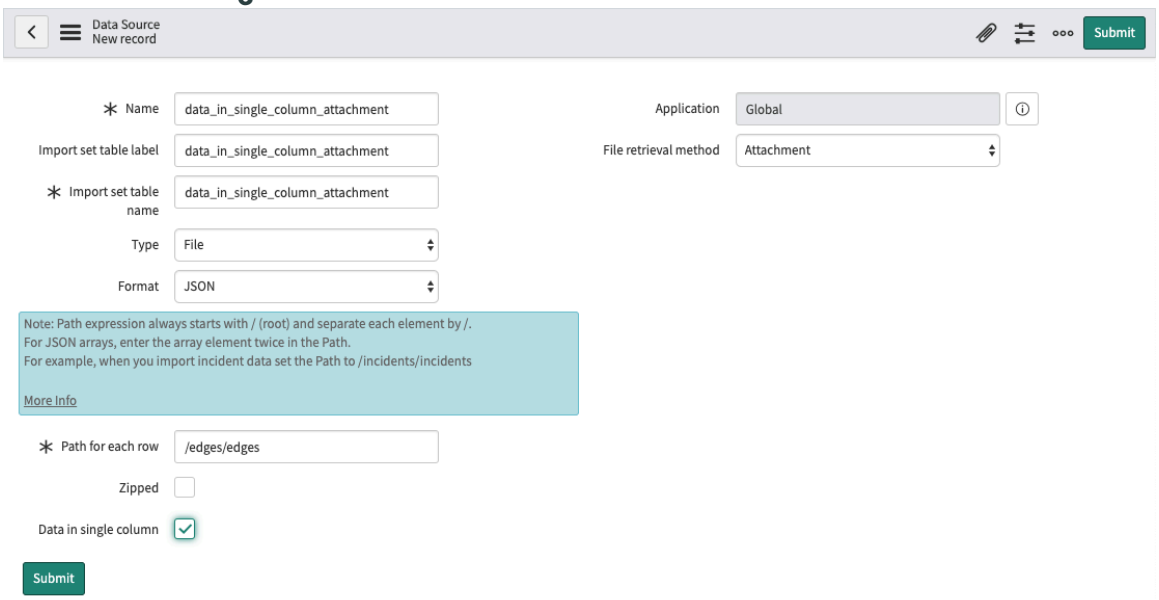
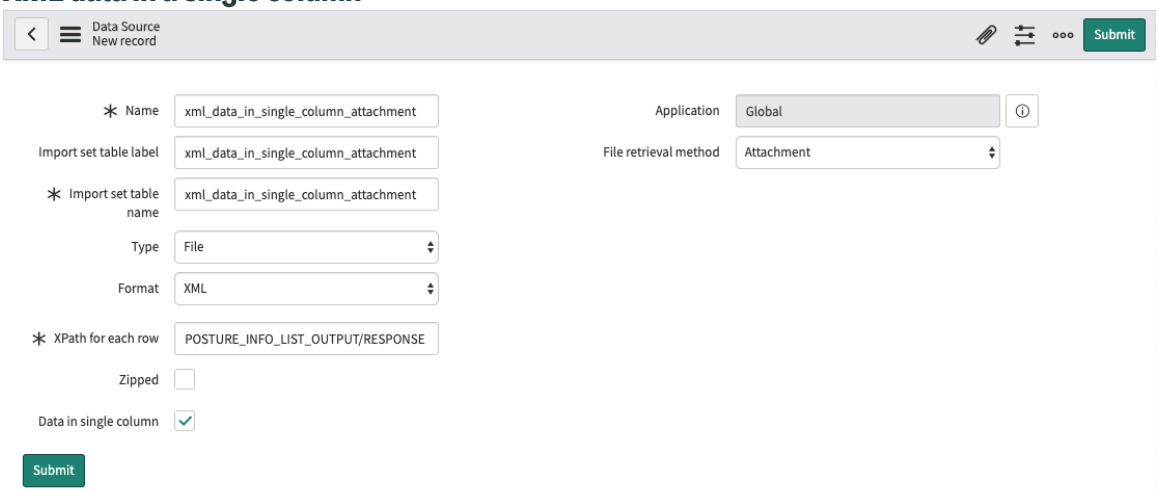
JSON data in a single column



If you create an XML format data source to save data in a single column and you select the **Data in single column** check box, **Expand node children** becomes selected and is removed from the form.

XML data in a single column



Custom (Parse by Script) format

When you select a **Type** of **File** and a **Format** of **Custom (Parse by Script)**, a Javascript editor called **Parsing script** appears. You can use the parsing script to create customized Javascript to parse input lines into the list of maps.

The Javascript has three predefined parameters:

- The *`line`* parameter is a string which contains line data from the source file.
- The *`lineNumber`* is the line number from the source file for this line data.
- The *`result`* parameter is used to pass back the parsed result from Javascript.

The *`result`* parameter is an instance of Java object ScopedScriptParseResult. When you type `result.`, four available methods appear as script auto-complete in the Javascript editor:

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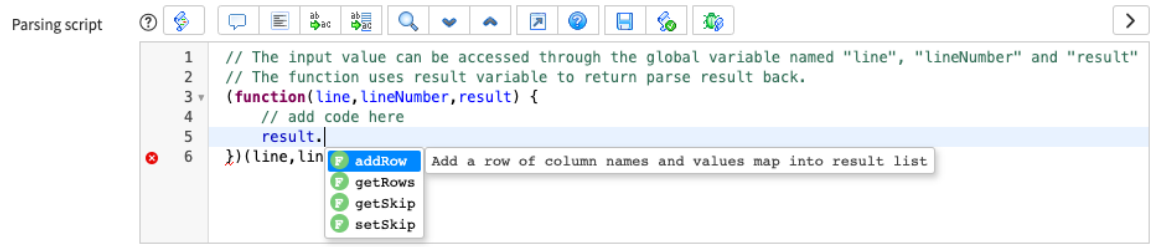
Auto-complete menu



- `void setSkip(boolean skip);`
- `boolean getSkip();`
- `addRow(Map<String, String> map);`
- `List<Map<String,String>> getRows()`

The `setSkip()` and `getSkip()` set and retrieve the skip flag. When the skip flag is set to true, the entire parsing result from Javascript is ignored.

The `addRow()` adds one map of the parsing row result, which is inserted into the staging table.

The `getRows()` retrieves all rows of the current parsing result, which are inserted into the staging table.

One line of source data can contain one row or multiple rows. It is up to the script writer to decide how to process the line data. For example, for line data `name=john,computer=windows;name=joe,computer=linux;name=linda,computer=windov` if you use a semicolon (;) as a row break, then this line contains three rows of data. Each row is a map with two keys: `name` and `computer`. The `name` and `computer` become the column names for the staging table schema. You could use the following sample of Javascript to parse this line data:

```
(function(line, lineNumber, result) {
 var rowArr = line.split(";");
 var i;
 for(i in rowArr) {
 var map = {};
 var arr = rowArr[i].split(",");
 var x;
 for(x in arr) {
 var items = arr[x].split("=");
 map[items[0]]=items[1];
 }
 result.addRow(map);
 }
})(line, lineNumber, result);
```

The script writer must add the result so that the result is inserted in the staging table.

Processing custom CSV files

You can process CSV files that are delimited by a character other than commas.

Before you begin
Role required: admin.

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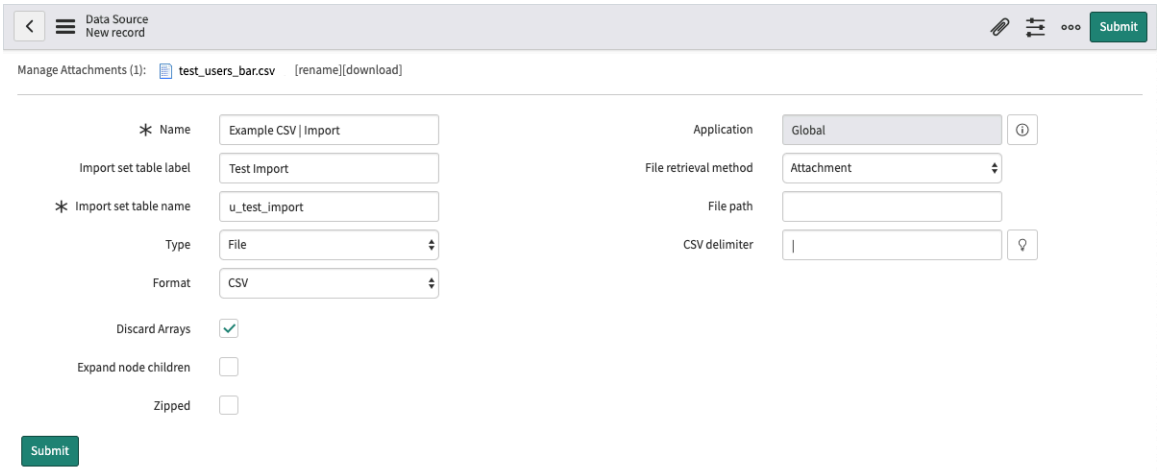
About this task

This is an advanced step to create a CSV import. Normally, you would upload the data and import it directly using System Import Sets, which will create this CSV data source for you automatically.

Procedure

1. Create the data source record.
2. Attach the CSV file to the data source.
3. Customize the Data Source form and add the **CSV Delimiter** field.
4. Enter the character you want to use as the CSV file delimiter, such as the pipe symbol (|).
5. Test load the data source.



JSON file import examples

These examples demonstrate how to import various types of JSON data and the necessary path for each row. JSON files that you import should follow these guidelines.

For step-by-step instructions on creating a File type data source see, Create a File type data source.

- For JSON arrays, the path for each row must specify the array root element twice, such as `/incidents/incidents`.
- JSON files should follow RFC-4627. For example, a single comma should separate a value from the following name. Names within an object should be unique.
- Predicates such as `@element`, `[index]`, or `text()`, as well as Axis such as children, siblings, or ancestors are not supported.

Simple array

- Path for each row: `/incidents/incidents`
- Result: 2 records

In this example, the path for each row includes the array root node `/incidents` twice. This is necessary when importing an array.

```
{
   "source":"HI",
   "incidents":[
      {
```

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```
         "number":"INC0000001",
         "short_description":"Can't read email"
      },
      {
         "number":"INC0000002",
         "short_description":"Error loading XML file"
      }
   ]
}
```

Array in 2nd level

- Path for each row: `/problems/data/data`
- Result: 3 records

In this example, the path for each row includes the array root node `/data` twice.

```
{
   "problems":{
      "id":"0",
      "data":[
         {
            "number":"PRBTEST001",
            "short_description":"testsd1"
         },
         {
            "number":"PRBTEST002",
            "short_description":"testsd2"
         },
         {
            "number":"PRBTEST003",
            "short_description":"testsd3"
         }
      ]
   }
}
```

Nested array

- Path for each row: `/problems/problems/data/data`
- Result: 3 records

In this example, the path for each row includes the root nodes for both arrays twice, `/problems` and `/data`.

```
{
   "problems": [
         {
      "id":0,
      "data":[
            {
               "number":"PRBTEST001",
               "short_description":"testsd1"
            },
            {
```

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```
            "number":"PRBTEST002",
            "short_description":"testsd2"
         },
         {
            "number":"PRBTEST003",
            "short_description":"testsd3"
         }
      ]
   }
]
}
```

Supporting child (nested) arrays

By default, import does not support child (nested) arrays. You can enable support by unchecking the **Discard Arrays** check box in the Data Source view. The following table describes different behaviors when enabling and disabling child array support.

```
{
  "response":{
    "docs":[
      {
        "id":"id_val",
        "childrenArray":[1,2,3],
        "anotherArray":[{"key1":"value1"}, {"key1": "value2"}],
        "elementWithArray":{"childrenArray":[1,2,3]}
      }
    ]
  }
}
```

Child array behavior

Path	Discard Arrays Enabled	Discard Arrays Disabled
/response/docs/docs	Creates one record with the following columns and values: • Id : id_val • elementWithArray : {} Any arrays found in a record, such as childrenArray or anotherArray, are not created as columns in the import table.	Creates one record with the following columns and values: • Id : id_val • childrenArray : [1, 2, 3] • anotherArray : [{"key1" : "value1"}, {"key1" : "value2"}] • elementWithArray : {"childrenArray" : [1, 2, 3]}
/response/docs/docs/ anotherArray/anotherArray	Creates two records, each with one column: key1.	Creates two records, each with one column: key1.
/response/docs/docs/ childrenArray/childrenArray	Does not work and returns a **Path should always refer JSON Objects** error because the values in the array are not in a key-value structure.	Does not work and returns a **Path should always refer JSON Objects** error because the values in the array are not in a key-value structure.

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Orphan array

- Path for each row: `//`
- Result: 2 records

```
[
   {
      "number":"PRBTEST001",
      "short_description":"testsd1"
   },
   {
      "number":"PRBTEST002",
      "short_description":"testsd2"
   }
]
```

Multiple elements instead of an array

- Path for each row: `/problems/problem`
- Result: 3 records

Important: This format is not recommended. JSON files should follow RFC-4627, which states that names within an object should be unique. Use JSON arrays instead.

```
{
   "problems":{
      "title":"2 problems",
      "problem":{
         "number":"PRBTEST001",
         "short_description":"testsd1"
      },
      "problem":{
         "number":"PRBTEST002",
         "short_description":"testsd2"
      }
   },
   "problems":{
      "title":"1 problem",
      "problem":{
         "number":"PRBTEST005",
         "short_description":"testsd5"
      }
   }
}
```

FTP data source extended properties

Certain properties are available for customizing your FTP data source.

To enter these properties, you must Configuring the form layout the Data Source form and add the **Properties** field. When specifying more than one property, use a comma to separate each property.

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Available FTP Properties

Property	Description
connection.timeout	Defines the number of milliseconds to wait before timing out the FTP connection attempt. • Default value: 10000 • Example custom value: connection.timeout=12000 • Data source: FTP, FTPS
remove_file	Determines if the remote file is deleted after the import. • Default value: true • Example custom value: remove_file=false • Data source: FTP, FTPS, SFTP
rename_file	Determines if the remote file is renamed after the import. Renamed files use the format <original file name>.imported. • Default value: false • Example custom value: rename_file=true • Data source: FTP, FTPS, SFTP

JDBC type data source

A JDBC data source retrieves its data via a JDBC driver, usually type 4 network.

The JDBC connection is available either directly from the ServiceNow instance (a VPN setup required), or via a dedicated MID Server installed inside your firewall that can access the database port.

Note: JDBC calls from the MID Server are never encrypted. Limit the rights available to the MID Server user whenever making JDBC calls from a MID server.

JDBC data source supported database formats

JDBC data sources support several database formats and ports.

Supported database formats

SQL Server Type	Port
MySQL	3306
Microsoft SQL Server	1433
Oracle	1521

Note: Oracle DATE fields are loaded as ServiceNow Date/Time fields.

JDBC data source SQL statement requirements

JDBC queries that run SQL statements must specify a column name.

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For example, this query specifies the column name **ServerID**.

```
SELECT DISTINCT 'server_name:' + CONVERT ( VARCHAR ,
 lg .ResourceID ) AS 'ServerID'
,LastHWScan
,Account0
,Category0
Fromv_GS_WORKSTATION_STATUSsInner  JOIN
v_GS_LocalGroupMembers0lg
ON s .ResourceID  = lg .ResourceID
WhereType0  = 'Local' AND Category0  = 'SystemAccount'
```

SQL server integrated authentication for Windows

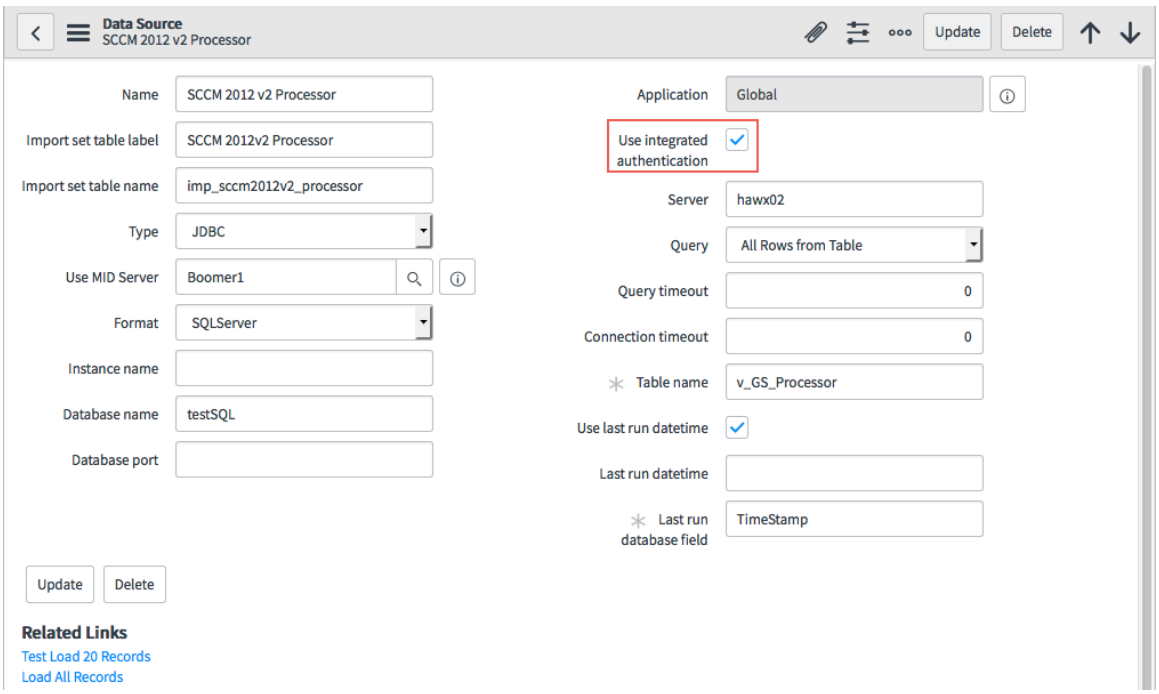
A JDBC data source can use the ID of for the Windows MID Server service user to authenticate with SQL Server.

The **Use integrated authentication** check box on the Data Source form determines if the JDBC data source uses the MID Server service user credentials. For this field to appear on the Data Source form, the integration must meet these criteria:

- The MID Server must be running on a Windows computer with SQL Server.
- The MID Server service must use the same credentials that SQL Server requires.
- The data source **Type** is JDBC.
- The data source **Use MID Server** check box is selected.
- The data source **Format** is SQLServer.

Important: If integrated authentication is chosen, and you are integrating with Microsoft System Center Configuration Manager, the account running the MID Server service must have read rights on the SCCM database.

Data Source form



Note: The **Last run database field** on the JDBC data source is case-sensitive for the SQL server.

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Adding JDBC drivers for unsupported database formats

Use the following procedure to extend the data source to use a driver for a database that is not provided in the base system. JDBC connections are supported for the following default databases:

Add a new JDBC format choice

Extend the available JDBC driver options by creating a new choice list entry to specify the JDBC driver Java package name.

Before you begin

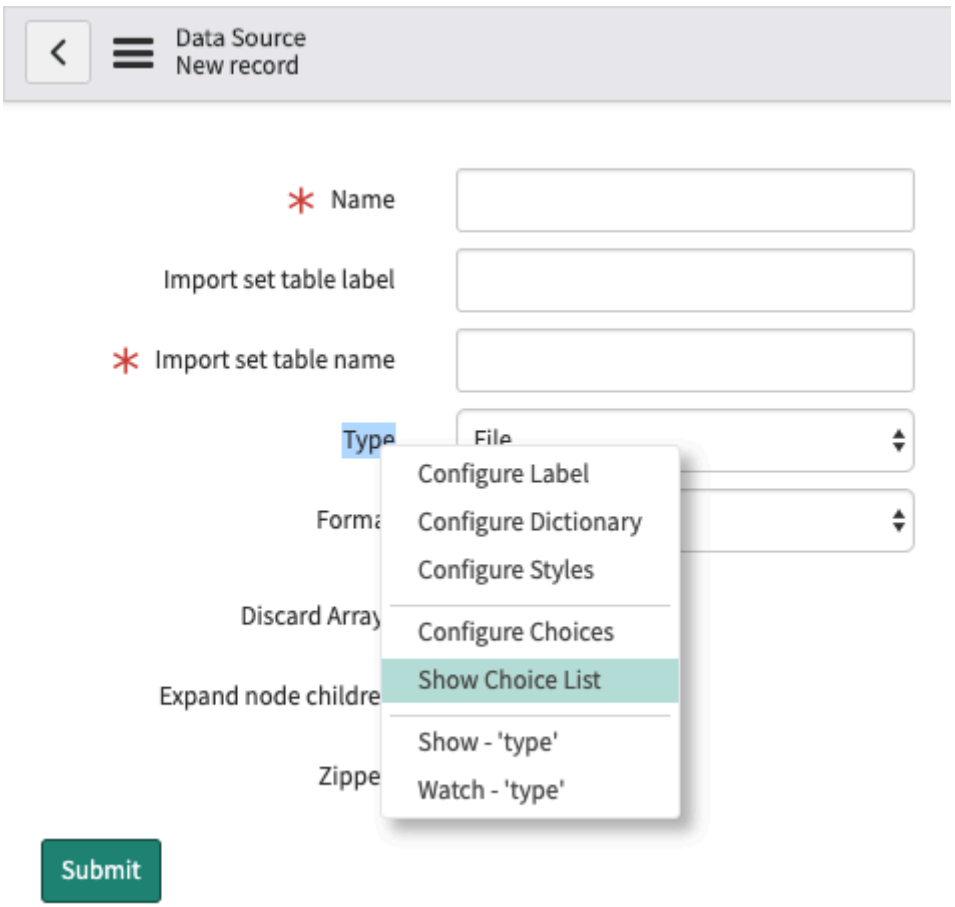
Role required: import_admin

About this task

Add a new choice list entry for the new database to the **Format** field in the *sys_data_source* table.

Procedure

1. Navigate to **System Import Sets > Administration > Data Sources**.
2. Click **New**.
3. In the Data Sources form, right-click the **Format** field label, and select **Show Choice List** from the pop-up menu.



4. Click **New** in the list of choices.
5. Provide the following values to create the new database choice.
   Look at the existing drivers for examples.

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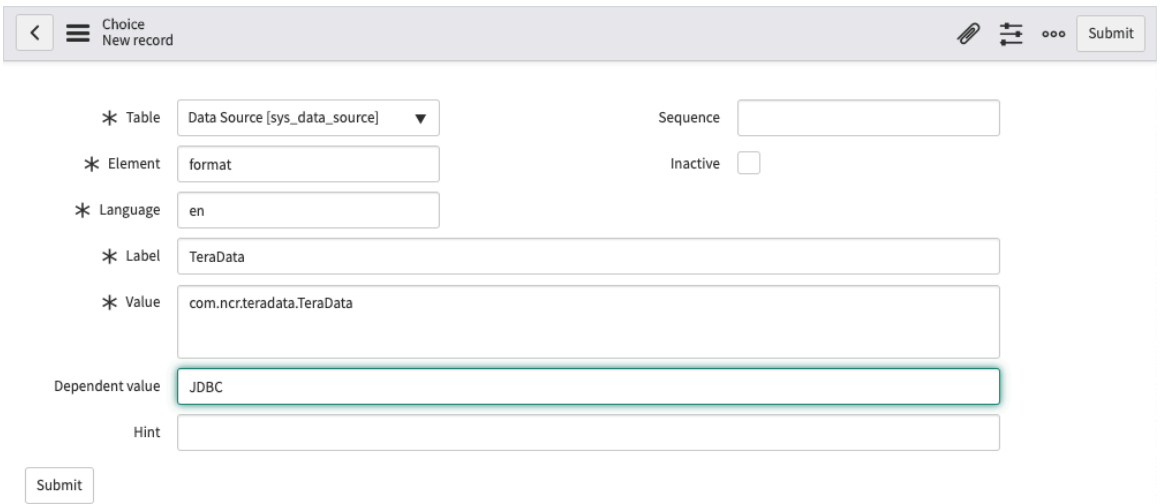
- Table: *sys_data_source*
- Label: Database name that appears as an option in the **Format** choice list, for example: Teradata.
- Value: Package name and class of the driver. For example, the value for TeraData is *com.ncr.teradata.TeraDriver*.

  Note: The driver package and class must be provided by the driver vendor. This information is often available in the vendor's documentation, such as for MariaDB or Teradata.

- Dependent value: JDBC



6. Click **Submit**.

   The new data source now appears in the list of available JDBC formats.

Add Sybase or DB2 JDBC format choices

Extend the available JDBC driver options by activating the Sybase or DB2 choices.

Before you begin

Roles required: admin

Important: To use Sybase or DB2 JDBC drivers, you must manually install the driver JAR file on a MID server. Refer to KB0551236 for more information.

About this task

Activate the Sybase or DB2 JDBC drivers to connect with those database formats through a MID server. This procedure assumes you are using the following Sybase or DB2 drivers:

Drivers

Format	Driver	Driver class
Sybase	jconnect-jdbc	com.sybase.jdbc3.jdbc.SybDriver
DB2	db2jcc	com.ibm.db2.jcc.DB2Driver

If you are using a different implementation of the Sybase or DB2 driver, you must modify the choice **Value** to use the driver class from your driver implementation.

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Procedure

1. Navigate to **System Import Sets > Administration > Data Sources**.
2. Click **New**.
3. In the **Type** field, select **JDBC**.
4. Right-click the **Format** field label, and select **Configure Choices** from the pop-up menu.
5. Move the **Sybase** or **DB2 Universal** choices from the **Available** column to the **Selected** column.
6. Click **Save**.

   The new data source now appears in the list of available JDBC formats.

Install a driver on a MID Server

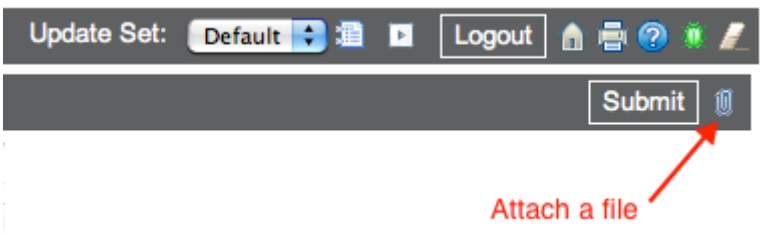
You can install a new JDBC driver JAR file to a MID server to access database formats that are not supported by default.

Before you begin

Role required: agent_admin

Procedure

1. Navigate to **MID Server > JAR Files**.
2. Click **New**.
3. Complete the following fields:
   - Name: A unique and descriptive name for identifying the file in the instance.
   - Version: A version number for the file, if one is available.
   - Source: Location of the JAR file for reference purposes. Source information is not used by the system.
   - Description: Short description of the JAR file and its purpose in the instance.
4. Click the paper clip icon in the banner and attach the JAR file to the record.



5. Click **Submit**.
6. Restart the MID Server service.

   The platform makes the JAR file available to any MID Server configured to communicate with the instance.

Create a JDBC data source for an unsupported database format

Add a JDBC data source by defining a data source record.

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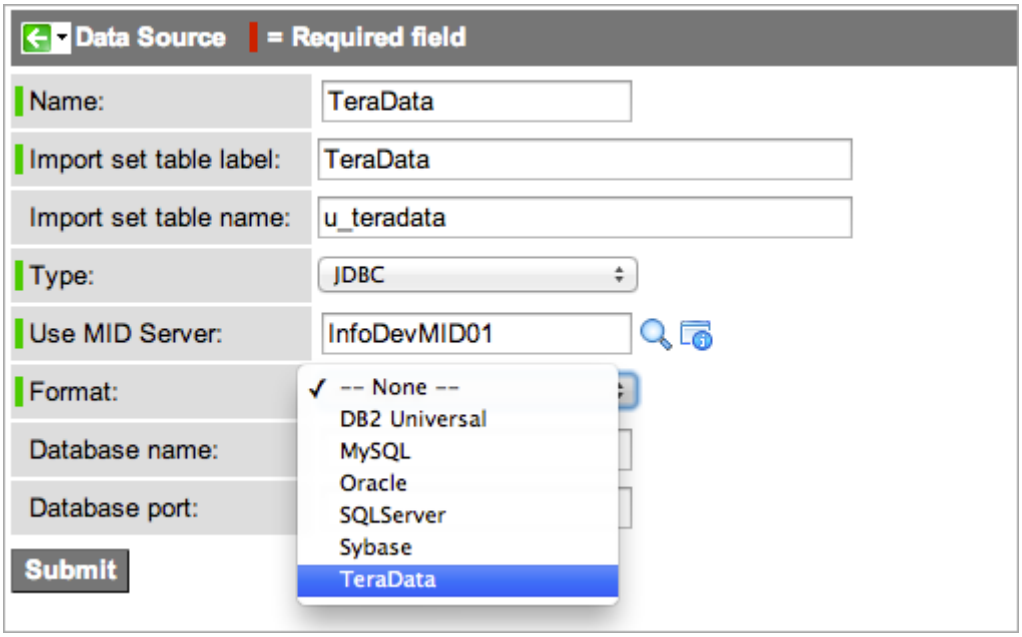
Before you begin

- Role required: import_admin
- This procedure covers how to create a JDBC data source for an unsupported database format. For general information on creating a JDBC data source, including a detailed description of form fields, see Create a JDBC type data source.

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources** and click **New**.
2. In the Data Source form, select **JDBC** from the list in the **Type** field.
3. Select the new data source from the choice list in the **Format** field.



4. Configuring the form layout and add the **Connection URL** field.
5. Provide the connection URL to the JDBC data source, and then click **Submit**.

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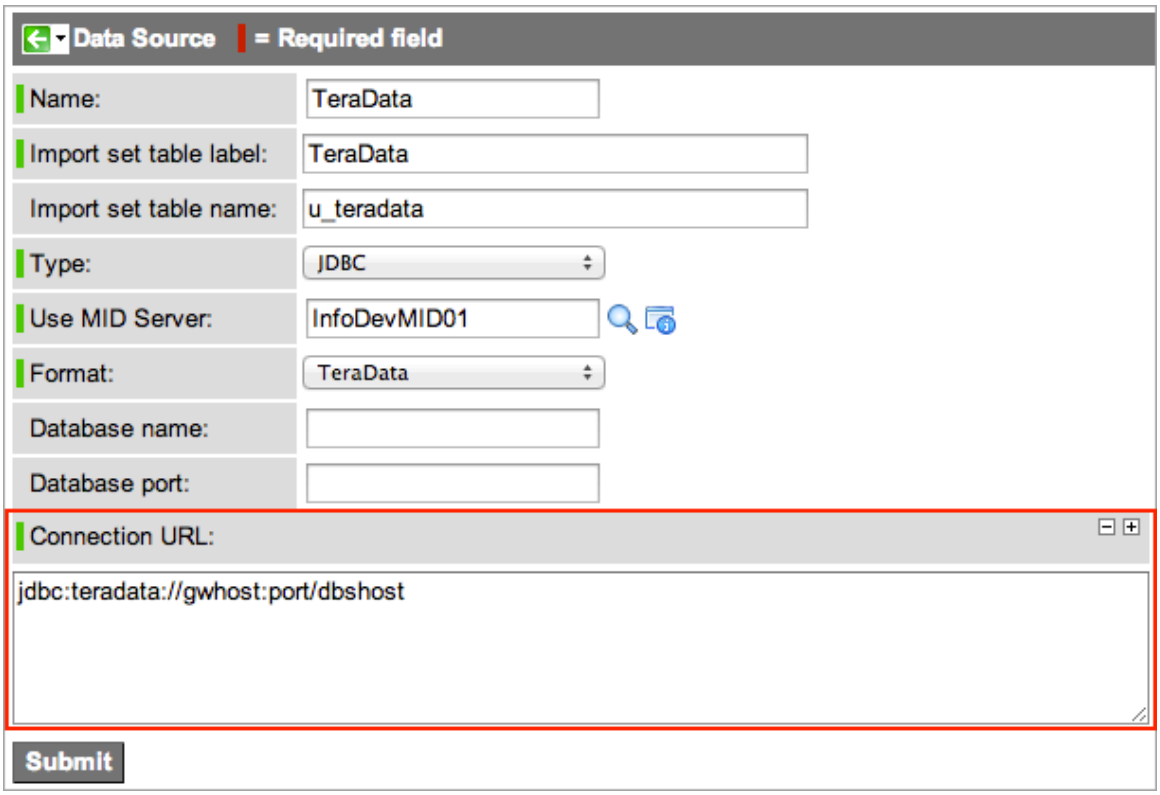
No other connection information is required.



Create an import connection alias

Create an import connection alias for the **JDBC** type data source records.

Before you begin

Role required: import_admin

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Import Connection Alias.**.
2. Select **New.**
3. Provide a name for the alias.
4. Select the name of the alias to open the JDBC connections page.
5. On the JDBC connections page, select **New**
6. Fill the form.

Field	Description
Name	A unique name for this JDBC connection.
Use MID Server	MID Server to use to connect to this data source.
Format	Select one of the following formats: MySQL, Oracle, or SQL Server.
Instance name	Used to support dynamic port connectivity with SQL Server. To ensure connectivity, provide the instance name for a SQL Server that receives a new

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Field	Description
	port number dynamically after each reboot. This field only appears when **SQLServer** is selected as a data source format.
Server	Name of the server from which the tables will be imported.
Database name	Name of the database instance.
Database port	Port number for the database. Leave this field empty when using dynamic port connectivity with SQL Server.
Use integrated authentication	Selected to enable the JDBC connection to use the ID of the user configured for the Windows MID Server service for SQL Server authentication. For additional details, see JDBC type data source.
Connection URL parameters	Optional parameters to add to the end of the URL generated for this data source. Semicolon-separated list of parameters.
Connection URL parameters	Optional parameters to add to the end of the URL generated for this data source. Semicolon-separated list of parameters.
Connection URL	Read-only field auto-generated by the system. To set connection URL manually, select the **Manually set connection URL** option.
Manually set connection URL	Option to manually set the connection URL.
Import connection alias	The import connection alias associated with the JDBC connection.
Use username password to authenticate	Option to provide the username and password for authentication. When this option is switched off, the connection properties are used for authentication.
Username	User name for authentication on the JDBC server.
Password	Password for authentication on the JDBC server.
Connection timeout	Number of seconds before MID Server connection cache pool closes and removes it from the pool. Zero (0) means no timeout.
Query timeout	Number of seconds the JDBC driver waits for a query (SELECT) to complete. Zero (0) means no timeout. If timeout is exceeded, the integration considers the JDBC result inaccessible and places it in an error state

7. Select **Submit.**

LDAP type data source

An LDAP data source is automatically created when you configure your instance to integrate with LDAP.

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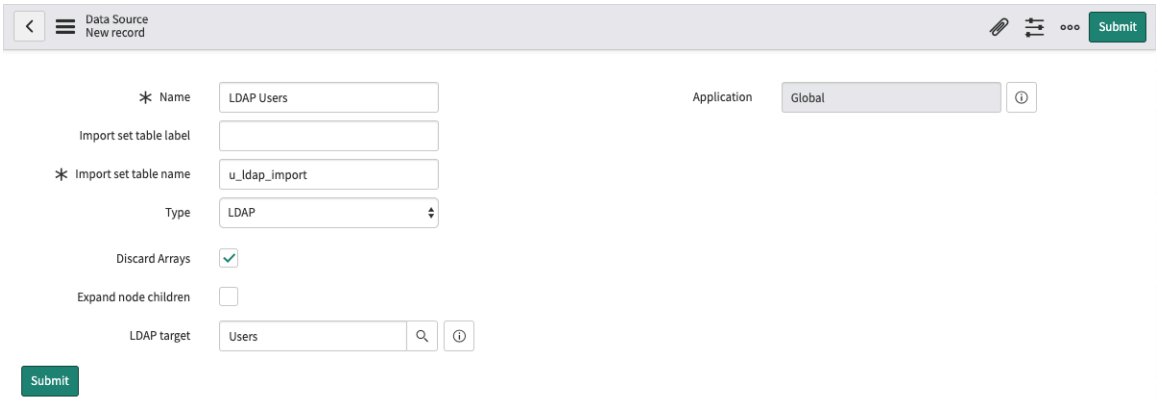

Processing a large LDAP request without paging

When an LDAP server does not support paging, a large request is automatically broken into multiple smaller requests.

This process is known as "nibbling" the LDAP request. The large request is broken into multiple smaller requests based on the value of the **Query field** in the LDAP OU definition. This field should specify a unique value such as email address or user ID.

For example, the following LDAP query might return more than 1000 records.

```
(&(objectclass=user)(sn=*))
```

In this example, the LDAP server **Query field** is **preferredIdentity**. The instance then splits the large request into multiple smaller requests, grouping records based on the **preferredIdentity** value.

```
(&((&((preferredIdentity>=0)(preferredIdentity<=1)))((&(objectc
lass=user)(sn=*))))
(&((&((preferredIdentity>=1)(preferredIdentity<=2)))((&(objectc
lass=user)(sn=*))))
(&((&((preferredIdentity>=2)(preferredIdentity<=3)))((&(objectc
lass=user)(sn=*))))
. . .
(&((&((preferredIdentity>=9)(preferredIdentity<=a)))((&(objectc
lass=user)(sn=*))))
(&((&((preferredIdentity>=a)(preferredIdentity<=b)))((&(objectc
lass=user)(sn=*))))
(&((&((preferredIdentity>=b)(preferredIdentity<=c)))((&(objectc
lass=user)(sn=*))))
```

Related topics

- LDAP integration
- Specify LDAP attributes
- Define LDAP organizational units

Data Stream (Integration Hub) data source

Enable platform Data Sources to load data from Integration Hub Data Stream actions.

A Data Stream is a stream of response data larger than 10 MB or data that returns paginated results. Successful execution of the Data Stream action returns a complex data output stream that the Data Source consumes. For more information, see Data stream actions and pagination.

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Complex data allows you to encode and store structured data in a machine-readable format. Based on Data Source configuration, complex objects can be either flattened into an import table or serialized completely as JSON data into a single column.

Complex data includes parent and child objects and nested objects, as shown in the following example:



For more information, see Complex data.

Custom (Load by Script) type data source

Use a custom script to store any type of incoming data in the import set table.

When you select a **Type** of **Custom (Load by Script)** for your data source, the **Data Loader** field appears. The **Data Loader** field is a JavaScript field where you can enter a script to fetch data and insert it into the import set table using the *`import_set_table`* input parameter. For example, you can enter a script to get data from a REST API or a file attachment.

The **Data Loader** script loads the data. You can also **Enable parallel loading** to use a script to partition the data into smaller sections, then load them in parallel. Parallel loading can enable your integrations to finish in less time and create less of an impact on other tasks. Parallel jobs are usually processed immediately. If you need to delay a job, you can configure a delay in the Data Loader script.

Note: With parallel loading, you must be running a concurrent import and the **Partition Method** for the import must be set to **Custom size**. For more information see, Schedule a data import.

Data Loader script

The data loader script has the following input parameters.

- `import_set_table`: The import set table referred to in the Data Source record. The data is inserted into this table.
- `data_source`: The data source referred to in the Data Source record.
- `import_log`: The log that records information about data import activity.
- `last_success_import_time`: The last time this data source was run successfully.
- `partition_info`: The partitioning information for the data. Used for parallel loading.

The import_set_table parameter has the following methods:

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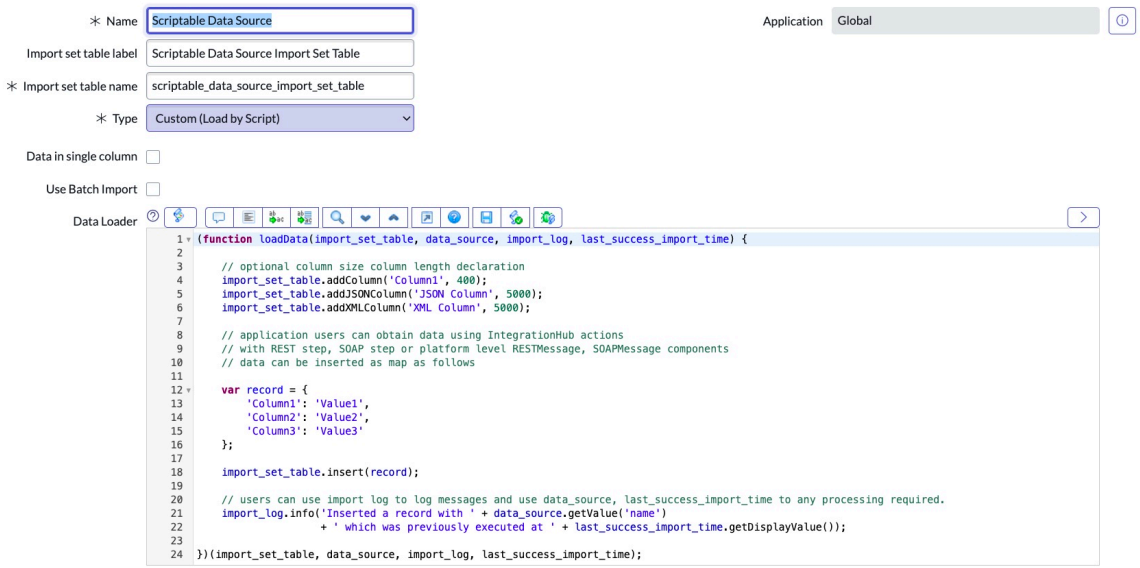
- `addColumn(label, maxLength)`: Adds a string-type column to the import set table.
- `addJSONColumn(label, maxLength)`: Adds a JSON-type column to the import set table.
- `addXMLColumn(label, maxLength)`: Adds an XML-type column to the import set table.
- `insert(rowData)`: Inserts a map (key = column name, value = column value) in the import set table.
- `getMaximumRows()`: Returns 20 when you select **Test load 20 records**. In every other case, returns `-1`.

Data Loader example



Parallel loading script

The parallel loading script has the following input parameters.

- `parallel_job_loader`: The Parallel Jobs [sys_parallel_job] table.
- `data_source`: The data source referred to in the Data Source record.
- `import_log`: The log that records information about data import activity.
- `last_success_import_time`: The last time this data source was run successfully.

The parallel_job_loader parameter has the `add(partitionInfo)` method, which adds the partition information to the Parallel Jobs [sys_parallel_job] table.

Parallel loading example

In this example, the parallel loading script partitions the data into smaller sections to be loaded in parallel. The Data Loader script loads the data into the import set table and adds a new partition to process data after a 120-second delay.

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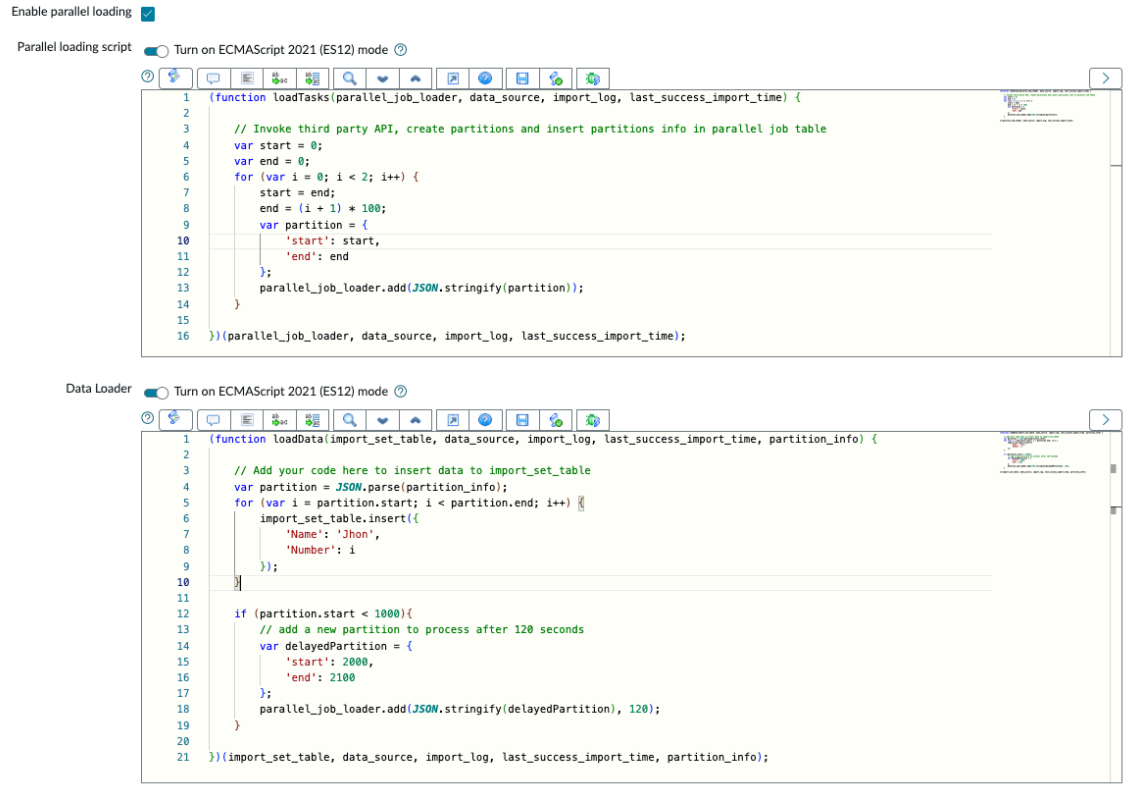

Parallel loading delays, status, and properties

For most parallel jobs, data is available when the Data Loader script runs, so you don't need to add any parallel jobs to the Data Loader script.

In cases where the data might not be immediately available, you can create an additional parallel job with a delay in the Data Loader script. When the Data Loader script runs, the parallel job is scheduled to run after the amount of time specified by the delay.

When adding parallel jobs to the Data Loader script, avoid repetitive loops. You can avoid repetitive loops by specifying a constraint. In the previous example, the parallel job in the Data Loader script uses the constraint`#(partition.start < 1000)`. Delays are measured in seconds.

You can check the status of your current parallel import tasks by going to the Concurrent Import Sets [sys_concurrent_import_set] table, selecting your job, and viewing the Parallel Jobs tab.

Delayed jobs may show as **Pending** depending on the delay's length of time. Parallel jobs are processed from the event queue, so you can also view your jobs by going to the Events [sysevent] table and filtering by **[Queue] [is] [impex_parallel_job_queue]**.

If a job gets stuck in a **Running** state for more than 600 minutes, it's automatically put back into a **Pending** state. You can modify the amount of time a parallel job is allowed to be stuck in a running state with the *`com.glide.system_parallel_job_inactive_time_minutes`* property.

If a parallel job can't complete after two tries, the job is set to **Error**. You can modify the number of tries before having an error state with the *`com.glide.system_parallel_job_max_retry_count`* property. The *`com.glide.system_parallel_job_auto_retry`* property can be set to false to disable auto retry.

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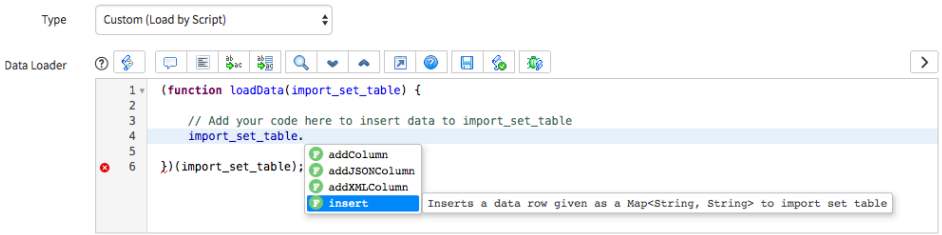
Script auto-complete

As you type the script, the script auto-complete displays the available options, as shown in this example.



Create a data source

Create a data source record to define what data an import set should import.

Depending on the type of data source you want to create, see the following topics for procedures.

Create a File type data source

Create a **File** type data source record to define what data an import set should import.

Before you begin

Role required: import_admin

About this task

For additional information, see File type data sources.

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**File**.
Format	Only the default XML-based file format (.xlsx) is supported, unless saved as "Strict Open XML Document."
Zipped	Selected if the import file is compressed.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**.

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Field	Description
	Note: The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. ○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
File retrieval method	The retrieval method for this file.
File path	The path to the file to import. You can include a system property value in this field using the format `${system.property.name}`. When the connection is made, the variable is replaced with the value of the specified property. **Note:** For files retrieved using HTTP or HTTPS, the *glide.ds.file.http.variable_replacement* property must be true to use system property expansion. For example, you can specify the **File path** value `/countries.csv?key=${datasource.apikey}`. When the connection is made, the value of the *datasource.apikey* system property is passed as the value for the *key* parameter. **Note:** For HTTP and HTTPS protocols, the file path is automatically URL encoded. Do not specify a URL-encoded file path when using either of these protocols.
CSV delimiter	The delimiter character for the CSV file.

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Field	Description
Parsing script	The script used to parse a single line of input. As you type the script, script auto-complete presents the choices available to you. For more information, see File type data sources.
Sheet number	The Excel sheet number to load data.
Header row	The Excel row number to load the column labels.
Path for each row	The path expression used to select JSON objects, which will become rows in the import set table. The path should be / / for JSON objects.
Discard Arrays	Selected to discard JSON arrays as a value. Unselected to serialize JSON arrays as a value.
Expand node children	Selected if child elements of the XML node or JSON object should be converted into additional columns. Unselected if the parent column value should be an XML or JSON fragment. For JSON, note that selecting this option expands objects only, not arrays. For nested array support, see JSON file import examples.
Data in single column	Selected to store data in a single column.
Xpath for each row	XPath expression that selects the nodes which become rows in the import table. The children of the selected nodes will become the columns in the rows.
SCP authentication method	Choice to authenticate with a username and password or with a public key. **Note:** You cannot authenticate to data sources with a public-private key pair. Use a username and password authentication instead.
Server	Name of the server from which the tables will be imported.
Port	Port to use to connect to the specified server. This field appears if you select HTTP or HTTPS as the file retrieval method.
Username	User name for authentication on the JDBC server.
Password	Password for authentication on the JDBC server.
Private keyfile	Keyfile when using legacy SCP public-private keyfiles. **Note:** ○ You cannot authenticate to data sources with a public-private key pair. Use username and password authentication instead. ○ Do not use this legacy option. Although it is available for use, it is not supported.
System keystore	Selected to validate the certificate from the FTPS server against all saved certificates. This certificate may be any type supported by the instance. If not selected, the instance uses the Java default certificate to validate the FTPS server. This field is available only for data sources with a **File retrieval method** value of **FTPS**. All FTPS file retrieval methods are supported, including Auth TLS, Auth SSL, Implicit SSL, and Implicit TLS.

4. Click **Submit**.

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What to do next
Define a transform map for the new data source and run an import.

Create a JDBC type data source

Create a **JDBC** type data source record to define what data an import set should import.

Before you begin
Role required: import_admin

About this task
For additional information, see JDBC type data source.

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**JDBC**.
Use import connection alias	Option to use per-configured connection details.
Import connection alias	Connection alias to use to connect to this data source. For additional details, see Create an import connection alias.
Use MID Server	MID Server to use to connect to this data source.
Format	Select one of the following formats: MySQL, Oracle, or SQLServer.
Instance name	Used to support dynamic port connectivity with SQL Server. To ensure connectivity, provide the instance name for a SQL Server that receives a new port number dynamically after each reboot. This field only appears when **SQLServer** is selected as a data source format.
Database name	Name of the database instance.
Database port	Port number for the database. Leave this field empty when using dynamic port connectivity with SQL Server.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**.

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Field	Description
	Note: The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. ○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Use integrated authentication	Selected to allow the JDBC connection to use the ID of the user configured for the Windows MID Server service for SQL Server authentication. For additional details, see JDBC type data source.
Username	User name for authentication on the JDBC server.
Password	Password for authentication on the JDBC server.
Server	Name of the server from which the tables will be imported.
Query	Type of query to run: **All rows from Table** or **Specific SQL**. If you select to run a SQL statement, the SQL statement field appears.
Query timeout	Number of seconds the JDBC driver will wait for a query (SELECT) to complete. Zero (0) means no timeout. If timeout is exceeded, the integration considers the JDBC result inaccessible and places it in an error state.
Connection timeout	Number of seconds before MID Server connection cache pool closes and removes it from the pool. Zero (0) means no timeout.
Table name	Name of the table from which the data is being exported.
SQL statement	SQL statement to extract the desired data from the database.
Use last run datetime	Controls the amount of data that is retrieved from a database during an import run. If unselected, then all rows in the table specified are imported, every time. You might want to use this setting if this is a one-time import, or if

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Field	Description
	all the data in the target table is new. If selected, two additional fields appear, enabling you to select a datetime value to limit imported data to delta values only.
Last run datetime	The datetime value in this field is automatically populated from the database field you select below and represents the latest value from the previous run. This value acts as a dynamic filter to restrict the number of records retrieved to those records that have changed since the data source's last runtime.
Last run database field	Field name from the source table that will be used as the filter in the next run. This value may need to be case sensitive, depending on the target database type.
Additional Database Parameters	Optional parameters to add to the end of the URL generated for this data source. Semicolon-separated list of parameters. You may need to configure the form to view this field.

4. Click **Submit**.

What to do next
Define a transform map for the new data source and run an import.

Create an LDAP type data source

Create an **LDAP** type data source record to define what data an import set should import.

Before you begin
Role required: import_admin

About this task
For additional information, see LDAP type data source.

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**LDAP**.
LDAP target	Target selected from the list of your LDAP OU definitions.

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Field	Description
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. ○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.

4. Click **Submit**.

What to do next
Define a transform map for the new data source and run an import.

Create an OIDC type data source

Create an **OIDC** type data source record to define what data an import set should import.

Before you begin
Role required: import_admin

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.

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Field	Description
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**OIDC**.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. ○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Format	Defaults to **-- None --** and can't be changed.

4. Click **Submit**.

What to do next

Define a transform map for the new data source and run an import.

Create a REST (Integration Hub) type data source

Create a **REST (IntegrationHub)** type data source record to define what data an import set should import from a REST API.

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Before you begin

Roles required: import_admin and action_designer

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**REST (IntegrationHub)**.
Format	One of the following formats: Custom (Parse by Script), JSON, or XML.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. ○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.

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Field	Description
Request action	Data source request action that will be invoked to get data. You can choose only published request actions. Click the link in the dialog box below to create/configure a new Data Source request action in Integration Hub. After the request action is published in Integration Hub, you can choose it as a **Request action** in the Data Source record. For more information, see Define action properties.
Support pagination	Selected to enable pagination for the request action. Pagination helps you reduce processing overhead by processing a specified number of records at a time, instead of processing all records at once.
Limit	Maximum number of records per page. For example, to process 50 records at a time, enter a **Limit** of 50.
Offset	The initial offset used for pagination. The offset is the starting record number. For example, to process 50 records at a time, starting with the first record, enter a **Limit** of 50 and an **Offset** of 0.
Parsing script	Type the script used to parse a single line of input. Three parameters are available in this function: ○ **line**: the current line to be parsed by the script ○ **lineNumber**: the line number of the current line in the entire response payload ○ **result**: output result
Path for each row	The path expression used to select JSON objects, which will become rows in the import set table. The path should be / / for JSON objects.
Discard Arrays	Selected to discard JSON arrays as a value. Unselected to serialize JSON arrays as a value.
Expand node children	Selected if child elements of the XML node or JSON object should be converted into additional columns. Unselected if the parent column value should be an XML or JSON fragment. For JSON, note that selecting this option expands objects only, not arrays. For nested array support, see JSON file import examples.
Data in single column	Selected to store data in a single column.
Xpath for each row	XPath expression that selects the nodes which become rows in the import table. The children of the selected nodes will become the columns in the rows.

4. Click **Submit**.

What to do next
Define a transform map for the new data source and run an import.

Define action properties

Create and configure a Data Source request action in Integration Hub. After the request action is published in Integration Hub, you can choose it as a **Request action** in the Data Source record.

Before you begin
Role required: import_admin

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Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Select **New**.
3. Select a **Type** of **REST (IntegrationHub)**.
4. Click the link under **Request action**.
5. Complete the form.

Field	Description
Name	Name of the request action.
Accessible From	Scope from which the request action is accessible.
Category	Category of the request action.
Protection	Specifies whether the request action is read-only.
Description	Description of the request action.
Application	Scope of the application.
In-Flow Annotation	Text you want to appear under the **Action** title on the Data Source Request Action page.

6. Click **Submit**.
7. The Data Source Request Action page appears with the following fields:

Field	Description
Limit	Limit set by the user in the REST (IntegrationHub) data source record. If the REST API supports pagination and **Support pagination** is selected in the Data Source record, you must supply this input to your REST step.
Offset	Offset set by user in the REST (IntegrationHub) data source record. If the REST API supports pagination and **Support pagination** is selected in the Data Source record, you must supply this input to your REST step.
Last Success Import Time	Last time data was successfully imported. A numeric value representing the number of milliseconds since January 1, 1970, 00:00:00 GMT. The data source populates this value. If the REST API supports queries based on time, you must supply this input to your REST step.
Import Start Time	Time the import is actually started. A numeric value representing the number of milliseconds since January 1, 1970, 00:00:00 GMT. The data source populates this value. If the REST API supports queries based on time, you must supply this input to your REST step.

8. If desired, you can add a Script step to validate or modify action inputs, set default values, or build request payloads before executing the REST step.
   a. Select **Data Source Request** from the Action Outline.
   b. Select **Enable Processing Script**.

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c. Select **Script step** from the Action Outline.

d. Configure the Script step as described in Script step.

9. Select **REST step** from the Action Outline.
10. Configure the REST step as described in REST step.
11. Choose from the following:
    - Click **Properties** to return to the Action Properties window.
    - Click **Test** to test the request action before publishing it.
    - Click **Executions** to view the history of executions of the request action.
    - Click **Save** to save the request action.
    - Click **Publish** to publish the request action and make it available for use.

Create a Data Stream (Integration Hub) type data source

Create a **Data Stream (IntegrationHub)** type data source record to define what complex data an import set should import from a Data Stream action.

Before you begin

Role required: import_admin and action_designer

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	Data Stream (Integration Hub) type data source.
Data Stream action	 Selected to use an existing published Data Stream action from Integration Hub.  Selected for one of the following reasons: ▪ If you select a published Data Stream action, click this button to open the Data Stream action in Integration Hub. ▪ If you don't select a Data Stream action, click this button to create and publish a new Data Stream action in Integration Hub. **Note:** Data Stream actions require a subscription for production use.

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Field	Description
Connection	Specify the connection alias for the Data Stream action. You can use the default parent alias or select any of its children's aliases. Available child aliases are listed in the menu. This field is only available when the Data Stream action is configured to use a connection alias. For more information, see Create a Connection and Credential alias.
Data in single column	Selected to store data in a single column.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. ○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Data Stream action inputs	Additional fields may appear, based on the inputs defined in the **Data Stream action**.

4. Click **Submit**.

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What to do next
Define a transform map for the new data source and run an import.

Create a Custom (Load by Script) type data source

Create a **Custom (Load by Script)** type data source record to define what data an import set should import.

Before you begin
Role required: import_admin

About this task
For additional information, see Custom (Load by Script) type data source.

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**Custom (Load by Script)**.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000.

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Field	Description
	○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Enable parallel loading	Option to use parallel data loading.
Parallel loading script	Script used for parallel data loading. Appears only when **Enable parallel loading** is selected. For more information, see Custom (Load by Script) type data source.
Data Loader	Script used to load data. For more information, see Custom (Load by Script) type data source.

4. Click **Submit**.

What to do next

Define a transform map for the new data source and run an import.

Data source fields

In addition to common fields, other fields appear on the data source form, depending on the value of the **Type** field.

Common data source fields

These fields are common to all data sources.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	The type of data you are importing: • From a remote **File** • From a **JDBC** database • Using **LDAP** • Using **OIDC**

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Field	Description
	• Using **REST** to import data through the Integration Hub • From a **Data Stream** action through the Integration Hub • Using a **Custom** script
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. • For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. • For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. • For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) • For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Application	Application scope for this record.

File type data source fields

These additional fields appear on the data source form when the **Type** field value is **File**.

Field	Description
Format	Only the default XML-based file format (.xlsx) is supported, unless saved as "Strict Open XML Document."
Zipped	Selected if the import file is compressed.
File retrieval method	The retrieval method for this file.
File path	The path to the file to import.

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Field	Description
	You can include a system property value in this field using the format `${system.property.name}`. When the connection is made, the variable is replaced with the value of the specified property. **Note:** For files retrieved using HTTP or HTTPS, the *glide.ds.file.http.variable_replacement* property must be true to use system property expansion. For example, you can specify the **File path** value `/countries.csv?key=${datasource.apikey}`. When the connection is made, the value of the *datasource.apikey* system property is passed as the value for the *key* parameter. **Note:** For HTTP and HTTPS protocols, the file path is automatically URL encoded. Do not specify a URL-encoded file path when using either of these protocols.
CSV delimiter	The delimiter character for the CSV file.
Parsing script	The script used to parse a single line of input. As you type the script, script auto-complete presents the choices available to you. For more information, see File type data sources.
Sheet number	The Excel sheet number to load data.
Header row	The Excel row number to load the column labels.
Path for each row	The path expression used to select JSON objects, which will become rows in the import set table. The path should be `//` for JSON objects.
Discard Arrays	Selected to discard JSON arrays as a value. Unselected to serialize JSON arrays as a value.
Expand node children	Selected if child elements of the XML node or JSON object should be converted into additional columns. Unselected if the parent column value should be an XML or JSON fragment. For JSON, note that selecting this option expands objects only, not arrays. For nested array support, see JSON file import examples.
Data in single column	Selected to store data in a single column.
Xpath for each row	XPath expression that selects the nodes which become rows in the import table. The children of the selected nodes will become the columns in the rows.

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Field	Description
SCP authentication method	Choice to authenticate with a username and password or with a public key. **Note:** You cannot authenticate to data sources with a public-private key pair. Use a username and password authentication instead.
Server	Name of the server from which the tables will be imported.
Port	Port to use to connect to the specified server. This field appears if you select HTTP or HTTPS as the file retrieval method.
Username	User name for authentication on the JDBC server.
Password	Password for authentication on the JDBC server.
Private keyfile	Keyfile when using legacy SCP public-private keyfiles. **Note:** • You cannot authenticate to data sources with a public-private key pair. Use username and password authentication instead. • Do not use this legacy option. Although it is available for use, it is not supported.
System keystore	Selected to validate the certificate from the FTPS server against all saved certificates. This certificate may be any type supported by the instance. If not selected, the instance uses the Java default certificate to validate the FTPS server. This field is available only for data sources with a **File retrieval method** value of **FTPS**. All FTPS file retrieval methods are supported, including Auth TLS, Auth SSL, Implicit SSL, and Implicit TLS.

JDBC type data source fields

These additional fields appear on the data source form when the **Type** field value is **JDBC**.

Field	Description
Use MID Server	MID Server to use to connect to this data source.
Format	One of the following formats: MySQL, Oracle, or SQLServer.
Instance name	Used to support dynamic port connectivity with SQL Server. To ensure connectivity, provide the instance name for a SQL Server that receives a new port number dynamically after each reboot. This field only appears when **SQLServer** is selected as a data source format.

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Field	Description
Database name	Name of the database instance.
Database port	Port number for the database. Leave this field empty when using dynamic port connectivity with SQL Server.
Use integrated authentication	Selected to allow the JDBC connection to use the ID of the user configured for the Windows MID Server service for SQL Server authentication. For additional details, see JDBC type data source.
Username	User name for authentication on the JDBC server.
Password	Password for authentication on the JDBC server.
Server	Name of the server from which the tables will be imported.
Query	Type of query to run: **All rows from Table** or **Specific SQL**. If you select to run a SQL statement, the SQL statement field appears.
Query timeout	Number of seconds the JDBC driver will wait for a query (SELECT) to complete. Zero (0) means no timeout. If timeout is exceeded, the integration considers the JDBC result inaccessible and places it in an error state.
Connection timeout	Number of seconds before MID Server connection cache pool closes and removes it from the pool. Zero (0) means no timeout.
Table name	Name of the table from which the data is being exported.
SQL statement	SQL statement to extract the desired data from the database.
Use last run datetime	Controls the amount of data that is retrieved from a database during an import run. If unselected, then all rows in the table specified are imported, every time. You might want to use this setting if this is a one-time import, or if all the data in the target table is new. If selected, two additional fields appear, enabling you to select a datetime value to limit imported data to delta values only.
Last run datetime	The datetime value in this field is automatically populated from the database field you select below and represents the latest value from the previous run. This value acts as a dynamic filter to restrict the number of records retrieved to those records that have changed since the data source's last runtime.
Last run database field	Field name from the source table that will be used as the filter in the next run. This value may need to be case sensitive, depending on the target database type.
Additional Database Parameters	Optional parameters to add to the end of the URL generated for this data source. Semicolon-separated list of parameters. You may need to configure the form to view this field.

LDAP type data source field

This additional field appears on the data source form when the **Type** field value is **LDAP**.

Field	Description
LDAP target	Target selected from the list of your LDAP OU definitions.

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OIDC type data source field

This additional field appears on the data source form when the **Type** field value is **OIDC**.

Field	Description
Format	Defaults to **-- None --** and can't be changed.

REST (Integration Hub) type data source fields

These additional fields appear on the data source form when the **Type** field value is **REST (IntegrationHub)**.

Field	Description
Format	One of the following formats: Custom (Parse by Script), JSON, or XML.
Request action	Data source request action that will be invoked to get data. You can choose only published request actions. Click the link in the dialog box below to create/configure a new Data Source request action in Integration Hub. After the request action is published in Integration Hub, you can choose it as a **Request action** in the Data Source record. For more information, see Define action properties.
Support pagination	Selected to enable pagination for the request action. Pagination helps you reduce processing overhead by processing a specified number of records at a time, instead of processing all records at once.
Limit	Maximum number of records per page. For example, to process 50 records at a time, enter a **Limit** of 50.
Offset	The initial offset used for pagination. The offset is the starting record number. For example, to process 50 records at a time, starting with the first record, enter a **Limit** of 50 and an **Offset** of 0.
Parsing script	The script used to parse a single line of input. As you type the script, script auto-complete presents the choices available to you. For more information, see File type data sources.
Path for each row	The path expression used to select JSON objects, which will become rows in the import set table. The path should be / / for JSON objects.
Discard Arrays	Selected to discard JSON arrays as a value. Unselected to serialize JSON arrays as a value.
Expand node children	Selected if child elements of the XML node or JSON object should be converted into additional columns. Unselected if the parent column value should be an XML or JSON fragment. For JSON, note that selecting this option expands objects only, not arrays. For nested array support, see JSON file import examples.
Data in single column	Selected to store data in a single column.
Xpath for each row	XPath expression that selects the nodes which become rows in the import table. The children of the selected nodes will become the columns in the rows.

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Data Stream (Integration Hub) type data source fields

These additional fields appear on the data source form when the **Type** field value is **Data Stream (IntegrationHub)**.

Field	Description
Type	Data Stream (Integration Hub) type data source.
Data Stream action	•  Selected to use an existing published Data Stream action from Integration Hub. •  Selected for one of the following reasons: ○ If you select a published Data Stream action, click this button to open the Data Stream action in Integration Hub. ○ If you don't select a Data Stream action, click this button to create and publish a new Data Stream action in Integration Hub. **Note:** Data Stream actions require a subscription for production use.
Connection	Specify the connection alias for the Data Stream action. You can use the default parent alias or select any of its children's aliases. Available child aliases are listed in the menu. This field is only available when the Data Stream action is configured to use a connection alias. For more information, see Create a Connection and Credential alias.
Data in single column	Selected to store data in a single column.
Data Stream action inputs	Additional fields may appear, based on the inputs defined in the **Data Stream action**.

Custom (Load by Script) type data source field

This additional field appears on the data source form when the **Type** field value is **Custom (Load by Script)**.

Field	Description
Data Loader	Script used to load data. For more information, see Custom (Load by Script) type data source

Transform maps

A transform map is a set of field maps that determine the relationships between fields in an import set and fields in an existing ServiceNow table, such as Incident [incident] or User [sys_user].

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After creating a transform map, you can reuse it to map data from another import set to the same table.

The **Transform Maps** module enables an administrator to define destinations for imported data on any tables. Transform mapping can be as simple as a drag and drop operation to specify linking between source fields on an import set table and destination fields on any table. Use transform mapping to map source and destination fields dynamically.

For a video overview of transform maps, see the Transform Maps video on the ServiceNow Dev Program YouTube channel.

Transform considerations

Auto-mapping

Double-check that fields the system maps automatically are actually required. For example, encrypted passwords probably should not be mapped.

Mapping reference fields

If you are mapping reference field data and the sys_id does not exist, the sys_id could potentially appear in the target record as the DisplayValue, and this may be undesirable.

Field mapping a large number of reference fields incurs additional performance overhead because the system checks that the referenced sys_id actually exists before performing choice actions at the field level.

Note: You can bypass the performance overhead using transform scripts such as onBefore (on the assumption that there is no requirement to validate the import of reference fields). For example, `target.<field_name> = source.<field_name>`.

Using multiple transform maps

Multiple transform maps can be applied to a single data source.

One import set row is created per transform map, which can cause a large number of temporary records to be generated.

Note: If you use multiple transform maps for the same import set, the transform creates multiple entries in the import set table.

Run multiple transforms off a single import set

Users can select multiple transform maps during data import.

The selected transform maps will be executed on the same import set in the order specified.

Transform map scripts

Transform Map scripts allow you to customize import operations using a robust programming interface to introduce advanced logic.

A transform map script executes as events occur while an import set is being transformed onto a ServiceNow table. Transform Map scripting is fully integrated into the ServiceNow scripting environment. There are two types of Transform Map scripts:

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- Explicit Transform Map scripts, which explicitly define mapping relationships
- Transformation Event scripts, which modify the processing of events at different stages of a transformation

Transformation script variables

Multiple variables can be used to define explicit mapping relationships in a transform map script.

Variable name: source

Type: GlideRecord object

Description: Contains the import source record currently being transformed. Specify a specific field from the source record as an object property.

Example:

```
var x = source.incident_state;
```

Variable name: target

Type: GlideRecord object

Description: Contains the import target record currently being inserted. Specify a specific field from the target record as an object property.

Example:

```
target.incident_state = "active";
```

Variable name: map

Type: GlideRecord object

Description: Contains the transformation map record currently being used for the transformation process. Specify a specific field from the transform map record with one of these properties.

- name
- sys_id
- source_table
- target_table
- order

Example:

```
var x = map.order;
```

Variable name: log

Type: Function

Description: Log information about the current import process. Each log level has its own method.

Example:

```
log.info("This is an information message");
log.warn("This is a warning message");
log.error("This is an error message");
```

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Variable name: action

Type: Function

Description: Specify the transformation action occurring on the target record. This value can be either "insert" or "update".

Example:

```
if(action =="insert"){
    ignore = true;
}
```

Variable name: ignore

Type: Boolean

Description: When set to true, skips or aborts the current import action. In onStart scripts, this variable aborts the entire transformation process. In onBefore scripts, this variable only skips the current row being transformed.

Example:

```
(function runTransformScript(source, map, log,
 target /*undefined onStart*/ ) {
    var transformCheck = new TransformCheck(source,
 map, log, target);
    var isMappingValid =
 transformCheck.validateMapping();
    if (!isMappingValid) {
        ignore = true;
    }
})(source, map, log, target);
```

Variable name: error

Type: Boolean

Description: When set to true, aborts the current import action and logs an error message in the Import Set Log.

Example:

```
if(source.name=="no_transform"){
  error = true;
}
```

Variable name: error_message

Type: String (output message)

Description: When an error occurs, adds the specified error message to SOAP response.

Example:

```
if(source.name=="no_transform"){
  error = true;
  error_message = "Source is not intended for
 transformation";
}
```

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Variable name: status_message

Type: String (output message)

Description: Adds the specified status message to SOAP response.

Example:

```
if(action =="insert"){
    status_message = "Inserting record";
}
```

Map with explicit transform map scripts

Explicitly define mapping relationships in the Transform Map record itself.

An explicit Transform Map script explicitly defines mapping relationships in the Transform Map record itself. It runs after the source field values have been copied over to the target record, and before they are written to the database.

CMDB software import facilitated by explicit mapping script

An example demonstrating how explicit map scripting can be used to facilitate an import of software instances to the CMDB where it is necessary to have the count in the software packages table reflect the number of instances.

In the CMDB there exist tables for software packages and software instances. A software package refers to a one individual software title, such as Mozilla Firefox. A software instance refers to an individual instance of a software title such as Mozilla Firefox on Jared_T60_Laptop.

In more technical terms a software instance is a many-to-many relationship with a software package and a configuration item. This script imports software instances. In doing so it checks to see if a software package for the instance exists. If the software package doesn't exist then it is created and the sys_id for the newly created package is associated with the instance via the instance record's **Software** field.

```
//First we will initialize some temporary variables,
//referencing values from the Import Set table source that will
 be used to
//reference software package records and create them if
 necessary.

var name= source.u_name;
var version = source.u_version;
var sid ="";

//Next we will perform a glide query on the software package
 table (Note: The target table
//for the import is software instances)
var sgr =new GlideRecord("cmdb_ci_spkg");

//Here we are building our query to search for software packages
 where the name and
//version of the package matches the name and version of the
 instance being imported
sgr.addQuery("name",name);
sgr.addQuery("version", version);
sgr.query();
```

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```
//Now if a software package with the correct name and version
 are found then we record
//the sys_id of the package record otherwise we create the
 package and then record the sys_id
if(sgr.next()){
   sid = sgr.sys_id;}else{// create it
   sgr.initialize();
   sgr.newRecord();
   sgr.name=name;
   sgr.version= version;
   sid = sgr.insert();

   //Here we make an entry in System Import Set Log saying that
 we had to create a software package
   log.info("Created new spkg: "+name+" - "+ version);
}
//Finally we set the reference field on our software instance
 record to the sys_id we have
//recorded for the software package. In doing so we are also
 relating the
//software package with the instance and so the count, which
 keeps track of
//the number of instances associated with a package, will
 automatically be incremented.
target.software= sid;
```

Populating child tables by setting class names in an import to the CMDB

An example demonstrating how to import servers into the configuration management database.

The destination table for the import is the cmdb_ci_servers table.

```
var operating_system = source.u_operating_system.toString();


//This if statement uses JavaScript regular expressions to
 search the operating system
if( operating_system.match(/linux/i)!=null){
   target.sys_class_name="cmdb_ci_linux_server";
};

if( operating_system.match(/win/i)!=null){
   target.sys_class_name="cmdb_ci_win_server";
};
```

User import data sanitation

An example script demonstrating how to sanitize user data before import.

```
//Note: The field names referenced from an import set are
//prefixed with an "u_", also note that it is necessary  to use
 the java method
// toString() to so that we can use JavaScript functions to
//manipulate the data.
var name= source.u_name.toString();
```

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```
//Use native JavaScript function split to create an array for
 each word in the name "splitting" it
//anywhere that there is a space
var split_names =name.split(" ");

//Find the number of of names (i.e., first and last name only,
 or first middle and last name, etc.)
var num_names = split_names.length;

// If there is only one name then map it to the last name field
 in the user table
if(num_names ==1){
   target.last_name= split_names[0];
}

//if there are two names then map the first one to first name
 and the last one to last name
if(num_names ==2){
   target.first_name= split_names[0];
   target.last_name= split_names[1];
}

//if there are more than 3 names then all middle names get
 combined into one middle name this is done
//by shifting off the first name (array element 0 ) and mapping
 to first name and popping off the last
// name and returning it to the last name field
if(num_names >=3){
   target.first_name= split_names.shift();
   target.last_name= split_names.pop();
   target.middle_name= split_names.join(" ");
}
```

Map with transformation event scripts

Transformation events occur during the process of transforming an import set table onto a table.

These events modify the transformation behavior from any type of mapping specification. Transformation Event scripts modify the processing of the events at various stages of the transformation.

For example, the processing of a mapping operation defined using the Mapping Assist Utility can be manipulated using the event scripts. There are a number of import set JavaScript objects that are accessible during these events. These objects represent tables or portions of tables. It is important to note that what these objects refer to varies depending on the context of the event in which they are referenced.

The following is a table of all of the transform events and their contextual variables.

Note: To view the import logs, set the *glide.importlog.log_to_table* property to true. For more information, see Import sets properties.

Transform events and their contextual variables

Event name	Event Parameters
onStart	When: The onStart event script is processed at the start of an import run, before any data rows

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Transform events and their contextual variables (continued)

Event name	Event Parameters
	Import Set JS objects available to be referenced and their context in the onStart event

Import Set JS object	Type	Context in the onStart imp
source	GlideRecord	The first row of the sourc
import_set	GlideRecord	The import set that is cu
map	GlideTransformMap	Read-only information a
log	Function	The log object for the cu **Note:** To view the
ignore	Boolean	When set to true, the en
error	Boolean	When set to true, has th

Example:

```
var info = "Starting Import Set Transformation Mapping operatio
+ map.table_source + " and Transform Map " + map.name + " on im
log.info( info );
```

onComplete

When: The onComplete event script is processed at the end of an import run, after all data row

Import Set JS objects available to be referenced and their context in the onComplete event

Import Set JS object	Type	Context in the onComplete
source	GlideRecord	The last row of the sourc
target	GlideRecord	The last row of target tab
import_set	GlideRecord	The import set that is cu
map	GlideTransformMap	Read-only information a
log	Function	The log object for the cu **Note:** To view the
error	Boolean	When set to true, will ma

Example:

```
// Create a myimport_completed event that can be reacted by an
// (there is already an import.finished event that the system w
```

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Transform events and their contextual variables (continued)

Event name	Event Parameters
	`var e = new GlideEvent("myimport_completed", import_set.sys_id, e.insert();`

onBefore	When: The onBefore event script is processed at the start of a row transformation, before the s
	
	Import Set JS objects available to be referenced and their context in the onBefore event
	
	Example:
	`var name = source.u_name.toString();`
	`var info = "Before the row is transformed, " + name;`
	`log.info( info );`
	
	`// Make sure a company name has been provided`
	`var company = source.u_company.toString();`
	`if(company.length == 0 ){`
	`ignore = true;`
	`info ="No company name, row ignored! " + name;`
	`log.info( info );`
	`}`

onAfter	When: The onAfter event script is processed at the end of a row transformation, after the sourc

Import Set JS object	Type	Context in the onBefore im
source	GlideRecord	The row of the source ta
target	GlideRecord	The row of the target tab
import_set	GlideRecord	The import set that is cu
map	GlideTransformMap	Read-only information a
log	Function	The log object for the cu **Note:** To view the
action	String	Action returns a value o
ignore	Boolean	When set to true, the cu If you have defined an o
status_message	String	Defines a custom messa
error	Boolean	When set to true, will ha
error_message	String	Defines a custom messa

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Transform events and their contextual variables (continued)

Event name	Event Parameters

Import Set JS objects available to be referenced and their context in the onAfter event

Import Set JS object	Type	Context in the onAfter imp
source	GlideRecord	The row of the source ta
target	GlideRecord	The row of the target tab
import_set	GlideRecord	The import set that is cu
map	GlideTransformMap	Read-only information a
log	Function	The log object for the cu **Note:** To view the
action	String	Action returns a value o
status_message	String	Defines a custom messa
error	Boolean	When set to true, will ha
error_message	String	Defines a custom messa

Example:

```
if(source.new=="true"){
  gs.include('Cart');var bundle =new GlideRecord('sc_cat_item')
  bundle.addQuery('name','CONTAINS','comp');
  bundle.query();
  if(bundle.next()){
     var new_comp_cart = new Cart();
     var cart = new Cart();
     var item = cart.addItem(bundle);
     var rc = cart.placeOrder();
     log.info(rc.number);}}
```

onForeignInsert

When: The onForeignInsert event script is processed at the start of the creation of a related, re

Import Set JS objects available to be referenced and their context in the onForeignInsert e

Import Set JS object	Type	Context in the onForeignIn
source	GlideRecord	The row of the source ta
target	GlideRecord	The row of the target tab
map	GlideTransformMap	Read-only information a

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Transform events and their contextual variables (continued)

Event name	Event Parameters

Import Set JS object / Type / Context in the onForeignIn

Import Set JS object	Type	Context in the onForeignIn
log	Function	The log object for the cu **Note:** To view the
action	String	Action returns a value o
name	String	Evaluates to the field na
value	String	Evaluates to the display
ignore	Boolean	When set to true, ignore
error	Boolean	When set to true, rejects

Example:

```
//Create an event.
var e = new GlideEvent("myimport_ForeignInsert", action, name,
e.insert();
```

onChoiceCreate

When: The onChoiceCreate event script is processed at the start of a choice value creation, b

Import Set JS objects available to be referenced and their context in the onChoiceCreate e

Import Set JS object	Type	Context in the onChoiceCr
source	GlideRecord	The row of the source ta
target	GlideRecord	The row of the target tab
map	GlideTransformMap	Read-only information a
log	Function	The log object for the cu **Note:** To view the
action	String	Action returns a value o
name	String	Evaluates to the field na
value	String	Evaluates to the display
ignore	Boolean	When set to true, ignore
error	Boolean	When set to true, rejects

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Transform events and their contextual variables (continued)

Event name	Event Parameters

	Example:
	`//Create an event`
	`var e = new GlideEvent("myimport_ChoiceCreate", action, value,`
	`e.insert();`

onReject	When: The onReject event script is processed during the occurrence of a foreign record or ch
	
	Import Set JS objects available to be referenced and their context in the onError event
	
	Example:
	`//Create an event`
	`var e = new GlideEvent("myimport_onReject", action, "", "");`
	`e.insert();`

Import Set JS object	Type	Context in the onError imp
source	GlideRecord	The row of the source ta
target	GlideRecord	The row of the target tab
map	GlideTransformMap	Read-only information a
action	String	Action returns a value o
log	Function	The log object for the cu **Note:** To view the

Robust Import Set Transformers

Use robust import set transformers instead of transform maps if you want to extract, transform, and load data to one or more target tables.

Robust import set transformers versus transform maps

Transform maps define the mapping from imported data stored in a staging table to a single target table in the ServiceNow AI Platform. Transform maps also insert data into target tables, performing both transform and processing functions. You can define multiple table mappings with multiple transform maps.

The Robust Transform Engine (RTE) and the robust import set transformer separate the transform and processing functions, providing a more flexible alternative to transform maps. The robust import set transformer allows you to extract data from a source table into an intermediary data structure. You can transform the data as desired and then load that data to one or more target tables. Records are processed as batches to enhance performance.

With transform maps, if you want data from the source table to go to three different target tables, you must create three separate transform maps. Each transform map parses the data separately, which results in three separate read operations. By contrast, the robust import set transformer

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requires only a single read operation to prepare the data for three target tables. The robust import set transformer is more efficient, especially when dealing with multiple target tables.

Extract Transform Load (ETL)

When you use the robust import set transformer, Extract Transform Load (ETL) functionality transfers imported data to target tables. You define how the data is extracted, transformed, and loaded to one or more target tables. You can use ETL definitions to do the following:

- Define entities (an abstraction similar to tables).
- Define entity fields (an abstraction similar to table fields).
- Define mapping between entities, and optionally designate whether a specific mapping should be ignored during data integration.
- Define entity field mappings.
- Define entity operations.

For an overview of ETL definitions, see Extract Transform Load (ETL) definition overview. For a step-by-step guide on how to create ETL definitions, see Create Extract Transform Load (ETL) definitions.

As of the Paris release, ETL definitions also support nested data structures such as the following when the **Data source** has JSON/XML payloads in a single column.

```
{
   "records":[
      {
         "network":{
            "location":"San Diego",
            "computers":[
               {
                  "id":"C100",
                  "os":"Mac",
                  "disks":[
                     {
                        "size":"200GB",
                        "type":"SSD"
                     },
                     {
                        "size":"1TB",
                        "type":"Magnetic"
                     },
                     {
                        "size":"1TB",
                        "type":"Magnetic"
                     }
                  ]
               },
               {
                  "id":"C200",
                  "os":"Windows",
                  "disks":[
                     {
                        "size":"5TB",
                        "type":"Magnetic"
                     }
                  ]
```

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```
                    }
                ]
            }
        }
    ]
}
```

Related topics

Create a robust import set transformer

Create robust transform definitions

Create Extract Transform Load (ETL) definitions

Create a robust import set transformer

Define how information is sent from the source table to target tables via a Robust Transform Engine (RTE).

Before you begin

- Role required: import_transformer
- Create an ETL definition.
- Create a robust transform definition.

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Robust Import Set Transformers**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	The name of the robust import set transformer.
Source table	The source table for the robust import set transformer.
Robust transform engine	Enables you to select an ETL definition or CMDB definition. For procedures to define an RTE, see Create robust transform definitions.
Description	A description of the robust import set transformer.
Properties	Custom properties which can be used in processing the data.
Application	Application scope for this record.
Active	Selected if the robust import set transformer is currently active. Deselected if the robust import set transformer is not currently active.
Batch size	The number of import set rows the system processes at a time. For example, if an import set has 1000 rows and the batch size is 100, the system processes 10 batches of 100 rows each. The minimum batch size is 1. The maximum batch size depends on the row size and processing complexity. Consider starting with a batch size of 100 and adjusting from there.

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Field	Description
Verbose	Enables some transform logs that show how transform operations are applied to records.

4. Click **Submit**.

Robust import set transformer properties

Properties that define the types of updates that are permitted.

Properties for CI reclassification

To configure properties, navigate to **System Import Sets** > **Administration** > **Robust Import Set Transformers**.

The properties defined in the Robust Import Set Transformers form are at the IRE payload level and apply to all rows for the given import. If you define properties at the individual item level using IntegrationHub ETL, they take priority over properties defined at the IRE payload level. For more details about CI reclassification, see, CI reclassification during IRE processing.

CI reclassification properties

Name	Value	Description
ire.input.items.settings.updateWithoutDowngrade	true/ false	Valid values: • true: Update the item but don't permit a downgrade. • false: Update the item and permit a downgrade. Default: false
ire.input.items.settings.updateWithoutUpgrade	true/ false	Valid values: • true: Update the item but don't permit an upgrade. • false: Update the item and permit an upgrade. Default: false
ire.input.items.settings.updateWithoutSwitch	true/ false	Valid values: • true: Update the item but don't permit class switching. • false: Update the item and permit class switching. Default: false
ire.input.items.classDowngrade	true/ false	Valid values:

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CI reclassification properties (continued)

Name	Value	Description
		• true: Update the CI class to a class that is higher in the class hierarchy, and the newly assigned class is a parent of the current class. • false: Update the item but don't permit a class downgrade. Default: false
ire.input.items.classUpgrade	true/ false	Valid values: • true: Update the CI class to a class that is higher in the class hierarchy, and the newly assigned class is a parent of the current class. • false: Update the item but do permit a class downgrade. Default: false
ire.input.items.classSwitch	true/ false	Valid values: • true: Update the attribute. The newly assigned class is in a different branch in the class hierarchy and has a different set of attributes than the current class. • false: Update the attributes but don't permit a class switch. Default: false
ire.skip_sys_object_source_matching	true/ false	Determines whether IRE identification processes have the priority in being used to uniquely identify CIs in a payload, over the use of *sys_object_source* lookup. When set to true, the system prioritizes sending any payload that contains a criterion attribute to be processed by IRE identification instead of using *sys_object_source* lookup. This can be useful in situation that can potentially generate duplicate CIs. For example, using sources in which identifying attributes are changing while the source native key isn't.

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CI reclassification properties (continued)

Name	Value	Description
		However, when *source_native_key* is the only identifiable attribute (for example, if none of the identification rules can run because attributes and values for rule identifiers aren't present in the payload), then *source_native_key* is used for identification even when the property is set to **true**. • Type: true | false • Default: false • Learn more: • Location: Add to System Properties [sys_properties] table.

Create robust transform definitions

Specify your own Robust Transform Engine (RTE) to transfer data from a source table to a target table.

Before you begin

Role required: import_transformer

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Robust Import Set Transformers**.
2. Select an existing robust import set transformer, or click **New** to create a new robust import set transformer.
   For procedures, see Create a robust import set transformer.
3. At the **Transformer Definition** field, click the search icon.
4. On the Robust Transform Definitions window, click **New**.
5. On the Robust Transformer Definition pop-up, select **ETL Definition**.
6. Complete the form.

Field	Description
Active	Selected if the robust transform engine is active. Deselected if the robust transform engine is not active.
Description	A description of the robust transform engine.
Application	Application scope for this record.
Name	The name of the robust transform engine.

7. Click **Submit**.

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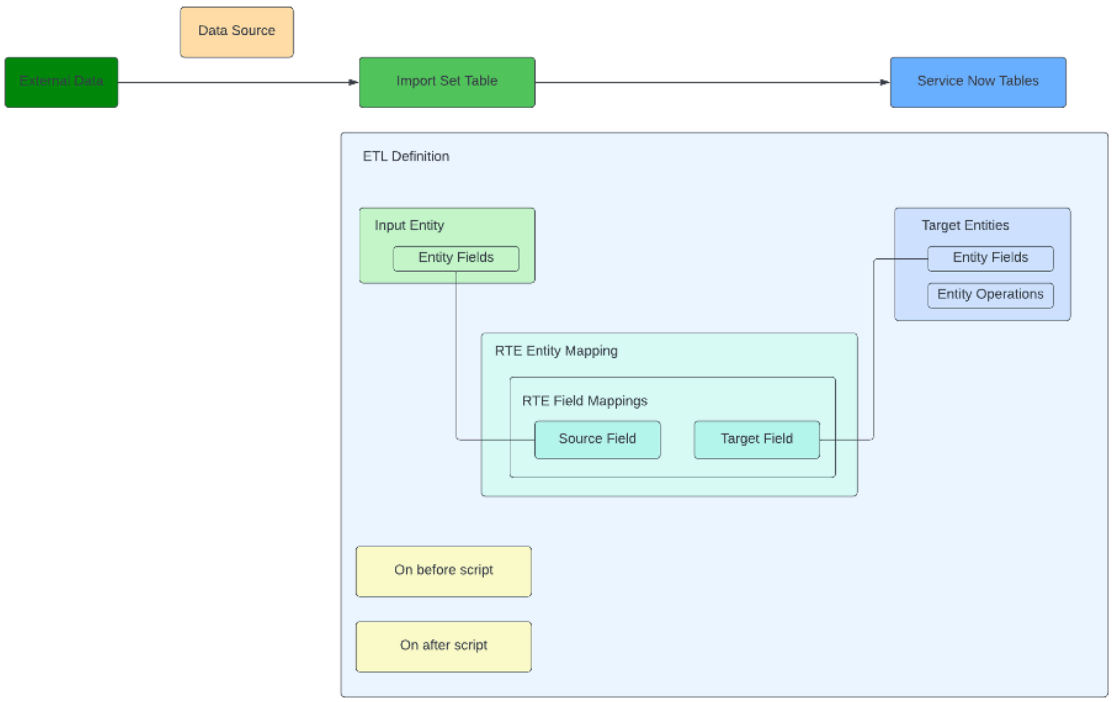
Extract Transform Load (ETL) definition overview

ETL definitions extract data from a source table, transform the data as desired, and load the data into one or more target tables. ETL definitions also support nested data structures.

ETL definitions specify how to map data

Importing data starts with a data source. A data source specifies the type of data that you want to extract and its location. After the data is extracted, it's loaded into a staging, or import set, table. Then an ETL definition specifies how to map the data into one or more target tables in ServiceNow. You can create ETL definitions that map data to ServiceNow tables while still maintaining the foreign key and unique key constraints.



ETL entities represent input data and target tables

ETL definitions are based on entities. Every ETL definition that you create must have entities associated with it. Entities represent input data and target tables.

- Input data is the data that has been loaded into the staging table.
- Target tables are the ServiceNow tables where you want your data to end up.

Mappings and operations are also based on entities, so it's helpful to create entities early, when you create the definition.

The following image shows an example of an ETL definition for Computer. This definition has three entities associated with it. The Import Set entity represents the input data, the data loaded from an Excel file into a staging table. The table for the Import Set entity is set to **None**. Computer and Disk are the target entities. They represent two ServiceNow tables named Computers [sn_etl_demo_computer] and Disk

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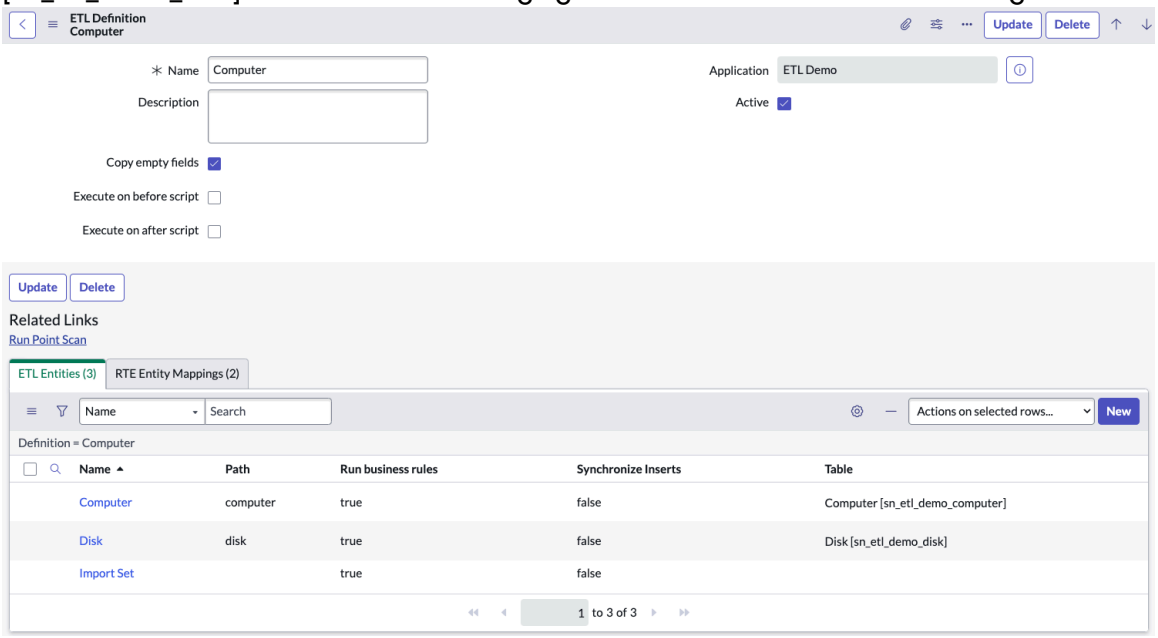
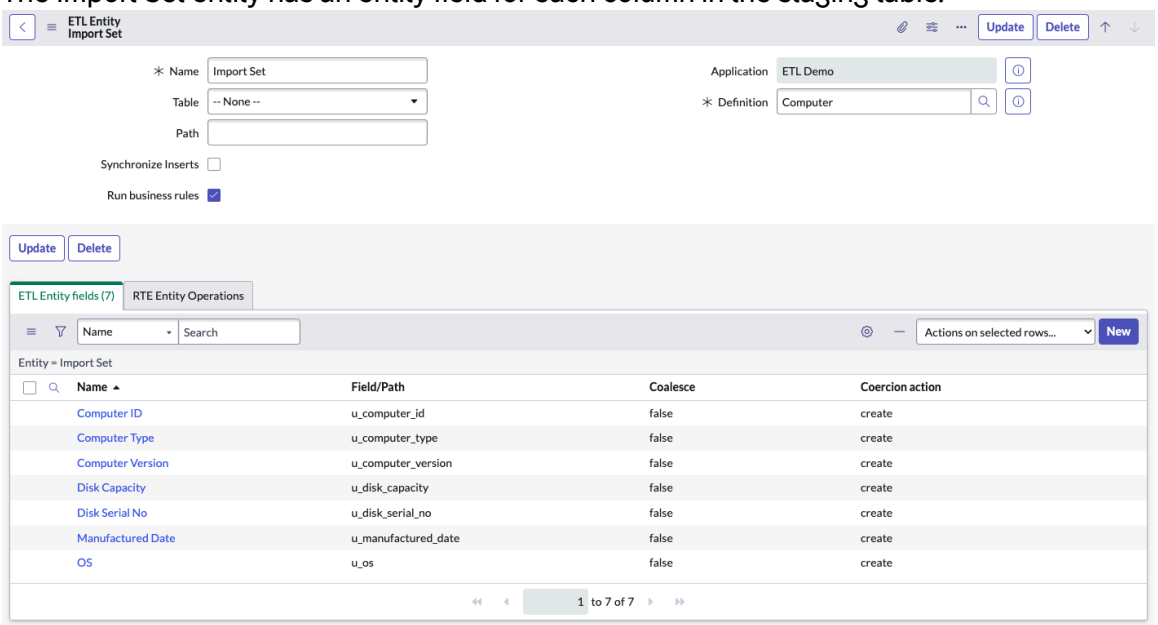
[sn_etl_demo_disk]. The data from the staging table will be loaded into the two target tables.



Input entities

Input entities represent the extracted data that was loaded into the staging table. Input entities have ETL entity fields to represent the import set table columns or, for a single column mode, JSON keys. You can create entity fields by selecting **New** on the ETL Entity fields tab.

The following image shows the Import Set entity from the Computer ETL definition. The Import Set entity represents the input data loaded from an Excel file into the Computers [sn_elt_demo_computers_stage] staging table. The Import Set entity has an entity field for each column in the staging table.



Target entities

Target Entities represent the target tables in ServiceNow. The following image shows the Disk target entity from the Computer ETL definition. Disk represents the sn_etl_demo_disk

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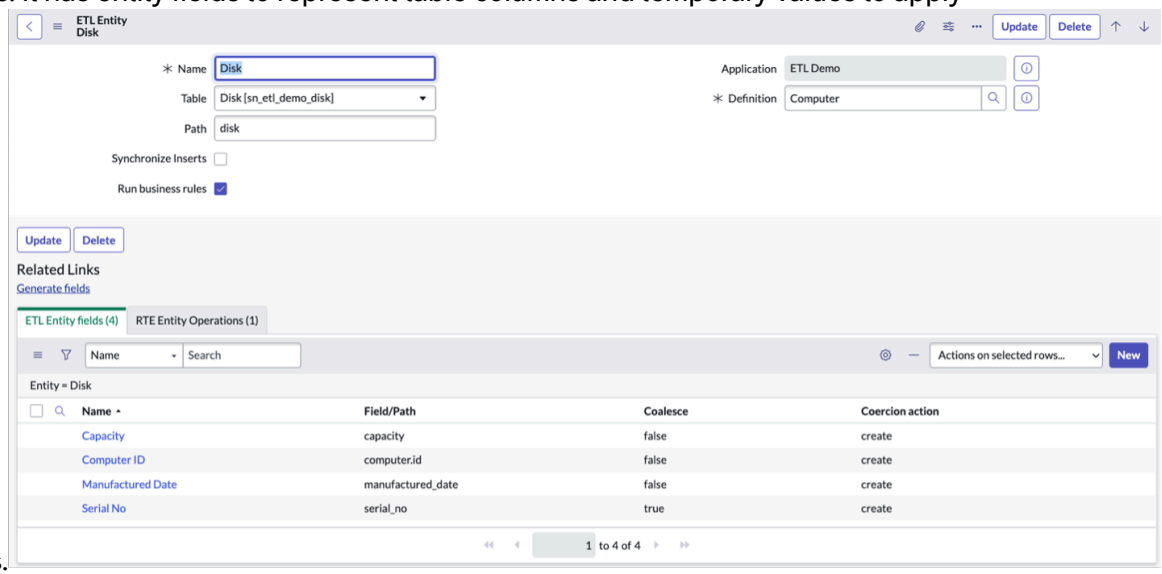
target table. It has entity fields to represent table columns and temporary values to apply operations.



Each entity field has a name, a reference or path field, a coalesce field, and a coercion action.

Reference field

Special field where a row in one table refers to a row in a second table by storing the sys_id of the second table's row as a column value in the first table's row. Though the reference is stored as a sys_id, when the data is imported, it's imported as values. So for reference fields, you map the values of the unique fields of the referred table to the imported data. Ultimately, the system will use the values to find the associated record, retrieve the sys_id, and store it in the appropriate column.

For example, in the Disk entity mentioned previously, the sn_etl_demo_disk table has a reference to the computer using the reference field **computer**. However, the imported data only contains the computer ID, which can be used to uniquely identify the computer. So in the Disk entity, the referenced field path (computer.id) specifies the column of the Computer table as well.

If there's more than one field for a unique key, all the field values should be given by adding multiple fields. For example, in the following image, the sn_etl_demo_worker table has a reference to the sn_etl_demo_address table. The sn_etl_demo_address table has three columns (number, street, and postal code) as unique keys. Therefore, the Worker entity has three fields for

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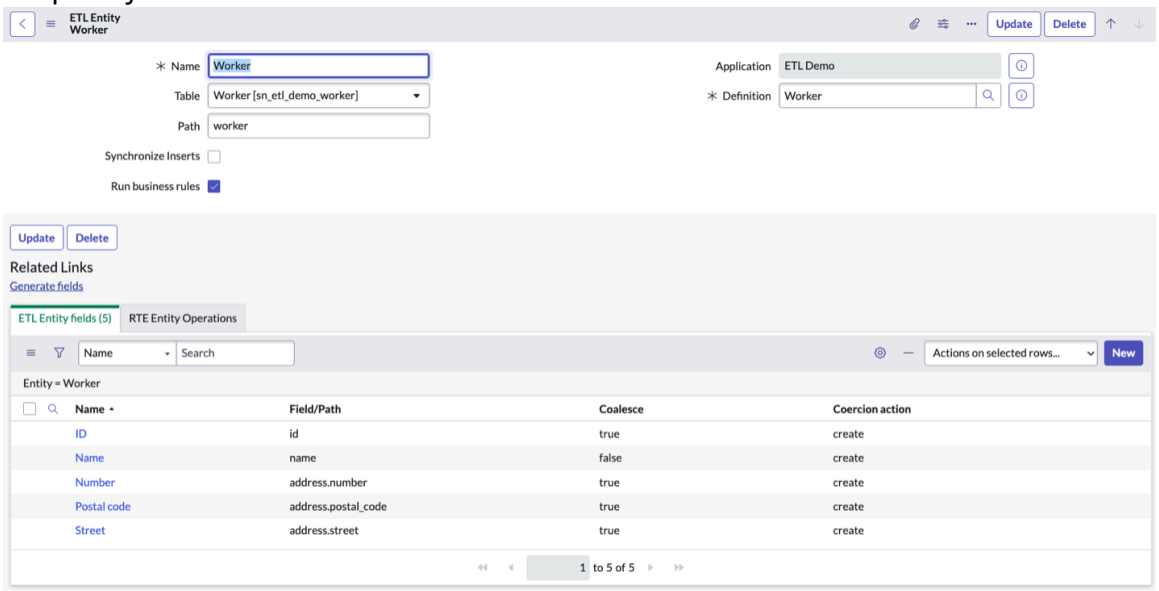
unique key columns. Reference fields can be used as coalesce fields as well.



Coalesce field

Specifies the unique key for a target entity. The system uses the coalesce field to determine whether to update an existing record or insert a new one. If the Coalesce field is true, and the system finds an existing record with the same coalesce field value, it updates the existing record. For the sn_etl_demo_disk table shown previously, in the Disk entity, the Serial No column is unique for all the disk entries, so it is specified as a coalesce field.

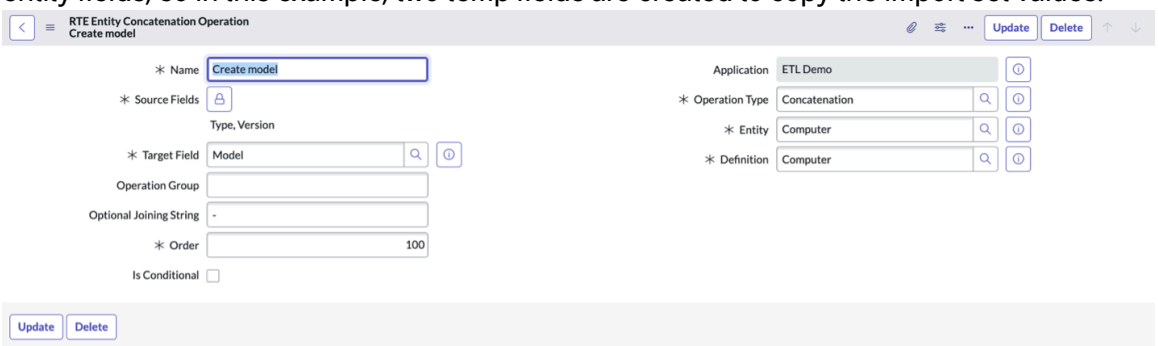
Coercion action

For reference fields, specifies what to do when a row with the unique key value doesn't exist in the referred table. The Coercion action has the following options.

- **Create** a new row in the referred table and assign it to the target row.
- **Ignore** the reference field value. The reference column is saved as empty.
- **Reject** the reference field value. It is not inserted into or updated in the target table.

Robust Transform Engine (RTE) entity operations modify data

Entity operations modify input data before storing it in a target table. The following image shows an example of a concatenation operation. In the ETL definition for Computer, the imported data contains both a type and a version. However, the target table requires a value that is a combination of the type and version. So the Computer entity uses a concatenation operation to concatenate type and version. Entity operations can only be performed on entity fields, so in this example, two temp fields are created to copy the import set values.



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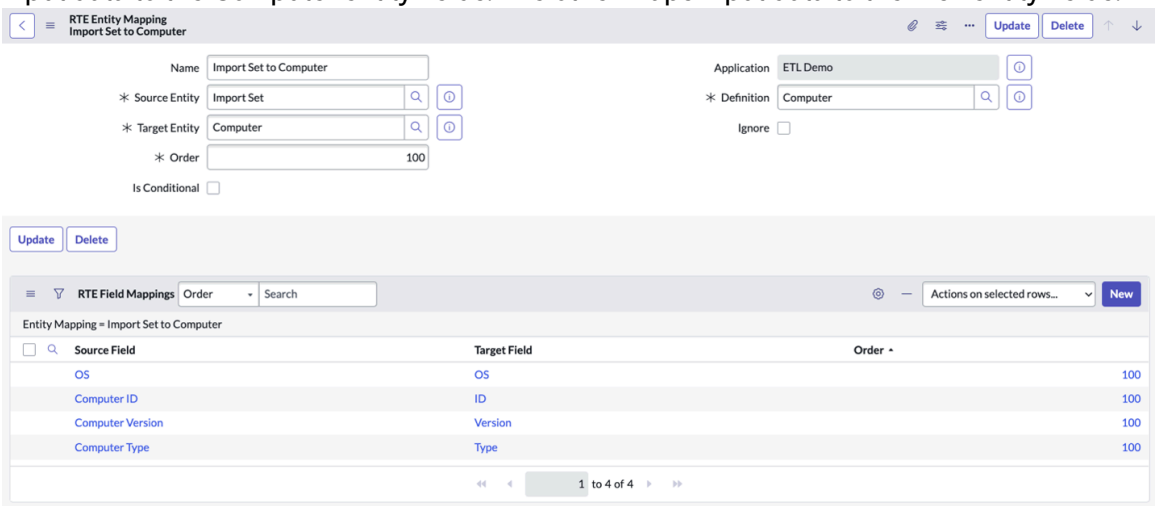
RTE entity mappings specify field mappings

After creating the input and target entities with their entity fields and operations, create an RTE entity mapping for each target entity. RTE entity mappings specify how fields in the input entity are mapped to fields in the target entities. In the ETL definition for Computer, there are two RTE entity mappings. One, shown in the following image, maps input data to the Computer entity fields. The other maps input data to the Disk entity fields.



Nested data in ETL definitions

With JSON data imports, you might need to import records with JSON arrays, or records that import more than one row for the same table. ETL definitions support these payloads with a small change to the paths. The following JSON data has an array for email information. You can import this data by modifying the path or paths in the input or target entities as shown in the next two images.

```
{
      "id": "123",
      "name": "Jhon",
      "emails": [
        {
          "address": "jhon@servicenow.com",
          "type": "work"
        },
        {
          "address": "jhon@gmail.com",
          "type": "personal"
        }
      ]
    }
```

Input entities with nested data

Input entities for nested data also represent the input JSON data. Like imports without nested data, they have entity fields to represent the values. The only difference is that paths with arrays are specified with an asterisk (*). The following image shows how the

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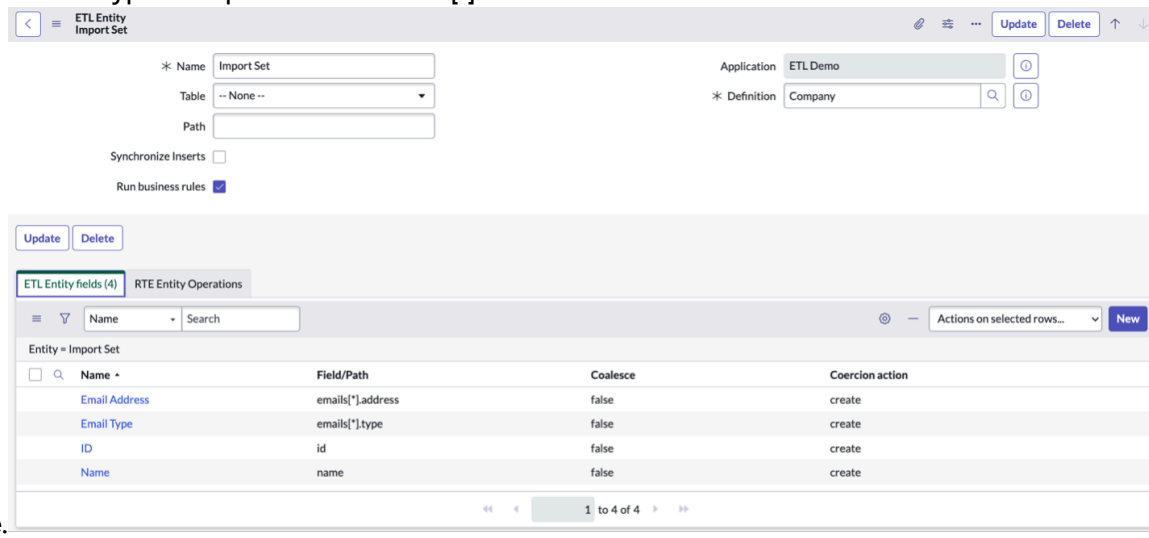
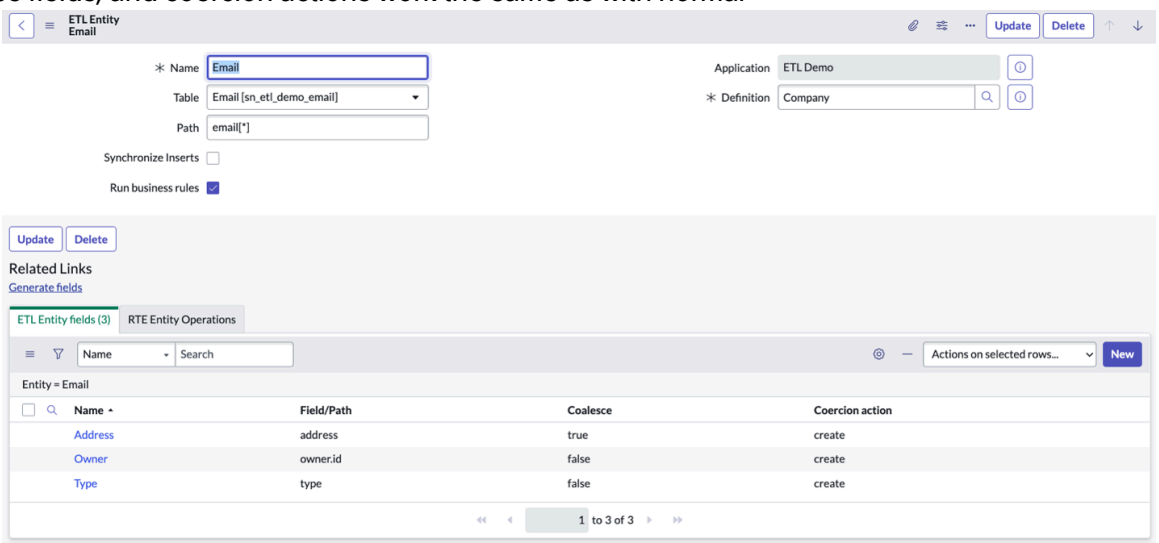
paths to address and type are specified as emails[*].address and emails[*].type.



Target entities with nested data

Target entities with nested data are also like the target entities in a normal import except that the path ends with an asterisk (*). The asterisk tells the system to process the entity as an array. In the Email entity, the target path is specified as email[*]. Coalesce fields, reference fields, and coercion actions work the same as with normal imports.



RTE entity mappings with nested data

RTE entity mappings for nested data are like normal mappings. Any field from the hierarchy can be assigned to the entity.

Temporary entity model

Use temporary ETL entities to avoid repetitive operations in target entities.

In the temporary (temp) entity model, temporary entities serve as an intermediate between the input and target entities. Data is mapped from the input entity to the temp entity, then from the temp entity to the target entities. To use the temp entity model:

- Create a temp entity, with entity fields similar to the ones in the input entity. For example, if the input entity has a field named Type, the temp entity might have a field named Temp Type.
- Add an RTE entity mapping to map data from the input entity to the temp entity.

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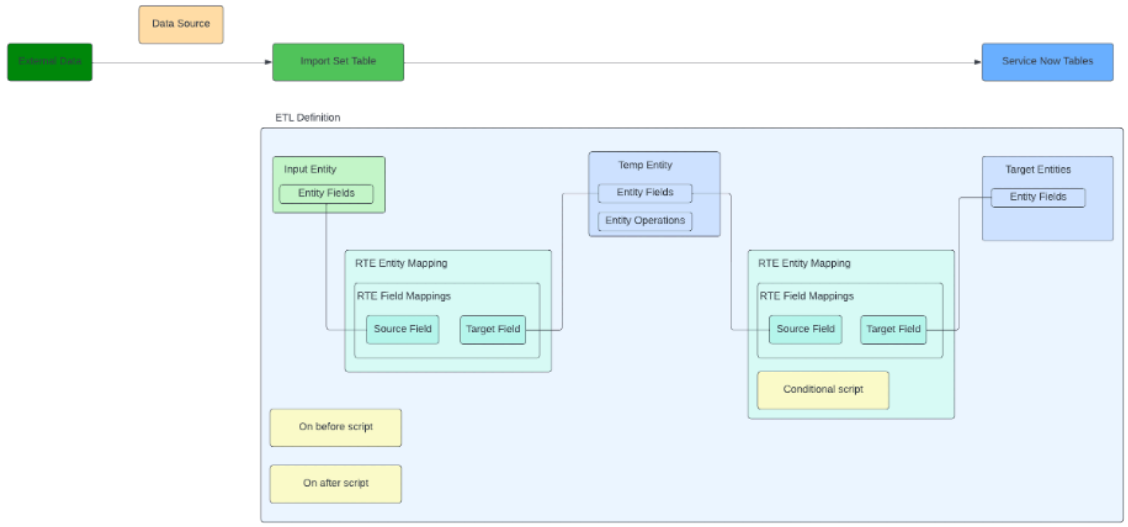
- In the temp entity, add new entity fields and entity operations to support the values required to map the data to the target entities.
- Add target entities and RTE entity mappings to map data from the temp entity to the target entities.

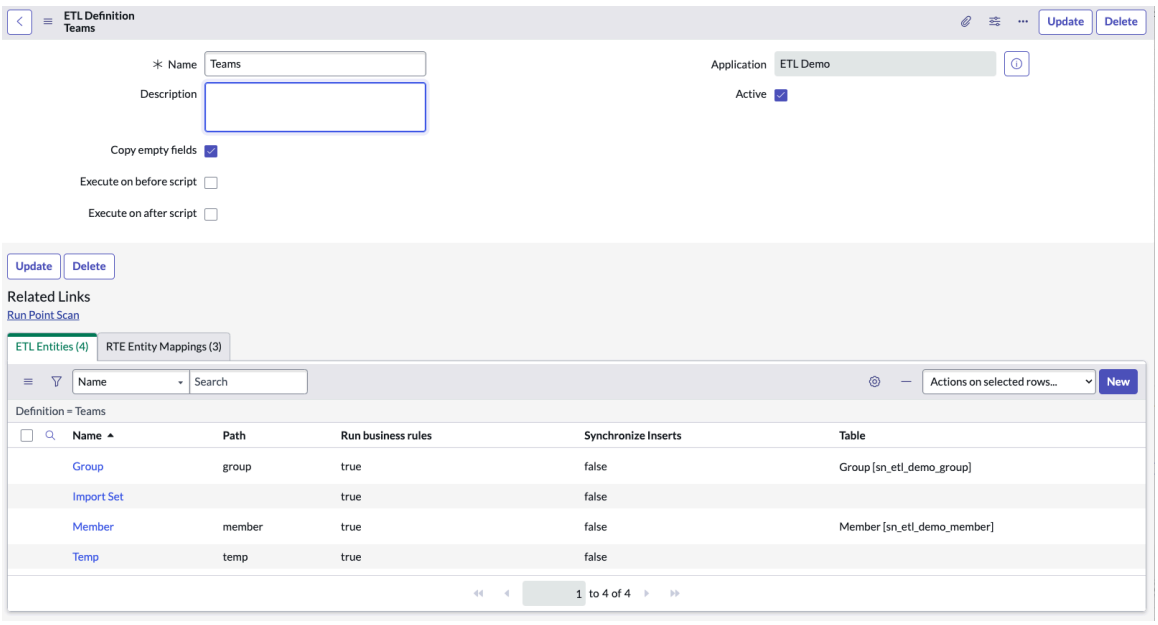
With this model, there's no need to define operations in the target entity. You create operations only in the temp entity, then map the final values to the target entities.



Example: Teams ETL definition

In this example, the Teams ETL definition maps data from the input entity to a temp entity, then from the temp entity to the target entities. The Teams definition has four ETL entities.

- Group: a target entity
- Import Set: an input entity
- Member: a target entity
- Temp: the temporary, intermediate entity



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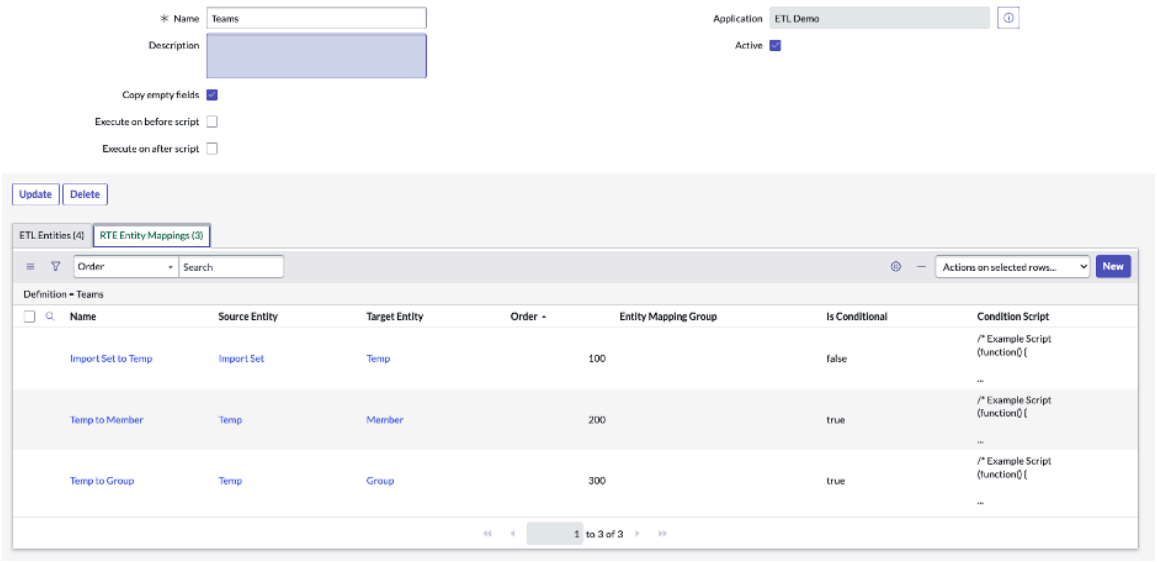
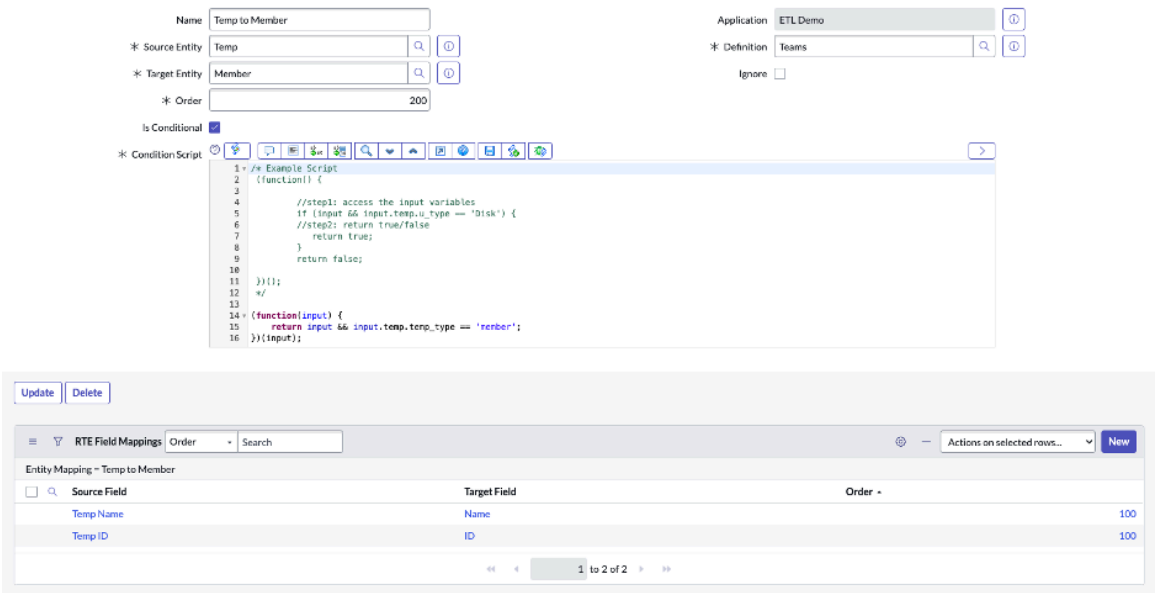
The Teams definition also has three RTE entity mappings.

- Import Set to Temp, which maps data from the input entity to the temp entity.
- Temp to Member, which maps data from the Temp entity to the Member target entity.
- Temp to Group, which maps data from the Temp entity to the Group target entity.



Conditional script

In some cases, you might not want to insert or update all the input data to a target table. You can use a conditional script to pick which import set rows to map to a target entity. In the following example, the Temp to Member RTE entity mapping uses a conditional script to specify which rows to map from the Temp entity to the Member entity. Only rows with a type of `member` are mapped to the Member entity.



ETL Definition quick start guide

Learn how to set up and use an ETL definition to import data into ServiceNow tables.

Before you begin
Role required: admin

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For this quick start guide, we're going to import data in the following JSON file to ServiceNow target tables. This JSON file contains hierarchical data for a school, classes, students and subjects. Save the following content to a JSON file.

```
[{
   "name": "schoolA",
   "classes": [
   {
    "name": "classA",
    "students": [
    {"name": "studentA", "subjects": [{"name": "subjectA",
 "marks": 80},
     {"name": "subjectB", "marks": 90},{"name": "subjectC",
 "marks": 100}]},
    {"name": "studentB", "subjects": [{"name": "subjectA",
 "marks": 75},
     {"name": "subjectB", "marks": 85}, {"name": "subjectC",
 "marks": 95}]}
   ]
  },{
   "name": "classB",
   "students": [
   {"name": "studentC", "subjects": [{"name": "subjectA",
 "marks": 60},
    {"name": "subjectB", "marks": 70}, {"name": "subjectC",
 "marks": 80}]},
   {"name": "studentD", "subjects": [{"name": "subjectA",
 "marks": 55},
    {"name": "subjectB", "marks": 65}, {"name": "subjectC",
 "marks": 75}]}
   ]
  }
 ]
}]
```

Procedure

1. Create a data source and load data.

a. Create a data source with a **Format** of **JSON**, and the **Path for each row** as `//`.

b. Check the **Data in single column** option.

c. Save the data source.

d. Attach the above JSON file to the data source.

e. Select **Load All Records** to load records to the import set table.

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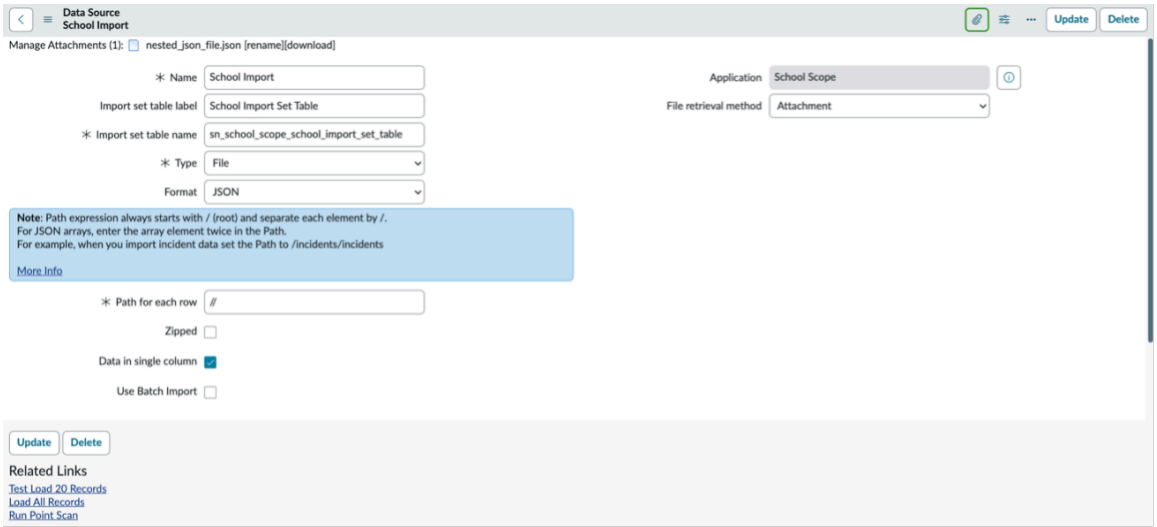
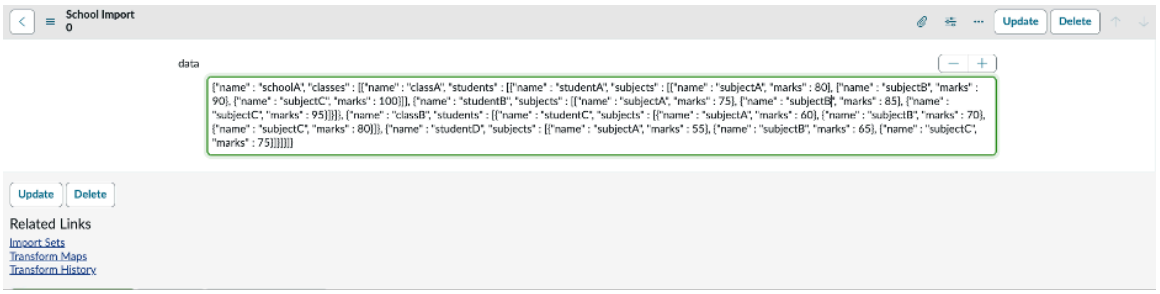


f. Open the import set row created.
The record should be saved to a single JSON column.



2. Create the target table structure to import data.

a. In this example, we have a school with multiple classes, each class has multiple students, and each student has multiple subjects.

b. Create a table structure to reflect these relationships.

c. `School -> name : string`.

d. `Class -> name : string , school : reference to school`.

e. `Student -> name : string, class : reference to class`.

f. `Subject -> name : string, mark : integer, student : reference to student`.

3. Create an ETL Definition to map the JSON record data to target tables.

a. Go to **System Import Sets** > **ETL Definition**.

b. Select **New**.

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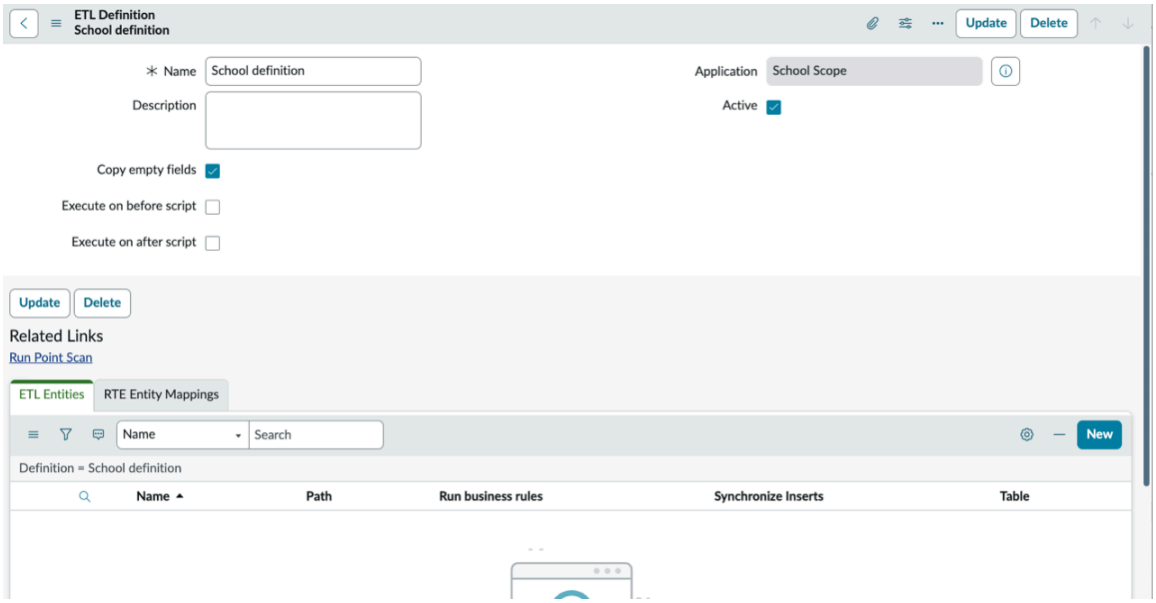
c. Enter a name and save the record.

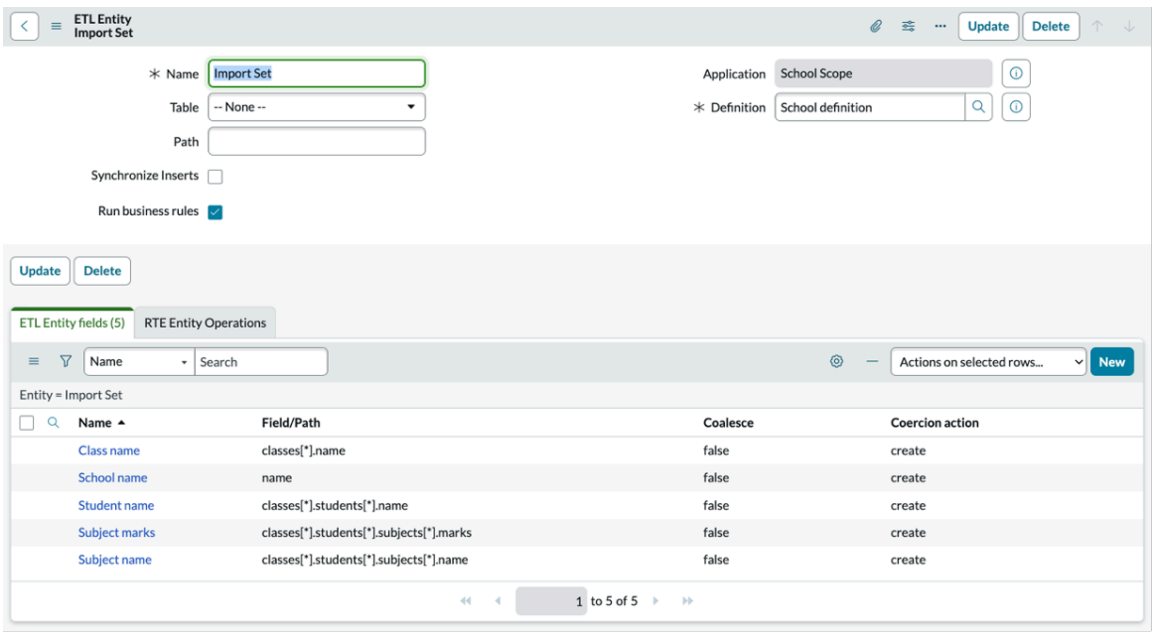


4. Create entities.

a. Under the ETL Entities tab, select **New**.

b. Set the **Name** as `Import Set` and save.

c. Add import set entity fields for all the leaf values of the JSON.
The field/path is the path from the root of the JSON and we mark arrays with [*].



d. Go to ETL Definition and under ETL Entities, select **New**.

e. Set the **Name** as `School`.

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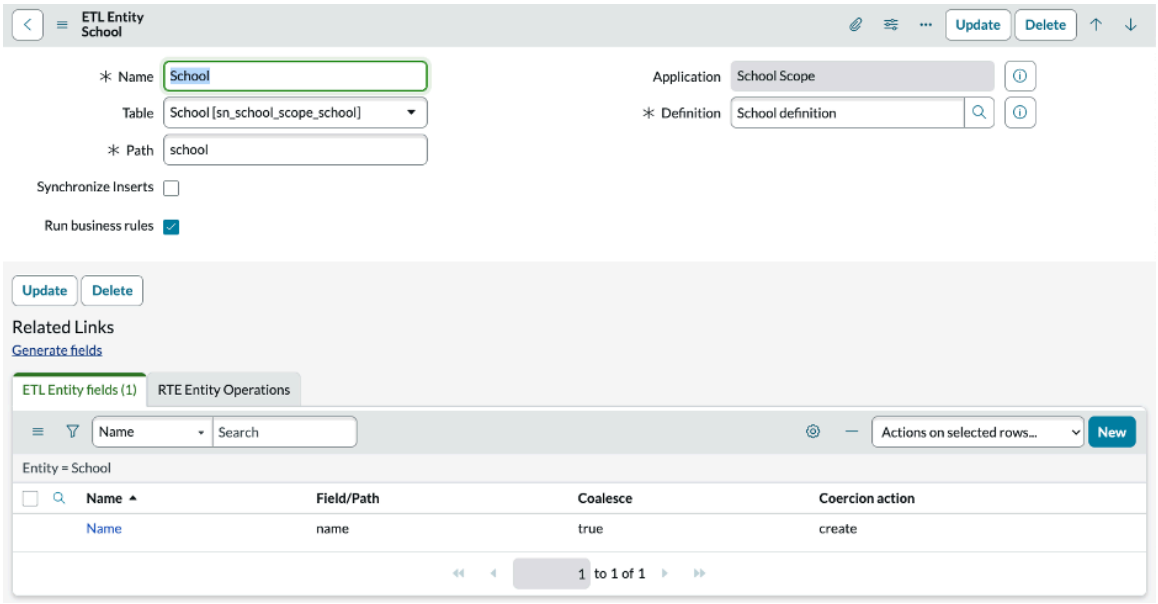
f. Set the **Table** as the school table created in step 2.

g. Set the **Path** as `school`.

h. Save the Entity.

i. Select **Generate fields** under Related Links.
This should generate the **Name** field. Set the **Coalesce** to **true**.



j. Go to ETL Definition and under ETL Entities, select **New**.

k. Set the **Table** as the class table created in step 2.

l. Set the **Path** as `class[*]`.
Using [*] makes it an entity with multiple rows.

m. Select **Generate fields** under Related Links.

n. Since **School** in the ETL Entity fields is a reference field, modify the **Field/Path** to `school.name` and set **Coalesce** to **true** for the **Name** field because name is unique.

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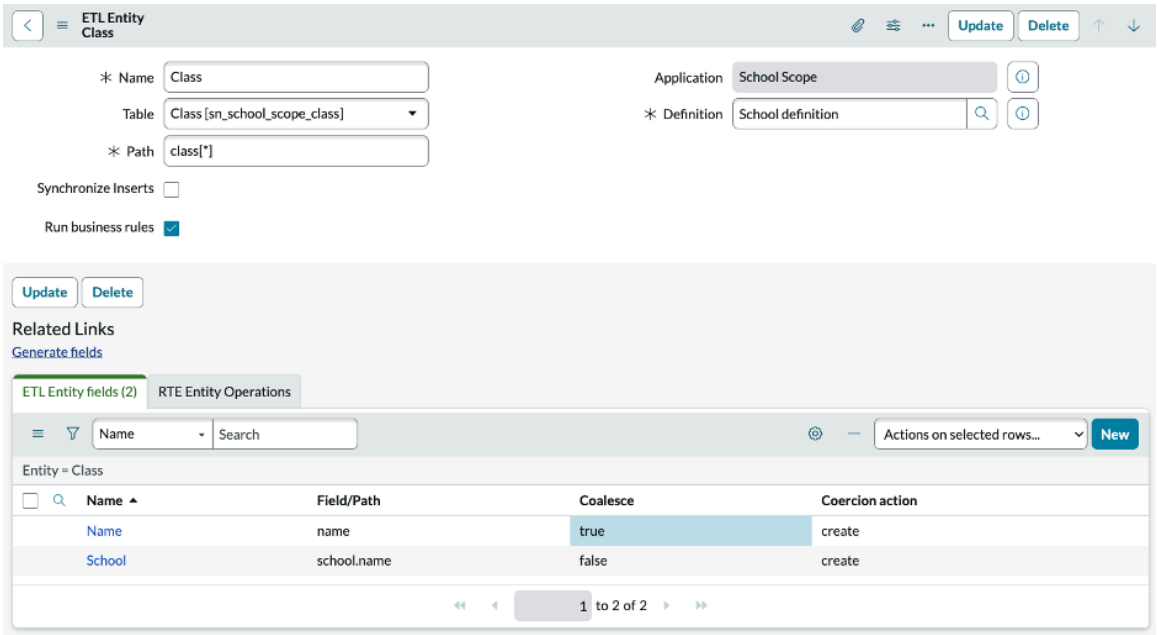

o. Add Entities to Student and Subject as well.
For Subject, set **Coalesce** to **true** for both the **Name** and **Student** fields.

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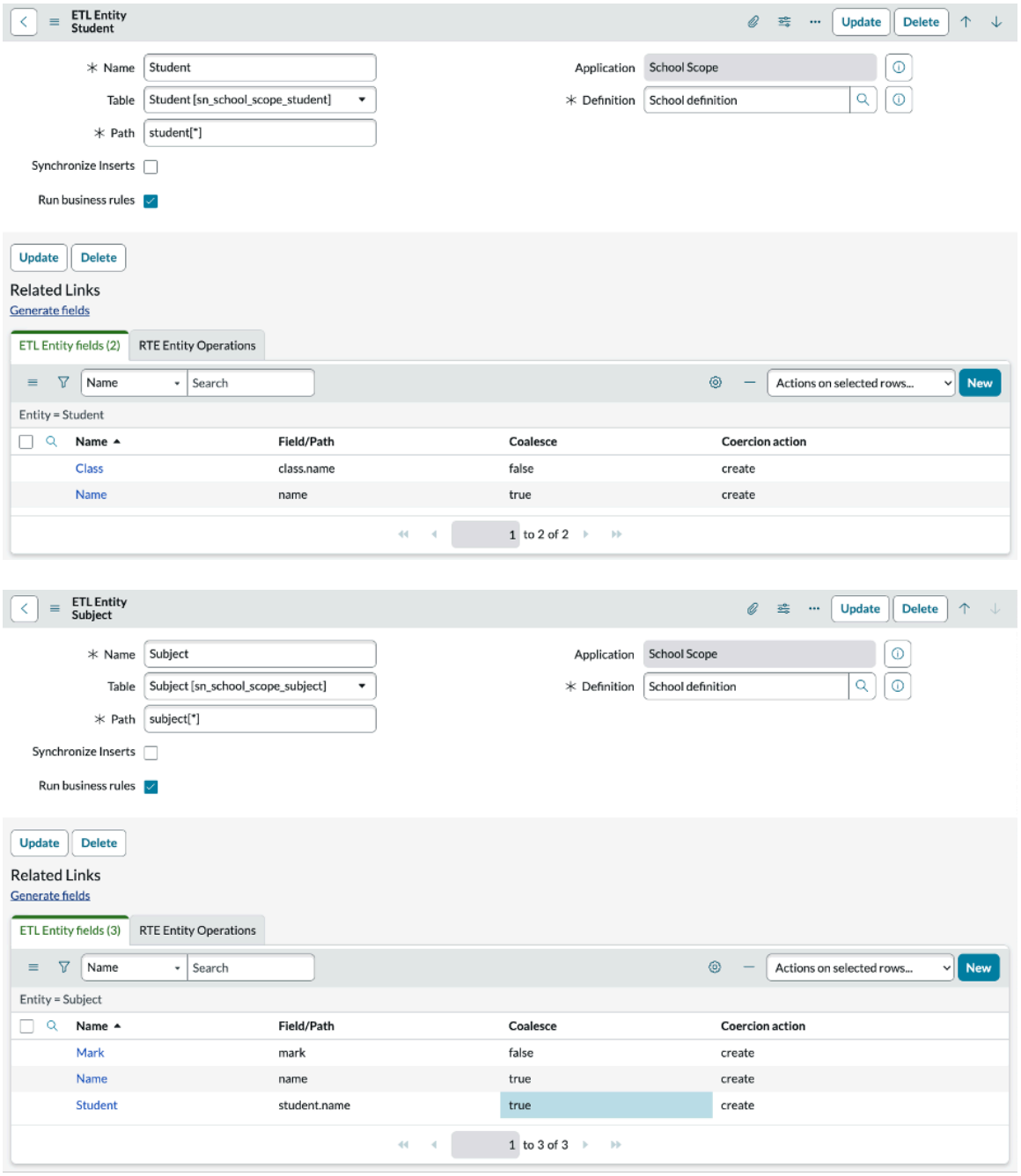

5. Add RTE Entity Mappings.

   a. Go to RTE Entity Mappings and select **New**.

   b. Set the **Name** to `Import Set to school`.

   c. Set the **Source Entity** to **Import Set**.

   d. Set the **Target Entity** to **School**.

   e. Keep the **Order** as **100**.

   f. Under RTE Field Mappings, select **New**.

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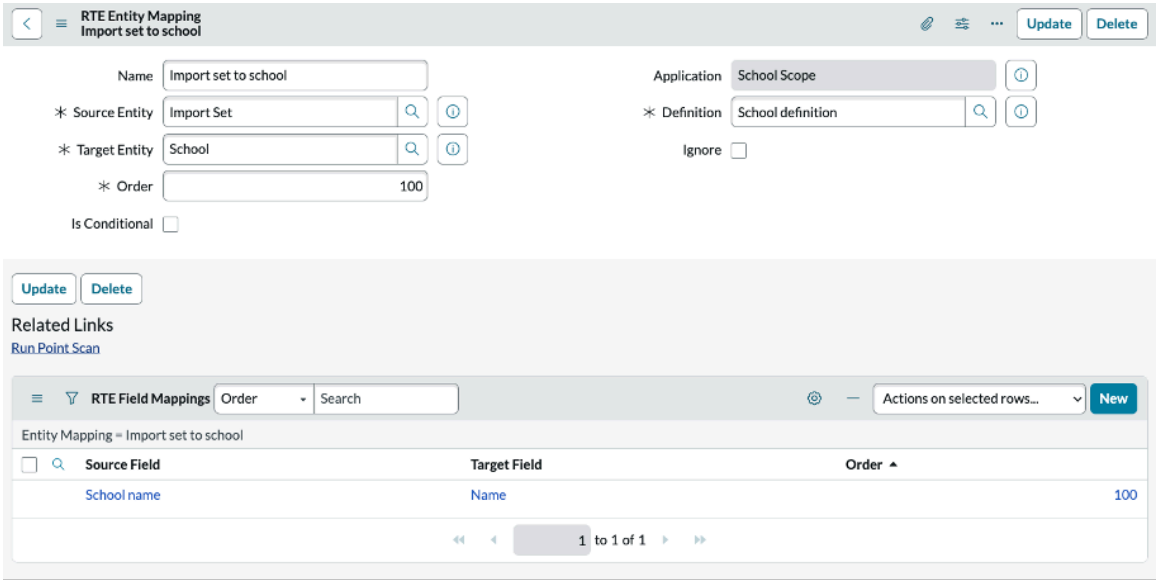
g. For the **Source Field**, select **School name**.
You can only select the Entity fields from the source entity.

h. For the **Target Field**, select **Name**.
You can only select the Entity fields from the target entity.



i. Go to ETL Definition and under RTE Entity Mappings select **New**.

j. Set the **Name** to `Import set to class`.

k. Select **Source Entity** to **Import Set**.

l. Select **Target Entity** to **Class**.

m. Set **Order** to **200**.

n. Add the RTE Field Mappings to map **Name** and **School name**.
The school **Target Field** should map to the **School name** of the import set. The system does the school look up using this value and sets the correct school reference.

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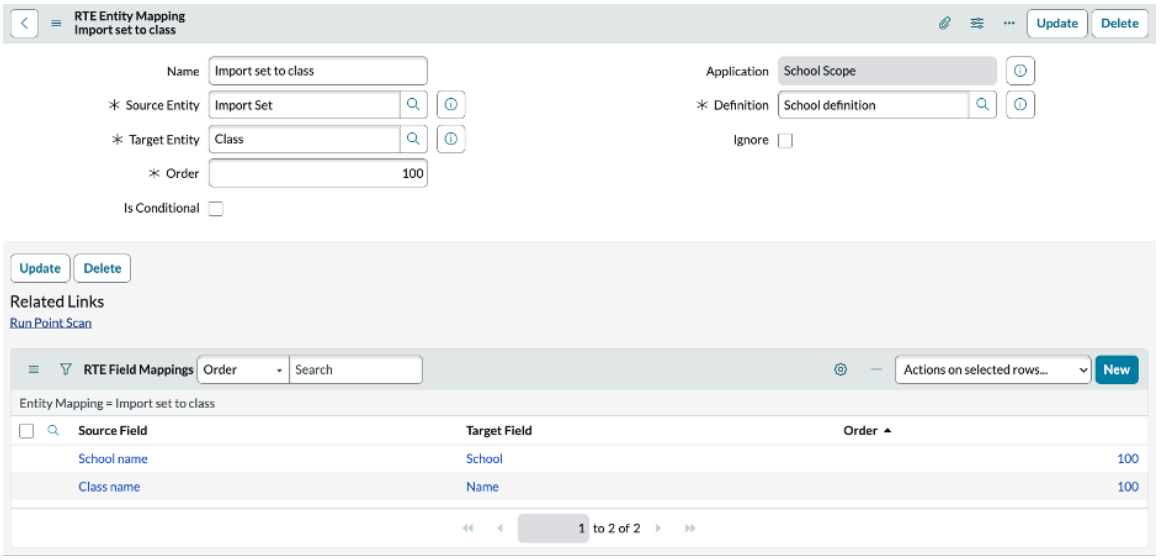
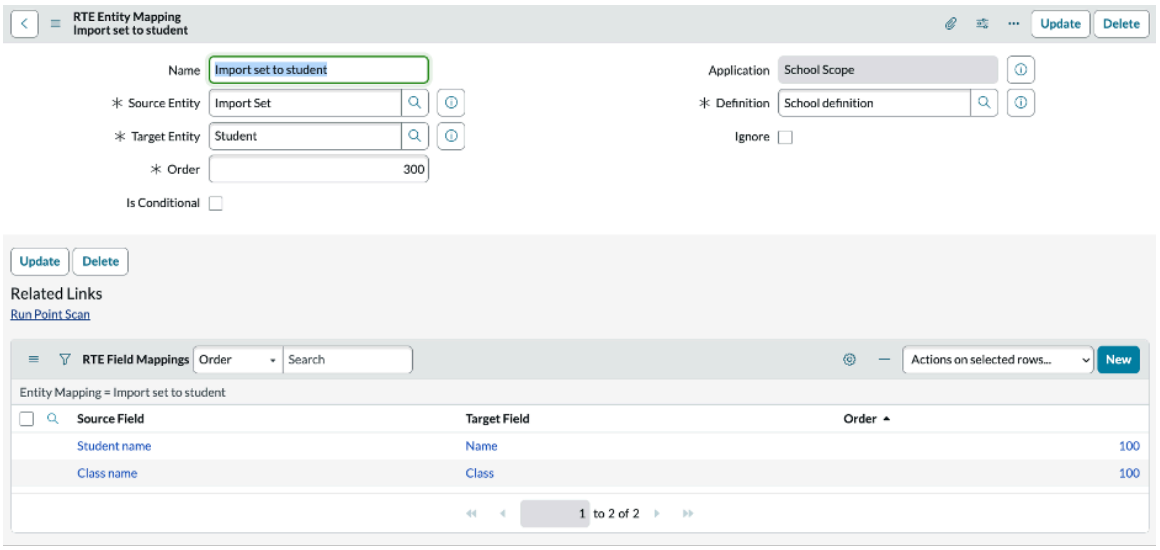
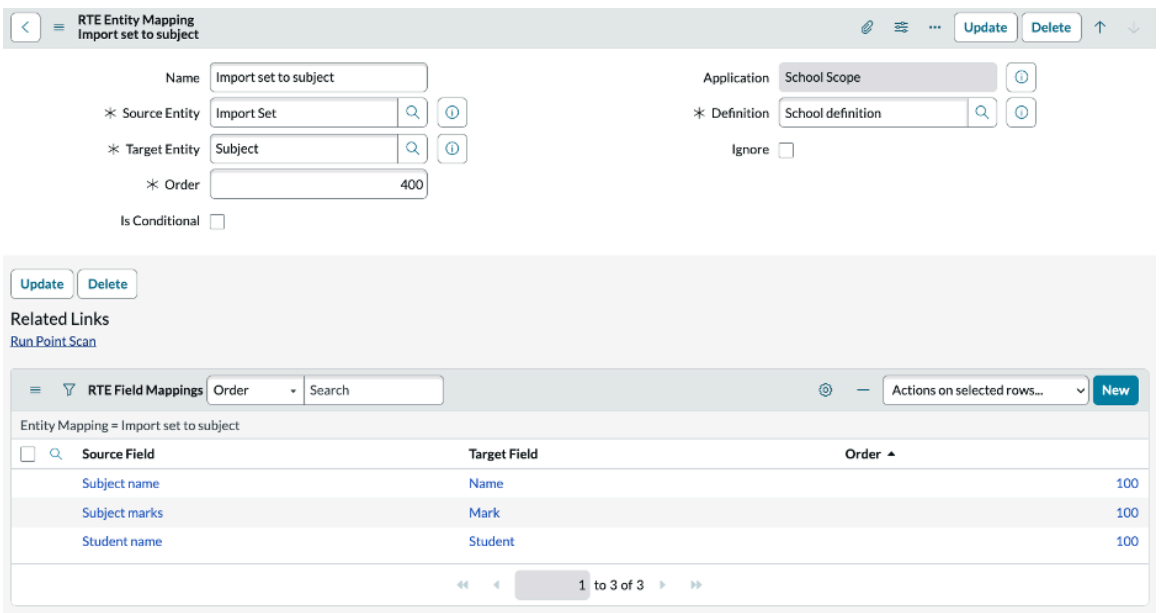


o. Add mappings for Student and Subject as well.





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6. Create a Robust Import Set Transformer record and run the import.

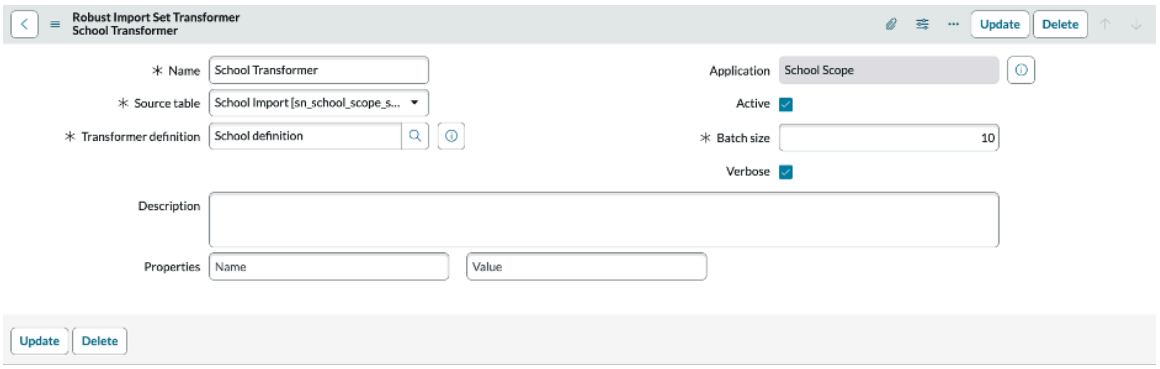
a. Go to the Data source created in step 1.

b. Select the Robust Transformer tab and select **New**.

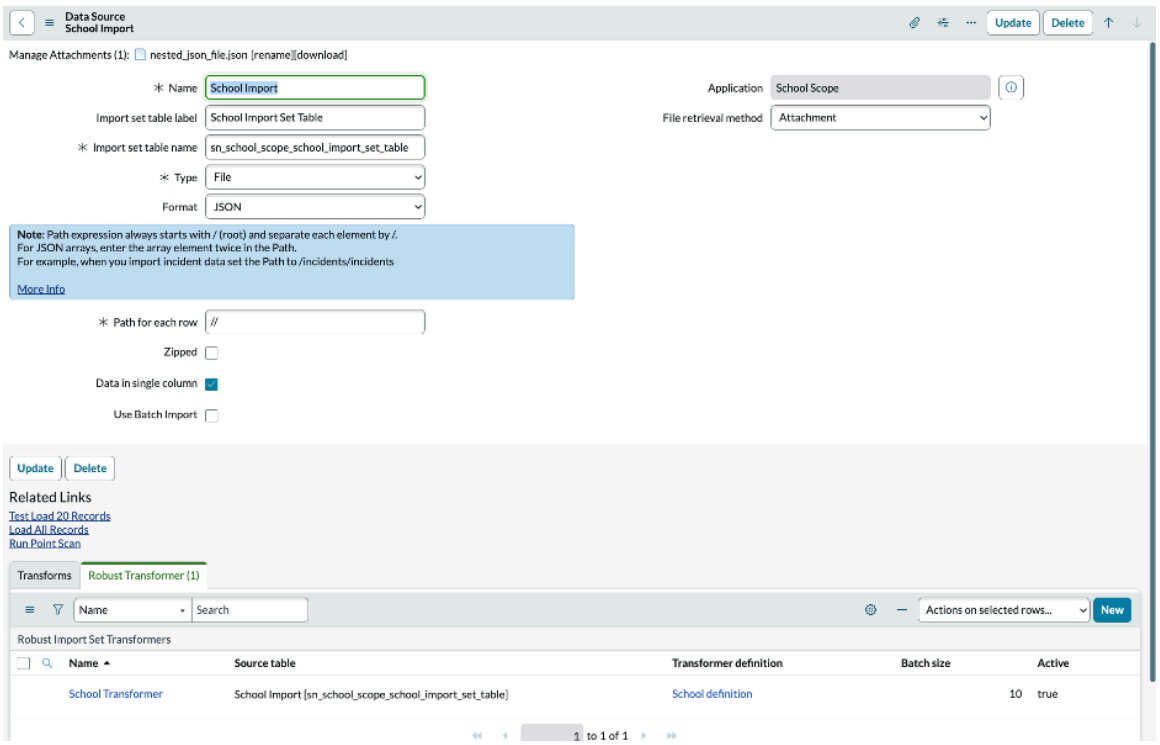
c. Set a **Name**.

d. Set the **Transformer definition** to the ETL Definition we created earlier.

e. Set **Verbose**.
Selecting **Verbose** is not required, but enables you to debug the configuration. Switch this off before moving to production because it can negatively impact the performance.



f. Select **Submit**.



g. Select **Load All Records**.

h. Select **Run Robust Transform**.

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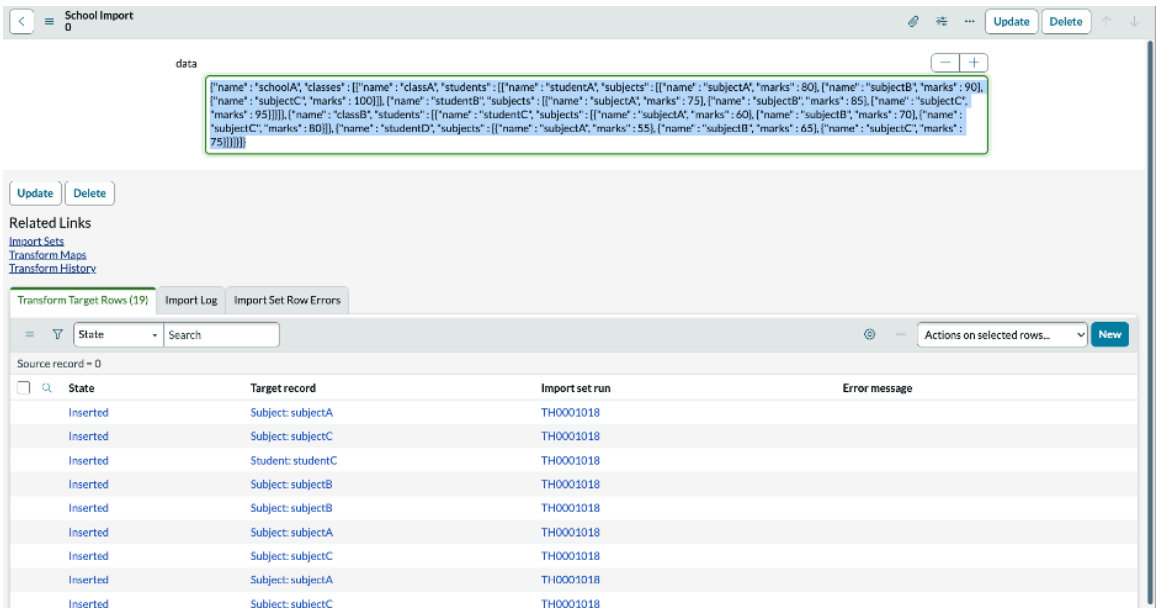
i. Select **Transform**.

j. Go to the import set.

k. Select the Import Set Rows tab and open the import set row record.

l. If the configuration works correctly, it should show the import set row record with all the records inserted.



Create Extract Transform Load (ETL) definitions

Create ETL definitions to extract data from a source table, transform the data as desired, and load the data into multiple target tables. ETL definitions also support nested data structures.

Before you begin

Role required: import_transformer

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **ETL Definitions**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	Name of the ETL definition.
Description	Description of the ETL definition.
Copy empty fields	Option to copy empty field values. If the incoming data has a field with an empty value, you can either copy the empty value or ignore it and keep the existing value.
Execute onBefore script	Option to run a script before inserting or updating data. The onBefore script has three parameters.

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Field	Description
	○ *source*: The source data from the import record. ○ *target*: The transformed data from the import record. In the onBefore script, this parameter accesses transformed data before it's inserted into the target table. ○ *importLog*: The log that records information about data import activity. The onBefore script has two variables. ○ *ignore*. Type: Boolean. When **true**, the specified import set row is ignored. ○ *ignore_reason*. Type: String. Message describing why the import set row was ignored.
Execute onAfter script	Option to run a script after inserting or updating data. The onAfter script has three parameters. ○ *source*: The source data from the import record. ○ *target*: The transformed data from the import record. In the onAfter script, this parameter accesses transformed data after it's inserted into the target table. Once a record is inserted or updated, it has a sys_id. ○ *importLog*: The log that records information about data import activity.
Application	Application scope for this record.
Active	Selected if the ETL definition is active. Unselected if the ETL definition isn't active.

4. Click **Submit**.

Example:
In this example, the ETL Definition for Worker has both an onBefore and onAfter script. In the onBefore script, the source record with an id of 124 is ignored because that worker has already resigned. The source data and target data are both written to the import log. Finally, the script iterates through the transformed values of the sn_etl_demo_worker table to get each worker's ID and name and record them in the import log.

In the onAfter script, the source and target data are both written to the import log. The script again iterates through the transformed values of the sn_etl_demo_worker table. Now that the data has been inserted into the target table, each record has a sys_id. The script records each worker's Sys ID, ID, and name in the import log.

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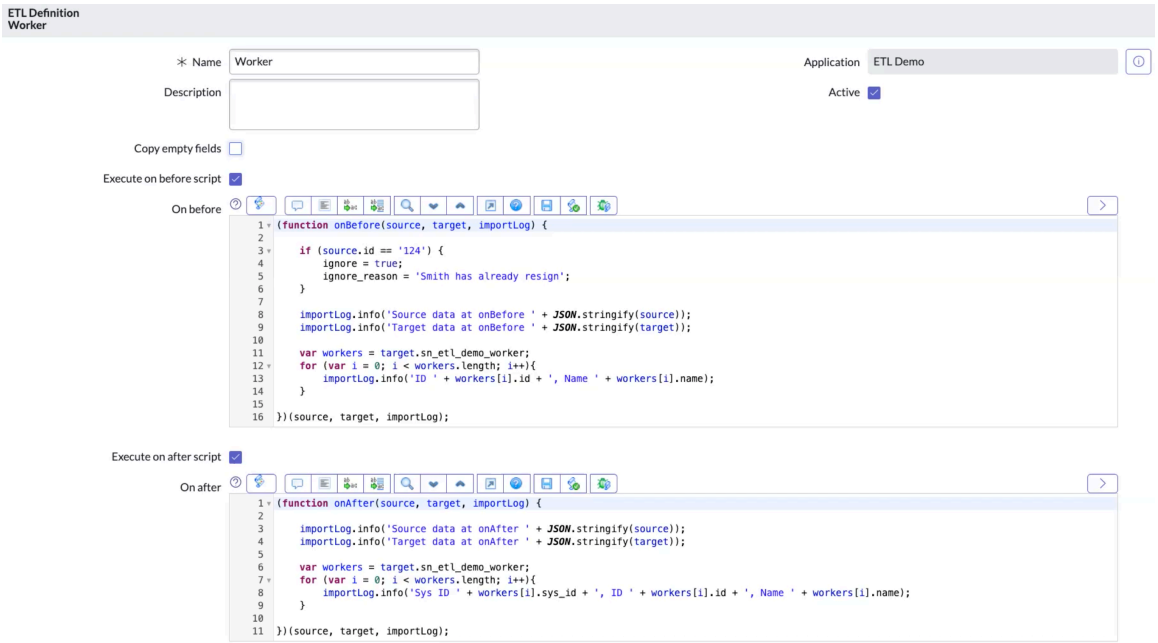

Note:

- For creating these definitions and mapping using a guided or step-by-step experience, refer to Integration Hub - Import.
- If your target table or application is related to CMDB, use the IntegrationHub ETL guided experience.

Related topics

Define ETL entities

Define ETL entity mappings

Create ETL entity field definitions

Define Robust Transform Engine operations

Define ETL entities

Define the Extract Transform Load (ETL) entities used by the Robust Transform Engine.

Before you begin

Role required: import_transformer

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **ETL Definitions**.
2. Select an ETL definition.
3. On the ETL Entities tab, click **New**.
4. Complete the form.

Field	Description
Name	Name of the ETL entity.
Table	Target table for the ETL entity.

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Field	Description
Path	Unique path for this entity. Should not specify any path for the entity representing the import set table. When an entity represents a collection, the path must end with [*]. This requirement applies to intermediate entries and the target table entity.
Synchronize Inserts	Selected to guarantee only one record with unique coalesce field values by synchronizing record inserts. Unselected if you don't want to synchronize record inserts.
Run business rules	Selected to run business rules. Unselected if you don't want to run business rules.
Application	Application scope for this record.
Definition	Selected ETL entity.

5. Click **Submit**.

Define ETL entity mappings

Map the source entity to a target entity.

Before you begin
Role required: import_transformer

About this task
You can optionally set the **Ignore** check box to exclude the entity mapping when performing data integrations using Robust Import Set Transformation (RTE).

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **ETL Definitions**.
2. Select an ETL definition.
3. On the RTE Entity Mappings tab, click **New**.
4. Complete the form.

Field	Description
Name	Name of the mapping.
Source Entity	Source entity for the mapping.
Target Entity	Target entity for the mapping.
Order	Order in which the mapping should be processed.
Is Conditional	Check box that designates that the mapping is conditional. Select the check box if the mapping is conditional and clear it if it is not.
Condition Script	Script that defines the conditions that must be met for the mapping. For an example of a conditional script, see Temporary entity model.
Application	Application scope for this record.
Definition	Selected ETL entity that this mapping belongs to.

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Field	Description
Ignore	Check box that designates if this ETL entity mapping should be ignored when performing data integrations using Robust Import Set Transformation (RTE). Select this check box if this ETL entity mapping should be ignored when running data integrations using RTE. Clear the check box if it should not (default). To learn more about data integrations, see: ○ Importing data using import sets ○ Robust Import Set Transformers

Create ETL entity field definitions

Define the entity fields mapped for Extract Transform Load (ETL) operations.

Before you begin

Role required: import_transformer

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **ETL Definitions**.
2. Select an ETL definition.
3. On the ETL Entities tab, select an ETL entity.
4. On the ETL Entity fields tab, click **New**.
5. Complete the form.

Field	Description
Name	Name of the ETL Entity field definition.
Field/Path	The column name in the staging or import set table. For reference fields in a target entity, you can specify the columns to map data to. For example, suppose you're mapping data to an address table with three columns: number, street, and postal code. You can specify the unique column to map to by entering `address.number`, `address.postal_code`, and `address.street`. When specifying unique columns in reference fields, all must have the same coercion action and coalesce value. For example, all three address fields listed previously must have the same coercion action and the same coalesce value. For an import entity, a field within an array can be referenced with the [*] notation. For example, for the following nested structure, you can specify the email address by entering `emails[*].address`. `{ "id": "123", "name": "Jhon", "emails": [ { "address": "jhon@servicenow.com", "type": "work"`

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Field	Description

	<pre>},
	]
	}</pre>

Coercion action	What the system should do if a reference or choice could not be found. Available options are create, ignore, and reject. ○ For the create option, the system creates a new reference/choice and assigns it to the current record. ○ The ignore option sets the current value as empty. ○ The reject option does not save the whole record to the database.
Coalesce	Use this field to query the existing records.
Application	Application scope for this record.
Entity	Name of the robust transform engine entity.
Definition	Selected ETL entity that this field definition belongs to.

6. Click **Submit**.

Define Robust Transform Engine operations

Define the operations the Robust Transform Engine (RTE) should perform.

Before you begin

Role required: import_transformer

About this task

You should always perform operations on only one entry. Select all source and target fields from the same entity.

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **ETL Definitions**.
2. Select an ETL definition.
3. On the ETL Entities tab, select an ETL entity.
4. On the RTE Entity Operations tab, click **New**.
5. Select the kind of operation you want to create.
6. Complete the form.

Field	Description
Name	Name of the operation.
Source Field	Input ETL field for the operation if the operation takes a single input.
Target Field	Output ETL field for the operation if the operation takes a single output.
Source Fields	Input ETL fields for the operation if the operation takes multiple inputs.
Target Fields	Output ETL fields for the operation if the operation takes multiple outputs.
Operation Group	Optional name to group related operations.

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Field	Description
Overwrite Existing Value	If true, overwrites an existing non-empty value in the target fields.
Optional Joining String	Optional string to join values on.
Decimal Places	Optional number of decimal places to force output value to.
Remainder Target Field	Optional second target field to write the trimmed remainder of the source string after the first numeric value is removed.
Glide Matching Fields	Comma-delimited list of column names to use for lookup in the target table.
Target Table	Table to perform a lookup on.
Glide Target Fields	Comma-delimited list of columns to return from the target table.
Match Regular Expression	Matching regular expression for replace operations.
Replacement Regular Expression	Replacement string.
Use Unique Input Sets	If true, the operation processes only the unique set of inputs to the operation. Otherwise, the operation processes every record individually.
Literal Set Value	String value to set to target.
Splitting String	String to split the input value on.
Date Format	Date/time format expressed in simple Java format.
Order	Order in which the operation runs on the entity.
Script	Script that runs as part of the operation.
Is Conditional	Specifies whether to apply the operation if the specified conditions are met.
Conditional Fields	Fields to use in the condition.
Conditional Script	Condition specified as a string. For an example of a conditional script, see Temporary entity model.
Application	Application scope for this record.
Operation Type	Operation type for this operation.
Entity	Entity this operation applies to.
Definition	Selected ETL entity definition that this entity and operation belong to.

7. Click **Submit**.

Import run details

View detailed information about import set runs, individual rows in the import set, and import logs.

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There are two ways to run or process an import set. The data displayed after the run varies slightly depending on which way you choose.

Robust import set transformers

Separate the transform and processing functions, providing a more flexible alternative to transform maps. Robust import set transformers enable you to extract data from a source table into an intermediary data structure. You can transform the data as desired and then load that data to one or more target tables. Records are processed as batches to enhance performance. For more information, see Robust Import Set Transformers.

Transform maps

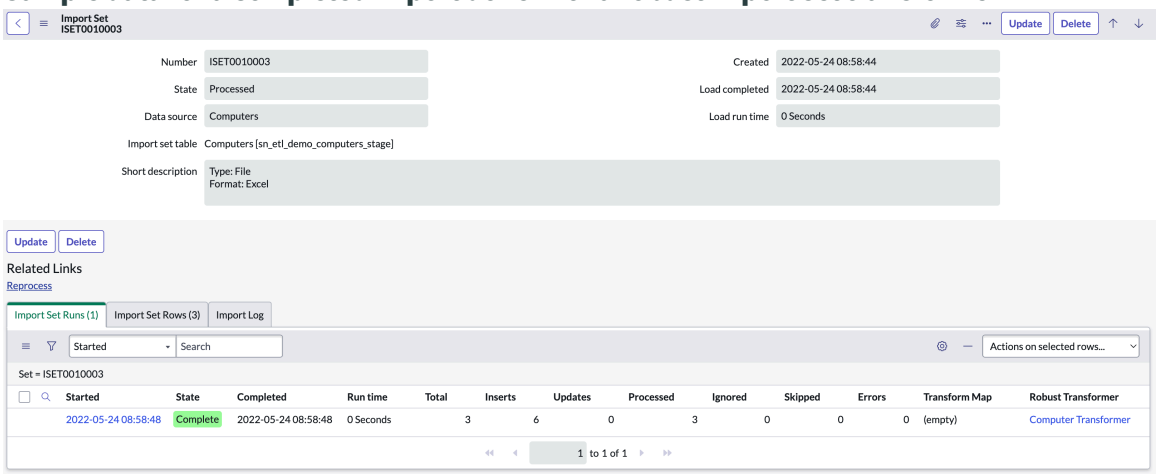
Legacy method to map data from an import set staging table to a single target table. Transform maps combine the transform and processing functions into a single process. Each time you run a transform map, the system must load data from the import set staging table, transform it, and then insert it into a single target table. You can define multiple table mappings with multiple transform maps. For more information, see Transform maps.

After running the import, you can view the import history by navigating to the Import Set record and checking the tabs below the Related Links section. They cover the import set runs, import set rows, and import log.

Import Set Runs

The **Import Set Runs** tab provides details about individual imports.

Sample data for a completed import done with a robust import set transformer



The following table provides more details about the fields in the image.

Field	Description
Started	Date and time the import started. Given in the time zone of the logged-in user.
State	State of the import. Options are: • Cancelled • Cancel requested • Complete • Complete with errors

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Field	Description
	• Did not complete • Running
Completed	Date and time the import finished. Given in the time zone of the logged-in user.
Run time	Total amount of time the import required to run.
Total	Total number of import set rows. For an import using a robust import set transformer, this field is the total number processed, ignored, skipped, and with errors. For an import using a transform map, this field is the total number inserted, updated, ignored, skipped, and with errors.
Inserts	Number of records inserted.
Updates	Number of records updated.
Processed	Number of records processed.
Ignored	Number of records ignored. An ignored record is one the user has specified should be ignored during an import. For example, you can identify records to ignore with the *ignore* variable in an onBefore script. For more information, see Create Extract Transform Load (ETL) definitions.
Skipped	Number of records skipped. A skipped record is one that has been skipped by the system, due to an internal issue.
Errors	Number of errors encountered during the import.
Transform Map	If data is imported using a transform map, the associated map is shown here.
Robust Transformer	If data is imported using a robust import set transformer, the associated transformer is shown here.

Import Set Rows

The **Import Set Rows** tab provides details about rows included in the import set run.

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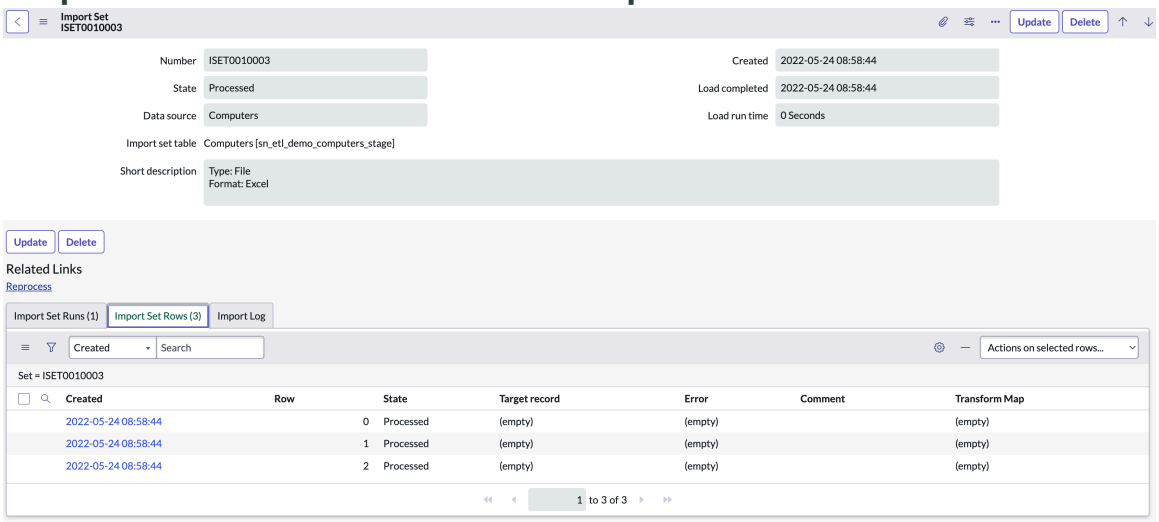
Sample data for the three rows included in the import



The following table provides more details about the fields in the image.

Field	Description
Created	Date and time the import set row was created. Given in the time zone of the logged-in user.
Row	Number for the row. Numbering starts at zero.
State	State of the row import.
Target record	Record updated with the row. This field displays the target record only when the import is run with a transform map. For imports run with a robust import set transformer, you can view the target records by clicking the row record and checking the **Target record** field in the **Transform Target Rows** tab. For more information and an example, see the following section on Target records for robust import set transformers.
Error	Details for any errors encountered during the row import.
Comment	Comments from the transform script.
Transform Map	If data is imported using a transform map, the associated map is shown here.

Target records for robust import set transformers

For imports using a robust import set transformer, you can view additional details by running the import in verbose mode. Verbose mode enables the following.

- Greater detail in the import log. With verbose mode, the import log includes transform logs that show how transform operations are applied to records.
- More information about each row's transform target rows. For each row in the **Import Set Rows** tab, clicking the row record opens the row in the import set table. In this view, you can see the transform target rows, import log, and import set row errors.

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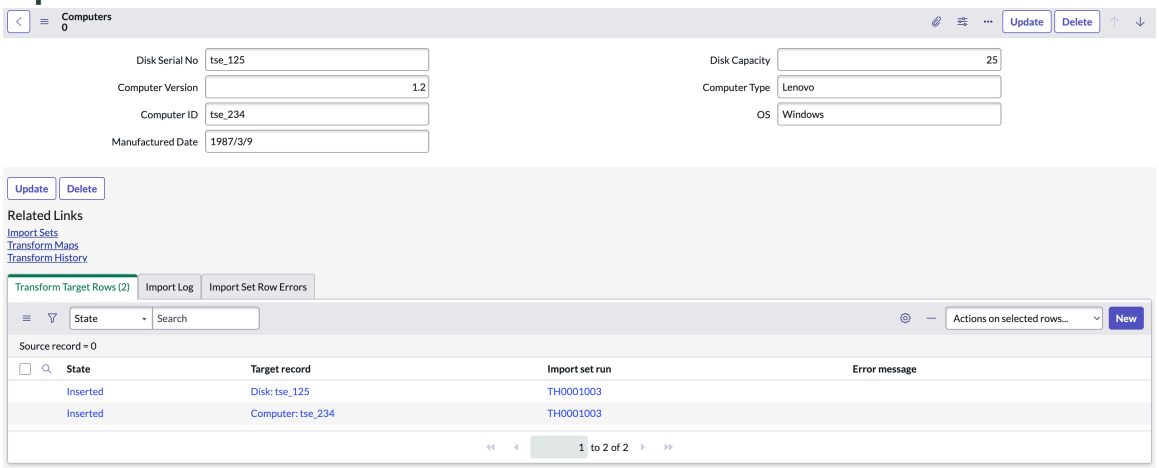
The **Transform Target Rows** tab displays the state, target record, import set run, and any error messages for each row. The first three fields are all links to the associated records, making it easier to find and track information for improved debugging. For more information on enabling verbose mode, see Create a robust import set transformer.

Sample data showing the transform target row details for a row in the Computers import set table



The following table provides more details about the fields in the image.

Field	Description
State	State of the transform target row. Options are: • Inserted • Updated • Error
Target record	Record updated with the row.
Import set run	Import Set record associated with the transform target row.
Error message	Text describing any errors encountered by the transform target row.

Import Log

The Import Log tab displays the logs for the import set. It shows when each log was created, its level, the log message, and the source of the log. For details, see Import logs.

Updating records using coalesce

The coalesce option allows you to update existing target table records when transforming import data.

The coalesce option on a field map allows you to specify if the selected **Target field** should be used to coalesce on when import set records are transformed. If the field map **Coalesce** checkbox is selected, when the import set row is transformed the instance checks for an existing record in the target table that has the same value in the **Target field** as the import set row **Source field**. For step-by-step instructions, see Create a field map.

If an existing record with a matching value in the target table is found, that record is updated. If no matching record is found, then a new record is created in the target table.

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Note: Choose fields in the target table to coalesce on only if those fields will have unique values. If more than one record in the target table matches the specified coalesce options, only the first matching record in the target table is updated.

Coalesce options

There are several possible configurations you can use to coalesce data in import sets.

No coalesce

If no coalesce is defined, all imported rows are treated as new records. No existing records are updated.

Single-field coalesce

You can coalesce on a single field to update an existing record.

If a target table record exists with the same value in the coalesce field as the staging table record, the target table record is updated using the import set record values.

Multiple-field coalesce

You can coalesce on multiple fields to update an existing record.

If a target table record exists with the same values in all coalesce fields as the staging table record, the target table record is updated using the staging table record values. All coalesce field values between the target and staging tables must match to coalesce with multiple fields.

Conditional coalesce

You can use a script to determine if a staging table row should coalesce to a target record.

Most conditional coalesce scripts are defined in the **Source script** field of a field map for the sys_id field. To update a target record using the staging table record values, the script must return the sys_id of the target table record.

Example conditional coalesce scripts

Review examples of conditional coalesce scripts.

Updates only

To only update records where a match is found, and skip records where a match is not found, specify a coalesce field and add the following script as an **onBefore** script to the transform map.

```
if (action == 'insert')
  ignore = true;
```

Conditional coalesce using dot-walking

You can use dot-walked fields in a conditional coalesce script, such as to match the email address of a user when importing incident data.

In this example, this script is defined in the **Source script** of a field map for the Incident target table sys_id field.

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```
var gr = new GlideRecord('incident');
gr.addQuery('caller_id.email', source.u_email); //check if the
 incident caller's email matches the import row email value
gr.query();

if(gr.next())
{
    answer = gr.sys_id; //if a match exists, return the sys_id
 of the matching Incident record
}
else
{
    answer= -1;
}
```

Conditional coalesce with an OR condition

You can use a conditional coalesce script to match source and target records based on multiple field values. Unlike multiple-field coalesce where all coalesce fields must match, you can specify a script to only require one of the fields to match.

In this example, this script is defined in the **Source script** of a field map for the User target table sys_id field.

```
var gr = new GlideRecord('sys_user');
var qc = gr.addQuery('email', source.u_email); //first check if
 the user's email matches
qc.addOrCondition('user_name', source.u_name); //alternatively,
 check if the username matches
gr.query();

if(gr.next())
{
    answer = gr.sys_id; //if a match exists, return the sys_id
 of the matching User record
}
else
{
    answer = -1;
}
```

Case-sensitive coalesce field values

You can control if an import set will coalesce on matching values with different cases.

The field map **Coalesce case sensitive** field enables you to coalesce field values by case sensitivity.

By default, fields marked as **Coalesce** in the field map are used in a case insensitive lookup for existing records. If the **Coalesce case sensitive** check box is selected, the instance attempts to match coalesce field values by case. The target table record is updated only if the value in the target record and the import set staging record have the same value and case. Otherwise, a new record is created.

Coalesce on empty fields

You can control if an import set will coalesce on fields with no value.

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The field map **Coalesce empty fields** field allows you to coalesce on fields with no value.

By default, fields marked as **Coalesce** in the field map cause the import set to check for a target record with a field value that matches the value from the import set staging record. When **Coalesce empty fields** is selected for that field map, an empty value in the target record and import set staging record counts as a match for the purpose of coalescing.

For example, the User transform map coalesces on the email field. With the **Coalesce empty fields** option selected, a source record containing an empty email address coalesces to a target record containing an empty email address.

Standard import set tables

Several Import Set tables are available by default.

Notification

A standard object for describing an external interface for a notification in the system, such as alarms and alerts from monitoring systems. The default transform map for this object will create or update an incident record. The incoming notifications are coalesced into incidents based on the UUID field.

imp_notification

Field	Description	Data type
uuid	The universally unique identification number or string that uniquely identifies this notification. It is marked as the coalescing value in the default transform map for the corresponding Incident and is mapped to the correlation_id field of Incident.	Character (40)
corrective_message	A free form string value that indicates the corrective or followup steps to be taken to address the issue identified in this notification. This field is not mapped by default.	Character (40)
duration	A string value representing the time value duration affecting the issue reported in this notification. Out of box, the duration field is not mapped. The format of the time is up to the calling program and must be mapped accordingly in the default map to be used.	Character (40)
expires_on	A string value representing the datetime value that the issue reported in this notification will expire. Out of box, the expires_on field is not mapped. The format of the time is up to the calling program and must be mapped accordingly in the default map to be used.	Character (40)
message	A string value describing the nature of the issue related to this notification. It should be a concise description and is mapped to the short_description field of the Incident.	Character (80)
comments	A string value containing additional comments related to this notification. The value is mapped to the comments field of the Incident.	Character (4000)
category	A string value categorising the nature of this notification. The value is mapped to the category field of the Incident, and therefore should be one of its valid values. If an existing	Character (40)

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imp_notification (continued)

Field	Description	Data type
	value does not exist, the default behavior is to create a new category.	
assignment_group	A string value of the assignment group for this notification. The value is mapped to the assignment_group field of the Incident, and therefore should be one of its valid values. If an existing value does not exist, the default behavior is to create a new assignment group and set it for the resulting incident.	Character (40)
severity	A string representation of a numeric value that indicates the severity of the issue being reported in this notification. This field is mapped to the severity field on Incident. The out of box numeric values and their meanings are: • 1 - High • 2 - Medium • 3 - Low	Character (40)
state	A string that indicates the state of the issue being reported in this notification. This field is mapped to the incident_state field on Incident. The out of box values are: • New • Active • Resolved • Closed	Character (40)
source	A string value to indicate the source of the issue or the configuration item (by unique identifier eg IP address, host name etc) related to the issue in this notification. It s mapped to the cmdb_ci field of Incident.	Character (40)
timestamp	A string value representing the datetime value that marks the beginning of the issue reported in this notification. Out of box, the timestamp field is not mapped. The format of the time is up to the calling program and must be mapped accordingly in the default map to be used.	Character (40)
type	A string value categorizing the type of issue related to this notification. Out of box, this field is not mapped to any field on Incident. Integrations using this Notification message may use this field to identify its source and trigger additional scripts.	Character (40)

Computer

A standard object for describing an external interface for a computer in the system. The default transform map will create/update a Computer (cmdb_ci_computer) or Server (cmdb_ci_server, cmdb_ci_win_server, cmdb_aix_server etc ..) based on the operating_system field value. The incoming computers are coalesced based on the serial_number field. Additionally, the transform script of the map will map to various extensions of the Computer (cmdb_ci_computer) based on the operating_system value being entered.

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- UNIX Server (cmdb_ci_unix_server)
  - AIX
  - HP/UX
  - Solaris
  - AIX
- Windows Server (cmdb_ci_win_server)
  - Windows 2000 Server
  - Windows 2003 Server
  - Windows NT 4.0
- Server (cmdb_ci_server)

  Any operating system that contains the word "Linux".

imp_computer

Field	Description	Data type
serial_number	The unique identifier for this computer. It is marked as the coalescing value in the default transform map for the correcponding Computer and is mapped to the serial_number field of Computer (cmdb_ci_computer).	Character (40)
cpu_count	The number of CPUs that this computer has. It is mapped to the cpu_count field of the Computer (cmdb_ci_computer) table.	Character (40)
cpu_speed	The clock speed of the CPU in MHz. This field is mapped to the cpu_speed field of Computer (cmdb_ci_computer)	Character (40)
cpu_type	Free form text describing the type of CPU. Example values are "GenuineIntel", "IBM", or "Pentium 4". This field is mapped to the cpu_type field of Computer (cmdb_ci_computer)	Character (40)
disk_space	A numeric value describing the total disk space available to the computer in GB. This field is mapped to the disk_space field of Computer (cmdb_ci_computer)	Character (40)
manufacturer	A string name for the manufacturer of the computer. This field is mapped to the manufacturer field of Computer (cmdb_ci_computer) which is a reference to Company (core_company)	Character (40)
model_id	A string name for the model of the computer. This field is mapped to the model_id field of Computer (cmdb_ci_computer) which is a reference to Model Name (cmdb_model)	Character (40)
name	A string value representing the name of the Computer, usually a host name or IP/MAC address. It is mapped to the name field of Computer (cmdb_ci_computer)	Character (40)
operating_system	A string value for the main operating system running on the computer. It is mapped to the os field of Computer (cmdb_ci_computer). Out of box values are: • AIX • GNU/Linux	Character (40)

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imp_computer (continued)

Field	Description	Data type
	• HP/UX • Linux Fedora • Linux Red Hat • Linux SuSE • macOS OS 10 (OS/X) • macOS OS 8 • macOS OS 9 • macOS OS/X • OS/400 • Solaris • SunOS • Windows • Windows 2000 • Windows 2000 Advanced Server • Windows 2000 Datacenter Server • Windows 2000 Professional • Windows 2000 Server • Windows 2003 Datacenter • Windows 2003 Enterprise • Windows 2003 Standard • Windows 2003 Web • Windows 95 • Windows 98 • Windows ME • Windows NT 4.0 • Windows XP • Windows XP Home • Windows XP Professional • Windows 2000 Server • Windows 2003 Enterprise	
ram	A numeric value for the total number of memory installed on this computer in MB. This value is mapped to the ram field of Computer (cmdb_ci_computer)	Character (40)

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User

A standard object for describing an external interface for a user in the system. The default transform map script sets the user_name field value to first_name.last_name if the web service's user_id field value is not supplied, otherwise, the user_id value is mapped directly to the user_name field in the User (sys_user) table.

imp_user

Field	Description	Data type
email	A string value containing the user's email address. This value is mapped to the email field in User (sys_user) and is set as the coalesce value for the transform.	Character (40)
department	The department the user is in. This field is mapped to the department field in User (sys_user) which is a reference to the Department (cmn_department) table.	Character (40)
first_name	The first name of the user, mapped to the first_name field of the User (sys_user) table.	Character (40)
last_name	The last name of the user, mapped to the last_name field of the User (sys_user) table.	Character (40)
location	The location the user is in, mapped to the location field of the User (sys_user) table which is a reference field to Location (cmn_location)	Character (40)
phone	The phone number of the user, mapped to the phone (Business Phone) field of the User (sys_user) table.	Character (40)
user_id	This is the user identification, usually a login name, that maps to the user_name (User ID) field of the User (sys_user) table.	Character (40)

Location

A standard object for describing an external interface for a location in the system. The web service will create or modify records in the Location (cmn_location) table.

imp_location

Field	Description	Data type
name	The name of the location, for example "Headquarters", "Sales office" etc. This field is mapped to the name field of Location (cmn_location) and is part of the coalesce to search for an existing location.	Character (40)
street	The street address of the location, for example "1234 ServiceNow way" etc. This field is mapped to the street field of Location (cmn_location) and is part of the coalesce to search for an existing location.	Character (40)
city	The city of the location, for example "San Diego", "Madrid" etc. This field is mapped to the city field of Location (cmn_location) and is part of the coalesce to search for an existing location.	Character (40)
state	The state of the location, for example "California", "Connecticut" etc. This field is mapped to the city field of Location (cmn_location) and is part of the coalesce to search for an existing location.	Character (40)

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imp_location (continued)

Field	Description	Data type
zip	The zip code for the location, for example "92130", "10001" etc. This field is mapped to the zip field of Location (cmn_location) and is part of the coalesce to search for an existing location.	Character (40)
country	The country for the location, for example "USA", "United Kingdom" etc. This field is mapped to the country field of Location (cmn_location).	Character (40)

Import sets maximum row size

Rows imported using import sets must not exceed the maximum row size.

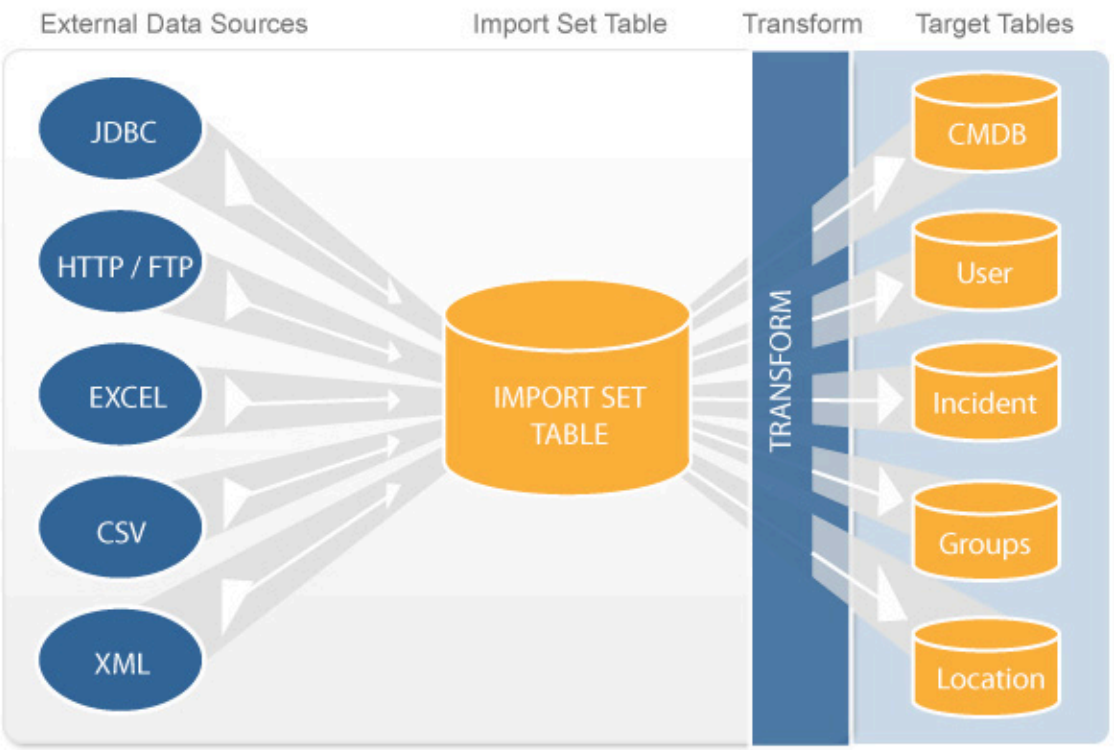
A single row in a database may not contain more than 8126 bytes of data. The size of each row is determined by the amount of content in all fields, as well as the character set for text fields. For example, a row with 10 text fields each containing 1000 characters using a French character set takes 15360 bytes.

Attempting to import more data to a single row than the maximum size causes the import to skip that row. Any rows that were skipped for this reason are listed in the import log.

Importing data using import sets

To import data define a data source and transform map, and run or schedule an import.

Importing data: data flow



Create a data source

Create a data source record to define what data an import set should import.

Depending on the type of data source you want to create, see the following topics for procedures.

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Create a File type data source

Create a **File** type data source record to define what data an import set should import.

Before you begin

Role required: import_admin

About this task

For additional information, see File type data sources.

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**File**.
Format	Only the default XML-based file format (.xlsx) is supported, unless saved as "Strict Open XML Document."
Zipped	Selected if the import file is compressed.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000.

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Field	Description
	○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
File retrieval method	The retrieval method for this file.
File path	The path to the file to import. You can include a system property value in this field using the format `${system.property.name}`. When the connection is made, the variable is replaced with the value of the specified property. **Note:** For files retrieved using HTTP or HTTPS, the *glide.ds.file.http.variable_replacement* property must be true to use system property expansion. For example, you can specify the **File path** value `/countries.csv?key=${datasource.apikey}`. When the connection is made, the value of the *datasource.apikey* system property is passed as the value for the *key* parameter. **Note:** For HTTP and HTTPS protocols, the file path is automatically URL encoded. Do not specify a URL-encoded file path when using either of these protocols.
CSV delimiter	The delimiter character for the CSV file.
Parsing script	The script used to parse a single line of input. As you type the script, script auto-complete presents the choices available to you. For more information, see File type data sources.
Sheet number	The Excel sheet number to load data.
Header row	The Excel row number to load the column labels.
Path for each row	The path expression used to select JSON objects, which will become rows in the import set table. The path should be `//` for JSON objects.
Discard Arrays	Selected to discard JSON arrays as a value. Unselected to serialize JSON arrays as a value.
Expand node children	Selected if child elements of the XML node or JSON object should be converted into additional columns. Unselected if the parent column value should be an XML or JSON fragment. For JSON, note that selecting this option expands objects only, not arrays. For nested array support, see JSON file import examples.

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Field	Description
Data in single column	Selected to store data in a single column.
Xpath for each row	XPath expression that selects the nodes which become rows in the import table. The children of the selected nodes will become the columns in the rows.
SCP authentication method	Choice to authenticate with a username and password or with a public key. **Note:** You cannot authenticate to data sources with a public-private key pair. Use a username and password authentication instead.
Server	Name of the server from which the tables will be imported.
Port	Port to use to connect to the specified server. This field appears if you select HTTP or HTTPS as the file retrieval method.
Username	User name for authentication on the JDBC server.
Password	Password for authentication on the JDBC server.
Private keyfile	Keyfile when using legacy SCP public-private keyfiles. **Note:** ○ You cannot authenticate to data sources with a public-private key pair. Use username and password authentication instead. ○ Do not use this legacy option. Although it is available for use, it is not supported.
System keystore	Selected to validate the certificate from the FTPS server against all saved certificates. This certificate may be any type supported by the instance. If not selected, the instance uses the Java default certificate to validate the FTPS server. This field is available only for data sources with a **File retrieval method** value of **FTPS**. All FTPS file retrieval methods are supported, including Auth TLS, Auth SSL, Implicit SSL, and Implicit TLS.

4. Click **Submit**.

What to do next
Define a transform map for the new data source and run an import.

Create a JDBC type data source

Create a **JDBC** type data source record to define what data an import set should import.

Before you begin
Role required: import_admin

About this task
For additional information, see JDBC type data source.

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

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Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**JDBC**.
Use import connection alias	Option to use per-configured connection details.
Import connection alias	Connection alias to use to connect to this data source. For additional details, see Create an import connection alias.
Use MID Server	MID Server to use to connect to this data source.
Format	Select one of the following formats: MySQL, Oracle, or SQLServer.
Instance name	Used to support dynamic port connectivity with SQL Server. To ensure connectivity, provide the instance name for a SQL Server that receives a new port number dynamically after each reboot. This field only appears when **SQLServer** is selected as a data source format.
Database name	Name of the database instance.
Database port	Port number for the database. Leave this field empty when using dynamic port connectivity with SQL Server.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000.

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Field	Description
	○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Use integrated authentication	Selected to allow the JDBC connection to use the ID of the user configured for the Windows MID Server service for SQL Server authentication. For additional details, see JDBC type data source.
Username	User name for authentication on the JDBC server.
Password	Password for authentication on the JDBC server.
Server	Name of the server from which the tables will be imported.
Query	Type of query to run: **All rows from Table** or **Specific SQL**. If you select to run a SQL statement, the SQL statement field appears.
Query timeout	Number of seconds the JDBC driver will wait for a query (SELECT) to complete. Zero (0) means no timeout. If timeout is exceeded, the integration considers the JDBC result inaccessible and places it in an error state.
Connection timeout	Number of seconds before MID Server connection cache pool closes and removes it from the pool. Zero (0) means no timeout.
Table name	Name of the table from which the data is being exported.
SQL statement	SQL statement to extract the desired data from the database.
Use last run datetime	Controls the amount of data that is retrieved from a database during an import run. If unselected, then all rows in the table specified are imported, every time. You might want to use this setting if this is a one-time import, or if all the data in the target table is new. If selected, two additional fields appear, enabling you to select a datetime value to limit imported data to delta values only.
Last run datetime	The datetime value in this field is automatically populated from the database field you select below and represents the latest value from the previous run. This value acts as a dynamic filter to restrict the number of records retrieved to those records that have changed since the data source's last runtime.
Last run database field	Field name from the source table that will be used as the filter in the next run. This value may need to be case sensitive, depending on the target database type.

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Field	Description
Additional Database Parameters	Optional parameters to add to the end of the URL generated for this data source. Semicolon-separated list of parameters. You may need to configure the form to view this field.

4. Click **Submit**.

What to do next
Define a transform map for the new data source and run an import.

Create an LDAP type data source

Create an **LDAP** type data source record to define what data an import set should import.

Before you begin
Role required: import_admin

About this task
For additional information, see LDAP type data source.

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**LDAP**.
LDAP target	Target selected from the list of your LDAP OU definitions.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected.

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Field	Description
	The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. ○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.

4. Click **Submit**.

What to do next
Define a transform map for the new data source and run an import.

Create an OIDC type data source

Create an **OIDC** type data source record to define what data an import set should import.

Before you begin
Role required: import_admin

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**OIDC**.

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Field	Description
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. ○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Format	Defaults to **-- None --** and can't be changed.

4. Click **Submit**.

What to do next
Define a transform map for the new data source and run an import.

Create a REST (Integration Hub) type data source

Create a **REST (IntegrationHub)** type data source record to define what data an import set should import from a REST API.

Before you begin
Roles required: import_admin and action_designer

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

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Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**REST (IntegrationHub)**.
Format	One of the following formats: Custom (Parse by Script), JSON, or XML.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. ○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Request action	Data source request action that will be invoked to get data. You can choose only published request actions. Click the link in the dialog box below to create/configure a new Data Source request action in Integration Hub. After the request action is published in Integration Hub, you can choose it as a **Request action** in the Data Source record. For more information, see Define action properties.

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Field	Description
Support pagination	Selected to enable pagination for the request action. Pagination helps you reduce processing overhead by processing a specified number of records at a time, instead of processing all records at once.
Limit	Maximum number of records per page. For example, to process 50 records at a time, enter a **Limit** of 50.
Offset	The initial offset used for pagination. The offset is the starting record number. For example, to process 50 records at a time, starting with the first record, enter a **Limit** of 50 and an **Offset** of 0.
Parsing script	Type the script used to parse a single line of input. Three parameters are available in this function: ○ **line**: the current line to be parsed by the script ○ **lineNumber**: the line number of the current line in the entire response payload ○ **result**: output result
Path for each row	The path expression used to select JSON objects, which will become rows in the import set table. The path should be / / for JSON objects.
Discard Arrays	Selected to discard JSON arrays as a value. Unselected to serialize JSON arrays as a value.
Expand node children	Selected if child elements of the XML node or JSON object should be converted into additional columns. Unselected if the parent column value should be an XML or JSON fragment. For JSON, note that selecting this option expands objects only, not arrays. For nested array support, see JSON file import examples.
Data in single column	Selected to store data in a single column.
Xpath for each row	XPath expression that selects the nodes which become rows in the import table. The children of the selected nodes will become the columns in the rows.

4. Click **Submit**.

What to do next
Define a transform map for the new data source and run an import.

Define action properties

Create and configure a Data Source request action in Integration Hub. After the request action is published in Integration Hub, you can choose it as a **Request action** in the Data Source record.

Before you begin
Role required: import_admin

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Select **New**.
3. Select a **Type** of **REST (IntegrationHub)**.
4. Click the link under **Request action**.
5. Complete the form.

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Field	Description
Name	Name of the request action.
Accessible From	Scope from which the request action is accessible.
Category	Category of the request action.
Protection	Specifies whether the request action is read-only.
Description	Description of the request action.
Application	Scope of the application.
In-Flow Annotation	Text you want to appear under the **Action** title on the Data Source Request Action page.

6. Click **Submit**.
7. The Data Source Request Action page appears with the following fields:

Field	Description
Limit	Limit set by the user in the REST (IntegrationHub) data source record. If the REST API supports pagination and **Support pagination** is selected in the Data Source record, you must supply this input to your REST step.
Offset	Offset set by user in the REST (IntegrationHub) data source record. If the REST API supports pagination and **Support pagination** is selected in the Data Source record, you must supply this input to your REST step.
Last Success Import Time	Last time data was successfully imported. A numeric value representing the number of milliseconds since January 1, 1970, 00:00:00 GMT. The data source populates this value. If the REST API supports queries based on time, you must supply this input to your REST step.
Import Start Time	Time the import is actually started. A numeric value representing the number of milliseconds since January 1, 1970, 00:00:00 GMT. The data source populates this value. If the REST API supports queries based on time, you must supply this input to your REST step.

8. If desired, you can add a Script step to validate or modify action inputs, set default values, or build request payloads before executing the REST step.
   a. Select **Data Source Request** from the Action Outline.
   b. Select **Enable Processing Script**.
   c. Select **Script step** from the Action Outline.
   d. Configure the Script step as described in Script step.
9. Select **REST step** from the Action Outline.
10. Configure the REST step as described in REST step.
11. Choose from the following:
    - Click **Properties** to return to the Action Properties window.
    - Click **Test** to test the request action before publishing it.

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- Click **Executions** to view the history of executions of the request action.
- Click **Save** to save the request action.
- Click **Publish** to publish the request action and make it available for use.

Create a Custom (Load by Script) type data source

Create a **Custom (Load by Script)** type data source record to define what data an import set should import.

Before you begin
Role required: import_admin

About this task
For additional information, see Custom (Load by Script) type data source.

Procedure
1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	**Custom (Load by Script)**.
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000.

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Field	Description
	○ For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. ○ For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. ○ For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) ○ For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Enable parallel loading	Option to use parallel data loading.
Parallel loading script	Script used for parallel data loading. Appears only when **Enable parallel loading** is selected. For more information, see Custom (Load by Script) type data source.
Data Loader	Script used to load data. For more information, see Custom (Load by Script) type data source.

4. Click **Submit**.

What to do next

Define a transform map for the new data source and run an import.

Data source fields

In addition to common fields, other fields appear on the data source form, depending on the value of the **Type** field.

Common data source fields

These fields are common to all data sources.

Field	Description
Name	A unique name for this data source.
Import set table label	A label for the import set staging table to use.
Import set table name	The ServiceNow AI Platform uses the label you entered to construct a unique table name. This prevents namespace collision with an already existing table.
Type	The type of data you are importing: • From a remote **File** • From a **JDBC** database • Using **LDAP** • Using **OIDC**

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Field	Description
	• Using **REST** to import data through the Integration Hub • From a **Data Stream** action through the Integration Hub • Using a **Custom** script
Use Batch Import	If selected, specifies that loading data should be batched when you select **Load data** or **Test load 20 records**. **Note:** The system keeps records in memory until it receives the number of records specified in the batch size. If the batch size is met, it commits all the records as one batched SQL. If all the records are loaded for the import set, it commits all the remaining records as one batched SQL. Since it keeps the maximum of the batch size records in memory when specified, make sure you set the correct batch size to not cause any out-of-memory issues.
Batch Size	Specifies how big the batches should be. Appears only when the **Use Batch Import** field is selected. The *glide.import_set_load_usebatch* and *glide.import_set_load_batch_size* properties affects these fields. The priority order for the properties and fields are as follows: If the property is set, use the property value. If not, use the field value. If neither property is set, use the default batch size of 1000. • For example, if *glide.import_set_load_usebatch* = **true** and *glide.import_set_load_batch_size* = **200**, use 200 as the batch size, regardless of the field values. • For example, if *glide.import_set_load_usebatch* = **true** and the *glide.import_set_load_batch_size* property is not set, use the default batch size of 1000. • For example, if the *glide.import_set_load_usebatch* property is not set and the **Use Batch Import** field = **true**, use the **Batch Size** field value (or the default of 1000 if the **Batch Size** field value is not set) • For example, if the *glide.import_set_load_usebatch* property = false and the **Use Batch Import** field = true, do not use batch import, since the property is set to false.
Application	Application scope for this record.

File type data source fields

These additional fields appear on the data source form when the **Type** field value is **File**.

Field	Description
Format	Only the default XML-based file format (.xlsx) is supported, unless saved as "Strict Open XML Document."
Zipped	Selected if the import file is compressed.
File retrieval method	The retrieval method for this file.
File path	The path to the file to import.

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Field	Description
	You can include a system property value in this field using the format `${system.property.name}`. When the connection is made, the variable is replaced with the value of the specified property. **Note:** For files retrieved using HTTP or HTTPS, the *glide.ds.file.http.variable_replacement* property must be true to use system property expansion. For example, you can specify the **File path** value `/countries.csv?key=${datasource.apikey}`. When the connection is made, the value of the *datasource.apikey* system property is passed as the value for the *key* parameter. **Note:** For HTTP and HTTPS protocols, the file path is automatically URL encoded. Do not specify a URL-encoded file path when using either of these protocols.
CSV delimiter	The delimiter character for the CSV file.
Parsing script	The script used to parse a single line of input. As you type the script, script auto-complete presents the choices available to you. For more information, see File type data sources.
Sheet number	The Excel sheet number to load data.
Header row	The Excel row number to load the column labels.
Path for each row	The path expression used to select JSON objects, which will become rows in the import set table. The path should be `//` for JSON objects.
Discard Arrays	Selected to discard JSON arrays as a value. Unselected to serialize JSON arrays as a value.
Expand node children	Selected if child elements of the XML node or JSON object should be converted into additional columns. Unselected if the parent column value should be an XML or JSON fragment. For JSON, note that selecting this option expands objects only, not arrays. For nested array support, see JSON file import examples.
Data in single column	Selected to store data in a single column.
Xpath for each row	XPath expression that selects the nodes which become rows in the import table. The children of the selected nodes will become the columns in the rows.

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Field	Description
SCP authentication method	Choice to authenticate with a username and password or with a public key. **Note:** You cannot authenticate to data sources with a public-private key pair. Use a username and password authentication instead.
Server	Name of the server from which the tables will be imported.
Port	Port to use to connect to the specified server. This field appears if you select HTTP or HTTPS as the file retrieval method.
Username	User name for authentication on the JDBC server.
Password	Password for authentication on the JDBC server.
Private keyfile	Keyfile when using legacy SCP public-private keyfiles. **Note:** • You cannot authenticate to data sources with a public-private key pair. Use username and password authentication instead. • Do not use this legacy option. Although it is available for use, it is not supported.
System keystore	Selected to validate the certificate from the FTPS server against all saved certificates. This certificate may be any type supported by the instance. If not selected, the instance uses the Java default certificate to validate the FTPS server. This field is available only for data sources with a **File retrieval method** value of **FTPS**. All FTPS file retrieval methods are supported, including Auth TLS, Auth SSL, Implicit SSL, and Implicit TLS.

JDBC type data source fields

These additional fields appear on the data source form when the **Type** field value is **JDBC**.

Field	Description
Use MID Server	MID Server to use to connect to this data source.
Format	One of the following formats: MySQL, Oracle, or SQLServer.
Instance name	Used to support dynamic port connectivity with SQL Server. To ensure connectivity, provide the instance name for a SQL Server that receives a new port number dynamically after each reboot. This field only appears when **SQLServer** is selected as a data source format.

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Field	Description
Database name	Name of the database instance.
Database port	Port number for the database. Leave this field empty when using dynamic port connectivity with SQL Server.
Use integrated authentication	Selected to allow the JDBC connection to use the ID of the user configured for the Windows MID Server service for SQL Server authentication. For additional details, see JDBC type data source.
Username	User name for authentication on the JDBC server.
Password	Password for authentication on the JDBC server.
Server	Name of the server from which the tables will be imported.
Query	Type of query to run: **All rows from Table** or **Specific SQL**. If you select to run a SQL statement, the SQL statement field appears.
Query timeout	Number of seconds the JDBC driver will wait for a query (SELECT) to complete. Zero (0) means no timeout. If timeout is exceeded, the integration considers the JDBC result inaccessible and places it in an error state.
Connection timeout	Number of seconds before MID Server connection cache pool closes and removes it from the pool. Zero (0) means no timeout.
Table name	Name of the table from which the data is being exported.
SQL statement	SQL statement to extract the desired data from the database.
Use last run datetime	Controls the amount of data that is retrieved from a database during an import run. If unselected, then all rows in the table specified are imported, every time. You might want to use this setting if this is a one-time import, or if all the data in the target table is new. If selected, two additional fields appear, enabling you to select a datetime value to limit imported data to delta values only.
Last run datetime	The datetime value in this field is automatically populated from the database field you select below and represents the latest value from the previous run. This value acts as a dynamic filter to restrict the number of records retrieved to those records that have changed since the data source's last runtime.
Last run database field	Field name from the source table that will be used as the filter in the next run. This value may need to be case sensitive, depending on the target database type.
Additional Database Parameters	Optional parameters to add to the end of the URL generated for this data source. Semicolon-separated list of parameters. You may need to configure the form to view this field.

LDAP type data source field

This additional field appears on the data source form when the **Type** field value is **LDAP**.

Field	Description
LDAP target	Target selected from the list of your LDAP OU definitions.

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OIDC type data source field

This additional field appears on the data source form when the **Type** field value is **OIDC**.

Field	Description
Format	Defaults to **-- None --** and can't be changed.

REST (Integration Hub) type data source fields

These additional fields appear on the data source form when the **Type** field value is **REST (IntegrationHub)**.

Field	Description
Format	One of the following formats: Custom (Parse by Script), JSON, or XML.
Request action	Data source request action that will be invoked to get data. You can choose only published request actions. Click the link in the dialog box below to create/configure a new Data Source request action in Integration Hub. After the request action is published in Integration Hub, you can choose it as a **Request action** in the Data Source record. For more information, see Define action properties.
Support pagination	Selected to enable pagination for the request action. Pagination helps you reduce processing overhead by processing a specified number of records at a time, instead of processing all records at once.
Limit	Maximum number of records per page. For example, to process 50 records at a time, enter a **Limit** of 50.
Offset	The initial offset used for pagination. The offset is the starting record number. For example, to process 50 records at a time, starting with the first record, enter a **Limit** of 50 and an **Offset** of 0.
Parsing script	The script used to parse a single line of input. As you type the script, script auto-complete presents the choices available to you. For more information, see File type data sources.
Path for each row	The path expression used to select JSON objects, which will become rows in the import set table. The path should be / / for JSON objects.
Discard Arrays	Selected to discard JSON arrays as a value. Unselected to serialize JSON arrays as a value.
Expand node children	Selected if child elements of the XML node or JSON object should be converted into additional columns. Unselected if the parent column value should be an XML or JSON fragment. For JSON, note that selecting this option expands objects only, not arrays. For nested array support, see JSON file import examples.
Data in single column	Selected to store data in a single column.
Xpath for each row	XPath expression that selects the nodes which become rows in the import table. The children of the selected nodes will become the columns in the rows.

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Data Stream (Integration Hub) type data source fields

These additional fields appear on the data source form when the **Type** field value is **Data Stream (IntegrationHub)**.

Field	Description
Type	Data Stream (Integration Hub) type data source.
Data Stream action	•  Selected to use an existing published Data Stream action from Integration Hub. •  Selected for one of the following reasons: ○ If you select a published Data Stream action, click this button to open the Data Stream action in Integration Hub. ○ If you don't select a Data Stream action, click this button to create and publish a new Data Stream action in Integration Hub. **Note:** Data Stream actions require a subscription for production use.
Connection	Specify the connection alias for the Data Stream action. You can use the default parent alias or select any of its children's aliases. Available child aliases are listed in the menu. This field is only available when the Data Stream action is configured to use a connection alias. For more information, see Create a Connection and Credential alias.
Data in single column	Selected to store data in a single column.
Data Stream action inputs	Additional fields may appear, based on the inputs defined in the **Data Stream action**.

Custom (Load by Script) type data source field

This additional field appears on the data source form when the **Type** field value is **Custom (Load by Script)**.

Field	Description
Data Loader	Script used to load data. For more information, see Custom (Load by Script) type data source

Create a transform map

Every import operation to a production table requires at least one transform map associated with an import set.

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Before you begin
Role required: import_transformer, import_admin, or admin

About this task
The transform map specifies the data relationships between the import set and the target table. For every transformation, you must either create a new transform map or select an existing one.

Procedure
1. Navigate to **All** > **System Import Sets** > **Create Transform Map**.
2. Complete the form.

Table transform map fields

Field	Description
Name	User-friendly label to identify the transform map.
Source table	Import table containing the raw import set data. An import table is any table that extends the Import Set Row `[sys_import_set_row]` table. You can select only tables within the currently selected application scope.
Active	Check box to make the transform map available for use.
Run business rules	Check box to run business rules, workflows, approval engines, auditing, and field normalization while the transformation inserts or updates data into the target table. Clearing this check box runs GlideRecord.setWorkflow() with a value of **false**.
Enforce mandatory fields	Selects whether to enforce mandatory fields on the target table: ○ **No**: Do not enforce mandatory fields. ○ **Only Mapped Fields**: Enforce mandatory mapped fields only. ○ **All Fields**: Enforce all mandatory fields.
Copy empty fields	Check box to copy empty field values and override existing target field values.
Create new record on empty coalesce fields	Check box to create a new record when all coalesce fields are empty, instead of ignoring the record or overwriting an existing record. If **Coalesce empty fields** is selected for any field in the record, the record is coalesced.
Application	Application scope: global or per application.
Created	Transform map creation date (populated automatically).

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Field	Description
Target table	The table in which you want the transformed data to be inserted. You can select only tables within the currently selected application scope or the global scope, or tables that grant write access to other applications.
Order	Order in which to apply transform maps if more than one map fits the conditions. The system runs transform maps from lowest to highest **Order**.
Use Secondary Storage for References	Option to use a secondary database to look up reference fields. Importing a high volume of data that includes many reference fields might cause performance issues. Using secondary storage enables some read queries to be redirected to a secondary database, reducing the load on the primary database. When using secondary storage, set the **Choice action** field in the field map to **ignore** or **reject**. Setting the **Choice action** to **create** may cause multiple copies of a record to be created because the reference resolution doesn't detect newly created records immediately. For more information, see Create a field map. A secondary database is always slightly out of date compared to the primary database. If your import requires completely up-to-date data, don't use secondary storage. This field appears only when the Secondary Database Pools [com.glide.secondary_db_pools] plugin has been activated, and the import_reference_resoultion secondary database category has been configured and enabled. For more information, see Large data imports with many reference fields.
Run script	Check box to define a script that transforms field values in the source table to the target table.
Script	Transform map script that transforms field values in the source table to the target table.

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Field	Description
	The system runs the transform map script in addition to any field maps.

Important: The string `NULL` is a reserved word. It should not be used as a field value in import set transform maps or anywhere in the **First name** or **Last name** fields. The reserved word is `NULL` in all capital letters. A field with the value `Null` or `null`, for example, is acceptable. `NULL` should be used only to clear out a particular field.

Mapping options

You can map fields in a number of ways depending on the circumstances of the import and whether data must be transformed prior to loading onto a production table.

It is also important to note that any given import operation may require taking advantage of multiple mapping methods, and these methods can be readily used in conjunction with one another.

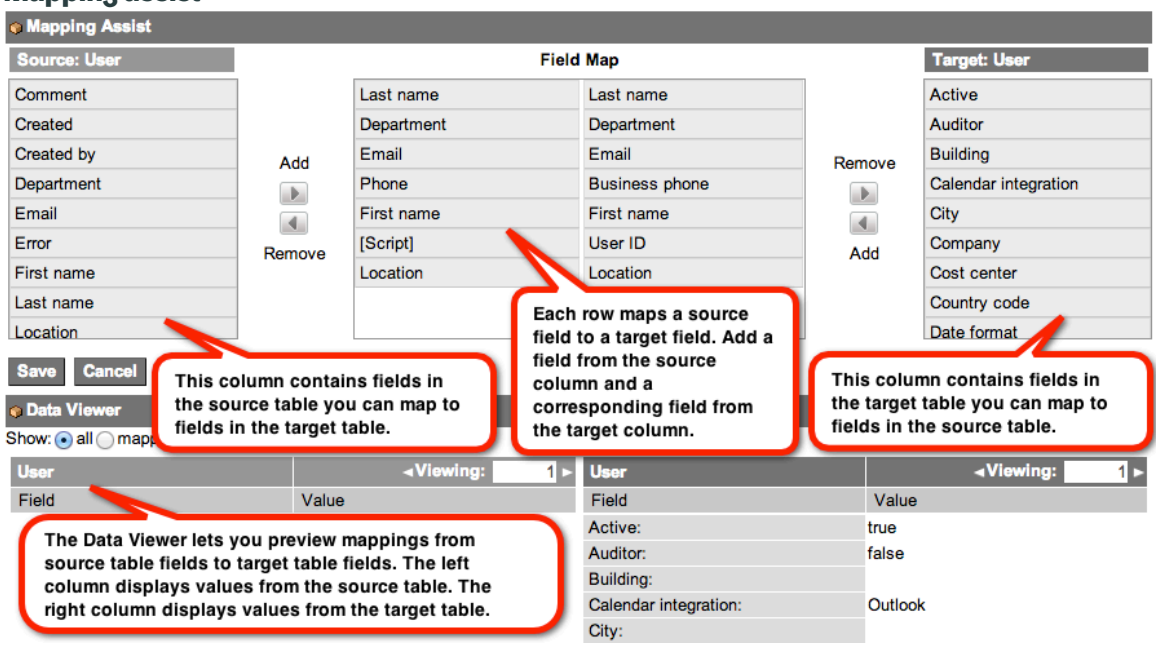
Automatic Mapping Utility

The simplest mapping method is where all of the field names of the import sets match the names of the fields on the production tables onto which the data will be transformed. In this case, simply click **Auto map matching fields** in the related list in the Table Transform Map form and confirm proper matching. If there are any discrepancies in terms of how fields were automatically matched, use the mapping assist utility to correct them. When all fields are matched properly, click the **Transform** related link to begin transforming data onto the destination table.

Mapping Assist Utility

The mapping assist utility provides a visually intuitive environment for specifying mapping between import set fields and production table fields. The mapping assist utility makes it possible to map a single source field (field on an import set table) to multiple destination fields (fields on a production table).

Mapping assist



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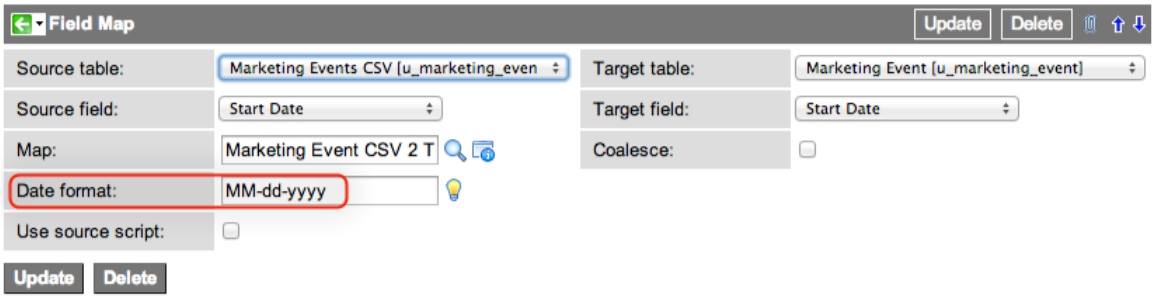
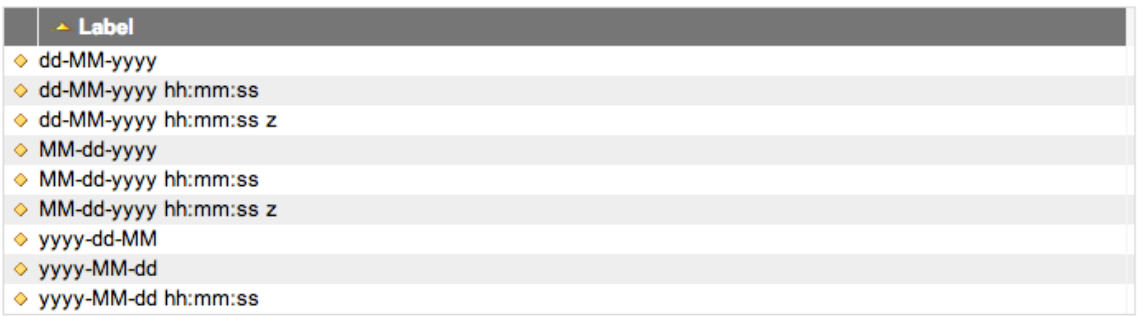
Changing the Date Format

If the date format of the source field does not match the format of the target field, you can set a date format mapping to transform dates from one format to another. For example, this mapping specifies that the date format of the CSV source file uses the **MM-dd-yyyy** format.

Field map date format



Field map date format options



Date format options include:

Mapping Options

Date Format	Description
dd-MM-yyyy	Day-month-year
dd-MM-yyyy hh:mm:ss	Day-month-year hours-minutes-seconds
dd-MM-yyyy hh:mm:ss z	Day-month-year hours-minutes-seconds timezone
MM-dd-yyyy	Month-day-year
MM-dd-yyyy hh:mm:ss	Month-day-year hours-minutes-seconds
MM-dd-yyyy hh:mm:ss z	Month-day-year hours-minutes-seconds timezone
yyyy-dd-MM	Year-day-month
yyyy-MM-dd	Year-month-day
yyyy-MM-dd hh:mm:ss	Year-month-day hours-minutes-seconds

To denote 24 hour time format, specify a custom date format using **HH:mm:ss** instead of hh:mm:ss.

Note:

Converting from a 24-hour to 12-hour date format might cause times from 12:00 to 23:59 to be formatted as 00:00 to 11:59.

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Mapping to a Duration Field

ServiceNow duration fields use a special data type that lists the number of milliseconds the duration value is. To map import data to a duration field use one of the following methods to transform source values into a duration.

- Calculate the duration from a start and end date
- Convert an existing duration value into a ServiceNow duration value

Calculating a Duration Value from a Start and End Date

If the import source has a start and end date, you can calculate a duration with JavaScript.

1. Navigate to **System Import Sets** > **Transform Maps**.
2. Select the transform map you want to calculate a duration value. For example, the Notification transform map that imports into the Incident table.
3. Select the **Run script** check box.
4. Enter JavaScript to transform the start and end dates into a duration. See the sample script.
5. Click **Update**.

This sample script transforms the source.u_start and source.u_end fields to a duration value in the target.duration field. Change the field names to match your source and target fields as needed.

```
target.duration = gs.dateDiff(source.u_start.getDisplayValue(),
 source.u_end.getDisplayValue(), false);
```

Convert a Duration Value into a ServiceNow Duration Value

If the import source already contains a start date and a duration value, you can convert the existing duration into a ServiceNow duration. For example, you might have an Excel data source that lists a duration in seconds. ServiceNow expects durations to have millisecond values.

1. Navigate to **System Import Sets** > **Transform Maps**.
2. Select a transform map.

   For example, the Notification transform map that imports into the Incident table.
3. Select the **Run script** check box.
4. Enter JavaScript to convert existing duration values into a ServiceNow duration values. See the sample script.
5. Click **Update**.

This sample script converts a duration in seconds (from the *source.u_duration* field) to a duration in milliseconds (in the *target.duration* field). Change the field names to match your source and target fields, as needed.

```
//Transform the value in source.u_duration from seconds to
 milliseconds
target.duration.setDateNumericValue(source.u_duration * 1000);
```

This sample script converts a duration already in milliseconds (from the *source.u_duration* field) to a ServiceNow duration (in the *target.duration* field). Change the field names to match your source and target fields, as needed.

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```
//Transform the value in source.u_duration to ServiceNow format
target.duration.setDateNumericValue(source.u_duration);
```

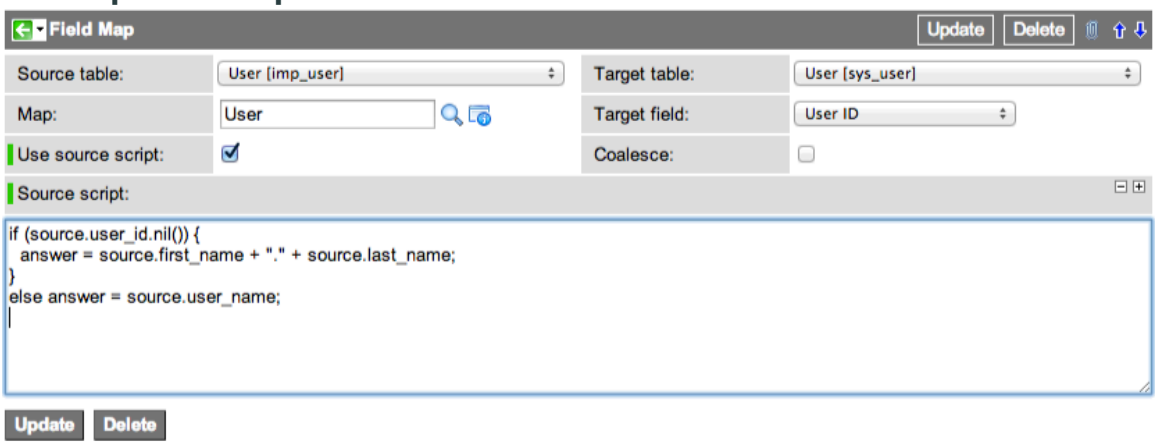
Using a Script to Calculate a Source Value

You may want to use a source script instead of the **Source field** when:

- The source value is not in the format for the mapped target value.
- You want to look up a value before mapping to the target field.
- The source value must be computed from multiple fields.
- You need to create a compounded or calculated coalesce value in the target field.

For example, this example source script computes the value of the user_name field when it is blank in the source.

Field map source script



A source script expects the calculated value to be set in the global variable `answer`.

Mapping Binary or BLOB Fields

ServiceNow uses a special process to import binary and binary large object (BLOB) data from JDBC data sources. All binary data is automatically converted into a record in the Attachment [sys_attachment] table before the transformation occurs. The import set table only stores the attachment record's sys_id value in the import table field instead of the actual binary value. For example, suppose you use a JDBC data source to import data from a CA Service Desk system, which stores each record's key value as binary data. When you import the Service Desk key values into a ServiceNow table, the ServiceNow field only contains a sys_id reference to the corresponding binary data in the Attachment Record [sys_attachment] table rather than the actual binary data.

To have a transform map access the attachment, use the *`GlideRecord`* API in an `onAfter` script. The script needs to run in an `onAfter` event because the `target.sys_id` object is only available after the data is placed in the import set table. For example, to map the resulting attachment to the target transform record, you can use the following script.

```
var agr = new GlideRecord("sys_attachment");
  agr.addQuery("sys_id", source.u_blob_field);
  // the source field needs to be mapped to the source that is
 the BLOB
  agr.query();
   if(agr.next()) {
```

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```
   agr.table_name = "cmdb_ci"; // the target table of the
transform map
   agr.table_sys_id = target.sys_id; // the target record
   agr.content_type = source.u_contentype;
   // the content type string if available,
   // this becomes the mime encoding when clicking an
attachment link
   agr.update(); // finally, move/re-attach the attachment to
the target row }
```

If you are mapping directly to the `db_image` table, run the following `onAfter` script to display the image:

```
var strTemp = source.u_file_name;
var fType = strTemp.substr(- 3);
var iCont = "" ;

 if(fType == 'jpg') {
  iCont = 'jpeg' ; }
 else {
  iCont = fType; }

 var agr = new GlideRecord("sys_attachment");
 agr.addQuery("sys_id", source.u_blob_field);
 agr.query();

 if(agr.next()) {
  agr.table_name = "ZZ_YYdb_image";
  agr.table_sys_id = target.sys_id;
  agr.content_type = 'image/' + iCont;
  agr.file_name = 'image';
  agr.update(); }
```

Create a field map

Field maps establish a relationship between a field in an import set table and a field in the target table.

Before you begin

Role required: import_transformer, import_admin, or admin

About this task

The field map determines what values from the source table the transformation adds to the target table.

Procedure

1. Navigate to **All** > **System Import Sets** > **Transform Maps**.
2. Open a transform map.
3. In the **Field Maps** related list, click **New**.
4. Complete the form.

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Field map fields

Field	Description
Map	Transform map that uses this field mapping (populated automatically).
Source table	Table from which the raw import set data is loaded (the source for the transformation). Populated automatically from the transform map.
Source field	Field on the source table to be transformed. Can be blank if the **Source table** contains only raw data.
Choice action	Specifies the action to take if the import set contains a reference or choice value other than those available. Appears if the target field is a choice list or reference field. ○ **create**: Create a new choice or record in the reference table. ○ **ignore**: Ignore the new value from the source table. ○ **reject**: Skip the entire row (record) containing the new value and continue to the next row.
Date format	Date format of the source field. Appears if the target field is a Date or Date/Time field. **Note:** To learn more about allowable date formats, see Global date and time field format.
Use source script	Check box to use a script instead of the **Source field**.
Application	Application scope: global or per application.
Target table	Table in which the transformed data is inserted. You can select only tables within the currently selected application scope or the global scope, or tables that grant write access to other applications.
Target field	Field in the target table where the value from the source field is stored.
Referenced field value name	When the target field is a reference field, the transform map needs a way to match incoming source values to existing records in the reference field's source table. Since most imports do not provide a 32-character sys_id value, you must specify a column from the reference field's source table that contains values that match the incoming source values.

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Field	Description
	When there is a matching record, the transform map stores the sys_id of the matching record in the target field. If there is no matching record, the transform map creates a new record in the reference field's table and stores the sys_id of the new record in the target field. If you leave this field blank, the transform map looks for matching values from the display value column of the reference field table. For example, suppose you are importing incident records and the incoming data lists user IDs for the **Assigned to** field. If you leave **Referenced value field name** blank, the transform map searches for matching values in the User table's display value column: name. By setting the **Referenced value field name** to the user_name column, you can match the user ID values to the appropriate user records.
Coalesce	Configuring a target field to coalesce causes the import set to treat the field as a unique key. When selected, the import set application attempts to match source values to records with values from an existing record. If a match is found, the transform map updates the record instead of creating a new record. When false, the import set application always creates new records for each transformation. If multiple fields are set to coalesce, all coalesce values must match an existing record. If two fields are set for coalescing and a matching value is found for one of the coalescing fields but not on the other, a new record is inserted. You must create an index on the target table if none of the coalesce fields are indexed. Indexing can improve performance for read and write operations. If one or more coalesce fields already has an index, you do not need to create an additional index. After setting the **Coalesce** value for all fields on the target table, use the **Index Coalesce Fields** related link to create an index. Before creating the index, ensure that the **Coalesce** value is set correctly for all fields on the target table to avoid creating unnecessary indexes for the same target table.

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Field	Description
	The index needs to be concatenated; meaning all fields specified to be coalesced, need to be in the same index. The correct setup is for one index to include all fields being coalesced.
Coalesce empty fields	Check box to match an empty source field value to an empty target field value. For example, the User transform map coalesces on the email field. With this option selected, a source record containing an empty email address coalesces to a target record containing an empty email address.
Coalesce case sensitive	Check box to make case-sensitive coalesce values result in the creation of new records. By default, values marked as **Coalesce** are used in a case-insensitive lookup for existing records. Case-insensitive records update existing records only and do not cause the creation of new records.

5. Click **Save**.
6. Repeat steps 3-5 for each field mapping.
7. Click **Update**.

Field map script variables

Several predefined variables are available in the **Source script** field.

Variable	Type	Description
source	GlideRecord	The record from the source table that is currently being processed.
target	GlideRecord	The record from the target table that is currently being processed.
answer	String	The field value to set in the target record.
map	GlideTransformMap	Read-only information about the current transform map record.
log	Function	The log object for the current import run. Use this object to log messages such as `log.info("<Message>")` or `log.warn("<Message>")`. This object logs to the import log for standard import sets, or other log locations as required, such as for web service imports.
action	String	Contains either the value **insert** or **update**, depending on whether the current target row will be created or updated. **Note:** The *action* variable is available only when the **Coalesce** field is **false**.

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Run an import

You can manually run an import to immediately import data.

Before you begin

Role required: admin

Procedure

1. From a Transform Map, click **Transform**.

   When the import completes, you see a link to go to the target table containing your imported records. The amount of time that it takes to run an import varies depending on the number of records you import. It might take as long as several hours for very large import operations (tens of thousands of records).

2. **Optional:** Click **View the imported data** to see the loaded import set table.
3. **Optional:** Click **Create transform map** to create a new transform map to transform the data in the import set table to its target table.
4. **Optional:** Click **Run import** to execute an existing transform map for the loaded data.

Result

Three things to note at this point:

- The spreadsheet is imported, and a new table is created to hold the data.
- Within that table, the imported records are designated with their own Set value.
- A new module is created in the System Import Sets application for the new table.

Importing date/time values

Considerations when importing data containing date/time values.

- The field containing the date/time value should be a Date/Time type field in the target table.
- The user performing the import should have their timezone (in the **Time zone** [time_zone] field in the User [sys_user] record for that user) set to match the timezone of the date/time values in the import file.

  To set the user timezone, do the following.

  1. Click the user drop-down in the banner and select **Profile**.
  2. Change the **Time zone** field value to the timezone of the date/time values in the import file and click **Update**.

Review the import set

After an import set completes, you can review the completed import and clean up import set tables. Even if no errors are reported by the progress indicator, review how your data is imported into the new import set.

Before you begin

Role required: admin.

Procedure

1. Click **View imported data**.

   There are several fields that are visible in the table that were not part of the original data source, these are system rows that can be used to facilitate scripted import operations.

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2. Review the data.
3. Return to the previous page.

What to do next

Create a transform map to associate with this import set.

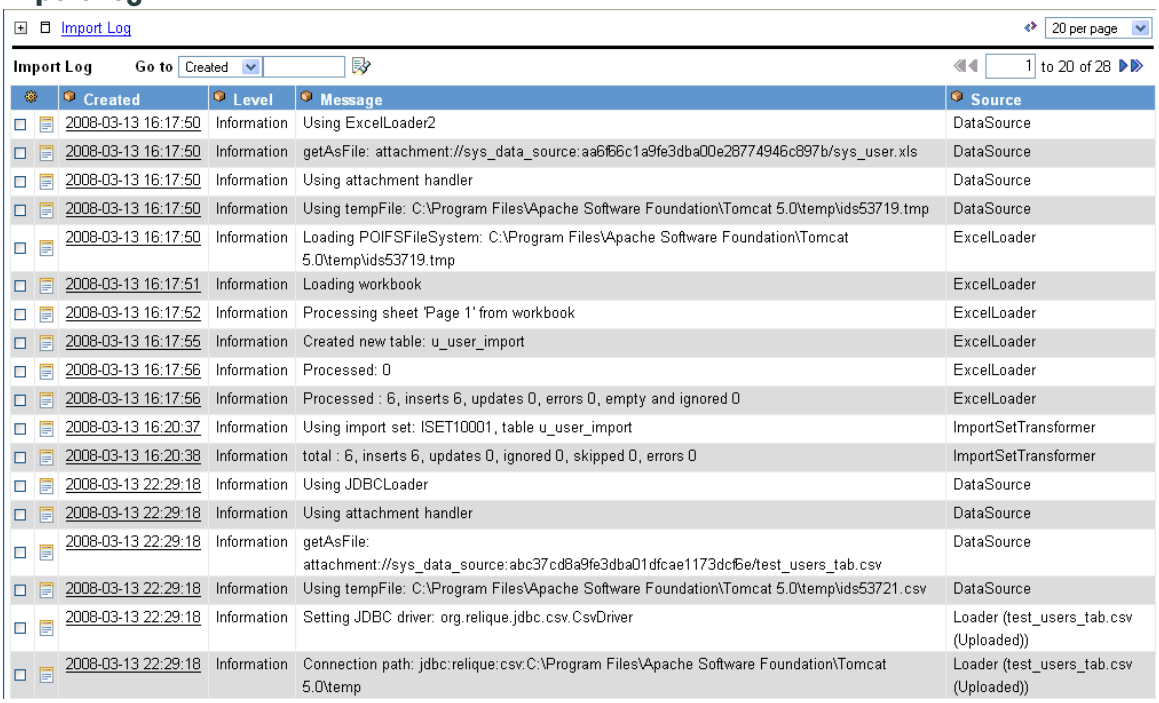
Viewing the import log

The import log is where you can find information about the internal processing that occurs during an import operation.

The log includes information generated by the system during every step of the import operation from initialization of the import set table from a data source to transformation onto a target table. It is also possible to customize log output during the transformation by using log.info, log.warn, log.error statements.

To view the import log, navigate to **All** > **System Import Sets** > **Advanced** > **Import Log**.

Import Log



Import Log

Import Log — 20 per page

Import Log — Go to: Created — 1 to 20 of 28

Created	Level	Message	Source
2008-03-13 16:17:50	Information	Using ExcelLoader2	DataSource
2008-03-13 16:17:50	Information	getAsFile: attachment://sys_data_source:aa6f66c1a9fe3dba00e28774946c897b/sys_user.xls	DataSource
2008-03-13 16:17:50	Information	Using attachment handler	DataSource
2008-03-13 16:17:50	Information	Using tempFile: C:\Program Files\Apache Software Foundation\Tomcat 5.0\temp\ids53719.tmp	DataSource
2008-03-13 16:17:50	Information	Loading POIFSFileSystem: C:\Program Files\Apache Software Foundation\Tomcat 5.0\temp\ids53719.tmp	ExcelLoader
2008-03-13 16:17:51	Information	Loading workbook	ExcelLoader
2008-03-13 16:17:52	Information	Processing sheet 'Page 1' from workbook	ExcelLoader
2008-03-13 16:17:55	Information	Created new table: u_user_import	ExcelLoader
2008-03-13 16:17:56	Information	Processed: 0	ExcelLoader
2008-03-13 16:17:56	Information	Processed : 6, inserts 6, updates 0, errors 0, empty and ignored 0	ExcelLoader
2008-03-13 16:20:37	Information	Using import set: ISET10001, table u_user_import	ImportSetTransformer
2008-03-13 16:20:38	Information	total : 6, inserts 6, updates 0, ignored 0, skipped 0, errors 0	ImportSetTransformer
2008-03-13 22:29:18	Information	Using JDBCLoader	DataSource
2008-03-13 22:29:18	Information	Using attachment handler	DataSource
2008-03-13 22:29:18	Information	getAsFile: attachment://sys_data_source:abc37cd8a9fe3dba01dfcae1173dcf6e/test_users_tab.csv	DataSource
2008-03-13 22:29:18	Information	Using tempFile: C:\Program Files\Apache Software Foundation\Tomcat 5.0\temp\ids53721.csv	DataSource
2008-03-13 22:29:18	Information	Setting JDBC driver: org.relique.jdbc.csv.CsvDriver	Loader (test_users_tab.csv (Uploaded))
2008-03-13 22:29:18	Information	Connection path: jdbc:relique:csv:C:\Program Files\Apache Software Foundation\Tomcat 5.0\temp	Loader (test_users_tab.csv (Uploaded))

Import run history

The import history gives status information about individual import operations.

Note: Functionality described here requires the **Admin** role.

Run import utility

The Run Import utility is used to run an import operation using an existing Transform Map and Import Set table.

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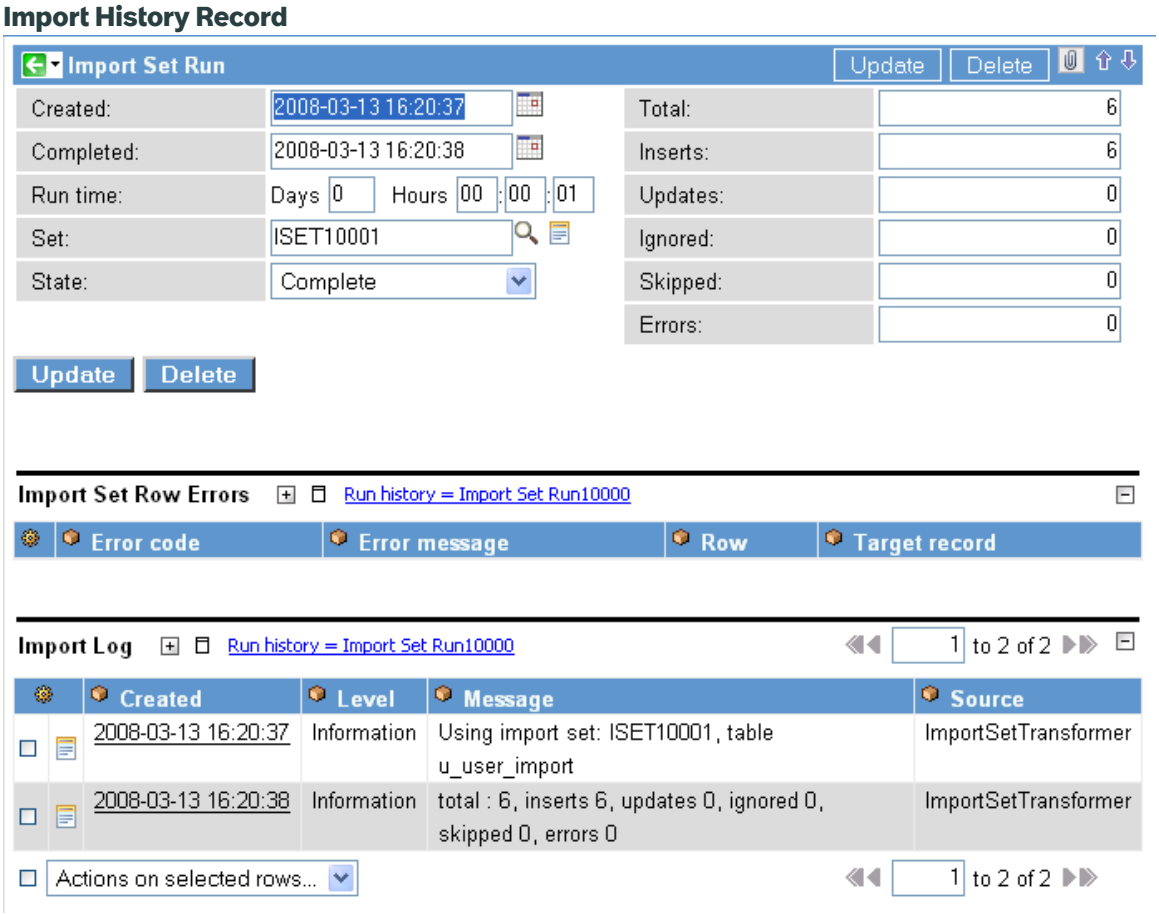

Error Codes are related to a transformation. Not all errors produce error codes. If an error code does exist, it is in the [sys_import_set_row_error] table error code field.

Error Codes

- **100** Reference field value rejected.
- **200** Choice field value rejected.
- **300** List reference field rejected.
- **800** Invalid target record or field.
- **900** Transform script error.

Schedule a data import

Schedule imports to make it possible to specify that certain import operations occur at a regular interval.

Before you begin

Role required: import_scheduler, import_admin, or admin

Warning:

Giving the user the import_scheduler role is equivalent to giving the user the admin role, because the import_scheduler has the ability to execute scripts with administrator level privileges.

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Scheduled Imports**.
2. Click **New**.

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3. On the form, fill in the fields.

Scheduled Data Import form

Field	Description
Name	Name for the scheduled data import.
Data source	Data source record that defines the data to import. If you select a remote data source, it refreshes using the remote connection before the import be The transform map or robust transformer used for the data import is connected to the selected d source. You can view the transform map or robust transformer by opening the data source record viewing the Transforms and Robust Transformer tabs.
Run as	Name of a user whose credentials the import job uses. If you do not specify a value, the import jo runs as the guest user.
Active	Option to activate the scheduled import.
Use connection	Option to specify the connection alias for the scheduled import. This option is available for Data Sources configured to use a connection alias.
Connection	Connection to use for the scheduled import. Select the default parent alias or any of its children's aliases. This field is available when **Use connection** is checked. The sys_id for the selected connection alias is stored in the Glide session. It can be accessed in the script for the custom data source or in any transform script using the code `gs.getSession().getClientData('connection_credential_alias_overri`
Run	Frequency at which you want to run the import.
Day	Day on which to run the import. Visible only if you select *Weekly* or **Monthly** from the Run list.
Time	Time that you want the import to begin. Do not schedule multiple imports at the same time. Runni multiple imports at the same time might negatively impact performance or cause an instance out
Repeat interval	Period that must elapse before the import repeats. Visible only if you set **Run** to *Periodically*.
Starting	Date on which the import should begin (selected using the select date and time icon (). Vis only if you set **Run** to *Periodically*.
Parent	The parent import set to which this import set belongs, and after which this import should run. Vis only if you set **Run** to *After Parent Runs*.
Conditional	Option to specify a script that defines the conditions that must evaluate to *true* before the import runs.
Condition	Script that evaluates whether an import should run. Visible only if you select **Conditional**.
Concurrent Import	Option to run a concurrent import. A concurrent import splits the data into multiple import sets ar runs the import sets concurrently to reduce processing time for large data sets. **Note:** A concurrent import does not transform data in a predictable order. If order matters, c not run a concurrent import. For more information, see Concurrent imports.

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Field	Description
Partition Method	Method used to allocate each data set record to an import set: ○ **Round Robin**: The system sets partitions automatically. Assume that there are 20 records and 4 import sets. The system allocates record 1 to import se 1, record 2 to import set 2, record 3 to import set 3, and record 4 to import set 4. The system the allocates record 5 to import set 1, record 6 to import set 2, record 7 to import set 3, and record 8 import set 4. This pattern continues until all records are assigned to import sets. When the allocation finishes, import set 1 contains records 1, 5, 9, 13, 17. Import set 2 contains records 2, 6, 10, 14, 18. Import set 3 contains records 3, 7, 11, 15, and 19. Import set 4 contains records 4, 8, 12, 16, and 20. ○ **Custom Script**: Sets the partitions with a **Partition Script** that you provide. ○ **Custom size**: Sets the partition size to the **Partition Size** specified. After the system processes the first partition, the data from that partition can be transformed, e though the other partitions have not finished processing.
Partition Script	Script used to return a partition key. The system ensures that data set rows with the same partitio key go to the same import set. Visible only if you set **Partition Method** to **Custom Script**.
Partition Size	The number of records in each partition. Visible only if you select a **Partition Method** of **Custom size**.
Execute pre-import script	Option to specify a script to run before the import happens.
Prescript	Script to run before the data imports. Visible only if you select **Execute pre-import script**.
Execute post-import script	Option to run a script after the import happens.
Post script	Script to run after the import happens. Visible only if you select **Execute post-import script**. **Note:** For concurrent imports, the script runs after the last *`Import Set Transformer`* completes.

4. Click **Submit**.
5. To stop an import that is taking too much time, navigate to **System Import Sets** > **Advanced** > **Progress**.
   a. Open the Progress Worker that you must cancel.
   b. Click the **Cancel job** related link.
6. To display a list of executions records, click **Executions**.
7. From the Executions list, select the execution record that you want to display.

   The execution record shows:

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- The execution number.
- The schedule import name.
- The import set name.
- The execution context number.

8. To display details about the executions, select the executions contexts record that you want to display.

Scheduled data import scripting options

Multiple JavaScript objects are available in the Scheduled Data Import **Pre script** and **Post script** fields.

Data import scripting options

Object	Description	Example
cancel	Set this object to *true* to stop the import action.	Use the **Pre script** field to evaluate the conditions of the import and determine whether to cancel the import process. To cancel the import process, use the following call: `cancel = true;`
import_set	Get the GlideRecord object for the new import set. This variable allows you to query the following columns from the sys_import_set table: • number • sys_id • state • table_name	If you want to use information from the import set, you can specify one of the properties of the import_set variable. `var x = import_set.number;`

data_source	GlideRecord of the data source to be used for the scheduled import.	Typically, you define the data source with the Scheduled Data Import record. If you want to access this data source or modify the data source in certain conditions, you can use the following.
		`data_source.import_set_table_name = 'new_set_from_scheduler';`
		`data_source.update();`

Monitor scheduled data import executions

Monitor scheduled data import executions to see the hierarchy and flow of the scheduled chained imports.

Before you begin

If after executing a scheduled concurrent data import there are indications of a problem, use the Execution Contexts to see the details necessary to diagnose the issue.

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Role required: import_admin

About this task

The execution contexts feature enables you to identify the order of execution of concurrent import sets. You can also open the import set records to access the import log.

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Execution Contexts**.
2. In the list of execution contexts, select one record.

   The table lists:

   - The parent import scheduled data import record.
   - The execution record numbers for each scheduled import in a concurrent import.
   - All the import set records that are part of a scheduled import.
   - The scheduled import record names.
   - The date that the execution context was created. This date is when the import executed.
3. To add any of the following fields, click the personalized list icon ( ):
   - **Created by**
   - **Import Set Table**
   - **Updated**
   - **Tags**
   - **Updated by**
   - **Updates**
4. To open a record, click a record name or number.
5. To display the execution record, click the execution record number.

   The execution record shows:

   - Scheduled import name.
   - Import set table.
   - Import Set number.

   You can open the import set record from the execution record.

Monitor concurrent import sets

Monitor concurrent import sets to check the status of import sets and import set jobs, resume or reprocess import sets, and view transform history.

Before you begin

After executing a concurrent data import, use the Concurrent Import Set Jobs to verify the status.
Role required: import_admin.

About this task

When a scheduled concurrent import runs, each concurrent import creates a concurrent import set record. All related import sets, concurrent import set jobs, and transform histories are shown in the form view.

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Procedure

1. Navigate to **All** > **System Import Sets** > **Concurrent Import Set Jobs**.
2. Select the scheduled import for which you want to check the status.
3. Reprocess or continue import sets, check the status of import sets or concurrent import set jobs, view transform history, or display a list of executions records by clicking one of the following related links.

Option	Description
Reprocess	Start another scheduled import to reprocess the records.
Continue	Restart a scheduled import that is not complete.
Import Sets	State of import sets. **State** ○ **Pending** if the system has not started processing the im port set. ○ **Running** if the system is processing the import set. ○ **Processed** if the system has completed processing the im port set. ○ **Error** if the import set processing failed. Select an import set to see processing details for Import Set Runs and Import Set Rows for the import set.
Concurrent Import Set Jobs	Type and state of concurrent import set jobs: **Type** ○ **Regular** if you are running the scheduled im port for the first time. ○ **Reprocessing** if you are rerunning the sched uled import. ○ **Resuming** if you are resuming a scheduled im port that had an error. **State** ○ **Pending** if the system has not started process ing the import set. ○ **Running** if the system is processing the import set. ○ **Completed** if the system has completed pro cessing the import set. ○ **Error** if the import set processing failed. Select an import set job to see processing details for Import Set Runs and Import Set Rows for the import set job.
Transform Histories	Check statistics in the transform histories for the scheduled import.

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Option	Description
	Select a start time to see Import Set Row Errors (including er ror codes and messages) and the Import Log for the sched uled import.
Executions	Executions contexts ○ The parent import scheduled data import record. ○ The execution record numbers for each scheduled import in a concurrent import. ○ Import set records that are part of a scheduled import. ○ The scheduled import record names. ○ The date that the execution context was created.

Monitor concurrent import set jobs

Check the status of concurrent import set jobs.

Before you begin

Role required: import_admin

Procedure

1. Navigate to **All** > **System Import Sets** > **Concurrent Import Set Jobs**.
2. Review the **Type** and **State** of each parent import set job.

Option	Description
Type	Type of concurrent import set job: ○ **Regular** if you are running the scheduled import for the first time ○ **Reprocessing** if you are rerunning the scheduled import ○ **Resuming** if you are resuming a scheduled import that had an error
State	Status of the import set job: ○ **Pending** if import processing has not started ○ **Running** when import processing has started ○ **Completed** when import processing has finished ○ **Error** if import processing did not finish successfully

3. Select a parent import set job to review the **Type** and **State** of each of its child import set jobs.

Post CSV or Excel files directly to an import set

An administrator can post CSV or Excel files directly to instance.

Before you begin

Role required: import_set_loader

About this task

The `sys_import.do` target lets you dynamically upload a CSV or Excel file into the import set table specified by the *`sysparm_import_set_tablename`* parameter. You must specify a name that matches an existing import set table name. If the import set table does not exist, pre-

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create it by performing a manual import. The *sysparm_transform_after_load=true* parameter causes the CSV transform to be executed immediately, if a transform map exists.

You can upload a file using POST to the following URL (replace placeholders with desired values):

```
https://<instance>.service-now.com/sys_import.do?sysparm_import_
set_tablename=<table_name>&sysparm_transform_after_load=<true>
```

Important: The body of the POST must contain the file as a multi-part attachment.

Posting a CSV file - Perl and Java examples

An example using Perl to post a CSV file with basic auth credentials and Java Apache HttpClient class to post a CSV file with basic auth credentials.

For more information, see Post CSV or Excel files directly to an import set.

Perl example

```
# file: uploadafile.pl
# call me like this:
# uploadafile.pl
 --url="https://
instance.service-now.com/sys_import.do?sysparm_import_set_tablen
ame=dloo_test&sysparm_transform_after_load=true"
# --uploadfile=/Users/davidloo/Desktop/test_files/test_users.csv
#
# the "sysparm_transform_after_load=true" parameter instructs
 the import set to transform immediately after loading
#
use strict;
use LWP::UserAgent;
use HTTP::Request::Common;
use Getopt::Long;
use File::Basename;

my ( $o_url, $o_fqn );
GetOptions(
    "url=s"        => \$o_url,
    "uploadfile=s" => \$o_fqn,
);

# mandatory arguments: url
&usage unless ( $o_url && $o_fqn );

my $url   = $o_url;
my $fname = $o_fqn;

# put timeouts, proxy etc into the useragent if needed
my $ua  = LWP::UserAgent->new();

# setup basic authentication credentials
$ua->credentials(
  'demo.service-now.com:443',
  'Service-now',
  'admin' => 'admin'
);
```

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```
my $req = POST $url, Content_Type => 'form-data',
        Content      => [
                submit => 1,
                upfile =>  [ $fname ]
        ];
my $response = $ua->request($req);



if ($response->is_success()) {
    print "OK: ", $response->content;
} else {
    print $response->as_string;
}

exit;

sub usage {
        printf "usage: %s --url=%s --uploadfile=%s\\n",
                basename($0),'https://....','c:/data/test.csv';
        exit
}
```

Java example

Note: The Apache HttpClient may limit the amount of data you can import in a single transaction. This example is meant as a starting point and should not be used in production.

```
HttpClient httpclient = new HttpClient();
PostMethod post = new
 PostMethod("https://
instance-name.service-now.com/sys_import.do?sysparm_import_set_t
ablename=u_test_upload&sysparm_transform_after_load=true");

try {
  Credentials defaultcreds = new
 UsernamePasswordCredentials("admin", "admin");
  httpclient.getState().setCredentials(AuthScope.ANY,
 defaultcreds); // Prepare HTTP post
  httpclient.getParams().setAuthenticationPreemptive(true);

  File targetFile = new
 File("/Users/davidloo/Desktop/test_files/nodeinfo27368201988349
83863.csv");
  Part[] parts = { new FilePart(targetFile.getName(),
 targetFile) };

  post.setRequestEntity(new MultipartRequestEntity(parts,
 post.getParams()));

  int result = httpclient.executeMethod(post);

  // Display status code
  System.out.println("Response status code: " + result);
```

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```
  // Display response
  System.out.println("Response body:
 "+post.getResponseBodyAsString());
} catch(Exception e) {
  System.err.println(e.getMessage());
} finally {
  // Release current connection to the connection pool
  // once you are done
  post.releaseConnection();
}
```

Delete import sets

Delete import sets to clean up your database on a scheduled basis, one time only, or on demand.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Import Sets** > **Import Set Tables** > **Scheduled Cleanup**.
2. Fill out the form.

Field	Description
Name	Defaults to **Import Set Deleter**. You can change the name if desired.
Active	Checked if the schedule is active. Unchecked if the schedule is not active.
Application	Defaults to **Global** and can't be changed.
Conditional	Checked if the Import Set Deleter must meet specified conditions. Unchecked if the Import Set Deleter doesn't have to meet any conditions.
Run	Specifies the frequency of the Import Set Deleter: **Daily**, **Weekly**, **Monthly**, **Periodically**, **Once**, or **On Demand**.
Time zone	For scheduled job types that require an entered time, you can enter an associated time zone. If no time zone is selected, the job runs at the specified time in the time zone of the user who entered the time. If **Use System Time Zone** is selected, the job runs at the specified time in the time zone of the instance running the job.
Time	The time of day to run the Import Set Deleter.
Run this script	The script that performs the deletion. Defaults to deleting import sets and their related import set rows that were created more than seven days ago.
Day	The day of the week for weekly runs, or the day of the month for monthly runs.
Repeat Interval	The number of days in the repeat interval and up to three times of day for the repeat interval.
Starting	The starting date and time for the periodical run or the one-time run.

3. Click **Update** to update the schedule, or click **Execute Now** to run the Import Set Deleter immediately.

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Delete import set tables

Delete import set tables, related transform maps, or data only (preserving the table structure) to clean up your database.

Before you begin

Role required: admin

Procedure

1. Navigate to **All** > **System Import Sets** > **Import Set Tables** > **Cleanup**.
2. Move the tables you want to delete from **Available tables for deletion** to **Delete these tables**.
   Deleting any table deletes all records and removes the table.
3. Include deleting related transform maps when you delete the import set tables by selecting the **Delete related transform maps** check box.
   All records and all associated transform maps are removed.
4. Delete only data from the selected import set tables and preserve the table structure by selecting the **Delete data only (preserve table structure)** check box.
   All records are removed, but the tables remain intact.
5. Click **Cleanup**.

Import sets properties

Multiple properties control import set behavior.

Import sets properties

glide.import_set.preserve.leading.spaces

Specifies whether the import process preserves leading spaces in Excel data cells. When false, the import process removes non-breaking leading spaces from Excel data cells. When true, the import process preserves non-breaking leading spaces.

Note: The import process always removes trailing spaces from Excel data cells.

- Type: true | false
- Default value: false
- Location: Add a system property

glide.import_set_row.dynamically_add_fields

Specifies whether an import set can add new columns to the staging table (true) or not (false). Instances that contain large numbers of import sets can sometimes become unresponsive when an import adds a column because the instance must alter every row in the staging table. In some cases, the database alter table action causes an outage. Setting this property to false prevents an import set from adding columns to the staging table and produces a log message. As a workaround, administrators can manually add a column to the staging table by creating a new dictionary entry and then reimporting the import set.

- Type: true | false
- Default value: true
- Location: Add a system property

com.glide.loader.verify_target_field_size

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Enables dynamic resizing of import set fields. With the default setting of **false**, up to 20 records of the source data are sampled to determine the import set field length. If the field is empty in all the sampled records, the default length of 40 is used. Any data loaded that exceeds the import set table field length is truncated. Set this property to **true** to allow any import set field to increase the column size by 100 to match the length of the data. For example, if the incoming source data has a length of 60, the system sets the length of the column to 160. This is relevant to data source only.

- Type: true | false
- Default value: false
- Location: Add a system property

glide.ds.file.http.variable_replacement

Enables system property expansion for File-type data sources that are retrieved using HTTP or HTTPS.

- Type: true | false
- Default value: true
- Location: Add a system property
- More information: Data source fields

glide.scheduled_import.stop_on_error

Set to *true* to stop the import process when the parent scheduled import generates an error. This behavior can be useful when one import set depends on the results of another import set.

- Type: true | false
- Default value: false
- Location: Add a system property

glide.impex.transformer.empty_value_nil

Controls how empty string values are handled during transformation from an import set staging table. Set this property to *true* to preserve empty strings. Set this property to *false* to convert empty strings to the string NULL.

Note: An empty string is always stored as a null value in the database, regardless of this property value.

You can use this property when you run an onBefore script during transformation. Setting this property to *true* allows you to check for null values using `hasValue()` or `nil()` functions.

- Type: true | false
- Default value: false
- Location: Add a system property

com.glide.loader.max_scan_rows

Controls how many rows of source data are sampled to automatically generate staging table fields when you import data. This property applies to JDBC, XLS, CSV, and XML imports but not to JSON and XSLX imports.

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- Type: integer
- Default value: 20
- Location: Add a system property

Concurrent import sets properties

glide.scheduled_import.max.concurrent.import_sets

Maximum number of import sets for one concurrent import.

- Type: Integer
- Default value: 10
- Location: Add a system property

com.glide.concurrent_import_set_insert_mutex_spin_wait

Wait time mutex spends if the lock is acquired (in milliseconds).

- Type: Integer
- Default value: 1000
- Location: Add a system property

com.glide.concurrent_import_set_insert_mutex_expiration

Mutex expiration time (in milliseconds).

- Type: Integer
- Default value: 300000
- Location: Add a system property

com.glide.concurrent_import_set_mutex_fast_lock

Specifies whether to use fast lock (true) or SQL-based slow lock (false).

- Type: true | false
- Default value: false
- Location: Add a system property

Web service import sets properties

com.glide.ws_import_set.column_resize

When true, enables dynamic column resizing on import staging tables for web service import sets.

- Type: true | false
- Default value: false
- Location: Add a system property

com.glide.ws_import_set.column_resize.max_row_count

The maximum number of rows an import staging table can have for dynamic column resizing with web service import sets.

Import staging tables with more than this number of rows will not use dynamic resizing with web service import sets, even if *com.glide.ws_import_set.column_resize* is true.

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This property has a maximum value of 500,000.

- Type: Integer
- Default value: 100,000
- Location: Add a system property

CSV properties

com.glide.csv.loader.ignore_non_parseable_lines

Allows an instance to ignore one or more lines (rows) that contain bad data in a CSV import, such as a row that is missing a column of data. By default, imports cannot ignore bad data in CSV files and fail on the first error.

- Type: true | false
- Default value: false
- Location: Add a system property

com.glide.csv.loader.max_errors_allowed

Specifies the maximum number of lines (rows) that an import can ignore before failing. If the import succeeds, the import lists the number of rows the import ignored due to errors.

- Type: integer
- Default value: 100
- Location: Add a system property

glide.import.csv.charset

The charset of the CSV file to import. Valid values are UTF-8 and WINDOWS-1252. You may need to use UTF-8 formatting when importing special characters.

- Type: String
- Default value: WINDOWS-1252
- Location: Add a system property

Excel import properties

glide.excel.multiplier

The maximum amount of instance memory to allocate to an Excel import. This property applies when importing .XLS files only.

The value of this property is multiplied by the file size of the Excel file to determine the total memory allocation. The memory used cannot exceed the limit specified by the *glide.excel.max_memory_percent* property.

For example, with the default value 8 and a 10MB Excel file, the instance will use up to 80MB of memory for the import.

- Type: integer
- Default value: 8
- Location: Add a system property

glide.xlsx.multiplier

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The maximum amount of instance memory to allocate to an Excel import. This property applies when importing .XLSX files only.

The value of this property is multiplied by the file size of the Excel file to determine the total memory allocation. The memory used cannot exceed the limit specified by the *glide.excel.max_memory_percent* property.

For example, with the default value 10 and a 10MB Excel file, the instance will use up to 100MB of memory for the import.

Note: Do not modify the value of this property. The default value was selected for optimal performance.

- Type: integer
- Default value: 10
- Location: Add a system property

glide.excel.max_memory_percent

The maximum amount of memory allowed for Excel imports, as a percentage of the total instance memory.

- Type: integer
- Default value: 10
- Location: Add a system property

glide.excel.use_disk_backed_strings_table

Controls whether the instance uses disk storage to maintain large file data during XLSX import. Set this property to false to store XLSX file data only in memory. Setting this property to false increases the memory used during XLSX import.

- Type: true | false
- Default value: true
- Location: Add a system property

glide.excel.in_memory_strings_table_size_mb

The maximum amount of memory, in megabytes, available to store XLSX file data before writing to disk storage when glide.excel.use_disk_backed_strings_table is true. Setting a lower value for this property will use less memory during XLSX import but may result in slower imports.

- Type: integer
- Default value: 5
- Location: Add a system property

glide.xlsx.import.debug

Enables debug logging for XLSX imports.

- Type: true | false
- Default value: false
- Location: Add a system property

glide.import.excel.enhanced_number_conversions

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When true, numeric values greater than 10 million are preserved in import staging tables. When false, imported values greater than 10 million are converted to scientific notation that may not match the original imported value. This property should be set to true for importing most kinds of data.

- Type: true | false
- Default value: true
- Location: Add a system property

glide.transform.boolean.casesensitive

When true, upper case boolean values of (TRUE/FALSE) always transform to false. When false, upper case boolean values (TRUE/FALSE) are transformed correctly.

- Type: true | false
- Default value: true
- Location: Add a system property

JDBC connection properties

glide.jdbcprobeloader.retry

The number of times a JDBC probe loader attempts to process data returning from a JDBC data source. Sleeps on the value defined in *`glide.jdbcprobeloader.retry_millis`* between retries.

- Type: integer
- Default value: 60
- Location: Add a system property

glide.jdbcprobeloader.retry_millis

How many milliseconds a JDBC probe loader waits in between retry attempts to process data from a JDBC data source.

- Type: integer
- Default value: 5000
- Location: Add a system property

Logging and debug properties

com.glide.import_set.importlog_level

Specifies how much information import sets add to the log. Possible values are INFO, WARNING, and ERROR. You can set this to INFO in the dev environment and change it to WARNING or ERROR in production to reduce amount of logging noise traffic to the database.

> **Note:** This property does not impact logging related to the cleanup of staging tables.

- Type: string
- Default value: INFO
- Location: Add a system property

glide.import.debug

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Enables debug logging for all import processes.

- Type: true | false
- Default value: false
- Location: Add a system property Add to the System Property [sys_properties] table

glide.importlog.log_to_table

Specifies whether to write information-level log messages into the import_log table. When true, the information-level log messages are written.

> **Note:** The information-level logs for IntegrationHub ETL are written to the importlog.log table regardless of this property setting. To have additional exceptions added, contact Now Support.

- Type: true | false
- Default value: false
- Location: Add a system property

glide.import.sftp.debug

Enables additional debug logging for SFTP imports. Enabling this property will cause the instance to log all outgoing and incoming messages during the SSH session.

- Type: true | false
- Default value: false
- Location: Add a system property

glide.import.scp.debug

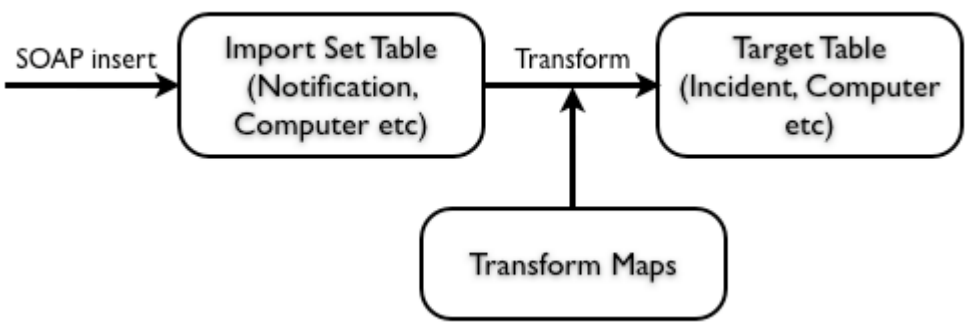
Enables additional debug logging for SCP imports. Enabling this property will cause the instance to log all outgoing and incoming messages during the SSH session.

- Type: true | false
- Default value: false
- Location: Add a system property

Web service import sets

Web service import sets complement direct web services and scripted SOAP web services providing a web service interface to import set tables.

Web service import set



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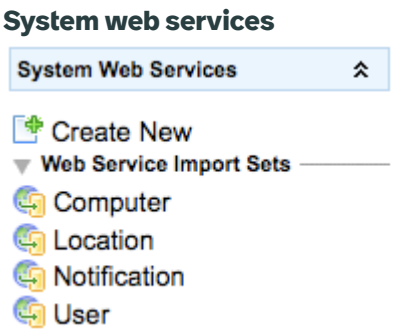
By default, this type of web service transforms the incoming data synchronously based on the associated transform maps. If the associated import set mode is set to *Asynchronous*, the behavior is to save the data for transformation at a later time. Web service import sets tables publish all the default web service functions in the WSDL.



This plugin also provides the following standard import set tables:

- Computer
- Location
- Notification
- User

You can access a web service import set WSDL by specifying the import set table name + ".do?WSDL" on the URL.

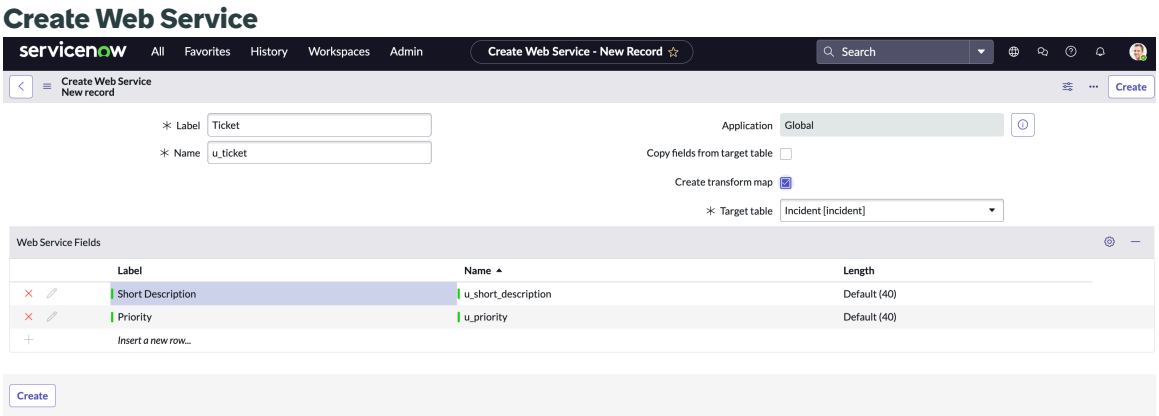
For example:

`http://<instance name>.service-now.com/imp_notification.do?WSDL`.

Creating an import set web service

Create a web service import set table to define how to stage and transform imported data.

Navigate to **All** > **System Web Services** > **Inbound** > **Create New**.



The *Name* of the web service is the table name of the import set table whereas the *Label* field is the resulting table field.

If you want to create a transform map after creating the web service, check the **Create transform map** checkbox and choose the target table you want the data to transform into. After the **Create** button is selected, the web service is created and you will be immediately put into the *Table Transform Map* form. You may then continue to specify the transform map or script.

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Web Service Fields

The fields available for this web service. All fields by default are published as the XSD type of `xsd:string`. The *Name* is the field that is exposed for the web service and therefore appears as the name of the field in the WSDL. The *Label* is the label of the field as it appears for the import sets table.

You can *Add*, mark for *Delete* or modify (double-click the field) an existing web service field in this list.

Note: After adding web service fields, click **Create** to create the web service import set table.

To add other fields after the Web Service is created, find the target table, and add the fields to that table.

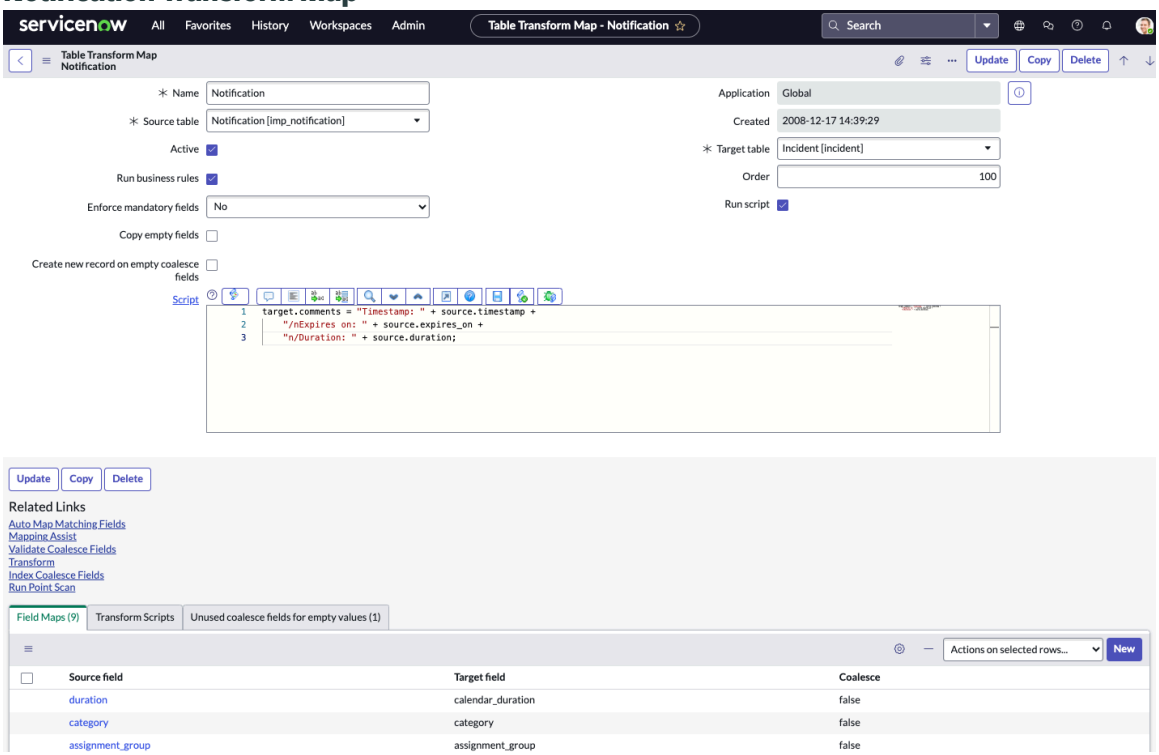
Mapping web service import sets

During the creation of the web service import set, you may optionally create the transform map for it.

All transform maps are executed for the service when it is invoked and the import set mode is set as "Synchronous" (the default).

The following image is an example of the transform map associated with the Notification web service import set.

Notification Transform Map



Adding Web Service Response Values

In the transform map script associated with a web service import set, some variable values can change the response values of the web service. In addition to the normal variables that are available in a transform map script, the table documents the variables that are available and their effects.

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Adding Web Service Response Values

Variable name	Type	Description
response	Output Object	Javascript object that holds dynamically created response elements used to customize the output response of a web service import set insert.

Example

```
// create new elements called "transaction_id"
// and "hello" in the web service response
response.transaction_id="abc123";
response.hello="world";

status_message="message 1";
// this is the normal status_message variable
```

The code snippet example results in the following response being generated back to the web service consumer

```
<soapenv:Envelopexmlns:imp="http://
www.service-now.com/imp_notification"
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/">
<soapenv:Header/><soapenv:Body>
<insertResponse
 xmlns="http://www.service-now.com/imp_notification">
  <sys_id>969d157c0a0a0baf008ba5770ffa798c</sys_id>
  <table>incident</table>
  <display_name>number</display_name>
  <display_value>INC0010091</display_value>
  <status>inserted</status>
  <status_message>message 1</status_message>
  <transaction_id>abc123</transaction_id>
  <hello>world</hello>
</insertResponse>
</soapenv:Body></soapenv:Envelope>
```

Debugging web service import sets

To debug a SOAP Request coming into the system, create the system property *`glide.processor.debug.SOAPProcessor`*.

Once you have created it, set it to *true* to have all SOAP requests be logged in the System Log. Set it to *false* when you are done to keep the size of your System Log to a managed length.

Web service import set mode

When a SOAP message inserts a record into an import set table, and there is no import set for that table in the **Loading** state, a new import set will be created with the **Mode** set to **Synchronous**.

An import set with a *Mode* of *Synchronous* will transform the data as soon as it is inserted (provided that the transform map already exists). This import set will also have a default *State* of *Loading*. By default, all *Synchronous* import sets will automatically be modified to *Processed* at midnight. As a result, when a new insert happens to the same table, a new *Synchronous* import set will be created.

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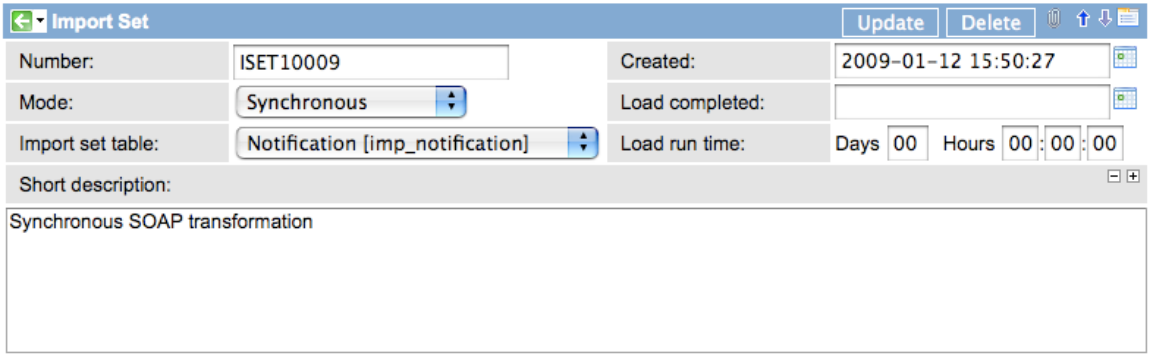
Synchronous import set



Changing this import set to a *mode* of *Asynchronous* and a *state* of *Loading* has the effect of not transforming the incoming data as it is inserted, but rather "loading" the import set and deferring the data transformation later, either manually, or with a scheduled script job.

Import Set Mode

Mode	State	Function
Asynchronous	Loading	Data transformation is not occurring automatically and immediately. Data added to import set row has a state of "Pending". Transform can be scheduled or executed manually when state is changed to *Loaded*
Asynchronous	Loaded	Marks the completion of data loading. Data transformation can now occur in a scheduled fashion or manually.
Synchronous	Loading	Data transformation is occurring automatically and immediately whenever data is inserted into the associated import set row.
Synchronous	Loaded	When new data is inserted into this associated import set, a new import set of mode *Synchronous* and state *Loading* will be created. Changing the state to *Loaded* is a way to indicate that a new *Synchronous* import set should be created for the next import set row insert (and transformed immediately)

Controlling Insert Behavior

In imports sets that specify one or more coalesce fields, records with a matching coalesce value are transformed from source to target table serially (one at a time) to prevent duplicates.

In import sets that do not specify any coalesce field, records are transformed concurrently. You can control this behavior using the `glide.import_set_insert_serialized_when_no_coalesce` property.

The `glide.import_set_insert_serialized.<table name>` system property controls how the instance inserts records from web service calls into a specific import set table. When true, this property prevents identical simultaneous inserts from creating duplicate records by serializing the database insert operations. If a target table does not have any coalesce fields defined in a transform map, set this property to *false* to improve web service import set performance.

Note: Setting this property to **false** can result in the creation of duplicate records.

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Note: The *glide.soap.import_set_insert_serialized.<table name>* system property provides equivalent functionality to *glide.import_set_insert_serialized.<table name>*, but if both properties are defined, *glide.import_set_insert_serialized.<table name>* supersedes *glide.soap.import_set_insert_serialized.<table name>*.

Standard SOAP Response

The SOAP response from a web service import set insert call returns the following standard values.

```
<SOAP-ENV:Envelope
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns:xsd="http://www.w3.org/2001/XMLSchema"
 xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
 xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
 SOAP-ENV:encodingStyle="http://
schemas.xmlsoap.org/soap/encoding/"><SOAP-ENV:Body><insertRespon
se><sys_id>fa648f5f0a0a0b2b0048e7012448b8f1</sys_id><table>incid
ent</table><display_name>number</display_name><display_value>INC
10014</display_value><status>inserted</status></insertResponse
></SOAP-ENV:Body></SOAP-ENV:Envelope>
```

Standard SOAP Response

Field	Description
sys_id	The Sys_id of the resulting record that was created or modified
table	The table name of the table that was affected. In the case of an *Asynchronous* call, the table name would be the import set table eg. imp_notification for the *Notifications* web service import set table
display_name	The name of the field that is set as the display field for the record that was created or modified
display_value	The value of the field designated as the display field. For example, the display field for the *Incident* table is the *Number* field and an example value would be INC10001
status	A string value that indicates the action that occurred as a result of the web service invocation, relating to the record defined by the `sys_id` and `table` field values • *inserted* - the record was inserted • *updated* - the record was updated • *ignored* - the input was ignored, the record was not updated and no new record was created • *skipped* - the input data was skipped (similar to ignored) due to missing coalesce values • *error* - there was an error processing the input
status_message	This value translates to the value found in the *Comment* field of the import set row and usually contains information related to the *status* value eg. "No field values changed" when the status is "ignored' . Setting this value to a

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Standard SOAP Response (continued)

Field	Description
	customized string value will cause the SOAP response to contain an optional status_message field to be returned.
error_message	The message related to a status of *error*. When an error occurs, setting this value to a customized string value will cause the SOAP response to contain an optional error_message field to be returned

Tailoring the SOAP Response

It is possible to include information other than the information specified in the WSDL by overwriting the contents of *status_message* using the transform script.

Inserting multiple records using insertMultiple

You can insert multiple records in one SOAP request by using the insertMultiple operation.

By default, insertMultiple operations create new import sets in **Synchronous** mode. To process new import sets asynchronously, activate the business rule Insert multiple asynchronous mode.

The insertMultiple operation is available for the Direct Web Service API and Web Service Import Sets. To enable insertMultiple, activate the Insert Multiple Web Service plugin.

Note: Activating this plugin adds a new operation to the SOAP WSDL. After this plugin is activated, consume a new WSDL to update your web services client.

Web service import sets security requirements

Web Service Import Sets use the same security mechanisms as SOAP Web Services.

- Basic authentication requires a Web Service user provide a valid user name and password.
- Contextual security requires a Web Service user meet the access control rule of the queried table.

If your instance uses high security settings, the Web Service user may also need the *soap* role.

Web service import sets related links

When displaying a mapped web service table, you have the following related links.

- Import Sets — The import sets related to this web service import set.
- Transform Maps — A list of transform maps related to this web service.
- Transform History — The transformation history.
- Edit Web Service — Edit the web service.

The following image shows a record that was inserted into the web service import set Notification. The target record is the resulting creation or modification to the Incident table record as a result of the transform.

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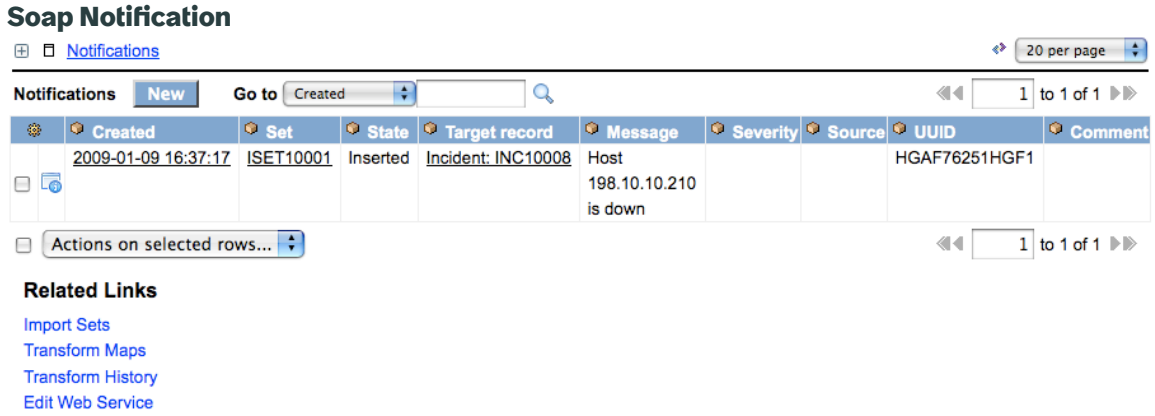

Web service import sets example

This example demonstrates the WSDL, SOAP envelope and response, Perl invocation, and result of a SOAP web service import.

Sample WSDL

```
<?xmlversion="1.0"encoding="UTF-8"?><wsdl:definitions
 targetNamespace="http://www.service-now.com"
 xmlns:tns="http://www.service-now.com/imp_notification"
  xmlns:sncns="http://www.service-now.com"
 xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/"
 xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
 xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
 xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
 xmlns:wsdl="http://
schemas.xmlsoap.org/wsdl/"><wsdl:types><xsd:schema
 xmlns:xsd="http://www.w3.org/2001/XMLSchema"
      elementFormDefault="unqualified"
 targetNamespace="http://
www.service-now.com/imp_notification"><xsd:element
 name="insert"><xsd:complexType><xsd:sequence><xsd:element
 maxOccurs="1" minOccurs="0" name="corrective_message"
 type="xsd:string"/><xsd:element maxOccurs="1" minOccurs="0"
 name="duration" type="xsd:string"/><xsd:element
 maxOccurs="1" minOccurs="0" name="expires_on"
 type="xsd:string"/><xsd:element maxOccurs="1" minOccurs="0"
 name="message" type="xsd:string"/><xsd:element maxOccurs="1"
 minOccurs="0" name="severity" type="xsd:string"/><xsd:element
 maxOccurs="1" minOccurs="0" name="source"
 type="xsd:string"/><xsd:element maxOccurs="1" minOccurs="0"
 name="timestamp" type="xsd:string"/><xsd:element maxOccurs="1"
 minOccurs="0" name="type" type="xsd:string"/><xsd:element
 maxOccurs="1" minOccurs="1" name="uuid"
 type="xsd:string"/></xsd:sequence></xsd:complexType></xsd:eleme
nt><xsd:element
 name="insertResponse"><xsd:complexType><xsd:sequence><xsd:elem
ent maxOccurs="1" minOccurs="1" name="sys_id"
 type="xsd:string"/><xsd:element maxOccurs="1"
 minOccurs="1" name="table" type="xsd:string"/><xsd:element
 maxOccurs="1" minOccurs="1" name="display_name"
 type="xsd:string"/><xsd:element maxOccurs="1" minOccurs="1"
```

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```
 name="display_value" type="xsd:string"/><xsd:element
 maxOccurs="1" minOccurs="1" name="status"
 type="xsd:string"/><xsd:element maxOccurs="1" minOccurs="0"
 name="status_message" type="xsd:string"/><xsd:element
 maxOccurs="1" minOccurs="0" name="error_message"
 type="xsd:string"/></xsd:sequence></xsd:complexType></xsd:eleme
nt></xsd:schema></wsdl:types><wsdl:message
 name="insertSoapOut"><wsdl:part name="imp_notification"
 element="tns:insertResponse"/></wsdl:message><wsdl:message
 name="insertSoapIn"><wsdl:part name="imp_notification"
 element="tns:insert"/></wsdl:message><wsdl:portType
 name="ServiceNowSoap"><wsdl:operation name="insert"><wsdl:input
 message="sncns:insertSoapIn"/><wsdl:output
 message="sncns:insertSoapOut"/></wsdl:operation></wsdl:portType
><wsdl:binding name="ServiceNowSoap"
 type="sncns:ServiceNowSoap"><soap:binding style="document"
 transport="http://
schemas.xmlsoap.org/soap/http"/><wsdl:operation
 name="insert"><soap:operation
 soapAction="http://www.service-now.com/imp_notification/insert"
 style="document"/><wsdl:input><soap:body
 use="literal"/></wsdl:input><wsdl:output><soap:body
 use="literal"/></wsdl:output></wsdl:operation></wsdl:binding><w
sdl:service name="ServiceNow"><wsdl:port name="ServiceNowSoap"
 binding="sncns:ServiceNowSoap"><soap:address
 location="http://
Macintosh-7.local:8080/glide/imp_notification.do?SOAP"/></wsdl:p
ort></wsdl:service></wsdl:definitions>
```

Sample SOAP Envelope

```
<?xmlversion="1.0"encoding="UTF-8"?><SOAP-ENV:Envelope
 xmlns:xsd="http://www.w3.org/2001/XMLSchema"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
 SOAP-ENV:encodingStyle="http://
schemas.xmlsoap.org/soap/encoding/"
 xmlns:SOAP-ENV="http://
schemas.xmlsoap.org/soap/envelope/"><SOAP-ENV:Body><insert
 xmlns="http://www.service-now.com"><message
 xsi:type="xsd:string">Host 198.10.10.210 is down</message><uuid
 xsi:type="xsd:string">HGAF76251HGF1</uuid></insert></SOAP-ENV:B
ody></SOAP-ENV:Envelope>
```

Sample SOAP Response

```
<?xmlversion="1.0"encoding="UTF-8"?><SOAP-ENV:Envelope
 SOAP-ENV:encodingStyle="http://
schemas.xmlsoap.org/soap/encoding/"
 xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
 xmlns:xsi="http://
www.w3.org/2001/XMLSchema-instance"><SOAP-ENV:Body><insertRespon
se><sys_id>b54aafbfc0a8006f0058db95daa5b88d</sys_id><table>incid
ent</table><display_name>number</display_name><display_value>INC
10008</display_value><status>ignored</status><status_message>No
```

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```
 field values
 changed</status_message></insertResponse></SOAP-ENV:Body></SO
AP-ENV:Envelope>
```

Example Invocation using Perl

The following example script uses the *Notification* web service to create an Incident as the *itil* user. It uses the Perl language and the SOAP::Lite package.

```
#!/usr/bin/perl -w

#use SOAP::Lite ( +trace => all, maptype => {} );use SOAP::Lite;

sub
 SOAP::Transport::HTTP::Client::get_basic_credentials{return'iti
l'=>'itil';// set basic auth credentials for the itil user
}

my$soap=
 SOAP::Lite->proxy('http://
localhost:8080/glide/imp_notification.do?SOAP');

my$method= SOAP::Data->name('insert')->;attr({xmlns
 =>'http://www.service-now.com/'});

# insert into the web
 servicemy@params=( SOAP::Data->name(message =>'problem detected
 for database DB12DG'));push(@params, SOAP::Data->name(source
 =>'DB12DG'));push(@params, SOAP::Data->name(uuid
 =>'HGAF76251HGF2'));

my$result=$soap->call($method=>@params);

print_fault($result);//print any SOAP faults
print_result($result);//print any results

sub print_result
 {my($result)=@_;if($result->body&&$result->body->{'insertRespon
se'}){my
%keyHash=%{$result->body->{'insertResponse'}};foreachmy$k(keys%k
eyHash){print"name=$k   value=$keyHash{$k}\n";}}}

sub print_fault
 {my($result)=@_;if($result->fault){print"faultcode=".$result->f
ault->{'faultcode'}."\n";print"faultstring=".$result->fault->{'f
aultstring'}."\n";print"detail=".$result->fault->{'detail'}."\n"
;}}
```

The following is the result printed by the Perl script on the console.

```
name=display_value   value=INC10011
name=status   value=inserted
name=table   value=incident
name=display_name   value=number
name=sys_id   value=cd45649c0a0a0b2b00e6f27649d6bd2c
```

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The following image shows the resultant row created for the import set table *Notification* (imp_notification).

WS Iset Perl

Created	Set	State	Target record	Message	Severity	Source	UUID	Comment
2009-01-12 15:55:23	ISET10009	Inserted	Incident: INC10011	problem detected for database DB12DG		DB12DG	HGAF76251HGF2	

Troubleshoot import set performance

Review these performance issues to troubleshoot and improve the performance of your import set jobs.

Running business rules during transform

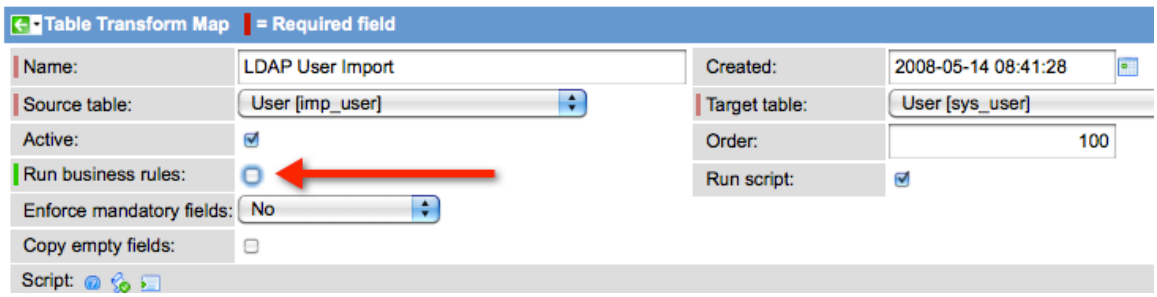
Running business rules during transform may cause the transform to take longer than expected, or cause the instance to slow down.

Becomes an issue: When importing a very large amount of data. For example, importing all data from an old system.

Symptoms:The transform takes much longer than expected. Also, the entire instance may be slow during that time.

How to avoid this: Do not run items like business rules, workflows, approval engines, and so on during a transform unless you want all insert and update business rules, notifications, and workflows to run. For example, when importing all data from an old system, you may not want notifications to run. To disable these items from running and to cease auditing and field normalization within the transform map for that import, deselect the **Run business rules** check box.

Transform Map Checkbox



Note: Consider using an onComplete transform script to run business logic such as calculations at the end of an import rather than on each record as business rules do.

Slow transform scripts

Using multiple GlideRecord queries or large loops may slow down transform scripts.

Becomes an issue: When the transform scripts are using multiple GlideRecord queries or looping through large collections of objects for each row. This issue may appear when the transform script is not efficient. In most cases, script goals can be accomplished using built-in functionality within the Import Set application. For example, you can script case-sensitive coalesce instead of writing scripts that use GlideRecord queries. GlideRecord queries typically slow down the import.

Symptoms: The transform takes much longer than would be expected. Depending on the script, the entire instance may be slow during that time.

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How to avoid this: Use base system functionality whenever possible instead of writing custom scripts and if you do write scripts, avoid writing complicated scripts that use GlideRecord queries.

Importing data that has not changed

Repeatedly importing data that has not changed leads to many skipped rows.

Becomes an issue: When you are importing data from a table that is very large and most of the records are not getting updated on a regular basis.

Symptoms: The import set takes longer than expected. Under **System Import Sets** > **Progress**, expect to see an import with a *Total count* that is very high with a *Skipped count* that is also very high - this is found under the *Messag*e column. Indicating that most of the records imported had not actually changed. These records did not need to be imported.

How to avoid this: If you are running a JDBC import, use the last run datetime option in your import set Data Source. For a type of File import, be sure that whatever is generating your files is only adding data that is new, or has been changed.

Coalescing on non-indexed fields

Coalescing on non-indexed fields with a large amount of data may cause transforms to slow down.

Becomes an issue: When matching on fields that are not indexed, this causes the transform stage of an import to run slowly. However, it only becomes an issue if there is a large enough amount of data. In extreme cases, this causes performance issues with the database due to added load.

Symptoms: Time spent in the transform stage of the import is large relative to the time taken to load the data. Expect to see high transform times.

How to avoid this: If possible, you should coalesce on a field that unique and already indexed. To determine if a field is already indexed, navigate to **System Definition** > **Tables & Columns** and find the table. In the list of columns for that table, an indexed column has a blue icon with an i next to it if indexed. For assistance indexing a field contact ServiceNow Technical Support.

Running imports simultaneously

Running imports simultaneously may cause excessive load on the database.

Becomes an issue: When importing large amounts of data puts an additional load on the database. For example, importing 500,000 users and importing 200,000 configuration items at the same time. This can have a significant performance impact on all queries on the system due to the increased load on the database. This issue is especially severe when two imports are importing to the same table. In such a case, there is a possible contention issue for the table. Additionally, depending on which table is involved in processing, this can severely degrade performance of the import and the instance.

Symptoms: Multiple simultaneous imports running slowly combined with load on the database. You see large numbers of inserts and updates along; and if there is enough load or contention, high IO Wait times.

How to avoid this: Stagger your imports so they do not overlap.

Large import set tables

Failing to clean import set tables may lead to those tables becoming cluttered and slow.

Becomes an issue: When the Import Set Deleter job is not running.

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Symptoms: This is a size issue. If the import sets are not cleaned on a regular basis (a cleanup is recommended after seven days worth of data) the table fills causing imports to stop.

How to avoid this: Verify the Import Set Deleter job is running. If it is not currently running, contact Customer Service and Support as they will truncate all import set tables before enabling this job.

Altering table schema during import

Changing the table schema, such as by importing a new column locks the import set table.

Becomes an issue: Any time a new column is imported, the entire import set table is locked during that schema change and depending on the size of the table, can take between five and ten minutes. During that time, no data can be selected or inserted. If that table is not used often, this may not cause any problems. However, if that table is frequently used, for example the LDAP import table, issues may arise.

Symptoms: The symptoms of this problem may vary. In our example of the LDAP import table, any transactions requiring a query of the LDAP import table will have to wait until the schema change has completed.

How to avoid this: Truncate the import table before importing with a new column.

Importing very large data sets

Importing a very large data set takes longer than importing multiple smaller data sets.

Becomes an issue: When very large data sets are imported in a single job.

Symptoms: The import job takes a long time to complete.

How to avoid this: Break a very large data set into multiple, smaller jobs for faster results. Consider import sets under 100,000 records as a guideline. For example, importing 10 sets of 100,000 records completes faster than one import of 1 million records even though the total data imported is the same.

Large data imports with many reference fields

Importing a high volume of data with many references to resolve might take longer than expected or cause the database to slow down.

Becomes an issue: When using a transform map for high-volume data imports with many reference fields.

Symptoms: The transform takes much longer than expected. While importing, the entire database slows down.

How to avoid this: Use secondary storage to look up references. Secondary storage uses a secondary database for reference resolution. It enables some read queries to be redirected to the secondary database, reducing the load on the primary database.

To enable secondary storage:

- Activate the Secondary Database Pools [com.glide.secondary_db_pools] plugin. For more information, see Request a plugin.
- Confirm that the import_reference_resoultion category in the Secondary Database Categories [sys_db_category] table has been configured and enabled. When you request the plugin, ServiceNow support configures this category for you.

After the plugin is activated and your secondary storage category has been configured and enabled, there will be a **Use Secondary Storage for References** check box on the form to Create a transform map. Use this check box to enable or disable secondary storage.

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When using secondary storage, set the **Choice action** field in the field map to **ignore** or **reject**. Setting the **Choice action** to **create** may cause multiple copies of a record to be created because the reference resolution doesn't detect newly created records immediately. For more information about choice actions, see Create a field map.

A secondary database is always slightly out of date compared to the primary database. If your import requires completely up-to-date data, don't use secondary storage.

Importing from another ServiceNow instance

There are several methods for moving data from one instance to another.

All of these methods assume you need to periodically move a collection of records from a table on one instance to a table on another instance. If you want an action on an individual record to trigger a corresponding action on another instance, consider using a REST web service instead.

Identifying Needed Related Records

All import processes work by fetching data from one table at a time. This process can produce unexpected results if the incoming data references new records in other tables such as users, locations, or companies. To prevent importing broken references to other tables you must identify the connections between your tables and import the common data prior to importing the application data.

For example, prior to importing incident data, you might want to first import related configuration items, users, and locations. Furthermore you might want to import incidents before importing problems or changes that refer to these incident records.

Available Import Processes

The system offers the following processes to move data from one instance to another.

- Export and import XML records directly from lists
- Create XML import sets and transform data as needed
- Export and import CSV files from lists

XML records from lists

You can directly export records as XML from any list or form.

This export process preserves all record field values including system generated field values such as:

- Sys ID
- Creation date
- Update date

The XML import process directly inserts records into the target table. During the import the system:

- Ignores any business rules that normally apply to the table.
- Does not provide any opportunity to transform incoming data.
- Automatically matches a reference field's display value to the local Sys ID for some tables.

This process is good for directly copying records from one system to another but does not remove the need to know the relationships between tables. If you need validate or transform data or reconcile the sys ID values of reference fields, use an XML import set instead.

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Automatic matching of display values

During the import of XML records, the system attempts to match some reference field display values to a local sys_id value.

If the system finds an existing record with a matching display value on the local instance, the import uses the sys_id of the existing record rather than the sys_id of the imported record.

For example, suppose you export an incident record that is assigned to the user John Smith. In the exported XML file there is an entry such as:

```
<incident>
 ...
 <assigned_to display_value="John
 Smith">7712173d2ba80200c5244f74b4da159a</assigned_to>
 ...
</incident>
```

This user already exists on the target instance but has a different sys_id value such as:

```
<sys_user><name>John Smith</name>
 ...
 <sys_id>18cab8de2be80200c5244f74b4da15f7</sys_id>
 ...
</sys_user>
```

Since the display value matches an existing record, the system uses the local instance's existing sys_id value for the reference field such as:

```
<incident>
 ...
 <assigned_to display_value="John
 Smith">18cab8de2be80200c5244f74b4da15f7</assigned_to>
 ...
</incident>
```

The system can match display values for the following tables.

- User [sys_user]
- Group [sys_user_group]
- Role [sys_user_role]
- Group Roles [sys_group_has_role]

Using XML import sets

Use an XML import set to import data from another instance.

This method allows you to:

- Apply business rules
- Transform incoming data
- Reconcile sys_id values if necessary

Note: Administrators cannot set the *update_synch* attribute in Dictionary records to move data as part of update sets. This attribute was being used incorrectly to migrate data in large tables and was causing significant performance problems.

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Create an XML data source to another instance

Data sources are used to create an import set so that data can be processed, if necessary, prior to being mapped onto a production table.

Before you begin

Role required: admin.

About this task

Note: To import using XML with High Security Settings enabled, you must possess elevated privileges.

Procedure

1. Navigate to **All** > **System Import Sets** > **Administration** > **Data Sources**.
2. Click **New**.
3. Complete the form using the following values:

Import set table label	`<import_set_table_label>`
Type	File
Format	XML
Xpath for each row	/xml/`<source_table_name>`
Expand node children	true
File retrieval method	HTTPS
File path	`/<source_table_name>`.do?XML
Server	<instance name>.service-now.com
Port	Port to use to connect to the specified server.
User name	A user account on the remote instance. The username used cannot be an email address.
Password	The password for the same remote account.

4. Click **Submit**.
5. Click **Test Load 20 Records** to create the import set table and to ensure that your data source is functional.

Note: The 20 loaded records can't be transformed and are for testing purposes only.

Create a transform map

A transform map is a set of field maps that determine the relationships between fields in an import set and fields in an existing ServiceNow table, such as Incidents [incident] or Users [sys_user].

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Before you begin
Role required: admin.

About this task
After creating a transform map, you can reuse it to map data from another import set to the same ServiceNow table.

Procedure
1. Open the data source record that you just created.
2. In the **Transforms** related list, click **New**.
3. Populate all the usual fields and be sure to choose the proper **Target table**.
4. Submit the record.

Result
You can view your transform map on the Table Transform Maps [sys_transform_map] table.

Add onBefore scripts to the transform map

Create one onBefore transform map script to copy the sys_id of new records from the source to the target instance. Create a second onBefore transform map script to identify records on the target instance that have the same unique values but different sys_id values.

Before you begin
Role required: admin.

Procedure
1. Open the table transform map record you created.
2. In the **Transform Scripts** related list, click **New**.
3. In the **When** field, select **onBefore**.
4. Enter the following script:

```
if (action == "insert")
 {target.setNewGuidValue(source.u_sys_id); }
```

5. Click **Submit**.
6. In the **Transform Scripts** related list, click **New**.
7. In the **When** field, select **onBefore**.
8. Enter the following **Script**:

```
/**
* This script queries for a uniquely identifying value of the
 referenced record and then
* updates the target reference field with the sys_id of the
 matching target record.
* This sample assumes:
* 1) The target table contains an assigned_to field which is a
 reference field.
* 2) The reference field references the User [sys_user] table.
* 3) You can use the email field to uniquely identify users.
 Alternatively you
*    could use the user_name field.
*/
```

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```
var ref = new GlideRecord("sys_user"); //Replace sys_user with
 any reference table
ref.addQuery("email", source.email); //Replace email with any
 unique field
ref.query();
if(ref.next()){
   target.assigned_to = ref.sys_id; //Replace assigned_to with
 any reference field
}
```

9. Click **Submit**.

Retrieving data from a CSV formatted file

In this method, you import data from another instance using an HTTPS data source to return a CSV formatted file containing the rows to be imported.

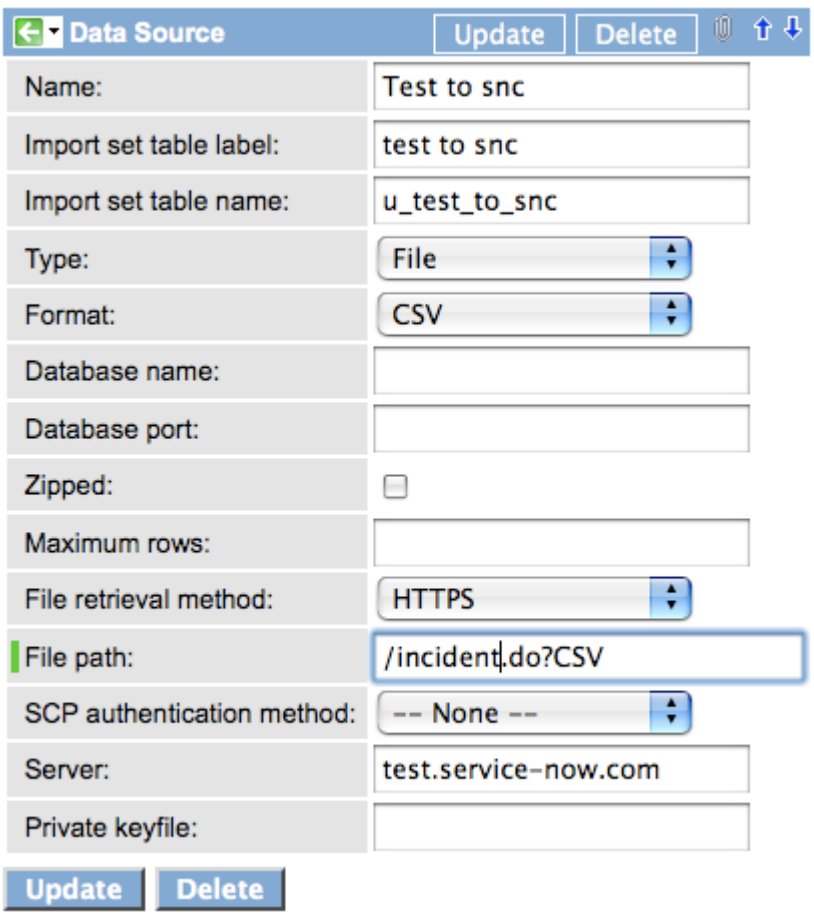
Before you begin

Role required: Admin.

About this task

This approach uses the Import Sets application to retrieve the data from the source and import it to the destination.

HTTPS Data Sources



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Procedure

1. Create a new data source by navigating to **Import Sets** > **Data Sources** on the destination instance.
2. Provide the following field values:
   - **Import set table name**: Select a table.
   - **Type**:File
   - **Format**:CSV
   - **File retrieval method**:HTTPS

     Note:

     If the **Server**, **File path**, **Username**, and **Password** fields are not visible when you select **HTTPS**, change the file retrieval method temporarily to **SCP** and enter this information. Remember to reset the **File retrieval method** to **HTTPS** after you enter these fields.

   - **File path**:incident.do?CSV

     Note: To import specific change records, you can add qualifiers to the path. For example, the following path would return all active change records: `incident.do ? CSV &amp ;sysparm_query =active = true "`

   - **User name** and **Password:** Enter the user name and password for a valid user on the destination instance.
3. Click the **Test load 20 records** related link to verify that the import is configured correctly.
4. After setting up the data source, configure a standard transform map.

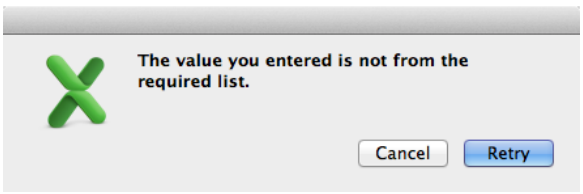
Easy import

Easy import is a simplified import process that enables you to import only the columns you want.

Only admins can use easy import. You can import data to tables within the current scope and tables that grant write access to other applications.

Easy import template validation

Each import template must pass two sets of validation.

Type of validation	Stored in	Results of failing validation
Client-side validation	Import template	The template highlights the invalid cell. 
Server-side validation	Instance	The import pauses and displays an error message.

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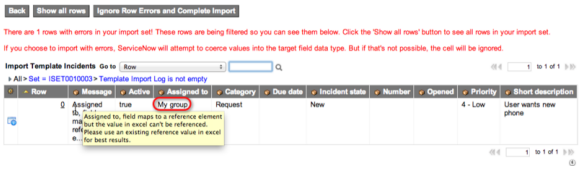
Type of validation	Stored in	Results of failing validation
		

Download an import template

Select the list you want to import data to and create an import template from that list.

Before you begin

Role required: admin.

Procedure

1. Navigate to any list, such as **All** > **Self-Service** > **Incidents**.
2. Right-click the column heading.
3. Select **Import**.

   Note: Make sure columns are updated before importing them.

4. Select if you want to **Insert** or **Update** records.

   Import template

Template	Description
Insert	Use this template to add new records to a table.
Update	Use this template to change values within existing records in a table. This template contains one row for each record in the list. The current list filter determines what records the template contains.

5. **Optional:** Clear the **Include all fields in the template?** check box to include only columns that appear in the list in the template.

   (Optional) Certain fields in the table are updated by system processes, and you cannot import values into them. An example is the **Created by** field, which is populated during import with the logged-in user who performs the import.

   Leave this check box selected to include all columns from the table in the template, even those columns that are hidden in the list.

6. Select the **Export template format** you want, either **XLS** or **XLSX**.
   XLSX is the preferred format, XLS is available for legacy support. The **Export template format** field appears only if the property `glide.legacy.excel.export` is true.
7. Click **Create Excel template**.

What to do next

Open the spreadsheet using your preferred application.

Note: Each template contains a *Directions* tab describing how to use the template.

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Add a record in the template

Add rows to the template to create new records.

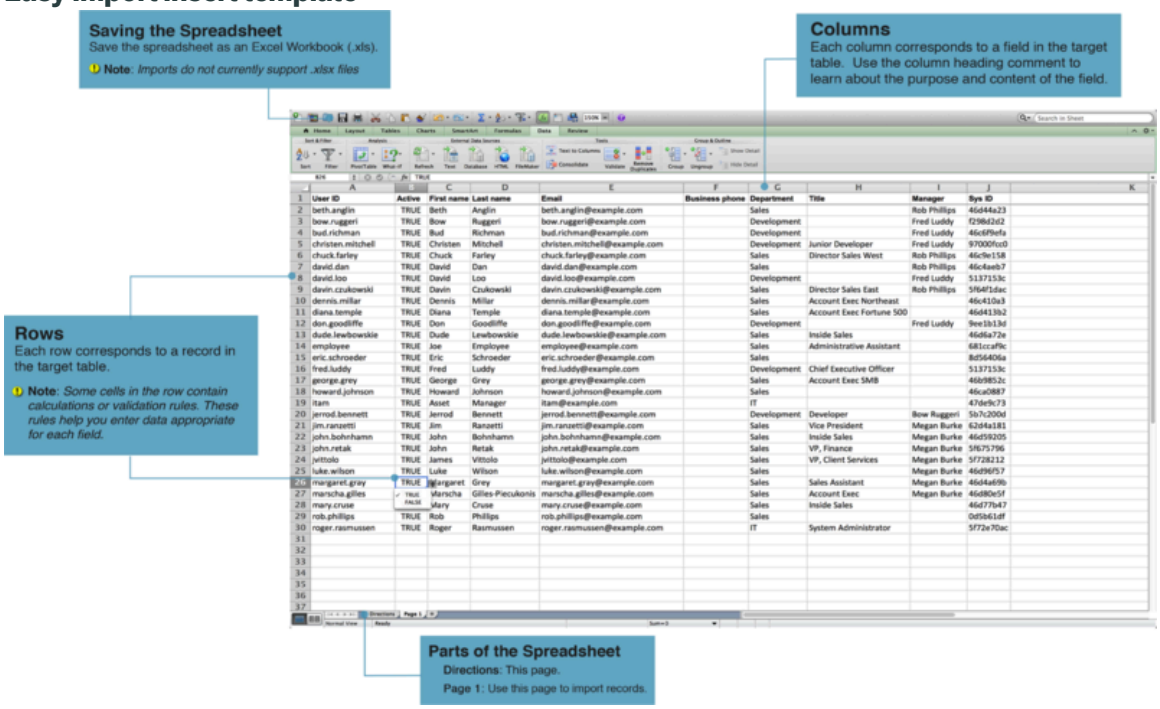
Before you begin

Role required: admin.

Note: The template only imports records on the first page of the template. The import process ignores all other pages.

About this task

Easy import insert template



Procedure

1. Add a row for each record you want to add to the table.
   Each column corresponds to a field in the target table. Use the UI Field administration to learn about the purpose and content of the field.

   The template validates values as you enter them and highlights cells containing invalid data. While you do not have a provide a value for every column, certain fields may fail validation if you do not provide a value.

2. Review any highlighted cell and resolve the issue.
3. When you finish entering new rows, save the spreadsheet as an Excel Workbook.

   The insert templates uses special processing for certain fields:

   - *Created by Field*: The insert template always lists the system administrator user (admin role) in the *Created by* field regardless of whether the import includes a Created by column. Even if you provide a different user value in the template, the import process overwrites this value with the system administrator user.
   - *Blank Values*: Leaving a cell blank in the insert template results in a blank value in the imported record, provided the field supports a blank value. Fields that do not support a blank value will produce a validation error if you provide a blank value.

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Update a record in the template

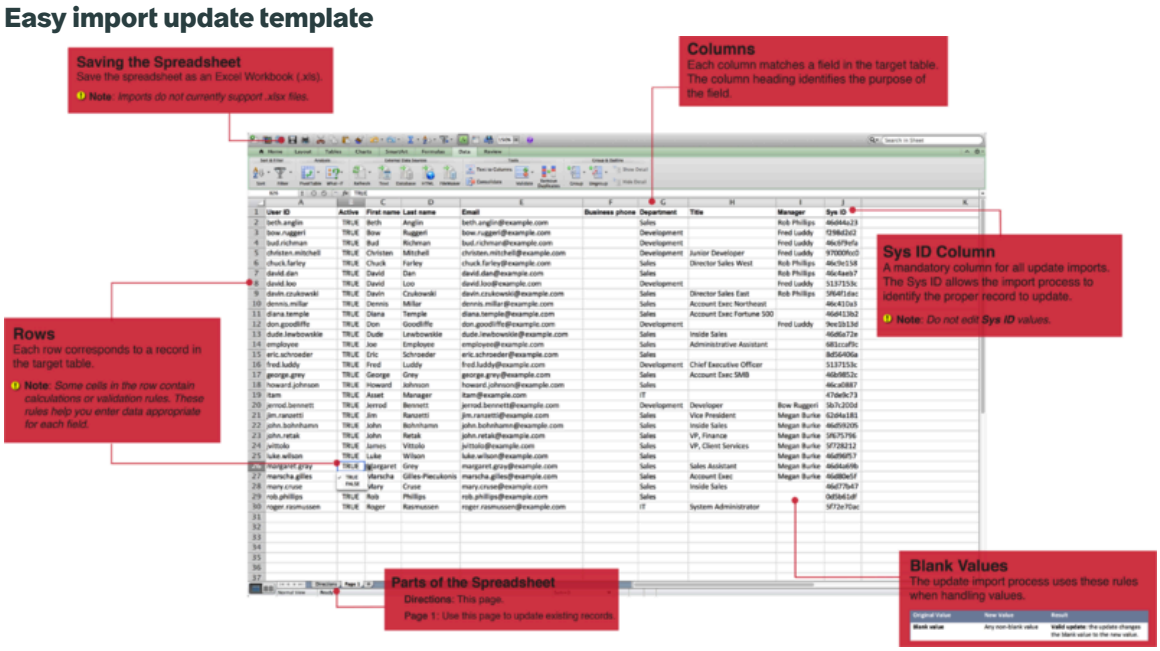
Modify rows in the template to update existing records.

Before you begin

Role required: admin.

Note: The template only imports records on the first page of the template. The import process ignores all other pages.

About this task



Procedure

1. Edit the row for each existing record to be updated and replace existing values with new values.
   Use the UI field hints to learn about the purpose and content of the field.

   The template validates values as you enter them and highlights cells containing invalid data. While you do not have a provide a value for every column, certain fields may fail validation if you do not provide a value.
2. Review any highlighted cell and resolve the issue.
3. When you finish updating existing rows, save the spreadsheet as an Excel Workbook (.xls).

   The insert templates uses special processing for certain fields:

   - *Updated by Field*: The update template always lists the system administrator user (admin role) in the *Updated by* field regardless of whether the import includes an Updated by column. Even if you provide a different user value in the template, the import process overwrites this value with the system administrator user.
   - Blank Values: The update template uses these rules when handling blank values in spreadsheet cells.

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Blank values

Original Value	New Value	Result
Blank value	Any non-blank value	Valid update: the update changes the blank value to the new value.
Any non-blank value	Blank value	Invalid update: the update preserves the existing non-blank value.

Import a record from the template

After updating the import template with new data, import the template to your instance.

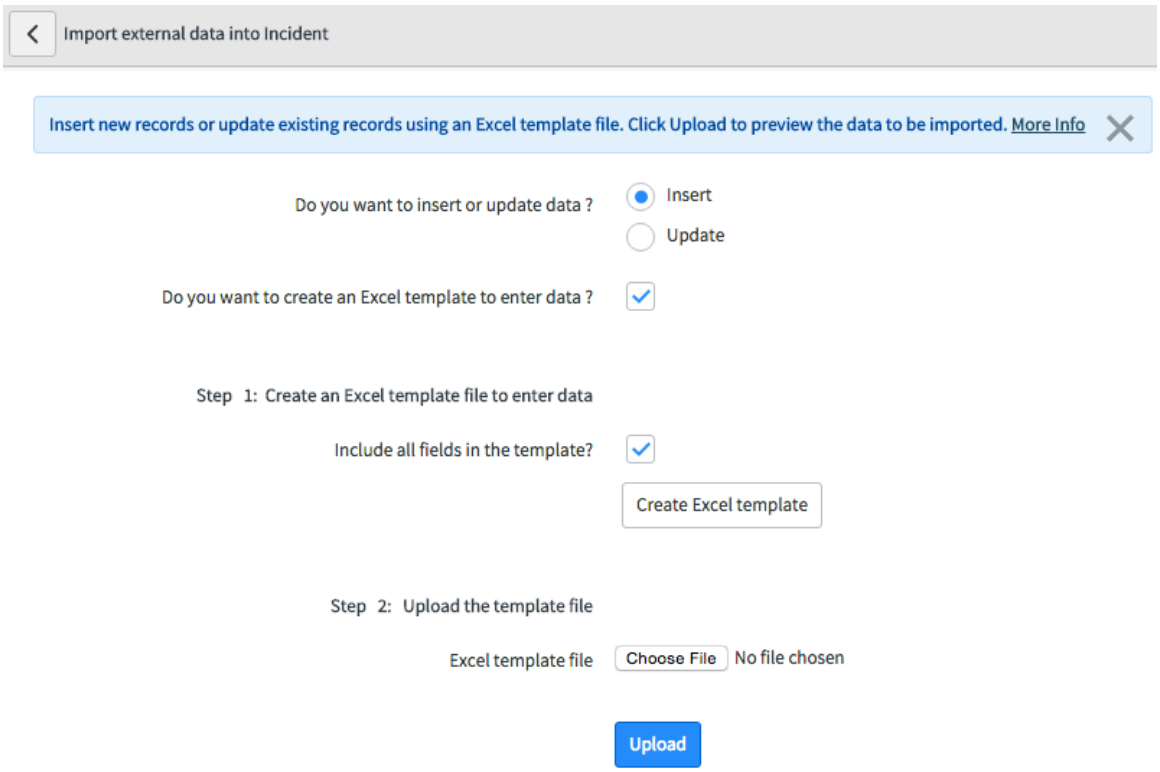
Before you begin

Role required: admin.

Procedure

1. Navigate to the same list you used to download the import template.
2. Perform the appropriate action for the list version.

Action	Version
List v2	Right-click the column heading and select **Import**
List v3	Open the list title menu and select **Import**.



3. From *Insert or update*, select the import type.
4. From *File*, select the import template to import.

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5. Click **Upload and Preview Import Data**.

   ServiceNow validates the template.

   If the template passes validation and the imported preview matches your expectations, click **Complete Import** to import records into the current table. If the template fails validation, review the errors. Click **Ignore Errors and Complete Import** to continue the import by skipping any bad data cells.

Show reference fields as lists in Excel templates

Display selected reference fields as lists in Excel templates to simplify data selection and updates.

Before you begin

When you do an Easy Import and export the data to an Excel spreadsheet, you may want to convert some cells to lists. For example, in the Incident [sys_incident] record, you may want the **Assigned to** field options to appear as a list to enable you to select or update the person assigned to the incident.

Role required: admin

Procedure

1. Navigate to the record for which you want to create lists.
2. Go to the field you want to appear as a list.
3. Right-click the field name and select **Configure Dictionary**.
4. In the **Attributes** field of the Dictionary Entry page, enter the following attribute: `easy_import_ref_as_choice=true`.
5. Save your dictionary entry.
   You can also enter other **Attributes** for the dictionary entry. For example, there is a default limit of 250 entries in a list. If there are more than 250 entry options for a field, the entries do not appear in list format, but as a single entry. Assume that there are 500+ entry options. You can enter the following attribute in the dictionary entry for a field to set a higher limit of 600 entry options for that field: `easy_import_ref_query_limit=600`. The Excel spreadsheet now displays the field as a list of up to 600 options.

   You can set a system-wide limit for the number of entry options at a field by entering a value for the *`glide.easy_import.reference_query_limit`* system property. If the system property is not present or not set and the `easy_import_ref_query_limit` attribute is not set for the field, the default limit of 250 entry options applies. The attribute always takes priority over the property: If both the attribute and the property are set, the attribute value is used.
6. Repeat steps 2-4 for any other fields you want to appear as lists in the Excel output.

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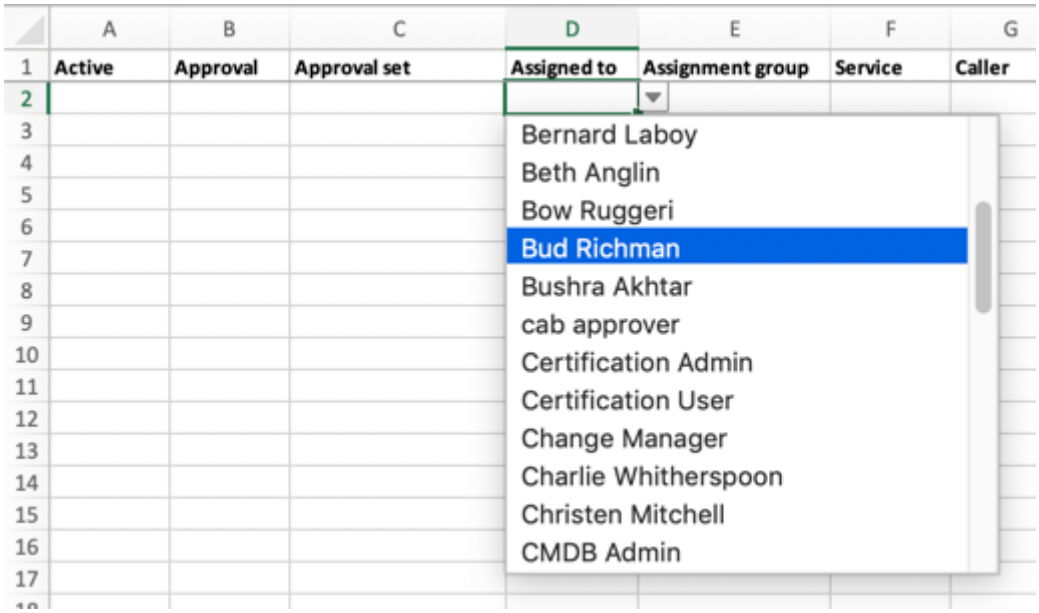
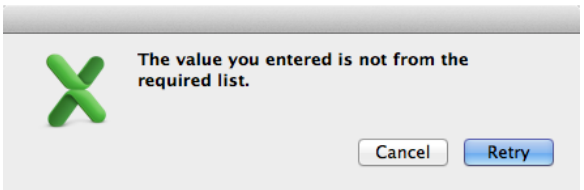
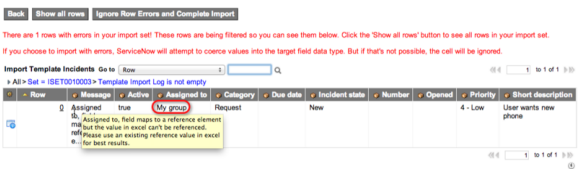
The field appears as a list on the Excel spreadsheet:



Easy import template validation

Each import template must pass two sets of validation.

Template validation

Type of validation	Stored in	Results of failing validation
Client-side validation	Import template	The template highlights the invalid cell. 
Server-side validation	Instance	The import pauses and displays an error message. 

Template data validation

Some cells in the template contain calculations or validation rules. These rules are intended to help you enter data that is appropriate for the field (column).

If you want to paste data from another spreadsheet, use the *Paste Special* command to paste only values or match the existing formatting.

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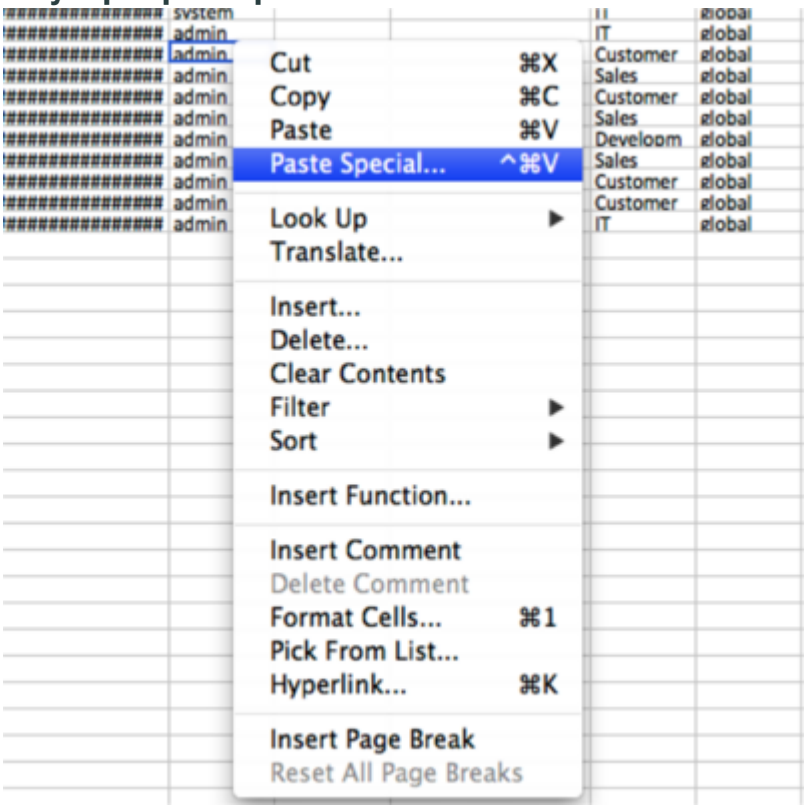
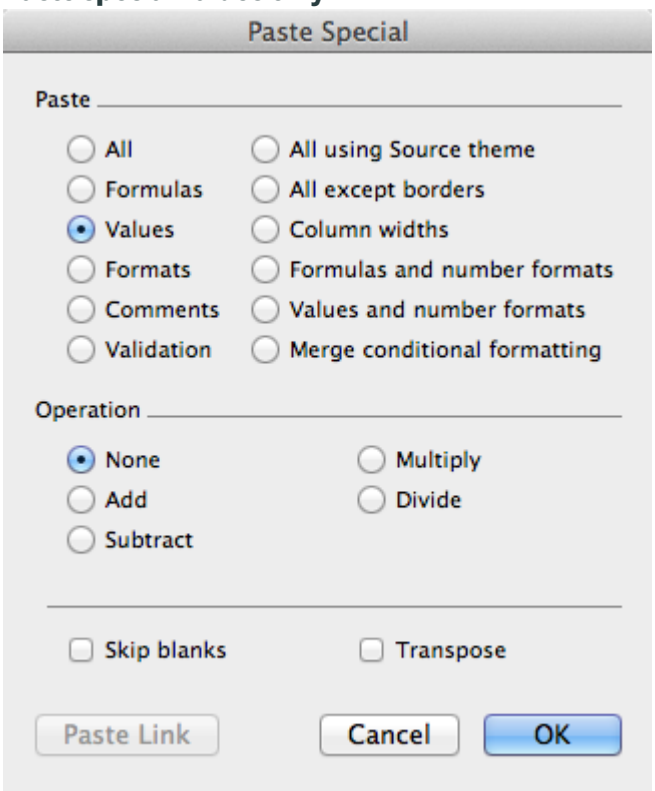
Easy import paste special



Paste special values only



Template type validations

Server-side validation verifies that the import template contains the necessary format.

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Template type validation

Template type	Validation done
Insert template	• Template contains a header row with valid field names. • Template contains one or more data rows. • Template does not contain a sys_id column.
Update template	• Template contains a header row with valid field names. • Template contains one or more data rows. • Template contains a sys_id column to match a row to an existing record.

Data type validations

Both client-side and server-side validation verify that template cells contain data that matches the ServiceNow field type.

Data type validations

ServiceNow field type	Validation done
Choice list	Cell contains a value that matches a choice option from the choice list.
Integer	Cell contains a number without any decimal points.
Reference	Cell contains a value that matches an existing related record. This validation applies only to fields in which the list of possible choices is relatively small and mostly static. It does not apply to fields such as 'Assigned To' in which the list of possible choices is dynamic and large. Validation takes place when the data is inserted into the database, but not in Excel. **Note:** When you enter reference field values in the Excel spreadsheet, enter the display value and not the sys_id of the referenced record. Enter this value the same as you would on a form. For example, for a reference to a user record, enter the username.
True | False	Cell contains a true or false value.

Easy import properties

Several properties control the behavior of easy import.

glide.import_template.row_limit

Controls the maximum number of rows included in an easy import template. By default, if a table contains more than 10,000 records, only the first 10,000 are exported.

- Type: Integer
- Default value: 10,000
- Location: Add a system property

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glide.easy_import.run_business_rules

When true, business rules, workflows, approval engines, auditing, and field normalization apply when easy import inserts or updates data. This functionality is equivalent to setting GlideRecord.setWorkflow() to true or false.

- Type: true | false
- Default value: true
- Location: Add a system property

glide.import_template.field_types_to_ignore

A list of fields that will be ignored when a record is imported with easy import feature.

- Type: String
- Default value: table_name, order_index, collection, user_image, video, timer, translated_field, conditions, field_name, sys_class_name, journal, journal_input, due_date, user_input, image, workflow, template_value, domain_id, documentation_field, user_roles, glide_list
- Location: Add a system property

Exports

Exports enable you to push data from an instance to an external file. To dynamically export data from a script or web service, export data from the URL.

Get started

Explore Learn about export sets concepts and features.	**Configure** Create export sets, definitions, targets, and schedule an export.
Use Learn how to export directly from a URL.	**Reference** Get details about export set properties.

Products

Export sets

Export sets enable you to push data from an instance to an external file.

Export directly from a URL

To dynamically export data from a script or web service, export data from the URL.

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Export sets

Export sets enable you to push data from an instance to an external file.

You can export data to a remote system using a MID Server.

Note: You must use a MID Server from the Geneva release or later. Earlier MID Server releases do not support export sets. Export sets are not supported on MID Servers in a cluster.

Create an export set

Create an export set to export records from your instance to a file on a MID Server.

Before you begin

Role required: export_set_admin

About this task

Note: Export sets do not export attachments to records. To download an attachment, either use the REST Attachment API (HTTP request originates from a third-party HTTP client), or use the outbound REST Message module to send the attachment from the instance (HTTP request originates from the instance).

Procedure

1. Navigate to **All** > **System Export Sets** > **Create Export Set**.
2. Enter a descriptive **Name** for the export set.
3. In the **What to export** section, define what data to export in one of these ways.

Option	Description
Select Yes and select an Export Definition record.	Use this configuration if you have already cre ated an export definition record specifying what data to export.
Select No and select a table to export data from.	Use this configuration if you have not created an export definition record. A new export de finition record is created automatically using the selected table that includes fields from the default list view for that table. You can modify the export definition record as needed after creating the export set.

4. In the **Where to export to** section, define where you want to export data to in one of these ways.

Option	Description
Select Yes and select an Export Target record.	Use this configuration if you have already cre ated an export target record specifying where to export data to.
Select No and select a MID Server, and spec ify a path on the MID Server to save the ex ported data to.	Use this configuration if you have not created an export target record. A new export target record is created automatically for the select ed MID Server and file path. You can modify

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Option	Description
	the export target record as needed after creating the export set.

5. Click **Submit**.

What to do next

After creating the export set, the Export Set form appears. You can configure advanced options from the form such as specifying a data format or scheduling recurring exports.

Export Set form fields

Field	Description
Name	Enter a descriptive name for this export set.
File name	Enter a name for the target file.
Format	Select the format of the target file, such as CSV.
Append timestamp	Select this check box to append the current date and time to the name of the exported file.
Export definition	Select the export definition that specifies the data to export.
Export target	Select the export target that specifies the location you want to export to.

Create an export set from a list

You can quickly create an export set from a list.

Before you begin

Role required: export_set_admin

Procedure

1. Navigate to a list of records.
2. Perform the appropriate action for the list version.

Version	Action
List v2	Right-click the list header and select **Export** > **Export Set**.
List v3	Open the list title menu and click **Export**, and then click **Export Set**.

The Export Set form appears. An export definition is created automatically based on the list.

3. Configure the export set as needed.
4. Click **Submit**.

Create an export definition

Create an export definition to define what data to export in an export set.

Before you begin

Role required: export_set_admin

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About this task
An export definition specifies the data to be exported in an export set. This data includes a table, one or more fields, and optionally a filter to limit the included records.

Procedure
1. Navigate to **All** > **System Export Sets** > **Export Definition**.
2. Click **New**.
3. Enter a descriptive **Name** for the export definition.
4. Select the **Table** to export data from.
5. Select one or more **Fields** from the selected table to export data from.
6. **Optional:** Specify a **Filter** to export only certain records from the selected table. Specifying a filter condition on the Created (sys_created_on) or Updated (sys_updated_on) fields may prevent scheduled data exports from using delta exports functionality. Do not specify filter conditions on these fields if you intend to use scheduled delta exports.

Create an export target

Define where to export data to by creating an export target.

Before you begin
Role required: export_set_admin

About this task
You must use a MID Server as the export destination. For more information on MID Server configuration, see MID Server.

Procedure

Navigate to **All** > **System Export Sets** > **Export Targets** and create a new record (see table for field descriptions).

Export target fields

Field	Description
Name	Enter a descriptive name for the export target.
MID Server	Select the MID Server to export to. The MID Server must have a **Validated** value of **Yes** and a **Status** value of **Up**. **Note:** You must use a MID Server from the Geneva release or later. Earlier MID Server releases do not support export sets. Export sets are not supported on MID Servers in a cluster.
File Path	Specify a path relative to the MID Server directory to save the exported data to. The user account used to run the MID Server must have permission to write to this location.

Related topics
https://msdn.microsoft.com/en-us/library/bb727008.aspx

Export set supported file types

Export sets support multiple file types for exporting and pushing data.

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File types

You can export to these formats:

- CSV
- XML
- Excel
- JSON

Schedule an export

You can schedule an export to regularly push data from an export set to a remote destination. By setting up a recurring, scheduled export you are able to regularly push data to an external location, such as for reporting or for preserving a snapshot of the data.

Before you begin

Role required: export_set_scheduler or export_set_admin

About this task

You can configure scheduled export sets to export only new or changed records using delta exports.

Procedure

1. Navigate to **All** > **System Export Sets** > **Administration** > **Scheduled Exports**.
2. Click **New**.
3. Fill in the following fields.

Schedule Data Export fields

Field	Description
Name	Enter a descriptive name for this scheduled export.
Export set	Select the export set to schedule.
Run as	Select the user to run the scheduled export as. Ensure the user has any roles needed to view the data to export.
Run	Select the frequency for scheduled export.
Day	Select which day of the week or month to run this scheduled export on. This field appears when the **Run** field is set to **Weekly** or **Monthly**
Repeat interval	Enter the number of days and hours to wait before repeating this scheduled export. This field appears when the **Run** field is set to **Periodically**.
Time	Enter the time of day to run the scheduled export.
Delta Exports	
Enable delta exports	Select this check box to enable delta functionality for this scheduled export. When selected, only new or changed records are exported.
Delta on or after	Select **Updated** to export all records that changed since the last export, including new records. Select **Created** to export only new records created after the last export.

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Field	Description
	Note: If the export definition already includes a filter condition on the sys_updated_on or sys_created_on fields, enabling delta exports will prevent you from saving the scheduled data export record. An error appears at the top of the form in this event.
Last export scheduled run	Leave this field blank to export all records from the export definition. When using delta exports, this field is set automatically each time the scheduled export runs. Records updated or created after this date and time are included in the export delta, depending on the **Delta on or after** value.
Scripts	
Conditional	Select this check box to run the schedule only when a condition is met.
Condition	Write the script to be used to evaluate whether the export should run. This field is visible if you select the **Conditional** check box.
Execute pre-export script	Select this check box to run a script before the export begins.
Pre script	Write the script you want to run before the data is exported. This field is visible if you selected the **Execute pre-export script** check box.
Execute post-export script	Select this check box to run a script after the export finishes.
Post script	Write the script you want to run after the export finishes. This field is visible if you selected the **Execute post-export script** check box.
Parallel export	Select this check box to enable parallel exports. See Parallel exports.

4. Click **Submit**.

What to do next

You can click the **Execute Now** button to run the export immediately and confirm the data is exported as expected.

Scheduled export set delta exports

Delta exports include only the records that changed since the last scheduled export.

You can use delta export for regular tables only, such as the task and problem tables.

Important: You cannot use delta export for a database view table, which is a virtual table that joins physical tables.

A database view does not include system fields such as sys_created on, sys_created by and sys_updated on. Because the system date fields are not included in the database view, you cannot use delta exports with database views since there is no way to know when the table was last updated.

Scheduled export set scripting options

When scheduling an export set, you can access certain JavaScript objects.

Use these objects in scheduled export set scripts, such as the **Pre-script** and **Post-script** fields.

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cancel

Set this object to *true* to stop the export action. Any child export sets are also cancelled if the parent is cancelled. This object is available only in the **Pre-script** field.

Example: Use the **Pre-script** field to evaluate the conditions of the export and determine whether to cancel the export process. To cancel the export process, use the following call:

```
cancel = true;
```

export_set

Get the GlideRecord object for the new export set. This variable allows you to query the following columns from the sys_export_set table:

- name
- sys_id
- state
- table_name

This object is available in both the **Pre-script** and **Post-script** fields.

Example: If you want to use information from the export set, you can specify one of the properties of the export_set variable.

```
var x = export_set.sys_id;
```

Export set history

An export set history record is automatically created whenever an export set runs, either scheduled or manually started by a user. Export set history records allow you to monitor and troubleshoot the progress of export sets.

Fields on the Export History form display the current status of the export set. The **Export Log** related list shows a detailed list of changes to the export set status.

Export History form fields

Field	Description
Export set	The export set that was run.
Started	The date and time the export started.
Completed	The date and time the export completed.
Export time	The amount of time it took to export the data, excluding the time it took to transfer the data to the target.
Run time	The amount of time it took to export the data, including the time it took to transfer the data to the target.
State	The current state of the export.
Delta export	The export used delta export functionality if this check box is selected.
ECC queue	The ECC Queue record associated with this export set run. This field is visible only to users with the admin role.

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Export History form fields (continued)

Field	Description
MID Server Attachment	A MID Server attachment record containing a copy of the exported file. The exported file is attached to this record in addition to being saved on the MID Server.

The **State** field may have the following values.

States

State	Description
Exporting	The export set is creating a file with the data to export.
MID Server Processing	The export set successfully created a file with the data to export. The file is being processed by the MID Server.
Completed	The export set successfully ran and sent the exported file to the target.
Completed with errors	The export set ran, but encountered one or more errors.
Cancel requested	A user requested that the export set be cancelled.
Cancelled	The export set was cancelled.

Parallel export history

Export history records include two fields for parallel exports:

- **Parallel Export Set**: References the parent parallel export set record
- **Parallel Export Set Job:** References the specific chunk/job record

For standard exports, these fields remain empty. For parallel exports, multiple export history records are created (one per chunk), and all records share the same Parallel Export Set reference. Each export history record contains one exported file attachment.

To identify the export type:

- Standard export: **Parallel Export Set** field is empty
- Parallel export: **Parallel Export Set** field is populated

Cancel an export set

You can cancel a running export set to stop the data from being sent to a MID server.

Before you begin

Role required: export_set_admin

About this task

You can cancel only exports that have not yet been sent to a MID server. You cannot cancel an export after it reaches the **MID Server Processing** state.

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Procedure

1. Navigate to **All** > **System Export Sets** > **Export Sets**.
2. Select an export set.
3. In the **Export Histories** related list, select a record with the **State** value of **Exporting**.
4. Click **Cancel Export Set**.

Export Set properties

Multiple properties control export set behavior.

Properties

Property	Description
glide.excel.local_based_currency	For Excel files, option to format curr to match the localization of the insta For example, say you've activated t French Canada Translations plugin instance, and you're exporting a cu value of 6300. If this property is set value will be correctly formatted as If this property is set to false, the va formatted as € 6,300. For more information on localizatio Localization Framework. • Type: true | false • Default: false • Location: Add a system property
glide.export.excel.duration.readable_string	For Excel files, option to format dura days, hours, minutes, and sometim When false, duration fields are give For example, the **Actual elapsed ti** might have a value of 191,760 secon When true, duration fields are forma hours, and minutes. For example, th **elapsed time** field mentioned previ have a value of 2 Days, 5 Hours, an In some situations, duration fields i seconds, even when this property i This happens when the duration is one minute, or when the system pro *glide.ui.duration.second* is true.

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Properties (continued)

Property	Description
	• Type: true | false • Default: false • Location: Add a system property
glide.export.xlsx.zip64_mode	For XLSX files, controls the compre When true, XSLX files are generate Zip64 algorithm. • Type: true | false • Default: false • Location: Add a system property
glide.scheduled_export.stop_on_parent_error	When true, if a parent scheduled ex encounters an error, scheduled chi sets don't run. • Type: true | false • Default: false • Location: Add a system property
glide.scheduled_export.min_rows_for_parallel_export	Minimum number of rows required export. The default value is 50000. If an export has fewer rows than thi the system uses standard export pr **Note:** To add this property an the threshold, navigate to **All** > **Properties** > **System Propertie**

Parallel exports

Split outgoing data into multiple export sets and process export sets in parallel to reduce processing time.

Running a parallel export can be helpful when exports take a long time due to large datasets with time-consuming scripts.

Parallel export is most effective for exports with 50,000 or more records. If your export doesn't meet the minimum requirements, the system automatically uses standard export processing.

How parallel exports work

When you enable parallel export, the system splits your data into multiple chunks and processes them concurrently to reduce processing time. The number of chunks depends on your instance node configuration and is calculated as: Number of chunks = (Number of nodes) × (Scale factor). The default scale factor is one, and a minimum of two chunks is required.

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When you run a parallel export, the system creates multiple export sets, up to the value of the *glide.scheduled_export.min_rows_for_parallel_export* system property (default = 10). For example:

- A two-node cluster produces four export sets
- A ten-node cluster produces 10 export sets

Each active node runs two Export Set Processor jobs every minute. These jobs:

1. Poll the Parallel Export Sets Jobs queue
2. Pick export sets from the queue
3. Process the export sets

All jobs run concurrently, depending on the availability of worker threads.

Parallel export record structure

Each parallel export creates a Parallel Export Set record. The form view shows:

- All related export sets
- Parallel export set jobs
- Export histories

Parallel export requires 50,000 rows by default. This threshold enables parallel processing to be used only for large datasets where it provides significant performance benefits.

To customize this threshold, create the system property *glide.scheduled_export.min_rows_for_parallel_export* with an integer value.

When the export runs with parallel export enabled:

- A parallel export set record is created with a PESO prefix (example: PESO010001)
- Multiple parallel export-set job records are created, one per chunk, with a PESJ prefix (example: PESJ0010001, PESJ0010002)
- Multiple export history records are created, one per chunk
- Each export history record contains an exported file attachment

The **Parallel Export Set** and **Parallel Export Set Job** fields on the export history records link back to the parallel export set and individual jobs.

Files from parallel exports are stored on the MID Server in a parallel subfolder: `{MID_Server}/agent/export/parallel/{configured_path}/`. File naming format includes the parallel export set number, export set name, timestamp, and sequential file number: Example: `PES00100001_incident__20251204001638_1.xlsx`. The file number increments for each chunk (_1, _2, _3, and so on).

Export directly from a URL

Dynamically export data from a script or web service by building a URL query.

Before you begin
Role required: None

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Note: ServiceNow enforces basic authentication for direct URL access. The data extracted from the URL contains only the fields to which the currently authenticated user has read access.

About this task

You can use URL queries to generate filtered lists of records programmatically before exporting them. URL queries are useful for scripts that generate a list of records or when no user can manually add the filter from the UI.

You must be familiar with the ServiceNow table and column names to export data directly from the URL. See Navigate to a record or a module using a URL.

You can control whether to export the display value or raw value of fields and the field label or field name for headers using query parameters or system properties.

- For details on using query parameters, see Query parameters for display value and header.
- For details on using system properties, see System properties for display value and header.

Query parameters, if present, override system properties.

Procedure

1. Specify the instance URL.
   For example:

   ```
   https://<instance name>.service-now.com/
   ```

2. Specify the table form or list to export.
   For example:

   ```
   incident_list.do
   ```

3. Specify the export format processor to use for the export.
   You can specify CSV, XLS, JSON, XLSX, or XML. For example:

   ```
   ?CSV
   ```

   Note: The XML processor in a URL export doesn't export attachments or journal fields. To export attachments and journal fields like the **Work Notes** or **Additional Comments** fields, export the records from a list by using the **Export** > **XML** option in the context menu.

4. **Optional:** Query for specific records by adding the *sysparm_query* parameter.
   The required syntax is `sysparm_query=[column name][operator][value]`. For example:

   ```
   https://<instance
    name>.service-now.com/incident_list.do?XML&sysparm_query=prior
   ity=1
   ```

   Note: All queries use a column name, an operator, and a value. See Condition Builder for a list of available operators.

5. **Optional:** Sort the records by column name using the *sysparm_orderby* parameter.
   The required syntax is `sysparm_orderby=[column name]`. For example:

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```
https://<instance
 name>.service-now.com/incident_list.do?XML&sysparm_query=prior
ity=1&sysparm_orderby=assigned_to
```

Note: You can sort by only one column using *sysparm_orderby*. To sort by multiple columns, use multiple orderby entries. For example:

```
sysparm_query=ORDERBYassigned_to^ORDERBYpriority
```

6. **Optional:** Export fields from a specific view using the *sysparm_view* parameter.
   The required syntax is `sysparm_view=[view name]`. For example:

   ```
   https://<instance
    name>.service-now.com/incident.do?CSV&sysparm_view=ess
   ```

   This URL exports incident fields visible from the Self Service (ess) view.

   - By default, exporting data from a list exports only the fields that are visible from the current view. If you want to export fields from another list view, you can switch views from the UI. See View management.
   - If you're exporting CSV or Excel data and don't specify a view, the export uses the default list view.
   - If you're exporting XML data, all fields are exported by default unless you specify a particular view.

7. **Optional:** Export specific fields from the table using the *sysparm_fields* parameter.
   The required syntax is `sysparm_fields=[field1],[field2]`. For example:

   ```
   https://<instance
    name>.service-now.com/incident_list.do?CSV&sysparm_fields=sys_
   id,number
   ```

8. **Optional:** Export all fields from the table, including the sys_id, using the *sysparm_default_export_fields* parameter.
   The required syntax is `sysparm_default_export_fields=all`. For example:

   ```
   https://<instance
    name>.service-now.com/incident_list.do?CSV&sysparm_default_exp
   ort_fields=all
   ```

   The *sysparm_default_export_fields* parameter has no effect on XML exports unless you include the *sysparm_view* parameter to specify a non-default view.

Example: Sample URLs

URL	Description
https://<instance name>.service-now.com/incident_list.do?CSV	Export all incidents to a comma-separated value text file.
https://<instance name>.service-now.com/incident_list.do?CSV&sysparm_query=sys_id%3E%3Db4aedb520a0a0b1001af10e278657d27	Export a particular incident to a comma-separated value text file.
https://<instance name>.service-now.com/incident_list.do?CSV&sysparm_orderby=sys_id	Export all incidents to a comma-separated value text file and sort the list by sys_id.

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URL	Description
https://<instance name>.service-now.com/incident_list.do?XML&sysparm_query=priority=1&sysparm_orderby=assigned_to	Export a list of all priority 1 incidents to an XML file and sort the list by **Assigned to** field.

Call URL export programmatically

Dynamically export data from a script or web service by calling a URL export from any programming language.

Before you begin

Role required: none

About this task

The following procedure includes code samples that demonstrate calling a URL export in C# for a .Net framework call:

Procedure

1. Add the following Imports:

```
using System.Net;
using System.IO;
```

2. Call the Download method:

```
static void Main(string[] args)

    {
        // Call to DownloadFile method supplying the URL and
 location to save CSV file locally
        int read =
 DownloadFile("https://
<instance>.service-now.com/incident_list.do?CSV&sysparm_query=p
riority=1&sysparm_orderby=assigned_to",
                    "c:\\test\\incident.csv");
    }
```

3. Create a Download method as follows:

```
public static int DownloadFile(String url,
                                    String localFilename)
    {
        // Function will return the number of bytes processed
        // to the caller. Initialize to 0 here.
        int bytesProcessed = 0;
        // Assign values to these objects here so that they can
        // be referenced in the finally block
        Stream remoteStream = null;
        Stream localStream = null;
        WebResponse response = null;
        // Use a try/catch/finally block as both the WebRequest
 and Stream
        // classes throw exceptions upon error
        try
        {
```

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```
            // Create a request for the specified remote file
name
            WebRequest request = WebRequest.Create(url);
            // Create the credentials required for Basic
Authentication
            System.Net.ICredentials cred = new
System.Net.NetworkCredential("user_name", "password");
            // Add the credentials to the request
            request.Credentials = cred;
            if (request != null)
            {
                // Send the request to the server and retrieve
the
                // WebResponse object
                response = request.GetResponse();
                if (response != null)
                {
                    // Once the WebResponse object has been
retrieved,
                    // get the stream object associated with
the response's data
                    remoteStream =
response.GetResponseStream();
                    // Create the local file
                    localStream = File.Create(localFilename);
                    // Allocate a 1k buffer
                    byte[] buffer = new byte[1024];
                    int bytesRead;
                    // Simple do/while loop to read from stream
until
                    // no bytes are returned
                    do
                    {
                        // Read data (up to 1k) from the stream
                        bytesRead = remoteStream.Read(buffer,
0, buffer.Length);
                        // Write the data to the local file
                        localStream.Write(buffer, 0,
bytesRead);
                        // Increment total bytes processed
                        bytesProcessed += bytesRead;
                    } while (bytesRead > 0);
                }
            }
        }
        catch (Exception e)
        {
            Console.WriteLine(e.Message);
        }
        finally
        {
            // Close the response and streams objects here
            // to make sure they're closed even if an exception
            // is thrown at some point
            if (response != null) response.Close();
            if (remoteStream != null) remoteStream.Close();
            if (localStream != null) localStream.Close();
```

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```
        }
        // Return total bytes processed to caller.
        return bytesProcessed;
    }
```

Break up a large export

If the number of records to be exported exceeds the actual export limit, you may want to break the export into smaller increments that do not place a significant performance load on the platform.

Before you begin

Role required: none

Procedure

1. Create a filtered list of records that you want to export by following the steps in Export directly from a URL.
2. Write down the number of records returned.
3. If the record number is higher than the defined threshold, issue a *sysparm* query for the first 10,000 records using the following syntax:

   ```
   https://<instance
    name>.service-now.com/syslog_list.do?XML&sysparm_orderby=sys_i
   d&sysparm_record_count=10000
   ```

   This exports the first 10,000 records in order, sorted by the *sys_id* number.

4. Find the next record in order, such as 10,001.
   You can find the next Sys ID value by creating a database view on the table and adding the sys_id column to the view. You don't need to specify a where clause. After you create the database view, view the records and their Sys ID values by selecting **Try it**. You can sort by the sys_id column and enter 10,001 to skip to that row.
5. Right-click the row and copy the sys_id of the next record you want to export.
6. Access the next series of records with a *greater than or equal to* query run against the *sys_id* of record 10,001.

   The following example shows a query that uses a sys_id of b4aedb520a0a0b1001af10e278657d27. Use the syntax shown in this query to export the next set of records.

   ```
   https://<instance
    name>.service-now.com/syslog_list.do?XML&sysparm_query=sys
   _id%3E
   %3Db4aedb520a0a0b1001af10e278657d27&sysparm_orderby=sys_id&sysp
   arm_record_count=10000
   ```

   Note: URL queries use typical percent encoding. In this example, the greater than sign (>) is encoded as %3E and the equal sign (=) is encoded as %3D.

7. **Optional:** Continue issuing this query, using the starting sys_id for the next set of records until you have exported all the necessary records.

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